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The Role of the Problem List in Chronic Pain Management

Author

Rylee, Tina Lynn

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The Role of the Problem List in Chronic Pain Management

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TINA RYLEE, BA

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Approved:

Jill G. Joseph, Ph.D, M.D., M.P.H., Chair

David Copenhaver, M.D., M.P.H.

Christiana Drake, Ph.D

Committee in Charge

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Table of Contents

Abstract

In the United States, roughly a quarter of the population suffers from moderate to severe chronic pain for at least six months out of any given year.[1] Chronic pain develops when gradual changes arise in both neurological and immunological levels, leading to the sensitization of pain receptors. This sensitization allows for pain to arise from modest to minimal stimuli.[2] The Centers for Disease Control and Prevention (CDC) developed chronic pain management guidelines for responsible opioid prescribing in 2016.[3] Although these guidelines are designed to help the provider manage chronic pain, only 56% of patients report satisfaction with their pain level.[4] Further, 18% of patients attending a pain clinic sought emergency care, with 6% experiencing a hospital admission.[5] Chronic pain puts stress on the body, and the prolonged state of stress may lead to endocrine, cardiovascular, and immune sequelae.[6-9]

The complexity of managing chronic pain and the adverse health outcomes associated with opioid therapy has encouraged health care professionals to seek out innovative ways to address pain. Problem lists were developed to improve the provider's awareness of relevant health problems or symptoms and assist in offering appropriate treatment decisions in the setting of various comorbidities.[10] It has been demonstrated that keeping the problem list up to date with the patient's current health problems can improve communication between visits and increase evidence-based treatment for chronic conditions.[11-14] However, there is a paucity of research as it pertains to the practical implications of using the problem list in the clinical practice of pain management.

To better understand the relationship between chronic pain documentation on the problem list and utilization of pain-specialty care, this study aims to answer the following questions: (1) What are the patient characteristics associated with chronic pain documentation on

the problem list? (2) Is documentation of chronic pain on the problem list associated with the utilization of specialty pain care?

The author conducted a historical cohort analysis of electronic health data from a large health network consisting of 37 acute care hospitals and 445 ancillary care sites. The study population included 12,803 adult patients with a chronic pain diagnosis. The patient cohorts were identified based on the presence or lack thereof of chronic pain on the problem list. Patient medical records were collected for one year after the patient's initial visit during the study period. The author used a binomial regression analysis to assess the relationships among chronic pain documentation, patient characteristics, and utilization of pain specialty care.

The study design consisted of two parts. In part 1, the author examined the independent and combined contributions of age, race/ethnicity, gender, type of chronic pain diagnosis, opioid prescription, and insurance status to the documentation of chronic pain on the problem list in patients diagnosed with chronic pain. Findings from these analyses indicate that younger age, female, Black non-Hispanic, having a migraine diagnosis, and use of opioid prescriptions ***w***ere significant predictors of chronic pain documentation on the problem list.

Part 2 of this study examined the association of chronic pain documentation on the problem list to utilization of chronic pain specialty care. A logistic regression explored the association of chronic pain documentation on the problem list and age, gender, race/ethnicity, diagnosis type, insurance status, and opioid prescription on utilization of specialty chronic pain care. The findings from Part 2 of this study indicate that the documentation of chronic pain on the problem list, female, and a diagnosis of other chronic pain were associated with utilization of specialty pain care. Thus, documentation of chronic pain on the problem list should be considered a possible pathway to improve specialty pain care utilization.

Other factors such as primary care provider experience or skill level may influence both the documentation on the problem list and referral for specialty pain care. Therefore, further research is needed to investigate if the association of chronic pain documentation on the problem list is a possible causal link to the utilization of specialty care. As a single location in the electronic health record to enable quick access to essential problems at hand, the problem list is a crucial tool that can assist with the communication of chronic pain from a visit to visit and provider to provider, providing higher quality care through instantaneous alerts and suggestions for patients. The policy implications may also help inform decisions based around value-based care initiatives by suggesting that the problem list may be used as a tool to help communicate about a patient’s pain problem and, therefore, promote early utilization of specialty pain care.

Keywords: chronic pain, ehr documentation, problem list, pain management, pain specialist

Chapter 1

INTRODUCTION

Experts estimate the prevalence of chronic non-cancer pain at approximately 20% in the United States.[15] Over 100 million adults suffer from pain, which costs the United States $560 to $635 billion a year.[16,17] Roughly, a quarter of the population suffers from chronic pain for at least six months with a moderate to severe intensity score.[1] Normally, the frequency of chronic pain increases with a person's age, with 27.6% of people aged 65 to 85 reporting that they currently experience chronic pain.[15] The growing population of individuals over the age of 65 suggests that the prevalence of chronic pain will likely increase.[18]

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue".[19] Chronic pain is pain that continues beyond the normal healing time, often estimated to be three or more months of continuous pain.[19-21] The goal of pain management is to alleviate pain or reduce pain to a level that is acceptable to the patient.[22]

The Centers for Disease Control and Prevention (CDC) established guidelines to facilitate primary care providers in treating chronic pain.[3,23] The guidelines highlight the importance of multi-disciplinary care. The first recommended step is non-pharmacological treatments such as physical or occupational therapy. Providers may pair non-pharmacological therapies with nonopioid medications. When the provider explores these steps and does not sufficiently resolve the symptoms, they may prescribe opioid medications.[3,23] At this current time, the guidelines highlight the importance of diligent tracking of the patient use of opioids with an ongoing estimation of the risks and benefits, and ceasing use of opioids when that balance falls out of favor for the patient.[3,23] Although the guidelines provide a clear step-by-step protocol for providers to follow, 44% of chronic pain patients are not satisfied with their pain management.[4]

Chronic pain has many similarities to chronic stress in that they both impact similar emotional and physiological pathways.[6] Chronic pain impacts the endocrine system[7], cardiovascular system[8], and the immune system[9] in harmful ways to the body. In acute pain, these response systems are more likely to affect the patient by producing tachycardia, increased reparatory rates, weight loss, fever, and death.[24] Chronic pain negatively impacts sleep, cognitive processes, brain function, cardiovascular health, and overall quality of life.[25]

A goal of healthcare is to keep a patient healthy to prevent an unnecessary and potentially costly hospital stay. Preventable emergency department visits are visits that would otherwise be handled in the primary care setting, and these visits are indicative of poor care management.[26,27] Preventable emergency visits are for conditions, which could be treated with appropriate primary care, thereby increasing the efficiency of the health system and decreasing costs.[27] Researchers discovered that around 13.7% to 27.1% of emergency department visits are for conditions that could be treated with primary care or urgent care, saving potentially $4.4 billion annually.[28] Approximately 11% of patients seeking care in the emergency department cite chronic pain as the presenting complaint.[29] Further, a primary reason for using the emergency department for non-urgent needs is the lack of alternative primary care options.[30]

Primary care providers facilitate interdisciplinary pain treatment by providing referrals and recommendations. Optimal healthcare can come to light when a multi-modal approach to care is achieved with seamless transitions between the different disciplines. One study that focused on adolescents and children with chronic pain found an interdisciplinary pain treatment program reduced the number of prescription medicine and hospital visits for up to a year postimplementation of the program.[31] Although there was no reduction in healthcare utilization cost, there was a change in utilization pattern leading to more goal-focused care.[31] For example, there was an increase in utilization of psychotherapy, which is a recommended guideline to manage pain.[31]

The shift towards utilizing multi-disciplinary approaches to address chronic pain encourages the healthcare team to find ways to communicate health problems through the patient care trajectory. The Health Information Technology for Economic and Clinical Health Act (HITECH) was signed into law in 2009, and a significant component of it is the transition to electronic health records (EHR). The goal of this transition was to increase transparency and patient safety by improving communication .[32]

Electronic health records are used as a central place to record and track patient problems, history, treatments, and outcomes.[10] challenges with managing diseases or symptoms have been occurring since well before the electronic version of the medical records existed.[10] Problem lists are lists used to gather any patient information that may be cause for concern.[10] The problem list act as a central source that serves as the basis for a checklist on current health uses to be addressed during care transitions from different disciplines and settings.[33] The problem list is a cue for the patient care team to bring a patient’s current or potential issues to their attention. The list facilitates the diagnosing process as well as improving the likelihood that symptoms and other health problems are attended to as the patient transitions throughout the healthcare system.[10]

The government enacted the HITECH Act, which provides incentives to health care facilities and practices that demonstrate “meaningful use” of the EHR system. There are two stages with the first focused on adopting an EHR and the second on using the data captured for provider and patient use. Furthermore, the Centers for Medicare & Medicaid Services (CMS) recognized the potential of the problem list and made it a required component for the "meaningful use" stages 1 and 2.[34] Nonetheless, problem lists are still not widely used.[12] Problem list completion varies by diagnosis, with completion rates from 60%[12] for diabetes to 36%[35] for obesity; these differences may be due to provider differences or hospital policy differences, which cannot be determined due to lack of research. It has been demonstrated, however, that when a problem list contains patients' diagnoses and problems, evidence-based treatments are more often provided.[11,13,36]

Problem lists are an essential tool that can be used to help facilitate interdisciplinary communication. Problem lists promote a patient's seamless transition between the care teams. Furthermore, automated clinical decision supports rely on problem list entries to provide customized evidenced-based treatment recommendations and warnings for possible drug interactions. Therefore, it is important for research to explore the clinical implications of utilizing problem lists.

SUMMARY OF THE LITERATURE

Section 1: Chronic Pain

Chronic pain is a common health condition that impacts many Americans daily. Treatment for this condition can be as complex as the condition itself. This section will succinctly review the prevalence of chronic pain, differing definitions of chronic pain, pathophysiology of pain, assessing chronic pain, chronic pain management, and consequences for pain management.

Chronic pain prevalence

The prevalence of chronic non-cancer pain in the U.S. ranges from 20%[15] - 43%[16]. Other estimates found that 100 million US adults suffer from pain, and it costs the United States $560 to $635 billion a year.[16,17] Roughly a quarter of the population suffers from chronic pain for at least six months with a moderate to severe intensity score.[1] The most substantial discrepancy in prevalence estimates between studies is their definition of what constitutes chronic pain or when it transitions from acute to chronic. The 2016 National Pain Strategy noted this discrepancy in prevalence rates as a problem, and they recommend more precise estimates using a consistent definition.[37]

The CDC reports chronic pain affects females (20.0%) somewhat more than males (18.0%).[15] However, another study using the National Health Interview Survey database found gender differences varied based on ethnicity and severity of pain, with White non-Hispanic (22%) and Black non-Hispanic (20%) females experiencing more pain than males (White non-Hispanic 16%; Black non-Hispanic 14%), but with all other racial and ethnic groups showing no significant difference between gender.[20] The CDC found White, non-Hispanic racial groups to have the highest chronic pain (21.0%), followed by Black, non-Hispanic (17.8%), Hispanic

(16.7%), and Other non-Hispanic patients (14.4%) after adjusting for differences in age.[15] Furthermore, chronic pain prevalence increased with a person's age, with 33.6% of adults aged 85 and older, 27.6% of adults aged 65-84 years old, 27.8% of adults aged 45-64 years old, 13.2% of adults aged 25-44 years old, and 7.0% of adults aged 18-24 years old experiencing chronic pain defined as limiting life or work activities most or every day in the past six months.[15]

There are several types of chronic pain: joint pain is among the most common pain (16.5%), followed by back or neck pain (15.5%), headache (9.9%), stomach or abdominal pain (7.2%), and chest pain (6.3%) based on a large sample in Sao Paulo, Brazil.[38] Similarly, another large study from the United Kingdom found back pain (16.0%) and arthritis (15.8%) were the most common complaints accounting for a third of all chronic pain patients.[39]

Defining chronic pain

Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage" according to the International Association for the Study of Pain.[19] Although this definition was developed in 1979, it is still widely used in clinical practice and research. Previous researchers attempted to modify the definition of pain to include a more comprehensive description of individuals' perception[40] and existential integrity,[41] but they are used less often.

