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Pain Quality by Location in Outpatients with Cancer

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ABSTRACT

Background: The McGill Pain Questionnaire (MPQ) pain quality descriptors have been analyzed to characterize the sensory, affective, and evaluative domains of pain, but have not been differentiated by pain location.
Aim: To examine MPQ pain quality descriptors by pain location in outpatients with lung or prostate cancer.
Design: Cross sectional.
Settings: Eleven oncology clinics or patients' homes.
Subjects: 264 adult outpatients (80% male; mean age 62.2 ± 10.0 years, 85% White).
Methods: Subjects completed a 100 mm visual analogue scale of pain intensity and MPQ clinic or home visit, marking sites where they had pain on a body outline and circling from 78 verbal descriptors those that described their pain. A researcher noted next to the descriptor spontaneous comments about sites feeling like a selected word and queried the subjects about any other words to obtain the site(s).
Results: Pain quality descriptors were assigned to all 7 pain locations marked by ≥ 20% of 198 lung or 66 prostate cancer patients. Four pain locations were marked with pain quality descriptors significanlty ($p < .05$) more frequently for lung cancer (53% chest—aching, burning; 58% back—aching, stabbing; 48% head—aching, sharp; and 19% arms—aching, stabbing) than for prostate cancer, which had significantly more frequent pain locations in the abdomen (64%—aching, burning) and lower back/buttocks (55%—aching, burning).
Conclusions: This type of pain characterization is innovative and has the potential to help implement targeted treatments for patients with cancer and other chronic pain conditions.

Cancer pain is a multidimensional symptom in body locations associated with disease progression that can damage one or more somatic, visceral, or neural tissue structures producing sensations of various qualities (Liu, Zheng, Tan, & Meredith, 2017). Current pain measurement tools typically do not capture the specificity of pain quality by pain location site, but such information could inform selection of pain therapies. Many years ago, researchers reported preliminary evidence to support site-specific pain quality scores in a small sample of patients with lung cancer (Wilkie, 1990). For example, pain located in the C6 or C7 spinal dermatomes and described as burning, numb, or radiating is typical of neuropathic pain of brachial plexopathy, a lung cancer syndrome (Brown,

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Ramirez, & Farquhar-Smith, 2014). The purpose of this study was to pursue this line of investigation in a larger outpatient sample with lung cancer and an outpatient sample with prostate cancer to identify the pain quality descriptors that were reported for various pain location sites.

Cancer pain causes physical pain and psychological suffering. Physical pain most often is caused by tumor enlargement, metastases, or both, which may lead to impingement on or invasion of bones, nerve plexuses, or the central nervous system (Liu et al., 2017). There may be invasion of soft, connective, and cutaneous tissue with acceleration of pathophysiologic processes, including pain (Hochberg, Elgueta, & Perez, 2017; Kumar, 2011). Myogenic pain, shingles, radiation fibrosis syndrome, peripheral neuropathy, lymphedema, postoperative pain, and joint infiltration are examples of secondary pain conditions that may result from either cancer itself or its treatment (Kumar, 2011; Wilkie, Huang, Reilly, & Cain, 2001b); some causes of pain are unknown (Wilkie, Huang, Reilly, et al., 2001b). Psychological suffering, specifically depression and anxiety, in patients with cancer differs with type and stage of cancer (Finnerup et al., 2015; Jacob, Bleicher, Kostev, & Kalder, 2016; Keyzer-Dekker, de Vries, Mertens, Roukema, & van der Steeg, 2014; Parahoo et al., 2013; Tang, Chang, et al., 2016a; Tang, Chen, Chou, Chang, et al., 2016b), presence of physical disfigurement (Ichikura, Yamashita, Sugimoto, Kishimoto, & Matsushima, 2016; Mahapatro & Parkar, 2005), presence of social support, symptom burden, perceived burden on others, proximity to death (Tang, Chen, Chou, Chang, et al., 2016b; Tang, Chen, Chou, Lin, et al., 2016c), fear of inadequate pain relief (Gavrin & McMenamin, 2008), fear of disease progression (Ahles, Blanchard, & Ruckdeschel, 1983), and fear of recurrence (Wagner, Bolling, Hambruegge, Hartlapp, & Krukemeyer, 2011).

