

The assessment and treatment of back and neck pain: an initial investigation in a primary care practice-based research network

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Aim: The purpose of this study was to conduct an exploratory examination of the current state of non-malignant acute and chronic back and neck pain assessment and management among primary care providers in a multi-site, practice-based research network.

Background: Acute and chronic pain are distinct conditions that often require different assessment and management approaches, however, little research has examined assessment and management of acute and chronic pain as separate conditions. The large majority of patients with acute and chronic back and neck pain are managed in primary care settings. Given the differences between acute and chronic pain, it is necessary to identify differences in patient characteristics, practitioner evaluation, treatment and management in primary care settings. **Methods:** Over a two-week period, 24 practitioners in a multi-site practice-based research network completed 196 data cards about 39 patients experiencing acute back and neck pain and 157 patients suffering from chronic back and neck pain. **Findings:** There were significant differences between the patients experiencing acute and chronic pain in regards to practitioner evaluation, current medication management and current treatment for depression. In addition, diagnostics differed between patients experiencing acute versus chronic back and neck pain. Further, primary care providers' review of online drug monitoring program reports during the current visit was associated with current medication management using short term opioids, long-term opioids or tramadol. Most research examining acute and chronic pain focuses on the low back. Additional research needs to be conducted to explore and compare acute and chronic pain across the whole spine.

Key words: acute back and neck pain; chronic back and neck pain; non-malignant back and neck pain; primary care providers

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Introduction

The prevalence of non-malignant lumbar, thoracic and cervical pain (back and neck pain) in Western

industrial nations is overwhelming (Hoy *et al.*, 2012; Manchikanti *et al.*, 2013). Approximately 23% of the population experiences high degrees of pain and disability due to low back pain (Hoy *et al.*, 2010) and 15% experience disabling neck pain (Hoy *et al.*, 2012). Most research and clinical guidelines differentiate among acute (one month or less duration), subacute (one to three months) and chronic (greater than three months) back and neck pain.

Acute pain is the result of actual or near tissue injury (Goodwin and Bajwa, 2004). Chronic pain has been defined as pain that persists for periods between one and six months, but perhaps more importantly as pain that continues after a reasonable time has passed for an injury to heal (Goodwin and Bajwa, 2004; Pergolizzi *et al.*, 2013). While acute pain is associated with tissue injury or near injury, chronic pain is often associated with remodeling of the nervous system that allows perception of pain to persist after healing has occurred. Chronic pain is often also associated with psychosocial issues such as poor coping skills and depression (Goodwin and Bajwa, 2004; Pergolizzi *et al.*, 2013). Chronic pain then, is not a symptom, but a disease in its own right (Goodwin and Bajwa, 2004). Given the differences between acute and chronic pain, it is not surprising that the two problems often require different management approaches (Chou *et al.*, 2007, Agency for Healthcare Research and Quality, 2014).

When experiencing acute and chronic back and neck pain, patients typically visit a primary care provider first (Scott *et al.*, 2010) and then remain under the care of that provider. In fact, family physicians provide 56% of low back pain treatments (Airaksinen *et al.*, 2006). Considering the large majority of patients with acute and chronic back and neck pain are treated in primary care settings and the fundamental differences between acute and chronic pain, it is necessary to identify differences in their characteristics and management in primary care. Most research has examined the progression from acute to chronic pain (da C. Menezes Costa *et al.*, 2012; Mehling *et al.*, 2012; Heuch and Foss, 2013) but little research has examined the assessment and management of acute and chronic pain as separate conditions. Therefore, the purpose of this study was to conduct an exploratory examination of the current state of non-malignant acute and chronic back and neck pain

assessment and management among primary care providers in a multi-site, practice-based research network.