Generally, providers define chronic pain as any pain that continues beyond the normal healing time.[19] A clear and precise definition of pain is difficult to identify due to the complexity and multifactorial components associated with the pain experience; pain often includes a pathophysiological and neuropathological expression[2,42], often paired with challenging mental and emotional components. The relationship between pain and depression, anxiety, and suicidal thoughts is complex and bidirectional .[43,44] A state of the knowledge paper on pain found individuals who have experienced pain disorders chronically also have an increased level of depression, anxiety, and suicidal thoughts; conversely, patients with severe anxiety and depression (65%) tend to have an increased prevalence of pain problems.[43]

Studies that attempted to quantify pain in more measurable terms provide mixed definitions.[3,15,20,21,45,46] Dahlhamer et al. defined chronic pain as pain that is experienced most or all days for the past six months[15], whereas Pitcher et al. defined it as pain experienced most or all days in the past three months.[21] Nahin defined pain as experiencing pain every day for three months.[20] Pain was further defined as having pain for greater than 30 days over the past three months[45], or simply as pain that lasts beyond the normal healing time or three months.[3]

Table 1: What Qualifies Pain to Be Chronic

Author	**How often**	**Duration**	**Definitions**
Dahlhamer	Most days	6 months	Pain that is experienced most or all days for the past six months
Pitcher	Most days	3 months	Pain experienced most or all days in the past three months
Nahin	Everyday	3 months	Experiencing pain every day for three months
Park	>30 days	3 months	Having pain for greater than 30 days over the past three months

CDC	N/A	3 months	Pain that lasts beyond the normal healing time or three months.

Although providers agree that chronic pain is generally pain that lasts beyond the standard healing time, there is no consistency in how investigators define chronic pain for their study. It appears as most studies arbitrarily chose a time limit between three and six months, and there is no agreement on the amount of pain and how often pain needed to be experienced during that time. The differences in definitions make direct comparisons of most studies very difficult, if not impossible. This is a limitation when studying chronic pain literature as a whole. Defining chronic pain begins by understanding what pain is and when it changes from acute to chronic. The next section will provide a short overview of the pathophysiological aspects of pain.

Pathophysiology of pain

Chapman et al. and Voscopoulos et al. describe the pain experience as a mixture of pathophysiologic and neuropathological mechanisms.[2,42] The authors depict pain beginning as pathophysiologic that can change into neuropathic when it involves neurological structures.[2,42] Lumley et al. indicates that acute pain is usually short-lived and indicates potential tissue damage.[44] Acute pain is when there is a mechanical, thermal, or chemical stimulus that excites a pain receptor called a nociceptor.[2] In other words, there is a physical trigger activating pain receptors.

In contrast, chronic pain is when pain is persistent and lasts beyond the healing process.[42,44] The development of chronic pain occurs when there are gradual changes at the neurological and immunological levels, which lead to altered gene expression and transsynaptic neurodegeneration.[2] In chronic pain, there does not need to be a physical trigger. Essentially, the receptors adapt over time to become excessively sensitive to any or even no stimuli inducing continuous pain. Unfortunately, understanding such cellular changes is not useful in clinical terms. However, scientists have developed pain assessment scales to help patients communicate the intensity of their pain experience with their providers.

Pain assessment tools

The most commonly used pain scales, including the numerical rating scales (NRS) and verbal rating scales (VRS), are generally accepted as reliable and valid (see Table 2; appendix 1 includes examples).[47-49] Validity of these tools was established by comparing each tool against each other.[50,51] For example, one study compared the Visual Analogue Scale (VAS) against the NRS (r = 0.941), then the VAS against the VRS (r = 0.878), and the NRS against the VRS (r = 0.925).[51]

Table 2: Most Common Pain Assessment Scales

Scale name	Description	Reliability/Validity
Numerical Rating Scale[50]	Unidimensional measure. Patient rates their pain along a number continuum, most often presented as a horizontal bar. Numbers 0-10; 0 = No pain and 10 = Worst possible pain	Reliability (r = 0.71-0.94) Validity (r = 0.62-0.91)
Visual Analogue Scales[50]	Unidimensional measure. The scale is a continuous measure consisting of a single 10-cm horizontal line. Patients rate their pain with a	Reliability (r = 0.96-0.95)

	single handwritten mark. The left end means no pain and the right end means the worst pain. Measurement is taken from the left point to where the patient marked and can be reported in cm or mm.	Validity (r > 0.86)
Verbal Rating Scale[51]	It can be multi-dimensional in the description but most often Unidimensional. This measure uses adjectives to describe different levels of pain, and the patient marks next to the adjective that best fits their pain. The lowest pain is noted as “no pain at all,” and the highest is “extremely intense pain.” Four to Six pain levels are described in sentences, including behavioral parameters.	Reliability (ICC = 0.93) Validity (r = 0.88- 0.93)
Faces Pain Scale[52]	Unidimensional measure. The scale consists of seven faces drawn horizontally. The patient points to the face that best represents their pain level. 0-6 are the numerical representations tied to the faces with 0 = no pain and 6 = worst pain possible.	Reliability (Cohens kappa = .93) Validity (r = .73)

Nevertheless, pain assessment issues are more complex than simply the accuracy of patient reporting. Nurse compliance in utilizing the pain assessment tools also limits the possible benefit of these tools. Specifically, a study from 12 hospitals that randomly sampled nurses who cared for patients who were 65 years of age or older with a hip fracture found that pain was assessed only 5.5% of the time every four hours and 26.4% of the time every eight hours; pain location was assessed even less frequently.[53] Similarly, a prospective study in the Netherlands also found that nurses only assessed pain the recommended three times a day 10% of the time and only 40% of the time after treatment was started or adjusted.[54] A small Israeli study found that pain was assessed 84.3% of the time upon admission and 72.7% daily after that; however, the nurses assessed pain only 33% of the time after the medication was provided, as recommended by standard guidelines.[55] Although this study revealed a relatively high level of compliance for pain documentation, it was conducted at a university hospital, which is generally known to provide better care.[56] Additionally, nurses reported they were not using optimal pain assessment practices even if they were aware the practice was desirable.[53] For example, 100% of the nurses reported awareness of the different ways to assess pain and 93.6% believed that assessments were preferred to assess pain intensity. However, only 41.9% of nurses reported always using a pain rating scale; 58.1% reported only using it sometimes.[53] Similarly, there are significant gaps in primary care provider adherence to documenting pain scores.[57] Although most of the published reports focused on nursed documentation, one study found primary care providers documented the presence of pain 73% of the time for chronic pain patients, and they conducted a functional assessment 17% of time.[57]

Although regular pain assessment with specific details, such as location, is not done as often as recommended, a systematic review found that 77% of the reviewed studies reported that nurses and physicians had moderate to good pain assessment accuracy, 13% had very poor or poor pain assessment accuracy, and less than 5% of the studies found providers had excellent pain assessment accuracy.[58] Nurses assessed pain more accurately for chronic than acute pain.[58]

Findings were mixed when it came to the relationship between provider experience and assessment accuracy.[58] Assessment accuracy started low and increased with experience, but after six years, the accuracy started to decline.[58]

Patient reliability in their self-assessment of pain is around 74%.[59] A large barrier confronting clinicians assessing pain is when a patient is non-verbal due to being unconscious or intubated.[60] Visual scales are often used with nonverbal patients, although this is not useful in all situations.[61] In a study focusing on non-verbal patients, nurses reported the challenges in assessing pain include forgetting to assess because it is not integrated into their clinical workflow.[60] Furthermore, there are organizational barriers such as the nurse-to-patient ratio, attitudinal barriers due to lack of support or belief of accuracy of non-verbal pain assessments, and barriers to knowledge such as lack of training.[60] These findings are informative, but methodologic issues limits the ability to generalize from them as this study was a qualitative single-site study of only 20 participants.

Another issue associated with pain assessment is patients underreporting of their pain, which is less obvious than an unresponsive or intubated patient. Specifically, African American patients, patients diagnosed with cancer, and patients of advanced age are known to underreport their symptoms. A cross-sectional survey found that cancer patients underreport pain because of fear of addiction (80%) and inability to pay for medications (76%).[62] The study included over 1000 participants who self-volunteered to complete the survey based on advertisements on a cancer information website. The study did not assess participant socioeconomic status to determine any relationship between it and fear of addiction or the inability to pay.[62]

Furthermore, literature reviews have found older chronic pain patients underreport pain because they believe pain is part of the aging process and should be dealt with silently.[63-65] A meta-analysis of over 33 thermal-cold experimental studies found that African Americans, Asians, and Hispanics had a higher pain sensitivity (i.e. they feel more pain) compared to non-Hispanic Whites.[66] African Americans had a lower pain tolerance (standardized mean difference of temperature, in Celsius, were -0.90) and higher pain ratings (standardized mean difference 0.50) than non-Hispanic Whites.[66] However, a systematic review of 70 articles exploring racial/ethnic disparities in pain management found that African Americans were more likely than whites to underreport their pain when in the company of a physician that appears to have a “higher” status.[67] Moreover, African Americans are less likely to receive an opioid medication or a referral for other treatment for their chronic pain even after controlling for gender, income, and age; whites were 2.67 times more likely than non-Hispanic Whites to use opioids.[67]

Chronic Pain management

Pain management is the alleviation of pain or a reduction of pain to a level that is acceptable to the patient.[22] The goal of pain management for chronic pain patients is to reduce the pain to an acceptable level focusing on improving the patient’s functional state, not the pain intensity.[3] This next section focuses on best practices and barriers to chronic pain management.

Best practices

Chronic pain is complex involving neurological and physiological aspects that often require multi-faceted treatment plans to address and suppress the nerve impulses to achieve pain management. The biopsychosocial systems model is often used to guide chronic pain management; it focuses on both disease and illness, with the illness viewed as the complex interaction of biological, psychological, and social factors.[68]

In order for clinicians to provide the best care, there are evidence-based steps that help providers understand the whole story behind a patient’s chronic pain and the best way to assess and address their pain. To understand the nature of acute or chronic pain a patient is experiencing, the provider will undertake a full assessment using history-taking, physical examination, diagnostic testing, development of a multi-modal plan, and reassessment of the patient's pain regularly.[69-72] The CDC has established guidelines concerning treatments in the form of opioid medications, nonopioid medications, and non-pharmacological treatment modalities for acute and chronic pain.[3,23] Hospitals may create their own pain management strategies, but more often, they follow one of the standardized guidelines.

In 2016, the CDC developed a chronic pain management guideline for opioid use intended for primary care providers who treat adult patients with chronic pain.[3] The guidelines are the most recent attempt to guide the prescribing of opioids. The CDC recommends using non-pharmacologic therapy and nonopioid pharmacologic therapy as the first line of action. Providers should consider opioid therapy once they believe the benefits for improved function and pain outweigh the risks. Treatment goals should be established before the onset of opioid use. If opioid therapy is needed, the CDC recommends the use of immediate-release opioids over the extended-release versions. When used with acute pain, the provider should only prescribe enough immediate-release opioids to last the expected duration of pain. They indicate that three days or less should be sufficient. Additionally, monitoring patients on opioids is critical.

Providers should reassess the patient's pain regularly after starting opioids, within one to four weeks, and determine if the benefits of opioid therapy outweigh the risks at each point. Once the patient is established on opioids, recurring evaluation should take place every three months to assess the usage of opioids. Management strategies to mitigate any risk should be established and reevaluated throughout the course of a patient's opioid use.[3]

Although clear guidelines and best practices are established, opioid prescribing in primary care varies significantly from patient to patient and clinician to clinician.[73] Differences may be attributed to specific barriers affecting pain management on several different levels.

Barriers

Similar to pain assessment, pain management is plagued with multiple issues that prevent optimal success. Scarborough et al. separated the barriers into five groups, including societal attitudes, system and regulatory barriers, clinician barriers, patient barriers, and racial/socioeconomic disparities.[74] In contrast, most the studies that separate barriers into groups describe three significant areas where providers run into challenges with managing pain: patient-related barriers, provider-level barriers, and system-level/structural barriers.[75-77]

The Institute of Medicine (IOM)'s report on "Relieving Pain in America" examined the current state of the science regarding pain almost a decade ago to address the differences between optimal pain treatment and clinical practice.[16] Barriers to pain management fall into three categories including patient-related barriers, provider-related barriers, and structural-related barriers, as described above. Chronic pain management begins with the patient; here are some patient-related barriers to consider. The IOM states that patients may be unable to understand or recognize the importance of managing pain early on.[78] A qualitative study using thematic analysis of interviews discovered that patients' lack of knowledge on the rationale of non-pharmacological pain treatments was a barrier.[78] Further, barriers also include limited or no access to transportation, out of pocket costs, and scheduling, which limits patient's access to treatment.[78]

Provider-related barriers include lack of proper education and training on pain assessment and management.[16] In interviews, providers acknowledged that they did not know what pain management with non-pharmacological methods entails or the rationale behind specific non-pharmacological treatments.[78] Further, provider attitudes and stereotypes regarding chronic pain patients also contribute to disparities in care. [16]

Structural-related barriers are driven by reimbursement policies and laws regarding opioid prescriptions.[16] For instance, health care facilities often have minimal capacity for frequent visits, which is recommended for appropriate pain management.[16] Additionally, providers have limited time with patients to provide a comprehensive assessment.[16] There are not educational materials to empower the patient to take part in their own pain management.[16] Furthermore, patients frequently experience difficulty in accessing specialty care, and when they do, it is often not reimbursed through insurance.[16] The complex nature of chronic pain requires care from interdisciplinary practices. Insurance may not cover many of these types of care, such as physical therapy or acupuncture, nor planning and coordinating care.[16] An overarching barrier is that the magnitude of the pain problem in America is incredibly immense, which makes coordinating and achieving a national effort to address the problem very difficult.[16] Current efforts to manage pain has led to some adverse consequences. The next section will discuss the complications associated with unmanaged pain and overmanaged pain.