The McGill Pain Questionnaire (MPQ) is the quintessential psychometric pain measure. It examines the multidimensionality of pain (Ahles et al., 1983; McGuire, 1984; Ngamkham et al., 2012; Wilkie, Lovejoy, Dodd, & Tesler, 1990). The total pain experience is captured within four domains: sensory (location, intensity, quality, and pattern), affective (anxiety, depression, and fear), evaluative (appraisal about the pain), and behavioral (behaviors that worsen or lessen pain) (McGuire, 1984; Melzack, 1975; Wilkie et al., 1990; Wilkie & Keefe, 1991; Wilkie, Williams, Grevstad, & Mekwa, 1995). The MPQ has four measures: (1) a body outline (sensory) on which the patient draws pain location(s) and the number of these pain sites is totaled; (2) a pain intensity (sensory) scale that rates current, least, and worst pain by choosing descriptors 0 = no pain to 5 = excruciating pain; (3) a pain pattern (temporal) question that asks how the pain changes over time; and (4) a pain quality scale (composed of sensory, affective, evaluative, and miscellaneous subscales) consisting of 78 pain quality descriptors that are selected to reflect the quality (nature) of the patient's pain (Ahles et al., 1983; McGuire, 1984; Melzack, 1975; Ngamkham et al., 2012; Wilkie, Huang, Reilly, et al., 2001b). These descriptors may be analyzed quantitatively or qualitatively. Quantitative scores for each subscale are totaled to obtain a pain rating index (PRI) (sensory [PRI-S], affective [PRI-A] evaluative [PRI-E], miscellaneous [PRI-M], and a total score) (Melzack, 1975). The 78 pain descriptors may also be used qualitatively to further characterize pain within the: (1) sensory domain to include descriptors that have spatial, temporal, thermal, pressure, and other characteristics; (2) affective domain to include descriptors that represent fear, tension, and autonomic characteristics; (3) evaluative domain that have descriptors that assess appraisal of pain severity; and (4) miscellaneous domain descriptors (Katz & Melzack, 1999). The number of words chosen, which over time is a reflection of changing pain status, is the number of the word groups, from which quality pain descriptors were chosen.

Because pain is a complex experience, its sensory, affective, and evaluative dimensions are interrelated and can influence patients' pain reports (Ahles et al., 1983; Haythornthwaite, Sieber, & Kerns, 1991; Kremer, Atkinson, & Ignelzi, 1982; Mishra, Bhatnagar, Chaudhary, & Rana, 2009). For example, depressed patients with pain choose more affective descriptors than nondepressed patients (Haythornthwaite et al., 1991; Mishra et al., 2009).

The MPQ provides important information for diagnostic purposes. Predictable clusters of pain quality descriptors have been used to differentiate between various pain syndromes (Dubuisson & Melzack, 1976) such as migraine and tension headache (Hunter & Philips, 1981), two different types of toothache (Grushka & Sessle, 1984), trigeminal neuralgia and atypical facial pain (Melzack, Terrence, Fromm, & Amsel, 1986), diabetic peripheral neuropathy (Boureau, Doubrère, & Luu, 1990), and lung cancer pain (Wilkie, Huang, Berry, et al., 2001a). Notably, patients with the same cancer diagnosis frequently selected the same pain quality descriptors. Lung cancer patients selected aching (sensory), annoying (evaluative), sharp (sensory), and tiring (affective) (Wilkie, Huang, Reilly, et al., 2001b); whereas head and neck cancer patients chose tender, sore, and burning (sensory); tiring (affective) and annoying (evaluative) (Epstein, Wilkie, Fischer, Kim, & Villines, 2009). MPQ pain quality descriptors have been used to determine nociceptive and neuropathic components of pain in lung cancer, sickle cell disease, and other chronic pain patients (Boureau et al., 1990; Savedra, Tesler, Holzemer, Wilkie, & Ward, 1989; Wilkie, Huang, Reilly, et al., 2001b). These determinations have enabled us to better characterize and treat chronic pain because it is known that neuropathic pain is more effectively treated with adjuvant drugs and less effectively treated with opioids (Arner & Meyerson, 1988; Cherny & Foley, 1994; McNicol, Midbari, & Eisenberg, 2013).

