

The association between the problem list and chronic pain management

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Abstract

Background Roughly a quarter of the US population suffers from moderate to severe chronic pain for at least six months in any given year. The complexity of managing chronic pain has encouraged providers to use innovative methods to address it. Research has shown that problem lists are potential tools that support the care of patients with diabetes and chronic kidney disease.

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

Methods The association between chronic pain documentation on the problem list and specialty pain care was investigated in this retrospective cohort study using 4531 patient records.

Results Chronic pain documentation in the problem list was associated with higher odds of receiving specialty pain care. The most common diagnosis was chronic pain (69.7%). A migraine diagnosis was associated with decreased odds of receiving specialty care, and chronic pain syndrome was associated with increased odds of receiving specialty care compared with the other chronic pain groups.

Conclusion Documenting chronic pain on the problem list was associated with a higher likelihood of patients receiving specialty pain care.

Keywords Chronic pain management · Problem list · EHR documentation · Quality · Chronic pain

Abbreviation

EHR Electronic health record

1 Introduction

The prevalence of chronic non-cancer pain is estimated to be approximately 20% in the United States [1]. 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) [2]. Chronic pain is defined as pain experienced most or all days over the past six months [1], most or all days in the past three months [3], or every day for three months [4]. Generally, providers report using the Centers for Disease Control and Prevention's definition of pain that lasts beyond the typical healing time for the injury, or three months [5]. Research indicates that chronic pain is associated with

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mental health issues, including anxiety and mood disorders [6]. Additionally, as a complex health condition, chronic pain negatively impacts sleep, cognitive processes such as memory and attention, cardiovascular health, and the overall quality of life [7].

Management of complex health conditions requires a multifaceted approach. For example, research has shown that early physical therapy in the treatment of chronic pain is associated with a lower probability of using opioids [8–10]. Furthermore, cognitive-behavioral therapeutic strategies can restructure and reframe a patient's pain experience while simultaneously alleviating mood disorders and pain-associated disabilities [11]. Pain management specialists are trained to evaluate, diagnose, and treat various types of chronic pain [12]. Although pain specialists are trained to utilize a multimodal approach to address pain, patients typically need referrals from their primary care provider to receive treatment from specialty pain providers.

Problem lists, established in the 60's, were developed to improve providers' awareness of relevant health problems or symptoms and assist in treatment decisions [13]. The original intent of the problem list was to have a single location that included established diagnoses and unexplained findings that may not be associated with a clear diagnosis [13]. It serves as a table of content that summarizes a patient's health issues in an easy-to-access review section. The Centers for Medicare and Medicaid saw the potential of the problem list and made it a required component of the electronic health record (EHR) in the United States [14]. Maintenance of the problem list may vary from health centers to health centers, but generally, primary care providers and specialists are both encouraged to maintain [15, 16]. Some institutions allow nurses to contribute to the problem list. 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 [17–20]. Unfortunately, the documentation of serious chronic conditions such as diabetes and heart failure are incomplete, and only ranges from 10 to 50% [17, 19, 21]. It is not surprising that no research supports the benefits of documenting chronic pain in the problem list.

Prior research discovered that 54.4% of heart failure patients accurately had heart failure documented on their problem list [21]. Although a diagnosis may be reported elsewhere in a patient's record, having a diagnosis of heart failure on the problem list may allow for more efficient and complete care [13]. For example, heart failure on a patient's problem list was associated with a 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 [17, 19]. Furthermore, failure to include chronic kidney disease on the problem list was associated with providers ordering fewer chronic kidney disease-specific laboratory studies [17, 19]. In addition, the group without chronic kidney disease included in the problem list was statistically less likely to have a nephrology visit than those whose problem list included chronic kidney disease [17]. Evidence suggests that using a problem list is associated with improved evidence-based care. Unfortunately, there is little information regarding the documentation of chronic pain in the problem list or the relationship between such documentation and patient care. Therefore, this study aimed to examine the extent to which chronic pain on a problem list is associated with the utilization of pain specialty care.

2 Methods

This observational study utilized a retrospective cohort design to examine EHR data collected from a large Western healthcare network between 2017 and 2019. Owing to the 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. To control for possible differences between the clinics due to demographic or geographical differences, and because certain clinics had as few 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 use the same EHR, Cerner, which includes a problem list that allows for the manual entry of patient problems based on Snowmed Clinical Terms. Clinicians can select the problem through a standardized drop-down list or search for the term and select the results. The healthcare system does not have a single pain management policy or chronic pain management policy across all healthcare centers. There is no automated clinical decision support or alerts that utilize the problem list to facilitate pain treatment, or any automation that facilitates the documentation of chronic pain on the problem list.

2.1 Study population

The study sample comprised of 4531 patients with chronic pain. 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 [22–27]. Diagnoses were selected if they were used in two or more of the published reports from 2013 to 2019. The selection of diagnoses for this study was limited in scope and did not include a comprehensive list of other chronic diseases with chronic pain being a prominent symptom. Although several diseases are associated with chronic pain, it is difficult to determine whether a patient's visit is due to chronic pain or an issue associated with the disease itself. Therefore, we excluded patients whose medical records did not indicate chronic pain as a diagnosis.