Consequences of pain mismanagement

Unmanaged pain

In 2016, 50 million Americans suffered from chronic pain.[15] Another study in 2016 on cancer patients being treated at the Veteran's Administration found that 56% of subjects were satisfied with their pain level.[4] Unfortunately, all other reported statistics on American satisfaction with pain are outdated and estimated or focused specifically on cancer pain.

Chronic pain has sequelae ranging from healthcare utilization to mental health and physiological responses. An interview of patients who attended an emergency department found that 13.7% of patients visited the emergency department in 2004 because of chronic pain.[79] A more recent study (2017) focusing on patients from a pain clinic found that 18% of their emergency visits and 6% of their hospital admissions were due to pain.[5] Furthermore, chronic pain was associated with mental disorders, anxiety disorders, and mood disorders.[38] Chronic pain puts stress on the body.[6] Living in a prolonged state of stress leads to harmful multi-system effects.[80] Chronic pain impacts the endocrine system[7], cardiovascular system[8], and the immune system[9] in ways that are harmful to the body. These response systems affect the patient by producing tachycardia, increased respiratory rates, weight loss, fever, and (in rare cases) death.[24]

When it comes to psychological and social health, unmanaged pain may lead to sleep deprivation, cognitive dysfunction, mood disorder, mental health problems, sexual dysfunction, loss of strength, and overall poor quality of life (QOL).[25,81] Physical, psychological, and social problems associated with unmanaged chronic pain may directly or indirectly lead to higher unplanned admission rates for chronic pain.

Overmanaged pain

Over management of pain can also have serious consequences. In the 1990s, there was a coordinated effort to address patient pain problems.[82] Although experts intended for the effort to be multi-modal, the push for opioids became “unidimensional”.[82] Part of the reason pain treatments focused on addictive opioids was the advocacy from pharmaceutical companies for provider use of synthetic and semi-synthetic opioids, most often sustained-release versions. The pharmaceutical companies reassured providers that the risk of addiction was minimal, often stating the risk was less than 1%.[83] From 1999 to 2010, prescription of opioid drugs quadrupled.[84] This time frame is known as the first wave of the opioid epidemic.[82] The second and third waves that followed are associated with the more recent influx of heroin and fentanyl.[82]

Management of pain through opioids can be useful if carefully monitored and prescribed according to the Centers for Disease (CDC) guidelines for prescribing opioids for chronic pain.[3] Although these recommendations reduced morphine milligram equivalents from 782 to 640 between 2010 and 2015, these values are still three times higher than prescribing practices in 1999.[84] The annual death toll of opioid overdose in the U.S. was 33,100 in 2015 and estimated to be 81,700 in 2025; 80% of these deaths were attributed to illicit drug use.[85] Researchers estimate 87% of illicit drug users to be experiencing chronic pain with over 50% of those users rating their pain as severe.[86] Lastly, 75% of opioid abusers reported that their first use of opioids was through a prescription.[87]

Summary

Chronic Pain affects at least 20% of Americans and costs the United States $560 billion a year.[15,16] Chronic pain is the most prevalent in non-Hispanic Whites, females across all demographics, and in people age 85 and older.[15] Chronic pain is “an unpleasant sensory and emotional experience associated with actual or potential tissue damage”.[19] Clinical definitions of pain are difficult to ascertain due to the complex, multifactorial aspects of pain. Pain is pathophysiologic, neuropathological, and often involves an emotional experience.[2,42] Pain is considered chronic if it happens most of, all of, or more than 30 days over a three-month or six-month period.[3,15,20,21,43-46]

To provide a simple and straightforward way for patients to communicate the intensity of their pain to clinicians, multiple validated pain assessment scales have been developed.

However, nurses and physicians do not assess pain as often as recommended, and the accuracy of provider assessed pain is limited.[53,58]

The goal of chronic pain management is to reduce pain to an acceptable level by assessing regularly, creating a plan, and avoiding opioids unless necessary.[3,22] Estimates of patient satisfaction with their chronic pain management are around 50%.[4,88] Unmanaged pain may put undue stress on the body and lead to physical and psychosocial health problems.[8,9,25,81] Overmanaged pain may lead to opioid addictions and death.[85,87]

Chronic pain management is complex and requires multi-faceted approaches to address it. Guidelines recommend an interdisciplinary approach to address pain. The patient's electronic health record is a crucial tool to use to track the patient record and communicate between care professionals. Utilizing the electronic health record to facilitate the chronic pain management process may be the missing link to providing the patient with tailored, coordinated care.

Section 2: Problem List

Medical health records, whether paper or electronic, are essential in the continuity of care of a patient. The records document in detail a patient's diagnostic test results, diagnoses, previous and upcoming procedures, and any notes relevant to the patient's history.[89] The next section will provide an introduction to the electronic health record (EHR), the Problem List as a tool within the EHR, the association between Problem Lists and better care, implications of these associations between problem lists and better care, and barriers to using the Problem List.

Introduction to EHR

The complexity of managing chronic pain and the associated adverse health outcomes associated with the current management practices encourages health care professionals to look for innovative ways to address pain. Health IT is a possible approach, among many, that has been the subject of limited research at this time.[90]

The Health Information Technology for Economic and Clinical Health Act (HITECH) was signed into law in 2009, and a significant component of it is the transition to the EHR. This transition was to increase transparency and patient safety.[32] Since that time, over 95% of all hospitals participating in CMS EHR incentives have adopted an EHR system.[91] The many benefits of using an EHR include the different tools available within the EHR to help clinicians' workflow.

Problem List as a Tool Within EHR

Before modern technology became available to facilitate provider and patient encounters, Dr. Lawrence Leonard Weed developed the Problem-Oriented Medical Record, intending to gather any patient information that may be a cause for concern onto one list.[10] Weed argued the record should include any established diagnoses or unexplained findings that are not a clear manifestation of a specific diagnosis, such as abnormal physical findings or symptoms.[10] This information was meant to facilitate the providers' diagnosing and treatment decisions by bringing the most relevant problems, whether it is a diagnosis or symptom, to the forefront.[10]

Although the problem-oriented medical record was established in the '60s, it is a fundamental component of today's EHR systems. Placing a healthcare-related issue, symptom, or diagnosis on the Problem List can trigger care management programs as well as allowing a patient's multidisciplinary care team access to necessary healthcare information that may facilitate their care process.[12]

CMS recognized the potential of the Problem List and made it a required component for the HITECH Act in the Meaningful Use stages 1 and 2.[34] The government provides incentives to health care facilities and practices that demonstrate “meaningful use” of the EHR system. In the first stage, the focus was on promoting provider adoption of the EHR by established requirements for electronic data capture of clinical data for the provider and patient use. The second stage meant to encourage providers to use those data to provide a better quality of care for their patients through three main foci: clinical decisions support, patient and family engagement, and continuity of care decision documentation.[34]

Starting in the first stage, one of the objectives was for providers to “maintain an up-to-date Problem List of current and active diagnoses.”[92] Nonetheless, it is still not widely used.[12] Problem List completion varies by diagnosis with completion rates ranging from 54% for heart failure[36] observed in 9 clinics to 36%[14] for obesity from the records of a single hospital; these differences may be due to provider differences or hospital policy differences, which cannot be determined due to lack of details in published reports.

Association between Problem Lists and better care

Generally, three retrospective cohort studies (two studies focusing on primary care clinics and one study utilizing a registry associated with a hospital system), found that patients who have a complete Problem List receive better care[11,13,36] and are more likely to receive follow-up care.[11] Better care, defined as the patient receiving recommended disease-appropriate monitoring or prescribing based on evidence, was more likely for patients if their disease was noted on the Problem List. The next few paragraphs will describe the studies in more detail.

One of the studies focused on nine primary care clinics with 793 patients across Oregon and explored the relationship between documenting heart failure on the Problem List and provider treatment decisions.[36] The study identified 180 patients with a confirmed heart failure diagnosis; of those patients, 54.4% had accurate heart failure documentation on the Problem

List.[36] Although a diagnosis may be reported elsewhere on a patient's record, having the diagnosis of heart failure on the Problem List may allow more efficient and complete care.[10] Heart failure on the patient's Problem List was associated with higher usage of medications demonstrated to benefit patients with systolic dysfunction. Specifically, the providers prescribed a research-supported drug, angiotensin-converting enzyme inhibitor or angiotensin II receptor blocker, to 92% of the patients if heart failure was on the list but only 77% if it was not.[36] Though this study explores an incomplete Problem List's relationship to treatment decisions, it was published in 2005 and has not been repeated or replicated for heart failure patients.

Heart failure is not the only disease studied concerning Problem Lists. Two of the studies, a registry study with 25,742 patients[11] and another study of 12 primary care clinics with 3149 patients[13], focused on chronic kidney disease (CKD). These studies found CKD was accurately documented in the Problem List only 11-16% of the time.[11,13] One of the studies discovered that accurate CKD documentation was more common if the patient was younger, male, and African American.[11] Both studies discovered that failure to document CKD on the Problem List was associated with fewer CKD-specific laboratory results being ordered.[11,13] Furthermore, the group without CKD on the Problem List was statistically less likely to have a nephrology visit than those with Problem List-recorded CKD.[11] Although lack of documentation on the Problem List was associated with less monitoring of the disease via laboratory results and appointments, it was not associated with blood pressure treatment or control,[13] end-stage renal disease,[11] or mortality.[11]

In a pre/post-program implementation and mixed methods study, researchers introduced a standardized intervention/protocol to help providers manage chronic pain.[93] The researchers measured the providers' adherence to the protocol, attitudes towards management of pain, and knowledge of opioid prescriptions.[93] After the intervention, recording of pain on Problem Lists increased by 424%; physicians reported feeling that they had more control of and understanding of managing chronic pain, had more job satisfaction, and self-esteem when it came to managing patient care plans with opioids.[93] Although these findings suggest that using the Problem List as a tool in chronic pain management may be associated with significant advantages, the lack of studies examining the relationship between Problem List use and meaningful outcomes limits the conclusions to be drawn from this study. Although the improvement in chronic pain documentation on the Problem List appears significant, it is essential to consider that providers documented pain 0.46% of the time pre-intervention (123/26,893 records), improving to 2.39% post-intervention (644/26,893 records).[93] There was an improvement, but the overall compliance in documenting chronic pain on the Problem List is still impressively deficient.

Implications of associations

Although evidence indicates there is a relationship between a complete Problem List and chronic disease treatment, this relationship may be confounded by many factors. For example, patients whose medical record includes a Problem List may have providers who are more skilled and attentive to a patient's health problems. Such highly skilled doctors may utilize the Problem List due to better training, which could impact both their capacity to treat and their use of the EHR. Therefore, it is not possible to determine if the better care received by a patient is due to the documentation on the Problem List or the above-average care provided by the clinician.

Another potentially confounding source in assessing the relationship between Problem Lists and better care may relate to the complexity of a patient's current health problems. If the patient has multiple health conditions, it may be more likely for a health condition not to be logged in the Problem List because it was forgotten or lost amongst several competing conditions. However, patients with less complex healthcare problems may have a higher chance that their single condition, or one of a limited few, is documented and addressed due to lacking competing conditions. Therefore, it is difficult to determine if better care is received due to an accurate Problem List or less nuanced healthcare problems.

Barriers to use of a Problem List

Several barriers limit the potential of Problem Lists. First, it is hard to determine ownership of the Problem List, and without established ownership, no one may feel it is their responsibility.[94,95] Often, the primary care providers (PCP) believe specialists should update the list when they diagnose a patient with a problem while the specialist feels it is the PCP's sole responsibility, and it would be intrusive to contribute or modify themselves.[92,94] Further, there are issues regarding how much or how little information to include in a Problem List .[92] For example, providers have argued that only primary diagnoses should belong on the list, and others believe any possible symptoms associated with a health condition should be included.[92] Complete Problem Lists have the potential to improve health outcomes, but cluttered Problem Lists may hinder provider use of the Problem List, effectively rendering it useless.