Cancer patients may have pain in a variety of sites. Marking pain locations on the MPQ body outline reflects the anatomic locations as well as distributions of pain. Marking multiple pain locations may indicate the progression of disease and/or metastases (Arner & Arner, 1985; Caraceni & Weinstein, 2001; Grond, Zech, Diefenbach, Radbruch, & Lehmann, 1996; Gutgsell, Walsh, Zhukovsky, Gonzales, & Lagman, 2003). The pain distribution of

Table 1
Frequency Distribution of Personal and Cancer Characteristics (N = 264)

Variable	Category	n	%
Personal Characteristics			
Gender			
	Male	212	80
	Female	52	20
Education Level (missing = 6)			
	≤8th grade	20	8
	High school	112	43
	Associate	51	20
	Bachelor's	47	18
	Master's	14	5
	Doctoral	14	5
Ethnicity (missing = 1)			
	White	225	85
	African American	22	8
	Hispanic	3	1
	Asian	5	2
	Other	8	3
Cancer Characteristics			
Cancer Type			
	Lung	198	75
	Prostate	66	25
Stage (missing = 6)			
	I	26	10
	II	34	13
	III	78	30
	IV	120	47

Table 2
Mean and Standard Deviation of Pain Characteristics (N = 264)

Variable	Mean	SD
Pain intensity		
Current pain (100-mm visual analog scale)	23.0	23.2
Pain quality		
PRI-S	11.5	7.4
PRI-A	1.6	2.1
PRI-E	1.9	1.7
PRI-M	3.2	3.4
PRI-T	18.1	12.2
NWC	7.4	4.2

SD = standard deviation; PRI-S = pain rating index–sensory; PRI-A = pain rating index–affective; PRI-E = pain rating index–evaluative; PRI-M = pain rating index–miscellaneous; PRI-T = pain rating index–total; NWC = number of words chosen.

lung cancer was in the anterior and/or posterior chest, brachial plexus, spine, and joints of the extremities or in other areas (Wilkie, Keefe, Dodd, & Copp, 1992). Patients with advanced lung cancer marked pain locations that were from three major sources: skeletal metastases, Pancoast tumor (in the lung apices with referred pain to the shoulder and down the medial aspect of the forearm, following the distribution of the ulnar nerve), and chest wall pain (Caraceni & Weinstein, 2001; Hochberg et al., 2017; Watson & Evans, 1987).

Although pain quality and its association with pain intensity (Dobratz, 2001), pain mechanisms (Boureau et al., 1990; Wilkie, Huang, Reilly, et al., 2001b), and affective effects (Kremer et al., 1982) have been studied, pain quality by pain location has been reported only in one abstract (Wilkie, 1990). Differentiation of pain quality by location promotes the understanding of pain etiology, pain dimensions, and progression of disease and could lead to etiology-targeted therapies. The specific aim of this study was to identify the MPQ pain quality descriptors for various pain location sites in outpatients with lung or prostate cancer.