Methods

Procedure

This study was conducted through the Northeast Ohio Network (NEON[®]), the practice-based research network of the Northeast Ohio Medical University Department of Family and Community Medicine, as part of a larger study examining patients with back and neck pain or other types of pain, for example headache. A request to participate in the study was sent to all family physician and advance-practice nurse faculty members and family medicine residents of the Northeast Ohio Medical University. Over a two-week period eligible family physicians, advance-practice nurses and residents used a structured data collection card to record their care practices for evaluating and treating patients with acute and chronic back and neck pain. This convenience sample of health care providers was asked to complete one data collection card for each eligible patient visit. Patient visits were included in the study if the patient presented with a complaint of pain and was at least 18 years old. This work was approved by the internal review board of Northeast Ohio Medical University.

Instrument

Information recorded on the data card by practitioners included: patient demographics, pain location, length of pain (the data card only included two choices regarding the length of pain (acute <3 months, chronic ≥3 months or more)), type of visit for the pain (first visit, routine follow-up, unscheduled exacerbation), reason for visit (pain was primary reason for visit or pain was addressed in addition to other reasons for the visit) and current prescription and non-prescription medication management of the pain. In addition, practitioners noted referrals for pain management and other modalities including physical/occupational therapy, orthopedics, anesthesia, rehabilitative medicine and complementary alternative medicine (CAM) made during the visit. Finally, urine drug screens, serum drug levels, review of state prescription monitoring system reports [Ohio Automated Rx Reporting System (OARRS)], diagnostic tests ordered during

the visit, length to follow-up appointments, and past or present treatment for depression and substance abuse disorders were documented.

Statistics

Statistical analyses were performed using SPSS version 22 (IBM/SPSS Inc., Chicago, IL, USA) and Stata version 12 (StataCorp L.P., College Station, TX, USA) to compare patients experiencing acute and chronic back and neck pain on all variables. Analyses included *t*-tests for continuous variables and χ^2 for categorical and dichotomous variables. A multi-nominal logistic regression was conducted to assess predictors of whether the physician checked with OARRS either during the current visit, prior visit, or never.

Results

Twenty-four practitioners including seven third-year family medicine residents, eight family medicine residency faculty members, eight community-based family medicine physicians and one nurse practitioner completed and submitted 196 data cards. Thirty-nine cards were completed about patients presenting with acute back and neck pain and 157 patients experiencing chronic back and neck pain. The patients were predominantly female (64.7%) and Caucasian (80.2%), and the remainder (16.8%) primarily African American, with an average age of 50.9 years, ranging from 19 to 90 years.

There were no significant differences between patients experiencing acute and chronic pain in age or gender (Table 1). Although not quite significant, patients experiencing acute pain were more likely to be African American than patients experiencing chronic pain (26.3% versus 14.9%; $P = 0.06$) (Table 1). Patients with acute back and neck pain were significantly more likely than those with chronic pain to have pain as the only reason for the visit (63.2% versus 42.5%, $P = 0.02$) and for the current visit to be the first visit for the pain (78.4% versus 5.2%, $P < 0.01$). Patients with acute pain were more likely to use non-prescription pain medication (51.3% versus 29.9%, $P = 0.01$) or take a non-narcotic prescription medication for the pain (20.5% versus 7.0%, $P = 0.01$). Patients experiencing chronic back and neck pain were significantly more likely to use short and long acting opiates (51.0% versus 17.9%, $P < 0.01$; 17.8% versus 0.0%,

$P < 0.01$). Patients experiencing chronic pain were more likely to be receiving current treatment for depression (48.4% versus 10.5%, $P < 0.01$) and to be taking antidepressants, specifically SSRIs (12.1% versus 0.0%, $P = 0.02$). However, both groups had similar rates of previous treatment for depression. Patients experiencing acute and chronic pain also had similar rates of alcohol and substance abuse recovery as well as current problems with alcohol and substance abuse disorders.