In an experimental setting[96] with PCP and in an academic hospital setting[95], Problem Lists were more often completed and kept accurately by PCPs compared to specialists.[95,96] According to a cross-sectional survey, PCPs enter more problems in the list with a higher level of detail and granularity than specialists.[95] In a controlled environment where limited artificial patient cases were developed to identify how a provider would capture the patient's current health status, the length and consistency of the patient Problem List were highly variable.[96]

Even though the level of completeness of a Problem List varies between PCPs and specialists, they are similar in the reasons they provided for adding a problem to the list.[95] All physicians typically rank ordered items on the Problem List based on acuity and immediate threat to the patient's health.[96] Lastly, hospital environments also impact the detail level of items added to the Problem List: more detail was logged upon hospitalization, less detail by ambulatory consultations, and least by emergency care units.[95] However, these studies did not control for different types of health conditions, and some of the discrepancies may be due to a difference between disease domains.

Summary

The Problem List, a tool within the EHR, has long been used as a snapshot of ongoing symptoms, findings, and diagnoses. Nonetheless, this required component based on CMS "meaningful use" stages 1 and 2 is not widely used.[12,34] However, research shows that patients with heart failure are more likely to get evidence-based prescriptions when they have their disease documented on the Problem List versus not.[36] Similarly, patients with CKD were more likely to get a follow-up nephrology visit and laboratory tests to track their disease progress.[11,13] Research supports documenting chronic diseases on the Problem List, but limited research explores the impact of documenting a chronic symptom like chronic pain.[93] A single study found physicians felt more confident in managing chronic pain after a training on how to evaluate and document the patient's pain history and treatment plan, which included documenting chronic pain on the Problem List.[93] Consequently, higher confidence in managing pain may be due to the specialized training and not the fact that pain was documented on the Problem List. Unfortunately, the association between accurate or complete Problem Lists and better care may not be a direct relationship. Possible confounding factors may include the provider's skill level or how complex the patient's health condition. Furthermore, several barriers limit the use of Problem Lists. For example, there is no standardization or rules on who should contribute and maintain the Problem List and what type of information beyond a diagnosis goes on the Problem List.[92,94,95]

Gaps in the Literature

This literature review reveals multiple gaps in the literature, which will be summarized in this section. Although there has been significant research on chronic pain in general, there is no consistent definition for providers to follow in identifying chronic pain. Given the range of chronic pain definitions, there is no gold standard definition. This lack of consistency in definitions makes analyzing and comparing differences among studies difficult.

To date, there is limited research exploring the clinical use of the Problem List in the EHR. Only a few of studies explored clinician attitude regarding what goes on and how to use the Problem List.[97-99] Based on the investigator's knowledge, there are only three studies that explored the role of the Problem List in clinical disease management.[11,13,36] The Problem List may help providers by providing clinical alerts that suggest treatment options using evidence-based care research, and it may bring awareness to a collection of diagnoses and symptoms that may be relevant for prescribing or diagnosing. Although the results from these studies suggest the Problem List helps providers care for their patients, three studies are far from sufficient evidence in this area.

While studies demonstrate an association between adding a disease diagnosis on the Problem List (CKD and HF) and better patient care as documented by monitoring the disease through labs, prescribing evidence-based drugs, and booking follow-up appointments [11,13], no study has investigated the relationships between Problem Lists and chronic pain. Dr. Weed recommended that patient health problems, including symptoms, should be included on a Problem List.[10] There is no research exploring the relevance of reporting disease symptoms on the Problem List. Understanding the whole patient story, including possible symptoms that may or may not be related to other diseases, is essential to providing the best care for a patient. Research needs to explore how reporting chronic pain on the Problem List impacts providers perceptions, treatment plans, and outcomes, and determine what are the current rates of reporting chronic pain.

The Present Study

Chronic pain presents as a top reason for a reduction in productive life years for middle age Americans.[100,101] Global rates of chronic pain are continuing to rise.[102,103] As people age, they experience chronic pain with increased frequency.[15] Further, the population of individuals over the age of 65 continues to grow, therefore, increasing the possible number of chronic pain sufferers.[18] The increased burden of chronic pain justifies urgent global leadership to drive quality pain care through optimized service delivery for chronic pain sufferer.[101]

Managing chronic pain can be complex, requiring various management strategies to help the patient. Problem lists were developed with the intent to improve the provider's awareness of relevant health problems or symptoms and assist treatment decisions.[10] It has been demonstrated that keeping the problem list up to date with the patient's current health problems can improve communication between visits and increase evidence-based treatment for chronic conditions.[11-14] However, there is no standardized protocol regarding what health problems belong on the problem list and who is responsible for maintaining the problem list .[98] Unfortunately, documentation of diseases such as diabetes and heart failure are neither completely nor consistently reported on the problem list, with reports ranging from 10%-50%.[11,13,36] Furthermore, there is no research supporting the efficacy of documenting chronic pain, often reported as a symptom and not a primary diagnosis, on the problem list.

The Centers for Medicaid Services (CMS) requires that hospitals keep an updated problem list on all patients.[92] Specifically, they note that this is a crucial part of patient healthcare planning and documentation.[92] Up to date and accurate problem lists can inform multi-disciplinary care teams of relevant patient diagnoses and symptoms for which treatment may impact a patient's healing time or their quality of life. Further, technological tools, for example clinical decision supports, utilize problem lists to reduce medical errors and improve care through an automated alert system that provides recommendations for care based on evidence.[104]

The adoption of an EHR system has the potential to advance healthcare and reduce medical errors if adopted correctly. Often, complex health problems require a multifaceted approach to guide care by leaning on technology to facilitate that process. Furthermore, the problem list is recommended as a tool to bridge the gap between transitions of care, ensuring the patient's problems are not ignored. The findings from this study will have the potential to better describe the association the problem list has with pain management techniques.

To the best of my knowledge, no previous research has examined the relationship between the documentation of chronic pain on the problem list and chronic pain management. The proposed study is a retrospective cohort analysis of patients within a large healthcare network on the west coast of the United States for whom the electronic health record document a diagnosis of chronic pain. For the chronic pain patients, this study will examine the specific patient characteristics that are associated with documentation of chronic pain on the problem list. Further, this study will explore whether the documentation of chronic pain is associated with utilization of specialty pain care. This study will contribute to the body of literature surrounding documentation practices on the problem list and clinical implications. Furthermore, this study will highlight using the problem list as a tool to help with the awareness portion of the chronic pain management process for primary care providers.

Chapter 2:

Characteristics associated with chronic pain documentation on the problem list

ABSTRACT

Chronic pain impacts 20% - 43% of Americans and costs the United States approximately $635 billion annually. Chronic pain is often elusive in terms of a specific diagnosis and complex in its presentation, challenging healthcare providers to develop safe and effective treatment plans. Experts recommend a multi-faceted approach to manage chronic pain. The electronic medical record and related problem list may facilitate the communication and coordination to best support providers. Research has found that patients who have a complete problem list receive better care and are more likely to receive follow-up care. Data was collected from 126 clinic EHRs. This study included 12,803 patients aged 18 years or older with a chronic pain diagnosis within six months before or during the study period. The findings discovered that 46.4% were over 60 years old, 68.3% were females, and 52.1% had chronic pain documented on their problem list**.** Chi-square tests revealed significant differences in demographics between those who did and did not have chronic pain documented on their problem list, with 55.2% of individuals under 60 having chronic pain documented on their problem list, 55.0% of females, 60.3% of Black non-Hispanic, and 64.8% of migraine sufferers. Logistic regression found that age, gender, race/ethnicity, diagnosis type, and opioid prescriptions were significant predictors of chronic pain documentation on the problem list.

Perspective

This article presents patient characteristics that are associated with provider documentation when chronic pain is noted on the patient’s respective problem list. This paper highlights the patient differences that may be associated with different usage of the problem list.

Key words

Patient problem list; chronic pain; EHR documentation; clinical notes; pain management

INTRODUCTION

The World Health Organization no longer considers chronic pain as a symptom of the disease, but rather the disease itself.[105] Chronic pain impacts 20% - 43% of Americans and costs the United States approximately $635 billion annually.[15,16] The condition affects females more than males and White non-Hispanic people more than any other racial group.[15] Chronic pain lasts beyond the typical healing time, which is around three to six months.[15,19,21] Typically, the prevalence of chronic pain increases with a person's age, with 27.6% of people aged 65 to 85 reporting that they currently experience chronic pain.[15] The growing population of individuals over the age of 65 suggests that the prevalence of chronic pain will likely be increasing.[18]

Chronic pain is challenging to manage considering the experience is multi-faceted including not only the pain itself but related emotional and physical disabilities. It is associated with mood disorders, cognitive dysfunction, and a poorer quality of life.[25,38,81] The physical, psychological, and social problems associated with chronic pain require a comprehensive approach to address the multiple dimensions chronic pain impacts.[25,38,81] The Centers for Disease Control recommends that healthcare providers utilize non-pharmacologic therapy first, followed by non-opioid drugs, then opioids, but only when absolutely necessary.[3] Even with clear guidelines, roughly 56% of the population report inadequate pain management.[4]

Adequate care coordination and communication improves the safety and efficiency of patient care, and when applied to chronic pain, may portend similar success.[106] One tool that could improve care communication as it pertains to chronic pain is the patient's problem list in the electronic health record (EHR). The problem list was developed in 1969 to help providers document and communicate about patients' current health problems.[10] Documenting chronic diseases on the problem list, such as chronic kidney disease, was associated with an increased likelihood of having a follow-up nephrology visit and more disease-specific laboratory results being ordered.[11,13] Similarly, documenting heart failure on the problem list was associated with providers prescribing medications known to benefit patients with systolic dysfunction.[36] However, documentation on the problem list varies from 16% for Chronic Kidney Disease[13] to 54.4% for Heart Failure.[36]

Incomplete information within the EHR and specifically the problem list may lead to inadequate communication surrounding the patient's care. When chronic pain is omitted from the problem list, several concerns manifest, such as insufficient treatment, reduced provider awareness, and obstacles to attaining appropriate clinical decision support. Based on the authors' knowledge, there are no other studies that have explored the role of the Problem List in clinical disease management.[11,13,36]. Studies on the topic of chronic pain have explored clinician attitude regarding what goes on the Problem List.[97-99] Therefore, it is important to better understand the factors associate with use versus non-use of the problem list in patients with documented chronic pain. This study aims to determine what factors among patients with chronic pain predict chronic pain documentation on their problem list specifically in the primary care setting.

METHODS

Sample and Data Source

The authors collected data for this cross-sectional study from an expansive western hospital system's EHR. The health system had 37 acute care hospitals and 445 ancillary care sites, which include neighborhood hospitals, urgent care, surgery, imaging centers, home health, and primary care clinics, at the time of this data extraction. All network practices utilize the same EHR, Cerner. The Cerner problem list is coded using Snowmed Clinical Terms. Physicians or nurses can easily add to the problem list by selecting a standardized entry through a drop-down list or by searching the term. There are no automated alerts or clinical decision supports that utilize the problem list entries related to chronic pain in this institution.

The study population included 12,803 patients aged 18 years or older with a chronic pain diagnosis within six months before or during the study period and who had a patient visit to their primary care provider between the study period of January 01, 2017, and December 31, 2019. The goal of this study is to study primary care pain management for the average chronic pain sufferer. As such, comfort care patients were excluded because their goal for pain management is different and is conducted with less concern about future addictions or complications associated with treatments. Patients with cancer, a surgery within three months of the study period, burns over 10% of their body, and pregnancy may receive pain management similar to other chronic pain patients. That said, the referral for a pain specialist may not come from the primary care provider but other specialists in the circle of care. Therefore, the authors excluded these patients from the study.

The authors extracted patient records if they had a diagnosis of chronic pain. Chronic pain was defined by having at least one noted diagnosis of chronic pain in the EHR and documented during the study duration: January 01, 2017, to December 31, 2019. The included chronic pain diagnosis and ICD-10 codes are listed in table 1. The authors compiled the list of chronic pain diagnoses from six different chronic pain studies using EHRs.[90,93,107-110] To ensure comparability with prior chronic pain research, this study included diagnoses utilized in two or more studies. Although chronic pain may consist of many more diagnoses than these alone, it is difficult to determine if an encounter is due to a different symptom or issue with the disease and not chronic pain itself. Since this study's objective is to focus on chronic pain patients, we did not include encounters that did not specifically indicate chronic pain as a diagnosis.

Measures

For this study, the outcome of interest is chronic pain documentation on the problem list(yes/no). A search of the problem lists using the terms “chronic” and “pain” or “migraine” helped identify qualifying chronic pain problems. The problem list entries that qualified as a chronic pain problem is located in table 3.