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

2.2 Measures

The authors extracted patient data from the EHR records. First, we identified patients with a qualifying diagnosis of chronic pain. Second, we determined whether patients had chronic pain documented on their problem list during their first visit during the study period. Third, we followed the patients in time to figure out how chronic pain was treated with opioids or specialty pain treatment. For a full list of problems that qualify as 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 for other chronic pain, migraine, and chronic pain syndrome. Although the list of qualifying chronic pain diagnoses was more extensive, the data indicated that only a handful of patients were diagnosed with chronic pain due to trauma, chronic post-thoracotomy pain, or other postoperative pain. These diagnoses alone were inadequate for statistical analysis. Therefore, we combined the patients with these three diagnoses into the "other chronic pain" group.

From the patients' records, the authors collected information regarding the patients' race and ethnicity, coded as white non-Hispanic, black non-Hispanic, Hispanic of any race, and others. Sex was documented as male or female. Age was recorded as a continuous variable in the EHR. Research indicates that patients with chronic pain older than 60 years suffer for longer periods of time, have more comorbidities, and obtain chronic pain treatments more often [28, 29]. 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 or privately funded insurance. The authors collected opioid prescription information and coded the variable as current prescription or non-current prescription.

The following measures were developed based on patient EHR data and were relevant only to patients who utilized pain specialty care. The authors measured and categorized the number of primary care provider visits patients had before

Table 1 Chronic pain ICD-10 codes [16–21]

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

they were seen by a pain specialist (one visit, two visits, three or more visits). The number of days it took the patients to see a specialist from their last visit to their primary care provider was collected and measured as a continuous variable.

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

2.3 Statistical analysis

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

Preliminary data analysis demonstrated minimal intraclass correlations within the different clinic groups. Therefore, there were no similarities between clinics within a cluster or group. Based on this result, the authors used clinic groups as covariates to adjust all models, rather than clustering. The authors fitted a logistic regression model to assess potential confounders and adjusted for them to examine the relationship between chronic pain documentation on the problem list and the utilization of specialty care. The authors conducted unadjusted logistic regressions and then, using backward selection, an adjusted model. The final model included the covariates of age, sex, race, and clinic groups while excluding

insurance status and opioids. Although opioids met the significance criteria to remain in the model, the descriptive statistics showed a possible multicollinearity issue between opioids and specialty pain follow-up, and were therefore excluded. All the unadjusted and adjusted estimates are presented. This study was approved by the institutional review board of our institution.

3 Results

We extracted the medical records of 4531 patients with chronic pain. The characteristics of the sample are listed 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-Hispanics (54.1%), followed by Hispanics (22.5%), other unclassified groups (17.5%), and black non-Hispanics (5.9%). The most common diagnosis of chronic pain was other chronic pain (69.7%). The most common type of problem list entry was chronic pain (73.6%) (Table 4). Most participants utilized specialty pain care within 365 days of their index visit (87.1%), with pain specialists being the most common type of utilization (94.8%).

3.1 Cohort characteristics

Of the 4531 patient records, 3740 (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 male patients had chronic pain documented on their problem list. Documentation of chronic pain was more common among black non-Hispanics (86.0%) than among other racial groups (76.7%). Among patients who had 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 diagnoses among the patients with chronic pain documented on their problem list were other/unclassified pain (69.2%), migraine (16.6%), and chronic pain syndrome (14.2%). Among the patients who had chronic pain on their problem list, 98.4% did not have an opioid prescription, and 1.6% had a prescription.

3.2 Factors associated with a follow-up visit with specialty pain care

After controlling for all confounders and clinic groups, logistic regression found that chronic pain documented on the problem list was a significant predictor of specialty pain care utilization (see Table 5); pain documented on the problem list had 57% increased odds of receiving specialty pain care (odds ratio [OR] 1.57; 95% CI 1.19–2.07). Furthermore, females had increased odds of receiving specialty pain care compared to males (OR 1.24; 95% CI 1.02–1.51). Uncategorized racial and ethnic groups had decreased odds of receiving specialty compared to 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 with 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).

4 Discussion

This study aimed to explore the extent to which documenting chronic pain on a problem list was associated with the utilization of specialty pain care. To date, no study has examined the documentation of chronic pain in the problem list. However, compared to problem list studies examining other chronic diseases, this study has some similarities and differences. This study discovered that providers documented chronic pain in 82.5% of the patients' problem lists. These findings contrast with recent literature suggesting that chronic pain documentation rates are augmented by 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% [22]. Although the higher documentation rates found in this study are promising, it is essential to note that this study was conducted in a single metropolitan area.