During the current visit, primary care providers made referrals for patients with acute and chronic pain at similar rates, 20.5% and 31.2%, respectively (Table 2). Approximately 77% of patients with acute pain and 35.7% of patients with chronic pain never received a referral during the current or prior visits. Patients with acute and chronic pain were referred to physical and/or occupational therapy (17.9% versus 20.4%), orthopedics (7.7% versus 8.3%), anesthesia (0.0% versus 5.1%), rehabilitative medicine (0.0% versus 4.5%) and CAM (0.0% versus 2.5%) at similar rates during the current visit. Patients experiencing chronic pain were more likely to receive a referral to a pain specialist during the current visit than patients with acute pain (10.8% versus 0.0%, $P = 0.03$). During the current visit as well as prior visits, physical and/or occupational therapy were the most frequently referred specialties for both types of patients.

During the current visit, primary care providers ordered significantly more diagnostic imaging for patients experiencing acute back and neck pain (31.6% versus 8.5%, $P < 0.01$) and recommended a significantly shorter follow-up period (32.4 versus 52.2 days, $P < 0.01$). A χ^2 test examining the rates of provider ordered and reviewed state prescription drug monitoring program reports (OARRS) during the current visit for patients with acute and chronic pain approached but fell short of significance (11.8% versus 25.7%, $P = 0.08$). Practitioners were not likely to order urine drug screens for either type of patient (0.0% acute and 5.2% chronic).

To better understand the factors associated with checking OARRS reports, a multi-nominal logistic regression was conducted (results available upon request). Pain type (acute or chronic), visit type (first visit, routine follow-up, unscheduled exacerbation) and current substance abuse problem were not associated with checking OARRS reports at any point (never checked, checked during current visit, checked during previous visits). Only status

Table 1 Statistical comparison of patients experiencing acute and chronic back and neck pain: patient demographics, visit information, medication history and psychosocial history

	Acute (<i>n</i> = 39)	Chronic (<i>n</i> = 157)	Statistic
Demographics			
Gender (%)			$\chi^2(1) = 0.22, P = 0.64$
Female	22 (61.1)	96 (65.3)	
Race (%)			$\chi^2(4) = 7.26, P = 0.06$
Asian	1 (2.6)	–	
African American	10 (26.3)	23 (14.9)	
Caucasian	27 (71.1)	130 (84.4)	
Other	–	1 (0.6)	
Ethnicity (%)			$\chi^2(1) = 8.03, P = 0.04$
Hispanic	2 (5.3)	–	
Age (years)			$t(190) = -0.73, P = 0.47$
Mean (SD)	49.5 (16.3)	51.4 (14.8)	
About the visit			
Reason for visit (%)			$\chi^2(1) = 5.23, P = 0.02$
Pain only reason	24 (63.2)	65 (42.5)	
Type of visit for the pain (%)			$\chi^2(2) = 101.91, P < 0.01$
First visit	29 (78.4)	8 (5.2)	
Routine follow-up	6 (16.2)	125 (81.7)	
Unscheduled, exacerbation	2 (5.4)	20 (13.1)	
Medication history			
Current medication management			
OTC pain medication (%)	20 (51.3)	47 (29.9)	$\chi^2(1) = 6.33, P = 0.01$
OTC tried and failed (%)	10 (25.6)	69 (43.9)	$\chi^2(1) = 4.35, P = 0.04$
SNRI (%)	2 (5.1)	14 (8.9)	$\chi^2(1) = .60, P = 0.74$
SSRI (%)	–	19 (12.1)	$\chi^2(1) = 5.22, P = 0.02$
Tricyclic (%)	1 (2.6)	20 (12.7)	$\chi^2(1) = 3.38, P = 0.08$
Anticonvulsant (%)	4 (10.3)	15 (9.6)	$\chi^2(1) = 0.02, P = 0.55$
Muscle relaxant (%)	9 (23.1)	33 (21.0)	$\chi^2(1) = 0.08, P = 0.78$
Tramadol (%)	9 (23.1)	27 (17.2)	$\chi^2(1) = 0.72, P = 0.40$
Short acting opiate (%)	7 (17.9)	80 (51.0)	$\chi^2(1) = 13.79, P < 0.01$
Long acting opiate (%)	–	28 (17.8)	$\chi^2(1) = 8.12, P < 0.01$
Other non-narcotic (%)	8 (20.5)	11 (7.0)	$\chi^2(1) = 6.51, P = 0.01$
Total medications [Mean (SD)]	1.6 (0.9)	2.0 (1.2)	$t(190) = -1.61, P = 0.11$
Psychosocial history			
Depression history			
Current treatment (%)	4 (10.5)	47 (48.4)	$\chi^2(1) = 18.04, P < 0.01$
Past treatment (%)	4 (10.5)	17 (11.1)	$\chi^2(1) = 0.01, P = 1.0$
Substance abuse disorder history			
Current problem (%)	2 (5.1)	2 (1.3)	$\chi^2(1) = 2.32, P = 0.18$
Recovered (%)	1 (2.6)	14 (8.9)	$\chi^2(1) = 1.78, P = 0.31$
Alcohol abuse disorder history			
Current problem (%)	3 (7.7)	7 (4.5)	$\chi^2(1) = 0.68, P = 0.42$
Recovered (%)	2 (5.1)	12 (7.6)	$\chi^2(1) = 0.30, P = 0.74$