The authors extracted demographic information from the EHR and recoded it for use as covariates. Variables included race and ethnicity (White non-Hispanic*, Black non-Hispanic, Hispanic of any race, and other), sex (*male, female), age (*less than 60, greater than or equal to 60), insurance (*publicly funded or privately funded) opioid prescriptions (*current prescription, none), and their qualifying chronic pain diagnosis (*other chronic pain, migraine, and chronic pain syndrome). The authors separated age into a categorical variable based on research indicating that chronic pain sufferers age 60 and older reported longer stretches of pain, more comorbidities, and received pain treatments more often.[111,112] Chronic pain diagnosis is the pain diagnosis that qualified the patient for the study. Due to a limited number of patients diagnosed with one of the three chronic pain diagnoses, the authors combined them into one “other” value (chronic pain due to trauma, chronic post-thoracotomy pain, and other postoperative pain). Variables dropped from the study due to a scarcity of values included substance abuse (current, past, none) and comorbidities (sleep disturbances, depression, anxiety). Those marked with asterisks indicate which ones were used as the reference category for regression analysis.

Statistical Analysis

All data were analyzed with SAS University Edition® and Microsoft Excel. We first identified the patients who had chronic pain documented on their problem list (see table 1). Then, we measured the proportion of patients who had chronic pain documented on their EHR problem list. Next, the authors used descriptive statistics to describe the included patients with respect to age, gender, race/ethnicity, insurance status, opioid prescription, and chronic pain diagnosis. Age was also described by its mean and standard deviation. The author described the categorical variables by percentages and ranges and compared the variables by chronic pain documentation on the problem list using the Chi^2 test.

Clinics serving as the site of care were grouped based on their location. The 22 clinic groups consisted of 126 hospitals grouped based on their nearest reporting hospital within the healthcare system.

To assess associations of potential confounders of the relationship between problem list documentation, the authors fit a logistic regression model, with chronic pain documentation on the problem list as the outcome, including the following covariates: age, sex, race, insurance, and opioid prescription and controlling for clinic groups. The authors adjusted for clinic groups in the adjusted model. The authors conducted each analysis independently; then, they conducted an analysis accounting for clinic groups. A backward selection procedure resulted in the elimination of insurance from the final model. All unadjusted and adjusted estimates are presented. The institution's Institutional Review Board approved this study.

RESULTS

A total of 13,678 patients had a qualifying chronic pain diagnosis between 2017 and 2019 after the exclusion criteria were applied. As shown in Table 2, the average age was 56.9 (SD=15.8 Range?), 46.4% were over the age of 60-years-old, 68.3% were females, and 52.1% had chronic pain documented on their problem list. Table 3 provides a summary of the type of problems reported on the problem list. White non-Hispanics (60.3%; n=8,244), followed by Hispanics (19.5%; n=2,663), Other (15.3%; n=2,089), and Black non-Hispanics (5.0%; n=682).

Chi-square tests revealed significant differences in demographics between those who did and did not have chronic pain documented on their problem list, with 55.2% of individuals under 60 having chronic pain documented on their problem list compared to individuals 60 and older ($p < 0.001$). Females had chronic pain documented on their problem list more than males (55.0% vs 45.0%; $p < 0.001$) and Black non-Hispanic (60.3%; $p < 0.001$) more than White non-Hispanic (50.9%), Hispanic (54.9%) and Other racial groups (50.8%). Migraine sufferers more often had chronic pain documented on their problem list (64.8%; $p < 0.001$) compared to other chronic pain (49.4%) and chronic pain syndrome suffers (43.0%). The proportion of patients who had a diagnosis of chronic pain on their problem list was highest for those with private insurance (56.1% vs. 47.7%; $p < 0.001$), those who had a follow-up with a pain specialist (86.3% vs. 50.5%; $p < 0.001$), and those without an opioid prescription (52.8% vs. 32.7%; $p < 0.001$) (Table 2).

The logistic regression analysis adjusting for the clinic groups, demographics, diagnosis, and opioid prescriptions revealed that individuals over the age of 60 years old had decreased odds of having chronic pain documented on their problem list (OR 0.8; 95% CI 0.8 – 0.9) while Females had increased odds (OR 1.4; 95% CI 1.3 – 1.5) of having chronic pain documented on their problem list (Table 3). After controlling for the clinic groups, demographics, diagnosis, and opioid prescriptions, the logistic regression revealed that Black non-Hispanics had increased odds of having chronic pain documented on the problem list compared to White non-Hispanics (OR 1.3; 95% CI 10.8 – 1.6) and the other racial group had decreased odds of having chronic pain documented on the problem list (OR 0.9; 95% CI 0.8 – 1.0). Finally, having an opioid prescription was associated with having decreased odds of having chronic pain documented on the problem list when controlling for clinic clusters and controlling for demographics and diagnosis type (0.5; 95% CI 0.4 – 0.7).

DISCUSSION

The purpose of this analysis was to identify characteristics associated with the documentation of chronic pain on the problem list. Although there is no existing research looking at chronic pain documentation on problem lists, an intervention study did explore provider training on managing chronic pain and measured the impact training had on various measures included documentation of chronic pain in the problem list.[93] In contrast to our findings, the study found that chronic pain was documented on the problem list only 0.5% of the time pre-training and 2.4% post-training.[93] Similarly, chronic kidney disease and obesity were also reported at lower rates (11% to 36%) than chronic pain in our study.[11,13,14] The sample for this study included patients who had a chronic pain diagnosis present on their medical records between 2017 and 2019. Interestingly, our findings showed similar problem list completion rates for heart failure, 54.5%.[36]

This sample showed that over half the chronic pain patients eligible for our study were under the age of 60 years old. Patients under the age of 60 had a higher likelihood of having chronic pain documented on the problem list. This may be due to several factors, including that the younger patient has a problem more typically impacting older individuals. Therefore, it may be more likely that a symptom or diagnosis of chronic pain stands out to the provider when a patient is younger, and consequently, they are more likely to document it on their problem list. Since patients are required to have a diagnosis of chronic pain on their medical record, there is not a lack of provider knowledge of the diagnosis. However, it is still possible that younger patients may receive more attention during the documentation process purely because it is more unusual for them to experience chronic pain.

Literature has shown that females suffer from chronic pain more than males.[15] In our sample of chronic pain patients, more females had a documented diagnosis of chronic pain. When exploring the differences between patients who had chronic pain documented on their problem list to those who do not, chronic pain was more likely to be reported on the problem list for females than males, an association that remained after adjusting for all covariates. Because research indicates that females are more likely to experience pain, providers may utilize this information and provide exceptional attention to females to address their chronic pain. Providers may pay more attention towards and tend to women's pain than to men. Therefore, there is a greater chance of the problem ending up on the problem list. Another possibility is that females are more likely to seek out pain treatments compared to their male counterparts.[113] The request for treatment options may be the added step that increases the likelihood that chronic pain is documented on the problem list.

The study's findings on racial differences reflect similarities with prior research[15]; there were more White non-Hispanics with documented chronic pain than other racial groups. Historically, different racial and ethnic groups have received different quality and quantity of care leading to disparities in health status.[114] The push to address pain problems in the 1990s and the advocacy for the use of synthetic and semi-synthetic opioids lead to an opioid epidemic.[82] However, the racial differences in prescribing practices led to an increase in opioid mortality among white but not black people.[115] Researchers attribute this difference due to the difference in care.[116] However, this study is the antithesis of this research. When looking at the differences in racial groups compared to the documentation of chronic pain on the problem list, we identified

Black non-Hispanics as having the highest documentation, results which persisted after controlling for all covariates. However, documentation is only one part of the puzzle, and this study does not explore if these differences actually impact the quality of care a racial group receives.

Out of the three primary chronic pain diagnoses, migraine was the highest diagnosis. Patients diagnosed with migraines were more likely to have chronic pain documented on their problem list. There exist vast amounts of literature documenting the best evidence-supported treatment for migraines.[117-119] However, there is not as much clarity when it comes to Chronic Pain Syndrome nor unclassified chronic pain documented as “other” in this study.[120] The standard guidelines for migraine treatment process may encourage providers to document migraine on the problem list more frequently rather than a diagnosis with less clear treatment options.

Patients with private health insurance, with a follow-up with a pain specialist, and those without an opioid prescription were more likely to have chronic pain documented on their problem list. Variation in the reimbursement rates for the different types of treatments of a chronic pain between private and publicly funded health insurance may influence whether a patient’s chronic pain is documented on the problem list.[121,122] If the providers have the motivation to document chronic pain due to reimbursement mechanisms, it may alter how complete the problem list is for chronic pain.

Understanding the role of opioids in the documentation of chronic pain is more challenging. First, we found that few patients were prescribed opioids in this population. This makes sense considering the push by the Centers for Disease Control and Prevention and the government to decrease opioid prescriptions generally.[3,84] Another possibility is that patients with an opioid medication may experience better pain management and therefore do not bring up their pain as often, leading to less provider awareness and documentation. However, having an opioid prescription should bring more attention to the problem, leading to chronic pain documentation on the problem list, arguing against that possible explanation.

This study was limited because there were no clinical data on pain severity, pain location, or functional assessments. Guidelines have highlighted the importance of collecting essential pain characteristics such as severity, location, duration, and likely causes.[123,124] Documenting these factors and other characteristics of the presenting pain is critical in developing coordinated care that can be tracked and assessed over time.[123] Most patients had a very generalized diagnosis of "other chronic pain." The study included ten different chronic pain diagnosis types; five patients were diagnosed with in three of the categories, but the remaining patients were diagnosed in one of three main groups. This highlights a gap in the documenting of different types of chronic pain. The lack of clarity of the type or location of chronic pain may reflect the attention put into the diagnosis treatment.

Another limitation of this study is the lack of information regarding psychosocial factors such as socio-economic status and substance abuse. These factors may play a role in whether providers document chronic pain on the problem list, but we could not measure or control for these factors. Furthermore, this study is limited because it uses a single hospital system that shares similar chronic pain management policies. The similarities in pain management and use of the same type of EHR system may limit comparisons to other hospital systems with other pain management policies and different EHR systems, which may have very different places and ways in which it asks for pain or adds pain to the Problem List.

To reduce any possible confounding associated with various diseases, our study narrowly focused on specific chronic pain diagnoses that the primary characteristic was pain. There are several diseases and health conditions that are associated with chronic pain, but these were not included in the study. Therefore, the findings are limited in explaining documentation practices of other diseases that are known to cause chronic pain.

Given that The Centers for Medicaid Services has required the use of problem lists stating it as an important part of patient care planning and documenation[92], it is vital that research highlights ways to improve completeness of problem list documentation. To date, this was the first study that looked at which patients' characteristics are associated with chronic pain documentation in the problem list. A strength of this study is that it was conducted in a large healthcare system allowing a large enough sample size across several clinics reducing possible clinic to clinic differences. These findings may help inform providers on which patients may have less complete problem lists. Further research is needed to explore other problems on the problem list and whether the documentation of these problems impact treatment or patient outcomes.

Table 1: Chronic pain codes

ICD-9	ICD-10	Description
338.29	G89.21	Other chronic pain
338.21	G89.22	Chronic pain due to trauma
338.22	G89.28	Chronic post-thoracotomy pain
338.28	G89.29	Other chronic postoperative pain
338.4	G89.4	Chronic pain syndrome
346.0	G43.109	Migraine with aura
346.7	G43.709	Chronic migraine without aura, not intractable, without status migrainosus
346.7	G43.719	Chronic migraine without aura, intractable without status migrainosus
346.7	G43.701	Chronic migraine without aura, not intractable, with status migrainosus
346.7	G43.711	Chronic migraine without aura, intractable with status migrainosus

ICD-10	Description
G89.21	Other chronic pain

Table 2: Chronic pain patient characteristics

Study Variables	Total Sample (n = 13,678) M(SD) or %	Chronic Pain Not on Problem List (n = 6,549) %	Chronic Pain on Problem List (n = 7,129) %	χ2
Age	56.88 (15.79)			57.03***
Under 60 years old	53.64%	44.85%	55.15%	
Over 60 years old	46.36%	51.38%	48.62	
Gender				96.77***
Female	68.31%	45.02%	54.98%	
Male	31.69%	54.05%	45.95%	
Race/Ethnicity				32.57***
White Non-Hispanic	60.27%	49.10%	50.90%	
Black Non-Hispanic	4.99%	39.74%	60.26%	
Hispanic	19.47%	45.14%	54.86%	
Other	15.27%	49.21%	50.79%	
Diagnosis				309.83***
Other chronic pain	60.25%	50.64%	49.36%	
Migraine	24.23%	35.18%	64.82%	
Chronic pain syndrome	15.52%	56.99%	43.01%	
Insurance				98.13***

Private	52.79%	43.88%	56.12%	
Subsidized	47.21%	52.35%	47.65%	
Follow-up with pain specialist				303.86***
Yes	4.53%	13.71%	86.29%	
No	95.47%	49.50%	50.50%	
Opioid prescription				77.18***
Yes	3.58%	67.35%	32.65%	
No	96.42%	47.16%	52.84%	
Pain documented on Problem List	52.12%	-	-	