Methods

Design and Setting

We conducted a descriptive study with secondary data. Using identical study instruments from 1989 to 1998, data were collected from outpatients. Three of the studies were conducted at oncology clinics of hospitals in the Puget Sound area of Seattle, Washington (Berry, Wilkie, Thomas, & Fortner, 2003; Wilkie et al., 1992, 1995, 2010a,b); one study was conducted in patients' homes in California and Colorado. The primary studies were approved by the Institutional Review Boards at the University of Washington, at the University of California at San Francisco, and at the recruitment facilities. Ongoing analysis of the deidentified data was approved by the Institutional Review Board at the University of Illinois at Chicago and the University of Florida. We combined the deidentified data from the three completed studies for analysis.

Participants

A total of 333 participants were outpatients with lung or prostate cancer in a preexisting deidentified data set (sample sizes ranged from 18 to 215); 264 met eligibility requirements (diagnosed with cancer and receiving ongoing oncology care for cancer treatment or symptom control, were aged 18 years or older, were able to read and write English, had completed the MPQ, and had consented to further research with their data). A total of 69 of 333 patients were excluded from the analysis either because they reported no pain on the data collection day (n = 42) or because the MPQ pain quality descriptor(s) were missing pain location identification (n = 27) and could not be analyzed. There were 212 men (80%) and 52 women (20%), whose ages ranged from 39 to 82 years (mean age 62.2 ± 10.0 years). The sample was predominately white (85%), with 8% African American, 1% Hispanic, 2% Asian, and 3% other ethnicities. Cancer characteristics are presented in Table 1.

Instruments

We used the 1970 MPQ version (Melzack, 1975) to measure (1) pain location(s) with a body outline drawing, and (2) pain quality with the 78 verbal pain quality descriptors. Six pain quality scores were obtained by summing the rank value of each PRI (Melzack, 1975; Wilkie et al., 1990). Each of the 78 descriptors was previously assigned to either the sensory, affective, evaluative, or miscellaneous subcategories. The PRI-S score ranges from 0 to 42; the PRI-A score ranges from 0 to 14; the PRI-E score ranges from 0 to 5; the PRI-M score ranges from 0 to 17; and the PRI-T score ranges from 0 to 78. The total number of descriptors selected was counted as the number of words chosen, limited to one word for each of the 20 groups. The MPQ has been reported to have good construct validity (sensory, affective, and cognitive) (Boureau et al., 1990; Byrne et al., 1982; Kremer et al., 1982; Kremer & Atkinson, 1981; McGuire, 1984; Melzack, 1975; Prieto et al., 1980; Reading, Hand, & Sledmere, 1983; Turk, Rudy, & Salovey, 1985), and strong criterion-related validity, including concurrent (r = 0.31-0.40) (Berry, Wilkie, Huang, & Blumenstein, 1999; Wilkie et al., 1995; Wilkie & Keefe, 1991), and good predictive validity (65%-77%) (Berry et al., 1999; Boureau et al., 1990; Dubuisson & Melzack, 1976; Wagstaff, Smith, & Wood, 1985; Wilkie & Keefe, 1991). Moreover, the MPQ had strong reliability, including good test-retest reliability (r = 0.70-0.90) (Berry et al., 1999; Graham, Bond, Gerkovich, & Cook, 1980; McGuire, 1984; Melzack, 1975; Wilkie et al., 1992, 1995; Wilkie & Keefe, 1991), and good sensitivity (Klepac, Dowling, Rokke, Dodge, & Schafer, 1981). The MPQ is well validated and has been used by many patient groups, including patients with cancer (McGuire, 1984; Melzack, 1975; Wilkie et al., 1990, 1995; Wilkie & Keefe, 1991).