OTC = over the counter (i.e., no prescription required); SNRI = serotonin-norepinephrine reuptake inhibitor; SSRI = selective serotonin reuptake inhibitor.

as having either a long-acting opiate, a short-acting opiate or tramadol as part of current medication management was significantly associated with a checking an OARRS report during the current visit. Further investigation revealed OARRS reports were checked during the current or prior visits for 42.9% of the patients who had either a

long-acting opiate, a short-acting opiate or tramadol as part of their current medication management. A separate analysis was not conducted on urine drug screens due to the small number of patients (*n* = 8) who received a urine drug screen during the current visit. However, of the eight patients who received a urine drug screen, all presented with chronic pain

Table 2 Patients experiencing acute and chronic back and neck pain: primary care provider ordered referrals, diagnostics and follow-up period

	Acute (<i>n</i> = 39)	Chronic (<i>n</i> = 157)	Statistic
Referrals			
Overall referrals ^a			
Referrals made this visit (%)	8 (20.5)	49 (31.2)	$\chi^2(1) = 1.733, P = 0.19^b$
Referrals never made (%)	30 (76.9)	56 (35.7)	
Referrals made prior visit (%)	1 (2.6)	67 (42.7)	
PT or OT			
Referral made this visit (%)	7 (17.9)	32 (20.4)	$\chi^2(1) = 0.116, P = 0.73^b$
Referral never made (%)	31 (75.9)	71 (45.2)	
Referral made prior visit (%)	1 (2.6)	54 (34.4)	
Orthopedics			
Referral made this visit (%)	3 (7.7)	13 (8.3)	$\chi^2(1) = 0.014, P = 1.0^b$
Referral never made (%)	36 (92.3)	108 (68.8)	
Referral made prior visit (%)	–	36 (22.9)	
Pain specialist			
Referral made this visit (%)	–	17 (10.8)	$\chi^2(1) = 4.624, P = 0.03^b$
Referral never made (%)	39 (100)	111 (70.7)	
Referral made prior visit (%)	–	29 (18.5)	
Anesthesia			
Referral made this visit (%)	–	8 (5.1)	$\chi^2(1) = 2.072, P = 0.36^b$
Referral never made (%)	39 (100)	135 (86.0)	
Referral made prior visit (%)	–	14 (8.9)	
Rehabilitative medicine			
Referral made this visit (%)	–	7 (4.5)	$\chi^2(1) = 1.80, P = 0.35^b$
Referral never made (%)	39 (100)	139 (88.5)	
Referral made prior visit (%)	–	11 (7.0)	
CAM			
Referral made this visit (%)	–	4 (2.5)	$\chi^2(1) = 1.014, P = 0.59^b$
Referral never made (%)	39 (100)	148 (94.3)	
Referral made prior visit (%)	–	5 (3.2)	
Diagnostics ordered			
OARRS report			
Checked today (%)	4 (11.8)	39 (25.7)	$\chi^2(1) = 3.017, P = 0.08^b$
Never checked (%)	30 (88.2)	99 (65.1)	
Checked in the past (%)	–	14 (9.2)	
Urine drug screen conducted today (%)	–	8 (5.2)	$\chi^2(1) = 2.07, P = 0.36$
Imaging ordered today (%)	12 (31.6)	13 (8.5)	$\chi^2(1) = 14.26, P < 0.01$
Other diagnostic (%)	1 (2.9)	1 (.7)	$\chi^2(1) = 1.36, P = 0.36$
Recommended follow-up period (days)			
Mean (SD)	32.4 (23.4)	52.2 (36.0)	$t(52) = -3.67, P < 0.01$