Note. M = mean; SD = standard deviation; $\chi2$ = Chi square test; *p < 0.05, **p < 0.01, ***p<0.001

Table 3: Type of problem on the problem list

Abdominal pain	0.60%
Adenolymphoma	0.03%
Back pain	11.21%
Chronic pain	57.63%
Injury	0.07%
Limb pain	0.06%
Migraine	30.35%
Neuropathic pain	0.01%
Postoperative	0.04%

N=7156

Table 4: Logistic regression predicting documentation of chronic pain on the problem list

	Unadjusted		Adjusted	
Variables	Odds Ratio	95% CI	Odds Ratio	95% CI
Age				
Under 60 years old	Ref	Ref	Ref	Ref
Over 60 years old	0.77***	0.72 - 0.82	0.83***	0.77 - 0.91
Gender				
Male	Ref	Ref	Ref	Ref
Female	1.44***	1.34 - 1.54	1.37***	1.25 - 1.49
Race/Ethnicity				
White non-Hispanic	Ref	Ref	Ref	Ref
Black non-Hispanic	1.46***	1.25 - 1.72	1.31**	1.08 - 1.57
Hispanic	1.17**	1.07 - 1.28	0.98	0.88 - 1.10
Other	1	0.91 - 1.10	0.86*	0.77 - 0.97
Diagnosis				
Chronic pain syndrome	Ref	Ref	Ref	Ref
Migraine	2.44***	2.18 - 2.73	2.60***	2.26 - 2.98
Other chronic pain	1.29***	1.17 - 1.42	0.88*	0.78 - 0.99
Insurance				
Subsidized	Ref	Ref	-	-
Private	1.41***	0.67 - 0.76	-	-
Opioid prescription				

No	Ref	Ref	Ref	Ref
Yes	0.43***	0.36 - 0.52	0.53***	0.43 - 0.66

Notes. Adjusted model selected using backwards selection and controlling for clinic groupings

Appendix 1: Problem list entry and associated categorization

Problem	Category
Abdominal migraine	Migraine
Acute confusional migraine	Migraine
Adenolymphoma	Adenolymphoma
Alteration in comfort: chronic pain	Chronic pain
Back pain, chronic	Back Pain
Back pain, chronic......	Back Pain
Basilar migraine	Back Pain
Chronic abdominal pain	Abdominal Pain
Chronic ankle pain	Limb pain
Chronic back pain	Back Pain
Chronic back pain greater than 3 months duration	Back Pain
Chronic back pain greater than three months durati	Back Pain
Chronic chest pain	Abdominal Pain
Chronic facial pain	Facial Pain
Chronic female pelvic pain	Abdominal Pain
Chronic female pelvic pain syndrome	Abdominal Pain
Chronic generalized pain......	Chronic pain
Chronic intractable migraine without aura	Migraine
Chronic intractable pain	Chronic pain
Chronic leg pain	Limb pain
Chronic low back pain	Back Pain

Chronic migraine	Migraine
Chronic migraine without aura, non-intractable	Migraine
Chronic musculoskeletal pain	Musculoskeletal Pain
Chronic neck pain	Back Pain
Chronic neuropathic pain	Neuropathic Pain
Chronic nonmalignant pain	Chronic Pain
Chronic pain	Chronic pain
Chronic pain control	Chronic pain
Chronic pain control management	Chronic pain
Chronic pain due to injury	Injury
Chronic pain following left total knee arthroplast	Limb Pain
Chronic pain following right total hip arthroplast	Limb Pain
Chronic pain following surgery or procedure	Postoperative
Chronic pain in face	Facial Pain
Chronic pain in female pelvis	Abdominal Pain
Chronic pain in shoulder	Limb Pain
Chronic pain of left foot	Limb Pain
Chronic pain of right upper limb	Limb Pain
Chronic pain syndrome	Chronic pain
Chronic pain......	Chronic pain
Chronic pain.......	Chronic pain
Chronic painful diabetic neuropathy	Neuropathic Pain
Chronic Painful Diabetic Neuropathy.....	Neuropathic Pain

Chronic pelvic pain	Abdominal Pain
Chronic pelvic pain of female	Abdominal Pain
Chronic postoperative pain	Postoperative
Chronic shoulder pain	Limb Pain
Chronic thoracic back pain	Back Pain
Classic migraine	Migraine
Classic migraine with aura	Migraine
Classical migraine	Migraine
CLBP - Chronic low back pain	Back Pain
Common migraine	Migraine
Common migraine without aura.......	Migraine
Complex migraine	Migraine
Complicated migraine	Migraine
Generalized chronic body pains	Chronic pain
Headache, migraine	Migraine
Headache, migraine NOS	Migraine
Hemiplegic migraine	Migraine
Hemiplegic-ophthalmoplegic migraine	Migraine
Herniation of rectum into vagina	Abdominal Pain
Intractable migraine with aura	Migraine
Lower half migraine	Migraine
Menstrual migraine	Migraine
Migraine	Migraine

Migraine aura without headache	Migraine
Migraine headache	Migraine
Migraine variant	Migraine
Migraine variant with headache	Migraine
Migraine variants	Migraine
Migraine with aura	Migraine
Migraine with persistent visual aura.	Migraine
Migraine with typical aura	Migraine
Migraine without aura	Migraine
Migraine without aura, not refractory	Migraine
Migraine, menstrual	Migraine
Migraine......	Migraine
Migraines	Migraine
Migraines......	Migraine
Neck pain, chronic	Back Pain
Ocular migraine	Migraine
Ophthalmic migraine	Migraine
Ophthalmoplegic migraine	Migraine
Pain, chronic	Chronic pain
Post-mastectomy chronic pain syndrome	Abdominal Pain
Refractory migraine	Migraine
Refractory migraine variants	Migraine
Refractory migraine with aura	Migraine

Refractory migraine without aura	Migraine
Retinal migraine	Migraine
Transformed migraine	Migraine
Unilateral mixed conductive and sensorineural hear	Migraine
Vertebrobasilar migraine	Migraine

Chapter 3:

The role the problem list plays in chronic pain management

ABSTRACT

Context: Chronic pain is a prevalent problem that requires a multifaceted approach to manage.

Objectives: To examine the extent to which the inclusion of chronic pain on the problem list is associated with follow-up with specialty pain care.

Methods: The association between chronic pain documentation on the problem list and specialty pain care were investigated through a retrospective cohort study utilizing 4,531 patient records.

Results: Chronic pain documentation on the problem list was associated with higher odds the patient received specialty pain care. The most common diagnosis was other chronic pain at 69.7%. A migraine diagnosis was associated with decreased odds of having specialty care, and chronic pain syndrome had increased odds of specialty care compared to the other chronic pain group.

Conclusion: We conclude that documenting chronic pain on the problem list is associated with a higher likelihood that patients will receive specialty pain care.

Key Message:

This article highlights a retrospective cohort study that describes the prevalence of chronic pain documentation on the problem list in the chronic pain population, a previously unstudied topic. The results indicate that chronic pain documentation on the problem list is associated with patients receiving specialty pain care.

Key Words:

Chronic pain management; problem list; EHR documentation; quality; chronic pain

INTRODUCTION

The prevalence of chronic non-cancer pain is estimated at around 20% in the United States.[15] Furthermore, chronic pain costs $635 billion a year for direct and indirect expenses, which is more than cancer ($243 billion), heart disease ($309 billion), or diabetes ($188 billion).[17] Research indicates that chronic pain is connected with mental health, including anxiety, and mood disorders.[38] Additionally, as a complex health condition, chronic pain negatively impacts sleep, cognitive processes such as memory and attention, cardiovascular health, and overall quality of life.[25]

Complex health conditions require multifaceted approaches to manage them. For example, research has shown that early physical therapy in the treatment of chronic pain is associated with a lower probability of using opioids.[125-127] Further, it appears that cognitive-behavioral therapeutic strategies can restructure and reframe a patients' pain experience, while simultaneously alleviating mood disorder and disability associated with pain.[128] Pain management specialists are providers who are trained specifically in the evaluation, diagnosis, and treatment of several types of chronic pain.[129] Although pain specialists are trained in utilizing a multi-modal approach to address pain, patients typically need referrals from their primary care provider to receive treatment by specialty pain providers.

Problem lists were developed to improve the provider's awareness of relevant health problems or symptoms and assist in treatment decisions.[10] Keeping the problem list up to date with the patient's current health problems can improve communication between visits and increase evidence-based treatment for chronic conditions.[11-14] Unfortunately, even documentation of serious chronic conditions such as diabetes and heart failure is incomplete and only ranges from 10%-50%.[11,13,36] Perhaps not surprisingly, there is no research supporting the benefits of documenting chronic pain on the problem list.

Prior research discovered that 54.4% of heart failure patients accurately had heart failure documented on their problem list.[36] Although a diagnosis may be reported elsewhere on a patient's record, having the diagnosis of heart failure on the problem list may allow for more efficient and complete care.[10] For example, heart failure on the patient's problem list was associated with higher usage of medications demonstrated to benefit patients with systolic dysfunction. Additional studies found that chronic kidney disease was accurately documented in the problem list only 11-16% of the time.[11,13] Furthermore, failure to include chronic kidney disease on the problem list was associated with providers ordering fewer chronic kidney disease-specific laboratory studies .[11,13] In addition, the group without their chronic kidney disease included on the Problem List was statistically less likely to have a nephrology visit than those whose problem list included chronic kidney disease.[11] Evidence suggests that the use of the problem list is associated with improved and more evidence-based care. Unfortunately, there is little information regarding the documentation of chronic pain on the problem list and the relationship of such documentation to patient care. Therefore, this study aims to examine the extent to which chronic pain on the problem list is associated with utilization of pain specialty care.

METHODS

This observational study utilized a retrospective cohort design examining electronic health record (EHR) data collected from a large western health care network between 2017 and 2019. Due to limited follow-up data for most clinics in this health system, this study focused primarily on a subset of clinics in the Sacramento region of California. In order to control for possible differences between the clinics due to demographic or geographical differences and because certain clinics had as little as one patient who qualified for the study, the authors grouped the 29 clinics that made up the study population's index visit into four clinic groupings based on the nearest reporting hospital of the clinics. The network practices utilize the same EHR, Cerner, which includes a problem list allowing for manual entry of patient problems based on the Snowmed Clinical Terms. Clinicians can select the problem through a standardized drop-down list or search the term and select among the results. The healthcare system does not have a single pain management or chronic pain management policy across all health care centers. There are no automated clinical decision supports or alerts utilizing the problem list to facilitate pain treatment.

Study population

The sample for this study was comprised of 4,531 chronic pain patients. The authors identified patients with at least one documented qualifying chronic pain diagnosis in the EHR within six-months before the study or throughout the study period, January 01, 2017, through December 31, 2019 (see table 1). The authors selected these specific diagnoses based on prior literature that used EHR records to identify chronic pain patients.[90,93,107-110] Diagnoses were selected if used in two or more published reports from 2013 - 2019. The selection of diagnoses for this study was limited in scope and did not include a comprehensive list of other types of chronic diseases with chronic pain being a prominent symptom. Although several chronic diseases are associated with chronic pain, it is difficult to determine if a patient visit is due to chronic pain or another issue associated with the disease itself. Therefore, the authors excluded patients whose medical records did not indicate chronic pain as the primary diagnosis.

Further inclusion criteria required that the included patients be 18 years or older. Since the study's goal was to study how primary care providers document and treat chronic pain in the outpatient setting, the authors excluded patients with alternative goals to pain management such as “comfort care” in the context of palliative care or hospice. In addition, patients with cancer, burns over 10% of the body, a surgery within three months of the study, or pregnant were excluded because the care they receive for their condition is typically from a specialist and not primary care.

Measures

The authors extracted patient data from EHR records. First, the authors identified patients who had a qualifying diagnosis of chronic pain. Second, the authors determined whether the patient had chronic pain documented on their problem list or not during their first visit during the study period. Third, the authors followed the patients in time to determine how the chronic pain was treated via opioids or specialty pain treatment. For a full list of problems that qualified as a chronic pain, see Table 2. To summarize, the authors included any problem with chronic and the word pain together in any format or if a patient had a migraine on their problem list.

Based on the chronic pain diagnosis that qualified the patient, the authors created a variable with the values other chronic pain, migraine, and chronic pain syndrome. Although the list of qualifying chronic pain diagnoses were more extensive than this list, the data indicated only a handful of patients were diagnosed with chronic pain due to trauma, chronic post-thoracotomy pain, and other postoperative pain. These diagnoses alone were inadequate for statistical analysis. Therefore, the authors combined patients with these three diagnoses into the "other chronic pain" group.