We used a visual analog scale (VAS), which was a horizontal, 100-millimeter line anchored on the left with "no pain" and on the right with "pain as bad as it could be" (Wilkie et al., 1990). A pain intensity score is obtained by the participant placing a mark to indicate the intensity of present pain. Good validity (r = 0.64-0.81)

Table 3
Comparison of Pain Location Frequency Distribution by Cancer Type (N = 264)

Location	Total (N = 264)	Lung (n = 198)	Prostate (n = 66)	*p*
Head	111 (42%)	96 (48%)	15 (23%)	.000
Arms	43 (16%)	38 (19%)	5 (8%)	.033
Chest	113 (43%)	105 (53%)	8 (12%)	.000
Abdomen	79 (30%)	37 (19%)	42 (64%)	.000
Legs	74 (28%)	51 (26%)	23 (35%)	.158
Upper back	126 (48%)	114 (58%)	12 (18%)	.000
Lower back & buttock	69 (26%)	33 (17%)	36 (55%)	.000

Table 4
Comparison of Pain Descriptor Frequency by Type of Cancer (N = 264)

Type of Descriptor	Lung Cancer	Prostate Cancer	*p*	*q*
Sensory Descriptors				
Flickering	4%	3%	1.00	1.00
Quivering	6%	5%	1.00	1.00
Pulsing	12%	14%	.83	1.00
Throbbing	32%	24%	.28	.82
Beating	3%	0%	.34	.82
Pounding	11%	2%	.02	.37
Jumping	5%	2%	.30	.82
Flashing	8%	5%	.42	.91
Shooting	21%	15%	.37	.83
Pricking	10%	8%	.81	1.00
Boring	8%	3%	.26	.82
Drilling	2%	2%	1.00	1.00
Stabbing	23%	11%	.03	.37
Lancinating	1%	5%	.10	.63
Sharp	41%	29%	.08	.58
Cutting	4%	6%	.50	.92
Lacerating	4%	5%	.72	1.00
Pinching	11%	8%	.63	1.00
Pressing	21%	18%	.73	1.00
Gnawing	14%	6%	.12	.63
Cramping	21%	12%	.11	.63
Crushing	4%	3%	1.00	1.00
Tugging	7%	6%	1.00	1.00
Pulling	13%	5%	.07	.58
Wrenching	11%	11%	1.00	1.00
Hot	13%	12%	1.00	1.00
Burning	24%	30%	.33	.82
Scalding	3%	0%	.34	.82
Searing	3%	2%	1.00	1.00
Tingling	14%	14%	1.00	1.00
Itchy	20%	14%	.36	.82
Smarting	8%	8%	1.00	1.00
Stinging	10%	17%	.12	.63
Dull	26%	26%	1.00	1.00
Sore	29%	26%	.75	1.00
Hurting	22%	29%	.25	.82
Aching	41%	33%	.31	.82
Heavy	14%	5%	.05	.44
Tender	35%	24%	.13	.63
Taut	9%	9%	1.00	1.00
Rasping	4%	3%	1.00	1.00
Splitting	6%	3%	.53	.92
Affective Descriptors				
Tiring	31%	36%	.45	.92
Exhausting	24%	15%	.17	.77
Sickening	13%	11%	.83	1.00
Suffocating	8%	2%	.08	.58
Fearful	13%	3%	.02	.37
Frightening	13%	2%	.01	.28
Terrifying	5%	2%	.46	.92
Punishing	6%	8%	.77	1.00
Grueling	5%	2%	.30	.82
Cruel	3%	0%	.34	.82
Vicious	3%	2%	1.00	1.00
Killing	1%	0%	1.00	1.00
Wretched	6%	3%	.53	.92
Blinding	3%	2%	1.00	1.00
Evaluative Descriptors				
Annoying	50%	56%	.48	.92
Troublesome	20%	24%	.49	.92
Miserable	23%	17%	.30	.82
Intense	16%	12%	.55	.92
Unbearable	10%	8%	.63	1.00
Miscellaneous Descriptors				
Spreading	6%	2%	.20	.80
Radiating	10%	14%	.50	.92
Penetrating	12%	9%	.66	1.00
Piercing	13%	14%	.83	1.00
Tight	20%	12%	.20	.80
Numb	19%	8%	.03	.37
Drawing	3%	0%	.34	.82
Squeezing	5%	8%	.35	.82
Tearing	5%	5%	1.00	1.00
Cool	4%	3%	1.00	1.00
Cold	7%	0%	.02	.37
Freezing	2%	2%	1.00	1.00
Nagging	26%	35%	.21	.81
Nauseating	20%	2%	.00	.00
Agonizing	13%	9%	.51	.92
Dreadful	2%	2%	1.00	1.00
Torturing	6%	8%	.56	.92

The *q* values indicate significance levels adjusted for multiple comparisons using false discovery rate.