PT = physical therapy; OT = occupational therapy; CAM = complimentary alternative medicine; OARRS = Ohio Automated Rx Reporting System (an electronic, online prescription drug monitoring system).

^a Breakdown of overall referrals for chronic pain is >100%. Patients could be counted in more than one category if, for example, a referral was made during the current visit for one specialty and a referral for a different specialty was made during a prior visit.

^b We examined statistical differences between acute and chronic pain only for referrals and OARRS reports conducted during the current visit since we were less interested comparing prior or no referrals/OARRS screens for acute and chronic pain.

and had either a long-acting opiate, a short-acting opiate or tramadol as part of their current medication management, representing a screening of 6.2% of the patients on these medications. Interestingly, of the 78.4% and 5.2% of patients presenting for a

first visit with acute and chronic pain (see Table 1), respectively, none received a urine drug screen. Likewise, none of the 5.1% and 1.3% of patients with acute and chronic pain and a current substance abuse disorder were given a urine drug screen.

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Discussion

Patients in this study with acute or chronic back and neck pain were similar in many ways, but there were also some key differences between these patients as well as physician practices. While several of these differences are consistent with previous research, others diverge from prior findings.

Patient gender was not related to pain type (chronic versus acute), but we did find that women were overrepresented in the current study, comprising ~65% of patients. Meta-analytic results regarding gender and care seeking for back pain have been mixed. A review of 11 studies by Ferriera *et al.* (2010) determined women were more likely than men to seek assistance for low back pain while Hunt *et al.* (2011) reported inconsistent findings for care seeking and gender. Although not significant, trends indicated that African Americans visited primary care providers at higher rates for acute than chronic back and neck pain as compared with Caucasians in the current study. African Americans typically receive lower quality assessment and treatment for pain (Green *et al.*, 2005; Burgess *et al.*, 2008) and African American patients with chronic pain report difficulties accessing and financing pain care compared with Caucasians (Green *et al.*, 2005). The challenges faced by African Americans experiencing chronic back and neck pain may be reflected in the results of the current research.

Levels of depression and psychological distress are generally higher in patients who experience chronic low back pain (Carey *et al.*, 2009). Similarly, we report higher rates of current treatment for depression and antidepressant use among patients with chronic back and neck pain than in patients with acute pain. Also consistent with previous research was the number of patients with chronic pain on short (51.0%) and long (17.8%) acting opioids (Carey *et al.*, 2009; Elder *et al.*, 2012). Only 17.9% of patients with acute pain were on short acting opioids and none were on long acting. Opioids have become increasingly prescribed for chronic pain although there is limited evidence of effectiveness for long-term relief of symptoms (Manchikanti *et al.*, 2010), and the risks for abuse and diversion are becoming better known (Volkow and McLellan, 2011). Unfortunately, we found that that none of the patients presenting for a first visit with acute or chronic pain received a urine drug screen, and only eight

(6.2%) patients who were prescribed either a short-term or long-term opioid or tramadol received a urine drug screen.