From the patient records, the authors collected information regarding the patient's race and ethnicity coded as White non-Hispanic, Black non-Hispanic, Hispanic of any race, and other. Sex documented as male and female. Age was recorded in the EHR as a continuous variable. Due to research indicating that chronic pain patients older than 60 suffer for longer periods of time, have more comorbidities, and obtain chronic pain treatments more often[111,112], the authors analyzed age as a categorical variable of less than 60 and greater than or equal to 60. Insurance indicated whether a patient had publicly funded or privately funded insurance. The authors collected opioid prescription information and coded the variable as a current prescription or none.

The following measures were developed based on patient EHR data and are only relevant to patients who utilized pain specialty care. The authors measured and categorized the number of primary care provider visits patients had before they were seen by a pain specialist (one visit, two visits, three or more visits). The number of days it took patients to see a specialist from the last visit they had with their primary care provider was collected and measured as a continuous variable.

The outcome of interest is whether a patient utilized specialty pain care within 365 days of their index visit. Such utilization included visits with the primary diagnosis being chronic pain and includes care received from a behavioral therapist, pain specialist, or surgery. For the statistical analysis, the authors measured the outcome as a dichotomous variable indicating whether the patient did or did not utilize specialty pain care regardless of which type it was.

Statistical Analysis

The authors analyzed the data with Microsoft Excel and SAS University Edition®. The first step in the analysis was to identify the patient cohort with chronic pain documented on their problem list (see Table 1). Using this information, the authors calculated the proportion of patients who had chronic pain on their problem list. Proportions were reported for the total sample and stratified by patient age, gender, race and ethnicity, and insurance status. The authors also reported the proportion of primary care provider visits before specialty care utilization, the type of specialty visit, and the days from the last primary care visit to the specialist.

Preliminary data analysis demonstrated there was a minimal intraclass correlation within the different clinic groups. Therefore, there were no similarities between the clinics within a cluster or group. Based on this result, the authors used the clinic groups as a covariate to adjust all models rather than clustering. The authors fit a logistic regression model to assess the potential for confounders and adjust for them in examining the relationship between chronic pain documentation on the problem list and utilization of specialty care. The authors conducted unadjusted logistic regressions and then, using a backwards selection, an adjusted model. The final model included the covariates age, sex, race, and clinic groups while dropping insurance status and opioids. Although opioids did meet the significance criteria to remain in the model, the descriptive statistics showed a possible multicollinearity issue between opioids and specialty pain follow-up and therefore was excluded. All unadjusted and adjusted estimates are presented. The Institutional Review Board approved this study.

RESULTS

The authors extracted the medical records of 4,531 chronic pain patients. The characteristics of the sample are presented in Table 3. The sample was predominantly female (68.2%), with an average age of 56.7 (SD 15.8). The majority were White non-Hispanic (54.1%), followed by Hispanic (22.5%), other unclassified groups (17.5%), and Black non-Hispanic (5.9%). The most common chronic pain diagnosis was other chronic pain (69.7%). The most common type of problem list entry is chronic pain (73.6%) (see table 4). Most of the population utilized specialty pain care within 365 days of their index visit (87.1%), with a pain specialist being the most common type of utilization (94.8%).

Cohort Characteristics

Of the 4,531 patient records, 3,740 (82.5%) had chronic pain documented on the problem list. Among female patients, 83.5% had chronic pain documented on their problem list, whereas 80.6% of males had it documented on their problem list. Documentation of chronic pain was most common among Black non-Hispanics (86.0%) compared to documentation among the other racial group (76.7%). Among patients who had a chronic pain documented on their problem list, 13.9% had a follow-up pain specialist visit compared to 86.1% with no follow-up. The most common chronic pain diagnosis among patients with chronic pain documented on their problem list were other/unclassified pain (69.2%) followed by migraine (16.6%) and chronic pain syndrome (14.2%). Among patients who had chronic pain on their problem list, 98.4% did not have an opioid prescription and 1.6% of patients did have a prescription.

Factors Associated with a Follow-up Visit with Specialty Pain Care

After controlling for all confounders and clinic groups, the logistic regression found that having chronic pain documented on the problem list was a significant predictor of specialty pain care utilization; pain documented on the problem list had 57% increased odds of receiving specialty pain care (OR 1.57; 95% CI 1.19 – 2.07). Further, females had increased odds of receiving specialty pain care than males (OR 1.24; 95% CI 1.02 – 1.51). Uncategorized racial and ethnic groups had decreased odds of receiving specialty care than White non-Hispanics (OR 0.64; 95% CI 0.48 – 0.85). A migraine diagnosis was associated with decreased odds of utilizing specialty care compared to chronic pain syndrome diagnoses (OR 0.35; 95% CI 0.22 – 0.56).

Additionally, having a non-specific diagnosis, codified as other chronic pain diagnosis, was associated with increased odds of receiving specialty pain care compared to a chronic pain syndrome diagnosis (OR 1.68; 95% CI 1.25 – 2.27).

DISCUSSION

The purpose of this study was to explore to what extent documenting chronic pain on the problem list was associated with utilization of specialty pain care. To date, there has been no research examining the documentation of chronic pain on the problem list. However, compared to problem list studies looking at other chronic diseases, this study has some similarities and differences. This study discovered that providers document chronic pain on 82.5% of patient problem lists. These findings contrast with recent literature suggesting that chronic pain documentation rates are augmented in the setting of pain management training programs. In these instances, there was an increase in documenting chronic pain on the problem list from 0.5% to 2.4%.[93] Although the higher documentation rates found in this study are promising, it is essential to note that this was a single metropolitan area.

The majority of the sample was female although rates of chronic pain documentation were similar in men and women. Females, compared to their male counterparts, are more likely to utilize pain management options.[113] Therefore, the higher utilization of pain management options might be associated with an increase in documentation of chronic pain on the problem list. Among patients diagnosed with chronic pain syndrome, 93.5% had chronic pain documented on their problem list compared to 77.2% of patients diagnosed with migraine. Chronic pain syndrome is associated with psychologic and physiologic disability.[120,130] The difference between a diagnosis of chronic pain syndrome and the non-specific other chronic pain diagnosis comes down to the psychological aspect of the pain experience.[130] The additional components of the psychological strain encompassed in the chronic pain syndrome diagnosis may reflect the rate at which providers document the problem. The increase in documentation may be due to several competing symptoms increasing the chance of documentation rather than just pain alone.

Other chronic pain was the most common chronic pain diagnosis in this study. These findings are similar to the problem documented for patients with chronic pain being the most common problem. Documentation of disease and treatment is an essential step in the long-term management of chronic diseases. Experts recommend collecting information regarding the patient's pain history, location, severity, duration, and possible causes.[123,124] However, primary care adherence to pain care standards, documentation, and practice is known to be inadequate.[57] The ambiguity behind diagnosing various issues as a single chronic pain diagnosis makes tracking patient care difficult. On the problem list, 10% of the patients had back pain. The treatment of back pain versus chest pain, which was never listed as a problem, is vastly different. However, outside of back pain, there is no specificity in the patient's type of pain. Although guidelines provide the best practices for managing chronic pain through pharmacological or non-pharmacological therapies[3], clarity of the kind of chronic pain the patient may be suffering is essential.

Recognition of heart failure and chronic kidney disease on the problem list was associated with more evidence-based management.[11,13,36] These findings are consistent with our study, which discovered that documenting chronic pain on the problem list was associated with a higher likelihood of utilizing specialty pain care. The relationship between documenting pain as a problem and receiving follow-up care may be related to the provider. One might postulate that a provider who has more chronic pain training might explain the association between these findings. Further research will need to address provider differences and to stratify whether the result of a complete problem list is due to the additional awareness of the actual problem or just the provider providing better comprehensive care in general.

After controlling for all other covariates, including the clinic clusters, gender was significantly associated with utilization of pain specialty care. As stated previously, a 3% difference in the rates of problem list completion between males and females is statistically significant, but minor differences in a large sample may show up as significant and the clinical significance is questionable.[131] The other unclassified chronic pain group had increased utilization of specialty pain care. Migraine sufferers had decreased odds of utilization of specialty pain care. This result is expected since migraine sufferers have clear established pain management guidelines, and specialty care is often unnecessary.[117-119]

A limitation of this study is the absence of provider characteristics or information. The association between problem list completion and treatment follow-up may be due to unmeasured provider differences. Research has shown that the provider's age can impact the type of care a person gets.[132] However, there is no literature exploring the variation between provider to patient demographic differences. Further, there is the possibility that the better the physician, the more likely they document the problem on the problem list and recommend the patient to specialty care. The difference would be due to this confounding and not the documentation of chronic pain.

Another limitation is that this healthcare network is an open network system. Therefore, if a patient sees a provider and obtains a referral for a pain specialist, we could not determine whether that patient saw a pain specialist outside of the network. It is entirely possible that a small portion of patients with chronic pain had a follow-up with a pain specialty clinic outside the hospital network and therefore are tracked as not receiving care under this dataset. Due to the nature of the retrospective review of EHR data, the data is only as reliable and clean as what providers put into the system. Psychosocial factors such as substance use are often less complete than other required fields, limiting the researcher's ability to control those factors.

A strength of this study is the inclusion of a large number of clinics and patients. Although these clinics are all under one healthcare network, the individual primary care clinics have their own pain management policies and practices. Such variability between these clinics increases generalizability to other clinics within a California metropolitan area. Further, this study is an essential first step towards value-based care. Value-based programs reward healthcare providers with incentives to provide quality care to patients with Medicare.[133,134] This patient-centered care model prioritizes patient health outcomes.[133] Value-based care focuses on high-value care such as preventative strategies rather than first-line defense like opioids.[101] Research such as this study helps identify new pathways to provide the best care to our patients utilizing our current resources.

Conclusion

Chronic pain is complex and requires a multifaceted approach to manage it. Often, lack of clarity in the documentation of chronic pain may lead to unclear treatment options. However, utilizing the EHR as a supportive tool in the pain management process may reduce such ambiguity. This is the first study to discover an association between chronic pain documentation on the problem list and patient follow-up with specialty pain care. Further research is needed to explore these findings across different health systems and locations. This study may inform future research looking at automating problem list entries based on relevant problems that research supports.

Table 1: Chronic pain codes[90,93,107-11016-2116-2116-2116-2116-2116-2116-2116-21]

ICD-10	Description
G89.21	Other chronic pain
G89.22	Chronic pain due to trauma
G89.28	Chronic post-thoracotomy pain
G89.29	Other chronic postoperative pain
G89.4	Chronic pain syndrome
G43.109	Migraine with aura
G43.709	Chronic migraine without aura, not intractable, without status migrainosus
G43.719	Chronic migraine without aura, intractable without status migrainosus
G43.701	Chronic migraine without aura, not intractable, with status migrainosus
G43.711	Chronic migraine without aura, intractable with status migrainosus

Table 2: Problem list entry and associated categorization

Problem	Category
Abdominal migraine	Migraine
Adenolymphoma	Adenolymphoma
Basilar migraine	Back Pain
Chronic Pain	Chronic pain
Chronic abdominal pain	Abdominal Pain
Chronic back pain	Back Pain
Chronic low back pain	Back Pain
Chronic pain	Chronic pain
Chronic pain control	Chronic pain
Chronic pain syndrome	Chronic pain
Chronic pelvic pain of female	Abdominal Pain
Classical migraine	Migraine
Common migraine	Migraine
Complicated migraine	Migraine
Generalized chronic body pains	Chronic pain
Herniation of rectum into vagina	Abdominal Pain
Menstrual migraine	Migraine
Migraine	Migraine
Migraine aura without headache	Migraine
Migraine variants	Migraine
Migraine with aura	Migraine

Migraine with typical aura	Migraine
Migraine without aura	Migraine
Ophthalmic migraine	Migraine
Ophthalmoplegic migraine	Migraine
Retinal migraine	Migraine
Unilateral mixed conductive and sensorineural hear	Migraine
Vertebrobasilar migraine	Migraine

Table 3: Chronic pain patient characteristics

	Total Sample (n = 4,531)	Chronic Pain Not on Problem List (n = 791)	Chronic Pain on Problem List (n = 3,740)	χ2
Study Variables	M(SD) or %	%	%	
Age	56.7 (15.8)			1.3
Under 60 years old	50.9%	52.7%	50.5%	
Over 60 years old	49.2%	47.3%	49.6%	
Gender				5.8*
Female	68.2%	64.6%	69.0%	
Male	31.8%	35.4%	31.0%	
Race/Ethnicity				28.1***
White Non-Hispanic	54.1%	48.2%	55.4%	
Black Non-Hispanic	5.9%	4.7%	6.1%	
Hispanic	22.5%	23.8%	22.3%	
Other	17.5%	23.4%	16.3%	
Specialty Pain Utilization				17.2***
No follow up	87.1%	91.5%	86.1%	
Follow up	13.0%	8.5%	13.9%	
Diagnosis				63.8***
Chronic pain syndrome	12.5%	4.7%	14.2%	
Migraine	17.8%	23.3%	16.6%	