(Wilkie et al., 1990; Zimmerman, Duncan, Pozehl, & Schmitz, 1987), strong reliability ($r = 0.99$) (Scott & Huskisson, 1979), and sensitivity of the VAS as a measure of pain intensity have been reported in numerous studies (Huskisson, 1983; Scott & Huskisson, 1979; Wilkie et al., 1990; Zimmerman et al., 1987).

Procedures

For data collection, the investigators used a VAS and the paper-and-pencil 1970 version of the MPQ to measure pain location and quality. Standardized instructions asked patients to do the following:

1. Mark the intensity of their pain on the 100-millimeter VAS. We scored the VAS with a digitizer tablet, a highly reliable method (Huang, Wilkie, & Berry, 1996).
2. Mark their pain on the body outline of the MPQ. We scored this tool by summing the number of pain sites, and the depth of each pain site was indicated as either internal, external, or both.
3. Select words that characterized their pain from the 78-word pain quality descriptors list that represented sensory, affective, evaluative, and miscellaneous aspects of pain. Patients were then asked to indicate which of the selected pain quality descriptors were associated with each pain site marked on the body outline.

Data Analysis

We analyzed data using the R statistical program. Descriptive statistics were used to examine pain characteristics of the sample, pain locations, and pain descriptors. We then conducted χ^2 analysis on the pain descriptors selected for the seven most commonly chosen pain locations. The approach of false discovery rate was used to process the *p* values obtained from tests comparing pain quality descriptors by type of cancer because of the multiple tests that were needed to examine differences in the selection of each of the 78 pain quality descriptors. The resulting *q* values were considered statistically significant if they were <.05.

Results

Pain intensity scores (Table 2) ranged from 0 to 99 (mean 23.0 ± 23.2). Statistics for PRI rank scores appear in Table 2 as context for the study sample.

Pain Location

The frequency distributions of pain location for both the total sample and each type of cancer are shown in Table 3. Distinct differences in pain locations chosen by participants with lung or prostate cancer were identified. The most commonly marked pain

Table 5
Frequency Distribution by Pain Location for Pain Descriptors Selected by at Least 20% of Lung or Prostate Cancer Patients (N = 264)

Descriptor	Head (n = 111)	Arms (n = 43)	Chest (n = 113)	Abdomen (n = 79)	Upper Back (n = 126)	Lower Back & Buttock (n = 69)	Legs (n = 74)
Aching*	27%	26%	30%	27%	32%	35%	31%
Burning*	13%	19%	19%	22%	13%	14%	14%
Shooting*	11%	9%	15%	9%	14%	7%	14%
Pressing†	9%	5%	17%	11%	15%	13%	7%
Stabbing*	10%	9%	15%	11%	17%	7%	5%
Cramping†	7%	14%	10%	14%	8%	9%	18%
Itchy*	8%	9%	13%	8%	16%	9%	0%
Sharp†	22%	23%	23%	16%	28%	17%	19%
Sore†	18%	16%	25%	15%	20%	17%	11%
Hurting†	14%	26%	18%	19%	10%	22%	27%
Tender†	26%	28%	24%	15%	21%	14%	12%
Throbbing†	19%	19%	20%	8%	27%	14%	18%
Tight*	7%	7%	16%	8%	11%	10%	9%
Dull†	19%	9%	17%	18%	14%	22%	12%
Tiring‡	33%	21%	30%	37%	33%	25%	30%
Exhausting‡	18%	19%	20%	18%	22%	20%	18%
Annoying§	47%	42%	42%	48%	38%	43%	46%
Miserable§	20%	26%	19%	28%	22%	20%	23%
Nagging‖	28%	26%	25%	20%	21%	30%	18%
Troublesome§	21%	23%	22%	22%	17%	20%	16%
Nauseating‡	13%	14%	14%	14	12	4%	1%