The majority of the sample was female although the rates of chronic pain documentation were similar in men and women. Compared to their male counterparts, females are more likely to utilize pain management options [30]. Therefore, a higher utilization of pain management options might be associated with an increase in the documentation of chronic pain on the problem list. Among patients diagnosed with chronic pain syndrome, 93.5% had chronic pain documented

Table 3 Chronic pain patient characteristics

Study variables	Total sample (n = 4531)	Chronic pain not on problem list (n = 791)	Chronic pain on prob- lem list (n = 3740)	χ^2
	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)	–	–	

* p < 0.05

** p < 0.01

*** p < 0.001

Reporting column percent

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

Variables	Unadjusted		Adjusted	
	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	–	–

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Adjusted model selected using backwards selection and controlling for clinic groupings

on their problem list, compared with 77.2% of patients diagnosed with migraine. Chronic pain syndrome is associated with psychological and physiological disabilities [31, 32]. The difference between a diagnosis of chronic pain syndrome and the non-specific other chronic pain diagnoses comes down to the psychological aspect of the pain experience [32]. The additional components of psychological strain encompassed in 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 that increase the chance of documentation rather than pain alone.

Other chronic pain was the most common diagnosis in the present study. Similarly, chronic pain is the most frequently documented problem. Documentation and treatment of diseases are essential steps in the long-term management of chronic diseases. Experts recommend collecting information regarding a patient's pain history, location, severity, duration, and possible causes [33, 34]. However, primary care adherence to pain care standards, documentation, and practice remains inadequate [35]. The ambiguity behind diagnosing various issues as a single chronic pain diagnosis makes it difficult to track patient care. On the problem list, 10% of patients had back pain. The treatment of back pain and chest pain, which has never been listed as a problem, is vastly different. However, other than back pain, there is no specificity for the patient's type of pain. Although guidelines provide the best practices for managing chronic pain through pharmacological or non-pharmacological therapies [36], clarity of the kind of chronic pain the patient may suffer is essential.

Recognition of heart failure and chronic kidney disease on the problem list was associated with more evidence-based management [17, 19, 21]. These findings are consistent with those of our study, which showed 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 might be related to the provider. One might postulate that a provider with more chronic pain training might explain the association between these findings. Further research is

needed to address provider differences and stratify whether the result of a complete problem list is due to the additional awareness of the actual problem or the provision of better comprehensive care in general.

After controlling for all other covariates, including clinic clusters, sex was found to be 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 be significant, and the clinical significance is questionable [37]. The other unclassified chronic pain group had an increased utilization of specialty pain care. Migraine sufferers had decreased odds of using specialty pain care. This result is expected since migraine sufferers have clear established pain management guidelines, and specialty care is often unnecessary [38–40].

Although chronic pain is considered a symptom of bigger health issues, it is a health condition that needs focused efforts to address. This study highlights the clinical implications of documenting chronic pain on the problem list. The problem list serves as a reminder or quick summary of the health conditions. When used correctly, it helps providers navigate complex health problems by visually observing all possible related health issues at a single location. Although this health center did not have any automated clinical decision supports associated with chronic pain in the problem list, decision supports may increase pain specialty referrals. Further research should examine whether clinical decision support leads to meaningful improvements in chronic pain specialty care. Furthermore, more research is required on the automation of the problem list to reduce the documentation burden on providers [41].

A limitation of this study was 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 a provider's age can impact the type of care a person receives [42]. However, no literature has explored the variation in provider-to-patient demographic differences. Furthermore, it is possible that the better the physician, the more likely they are to document the problem on the problem list and recommend specialty care to the patient. This difference could be due to this confounding factor and not the documentation of chronic pain. Additionally, given the various definitions of chronic pain, diagnostic criteria for chronic pain may vary from provider to provider. This may lead to bias for follow-up care, as providers who diagnose a severe versus light case of chronic pain may seek follow-up specialty care at different rates. This is a limitation of all chronic pain studies that rely on diagnosis codes to identify patients with chronic pain.

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

A strength of this study is the inclusion of a large number of clinics and patients. Although these clinics are all in a single healthcare network, individual primary care clinics have their own pain management policies and practices. Such variability among these clinics increases their generalizability to other clinics within the California Metropolitan Area. Furthermore, this study is an essential first step toward value-based care. Value-based programs reward healthcare providers with incentives to provide quality care to patients with Medicare [36, 43]. This patient-centered care model prioritizes patient health outcomes [43]. Value-based care focuses on high-value care, such as preventative strategies, rather than first-line defense, such as opioids [44]. Research such as this study helps to identify new pathways to provide the best care to patients utilizing our current resources.

5 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 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 a problem list and patient follow-up in specialty pain care. Further research is required to explore these findings in different health systems and locations. This study may inform future research looking at automating problem list entries based on the relevant problems supported by the research.

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Data availability The data that support the findings of this study are available from the corresponding author, TR, upon reasonable request.

Declarations

Ethical approval and consent to participate This research was conducted retrospectively from data obtained for clinical purposes. We consulted extensively with the IRB of Dignity Health and UC Davis Health who approved this study. The IRB waived consent of patients as this research resents no more than minimal risk of harm to subjects.

Consent for publication The authors certify the accuracy of the content given to the journal. The lead author/corresponding author ensures that all the co-authors have agreed to the contents and will be notified when the manuscript is accepted. The corresponding author is answerable to all inquiries on behalf of the co-authors. All authors have seen and approved the final version of the paper and are aware of the submission of the paper.

Competing interests All authors have no competing interest.

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