Other chronic pain	69.7%	72.1%	69.2%	
Insurance				1.8
Subsidized	44.5%	42.4%	45.0%	
Private	55.5%	57.7%	55.0%	
Opioid prescription				15.0***
No	98.1%	96.3%	98.4%	
Yes	1.9%	3.7%	1.6%	
Number of PCP visits before specialist (n=621)				
One	44.7%	-	-	
Two	22.0%	-	-	
Three or more	33.3%	-	-	
Specialty Utilization (n=621)				
Behavioral	1.0%	-	-	
Pain specialist	94.8%	-	-	
Surgery	4.2%	-	-	
Days from PCP to specialist visit (n=621)	61.4 (64.6)	-	-	

Notes. *p < 0.05, **p < 0.01, ***p<0.001; Reporting column percents

Table 4: Type of problem list entry

Problem Categorization	%
Abdominal pain	0.4%
Adenolymphoma	0.1%
Back pain	10.1%
Chronic pain	73.6%
Migraine	15.9%

n = 3740

Table 5: Logistic regression showing the factors associated with pain specialty care utilization

	Unadjusted		Adjusted	
Variables	OR	95% CI	OR	95% CI
Chronic pain on problem list				
Pain is not documented	Ref	Ref	Ref	Ref
Pain is documented	1.75***	1.34 - 2.28	1.57**	1.19 - 2.07
Age				
Under 60 years old	Ref	Ref	Ref	Ref
Over 60 years old	1.03	0.87 - 1.23	0.88	0.73 - 1.05
Gender				
Male	Ref	Ref	Ref	Ref
Female	1.12	0.93 - 1.35	1.24*	1.02 - 1.51
Race/Ethnicity				
White Non-Hispanic	Ref	Ref	Ref	Ref
Black Non-Hispanic	0.97	0.67 - 1.40	1.25	0.83 - 1.89
Hispanic	0.93	0.75 - 1.16	0.95	0.75 - 1.19
Other	0.65**	0.50 - 0.85	0.64**	0.49- 0.85
Diagnosis				
Chronic pain syndrome	Ref	Ref	Ref	Ref
Migraine	0.33***	0.21 - 0.53	0.35***	0.22 - 0.56
Other chronic pain	1.69**	1.27 - 2.26	1.68**	1.25 - 2.27
Insurance				

Subsidized	Ref	Ref	-	-
Private	0.97	0.81 - 1.15	-	-
Opioid prescription				
Yes	Ref	Ref	-	-
No	0.15**	0.04 - 0.62	-	-

Notes. Adjusted model selected using backwards selection and controlling for clinic groupings; *$p < 0.05$, **$p < 0.01$, ***$p<0.001$

Chapter 4:

Conclusions and Implications

This dissertation aims to understand better the patient characteristics associated with the documentation of chronic pain on the problem list and how this is related to the utilization of specialty pain care. This section presents some concluding research, practice, and policy implications of this dissertation. In doing so, we acknowledge that clearly distinguishing the domains of research, practice and policy is not altogether possible.

Research Implications

In section one, the authors identified age differences in likelihood that chronic pain would be documented on the problem list, with patients over 60 years old having a lower likelihood of having chronic pain documented on their problem list than patients under 60 years old. Additionally, females were more likely to have chronic pain recorded on their problem list. Compared to White non-Hispanics, Black non-Hispanics are more likely to have chronic pain documented, whereas the other or uncategorized racial group compared to White non-Hispanics were less likely. Lastly, patients with an opioid prescription were less likely to have chronic pain on their problem list. The documentation differences of chronic pain on the problem list related to patient characteristics help researchers better understand what factors might be associated with problem list usage for this health problem.

In section two, the authors found that the documentation of chronic pain on the problem list was associated with higher odds that the patient utilized specialty pain care after controlling for age, gender, race/ethnicity, diagnosis, and clinic groupings. Although the findings from this study elucidate the association between problem list completion and specialty care utilization, it is unclear whether the association is due to use of the problem list, the provider, another unmeasured factor, or some combination of these factors. Even so, this research brings to light the possible role the problem list has in chronic pain management. Research is needed to further examine this association to determine causality better. The authors recommend a randomized controlled trial to explore this area which would better control for unmeasured factors.

This dissertation revealed that clinicians might use the problem list to document more information about the chronic pain condition. For example, back pain or migraine was often indicated as the problem for patients. Although there was only partial usage of the problem list, which limits specificity about the type of chronic pain, there are potential benefits of providing more specificity in the problem list. The added specificity may help inform clinicians on treatment decisions for the different types of pain locations. Additionally, future researchers may better identify potential research participants based on the problem list's added information. Further studies may consider how the different types of problem list entries impact chronic pain management to see if there are clinical implications to documenting with such clarity.

Problem lists have been around for decades, but there is limited research that examines the problem list's clinical implications and potential benefits. To date, there is no literature looking at chronic pain and problem lists. Therefore, this study is the first of its kind to highlight these associations and provide insight into the possible use of the problem list to help manage chronic pain. Moreover, there is limited literature exploring the clinical usage of problem lists on various problems. This dissertation's findings help shed some light on a problem and the possible role the problem list has on it.

Practice Implications

Despite the development of the problem list in the 60s and its widespread implementation in either paper or electronic form, there is still limited research exploring the clinical implications of using the problem list. The problem list helps clinicians identify the essential health condition or issue for the patient allowing customized care.[92] Although most clinicians understand the importance of the problem list, most use it inconsistently.[12,99] There is ambiguity on what belongs on the problem list and what does not.[12,99] This dissertation discovered that it might be in the clinician's best interest to include problems, such as chronic pain, which are often difficult to define precisely and difficult to treat. Findings from this dissertation will help highlight the associations with documenting chronic pain on the problem list. On the individual clinician level, our findings may help strengthen the importance of the problem list. Although clinicians do what they think is best for the patient, many clinicians may become critical or not fully embrace a practice when there is no evidence to support a practice. Buy-in is essential for the users of any technology or practice. This dissertation may help alleviate the hesitation and show that there may be clinical implications of using the problem list.

On the leadership or hospital level, this dissertation may help inform provider training and awareness of the problem list. Leaders can identify who is responsible for the problem lists and clarify what their role will entail. In addition to the lack of clarity of who is responsible for the problem list, there is often no training regarding appropriate content for the problem list. Further, this dissertation may inform training or technical support requests to facilitate and promote the completion of problem lists. However, this study does not elaborate on which roles are responsible for the problem list, and further research is needed to clarify roles and responsibilities better.

The continuity in care movement has encouraged clinicians to use the EHR as the medium to communicate to other clinicians.[135] Further, accurate medical records allow quality improvement projects to measure their program's impact in real-time.[135] As a single location in the EHR to enable quick access to essential problems at hand, the problem list is a vital tool that can help with the communication of diseases or symptoms from visit to visit and provider to provider, providing higher quality care through instantaneous alerts and suggestions for patients.

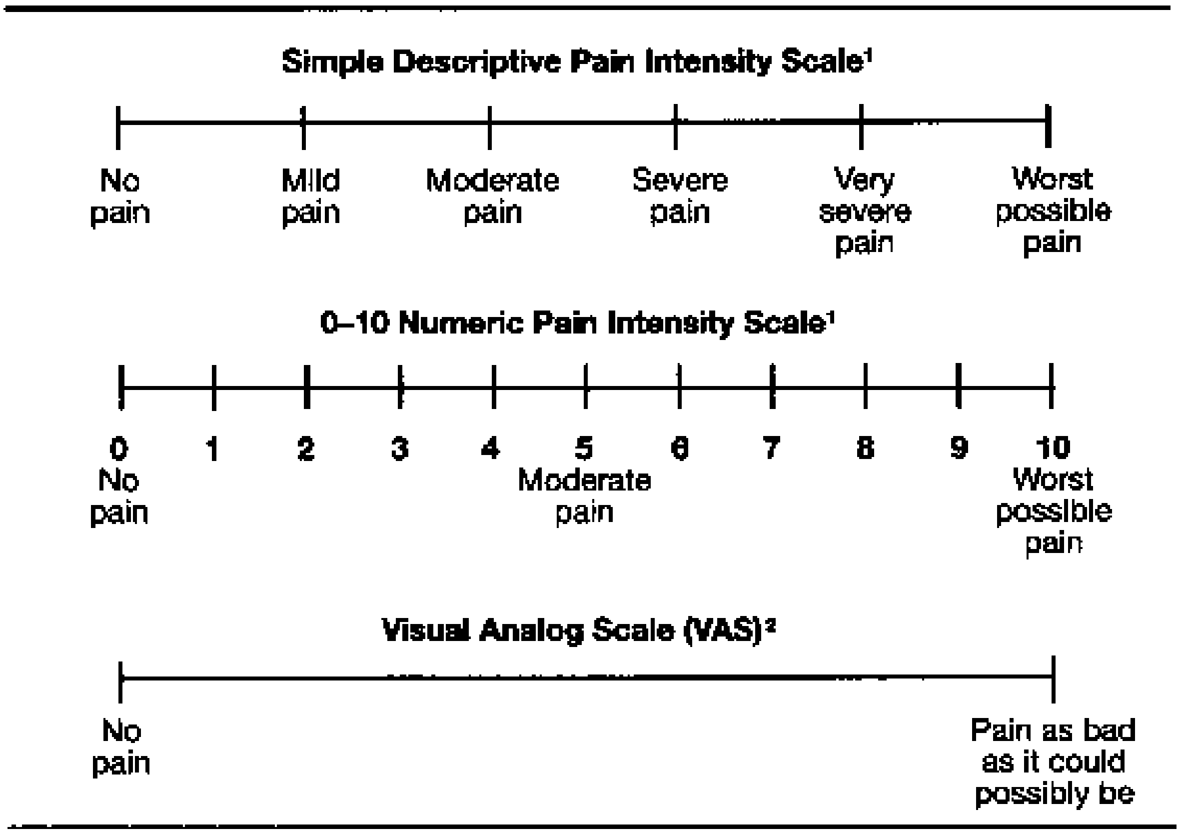
Policy Implications

The current health care model in the United States is a fee-for-service.[136] Increased health care prices is the main reason that the United States pays more for health care than any other country.[136,137] Fee for service tends to encourage higher volume and cost of service, which does not align with efficient and better care.[137] This skews the care towards patients with higher-reimbursed care rather than lower-reimbursed like seen in complex chronic conditions.[137] Therefore, experts suggest a shift in the care model to improve health care delivery by focusing on the care that provides greater value, higher efficiency, and improved patient outcomes.[137] Value-based care is care that prioritizes patient health outcomes in a more efficient and cost-effective manner.[138] Research has shown that care systems that focus on early physical therapy for neck pain may provide better patient outcomes, greater value, and improved efficiency in managing pain compared to delayed management.[139] This dissertation suggests that problem lists may be used as a tool to help communicate about a patient's pain problem and, therefore, promote early utilization of specialty pain care. Therefore, this dissertation presents findings that support value-based care.

To benefit from clinical decisions support and population management tools to meet the growing trend in healthcare, issues with the problem list's content and use need to be addressed.[135] The benefit of using the problem list, especially at the time of care, is it allows the rules within the clinical decision algorithms to adjust in real-time, providing the most accurate and timely suggestions for the patient's benefit.[140] Research exploring which problems should go on the problem list based on clinical impact is needed to best utilize clinical decisions supports effectively. This dissertation has shed some light on the role of chronic pain in the problem lists, but further research is needed on other diagnoses and symptoms and to confirm a causal link with documentation and clinical outcomes.

Policy changes may help support the usage of problem lists. Although the problem list is a required component of the Meaningful Use stages 1 and 2 in the HITECH Act, the minimum requirement of a single entry with no further guidance on what should be included is far from sufficient.[34] Policies that support standardization based on evidence are needed to realize the problem list's maximum benefits. Furthermore, targeted incentives to promote the more extensive usage of the problem list are needed nationally as well as from leaders. Clinician perspectives should be considered along this process since their use of the problem list is key to successfully implementing any incentive program. It is vital to empower clinicians to suggest improvements, workflow, and empower them to present policy recommendations and incentives.[140]

Appendix 1: Visual Example of Pain Assessment Scales



[1] If used as a graphic rating scale, a 10 cm baseline is recommended.
[2] A 10-cm baseline is recommended for VAS scales.

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