Without screening patients presenting with acute and chronic pain for current drug use, primary care providers may miss attempts by patients to procure controlled substances for the purposes of abuse or diversion. To reduce the incidence of this kind of drug seeking behavior, in 2006 the state of Ohio implemented OARRS. OARRS is an online drug monitoring program that provides a patient's history of filled controlled substance prescriptions (State Medical Board of Ohio, 2001). Each OARRS report allows a provider to see what reportable prescriptions have been filled, the number of doses and days supply dispensed, the prescribing provider and the dispensing pharmacy. Examination of an OARRS report may alert a provider to aberrant drug seeking behavior such as issuance of controlled substance prescriptions by multiple providers and filled at multiple pharmacies. Our additional analyses revealed that the only factor associated with review of OARRS reports was current medication management using short term or long-term opioids or tramadol. These reports had been reviewed for ~43% of patients using these controlled medications. At the time of our study, review of an OARRS report was optional in all circumstances. However, regulatory changes implemented since our data were collected mandate all physicians register with OARRS or receive disciplinary action. Further, beginning April 2015, the state medical board will require that OARRS is checked before prescribing an opiate or benzodiazepine and must be rechecked at least once every 90 days until the course of treatment ends (State Medical Board of Ohio, 2014). Consequently, the results of the current study may not reflect current or future practices regarding OARRS use.

Other studies have reported over utilization of referrals and diagnostic imaging when compared with clinical guidelines for patients with acute low back pain (Schroth *et al.*, 1992; Fishman *et al.*, 2004). Although the current study was not designed to assess adherence to guidelines, referrals rates among patients with acute back and neck pain were less than those for chronic back and neck pain patients. The large number of referrals for patients with chronic back and neck pain is consistent with other research (Carey *et al.*, 2009). Current clinical guideline recommendations for chronic low back

pain promote the use of nonpharmacological interventions such as spinal manipulation, physical and/or occupational therapy, yoga, acupuncture and interdisciplinary rehabilitation (Chou *et al.*, 2007). Interestingly, almost 36% of patients with chronic pain in the current study had never received a referral of any type. This indicates that many patients with chronic pain who might have benefited from referrals may not have received referrals or recommendations from their primary care provider. Clinical guidelines (Chou *et al.*, 2007) also recommend that patients with acute low back pain can benefit from spinal manipulation. Physical and/or occupational therapy was the most frequently made referral for patients with acute pain but only for ~18% of patients who presented with acute pain. These findings suggest that patients with acute pain may also have benefited from additional referrals and recommendations from their primary care provider.

This study presents a comparison of patient characteristics and physician practices for patients experiencing acute and chronic back and neck pain using data collection cards completed by primary care providers at the conclusion of eligible office visits. Card studies are an accepted and powerful tool to gather observational data in primary care settings (Westfall *et al.*, 2011). However, as in most card studies, the current research was dependent upon practitioners remembering to complete the card after an appropriate visit. As a result, data may have been missing from our sample. In addition, the current research was conducted in a regional practice-based research network and, therefore, the patients and health care provider practices may not generalize to larger populations.

The current study had a relatively small sample of patients with acute pain as compared with those experiencing chronic pain. Prevalence of acute low back pain is typically higher in population or community studies (estimates range from 7.6% to 37%) (Borenstein, 1997) compared with prevalence of chronic low back pain (estimates range from 2% to 10%) (Woolf and Pfleger, 2003; Koes *et al.*, 2006; Freburger *et al.*, 2009). However, individuals with acute low back pain, in particular those experiencing pain for less than two weeks, may be less likely to seek care (Ferreira *et al.*, 2010), potentially accounting for our small clinical sample of patients experiencing acute pain.

This research focused on back and neck pain, however, most work cited in the present study

focus on pain in the low back region. The paucity of existing research examining acute and chronic neck pain points to an important area for further investigation. Research needs to branch out and explore and compare acute and chronic pain across the whole spine. Further, additional research needs to be conducted examining the impact of changes in the state's online prescription drug monitoring program on primary care providers' prescribing and drug testing practices.

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Conflicts of Interest

None.

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional guidelines on human experimentation as approved by the Institutional Review Board at Northeast Ohio Medical University and with the Helsinki Declaration of 1975, as revised in 2008.

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