* Neuropathic word.
† Nociceptive word.
‡ Affective descriptors.
§ Evaluative descriptors.
‖ Miscellaneous descriptors.

locations for lung cancer were the chest, back, and head; for prostate cancer they were the abdomen, buttocks, and legs. Although there were differences in pain locations by cancer type, six of the seven of the pain locations that represented the entire body were marked by at least 20% of participants with lung or prostate cancer; arms were selected by 19% of the lung and 8% of the prostate samples.

Pain Quality

Table 4 presents the pain quality descriptor selection by the two types of cancer. *Nauseating* was the only descriptor selected by a statistically significantly larger proportion of the sample with lung cancer (20%) than prostate cancer (2%, $q = .00$). No other descriptors were selected more often by cancer type after adjusting for the false discovery rate.

As shown in Table 5, at least 20% of participants selected a total of 21 pain quality descriptors (of a possible 78) from all three main domains (sensory, affective, and evaluative). Of those 21 pain quality descriptors, 12 were sensory, 2 were affective, 4 were evaluative, and 3 were miscellaneous. Of the reported descriptors, 7 were classified as neuropathic (*aching, burning, numb, radiating, stabbing, tingling,* and *itchy*), and 7 were classified as nociceptive (*sharp, hurting, tender, throbbing, sore, dull,* and *pressing*) (Wilkie et al., 2010a,b).

Pain Quality by Location

Table 5 also shows the different numbers of pain quality descriptors selected by at least 20% of the participants for each particular location: 8 for pain in the head; 16 for pain in the arms; 12 for pain in the chest; 9 for pain in the abdomen; 14 for pain in the back; 12 for pain in the buttocks; and 8 for pain in the legs. Participants indicated that all pain locations were described by three of the descriptor, *aching, annoying,* and *miserable,* meaning that these words were attributed to their pain in general rather than to a single site as was the case for the other descriptors.

Moreover, pain quality descriptors from all three domains (sensory, affective, evaluative) were assigned to all seven pain locations that were chosen by at least 20% of lung or prostate cancer patients. At the 20% criterion, the sensory domain pain quality descriptors attributed to pain in the head were *aching, sharp,* and *tender*; in the arms, *aching, burning, tingling, sharp, sore, hurting,* and *tender*; in the chest, *aching, burning, sharp, sore, tender, throbbing*; in the upper back, *aching, stabbing, itchy, sharp, sore, tender, throbbing,* and *pressing*; in the lower back and buttocks, *aching, burning, sharp, sore, hurting,* and *dull*; and in the legs, *aching, sharp,* and *hurting.* The descriptor *sharp* was reported for six of the seven body sites, excluding the abdomen. *Dull* was only assigned to the lower back and buttocks site.

Discussion

This quantitative descriptive analysis of MPQ pain quality descriptors by location revealed important insights into the nature of pain in outpatients with lung or prostate cancer. Greater insight is needed that pain at a location other than the primary tumor site may be related to the cancer itself. This knowledge may facilitate patients' improved awareness of the course of their disease, quicker and more focused provider assessments, and more effective treatments. We presented the context of the pain experienced by the sample, including description of its pain intensity, pain quality, and pain location, in these two patient populations. The descriptors were not selected differently by proportion of the sample with each type of cancer, except for *nauseating,* which was selected more often by patients with lung cancer than prostate cancer. Most importantly we identified the frequency distribution of pain quality descriptors by pain location as well as their assignment to the four domains of pain (sensory, affective, evaluative, and miscellaneous); this innovative methodology provides distinct characterization of pain in lung and prostate cancer patients. Also important was our examination of the sensory pain quality descriptors that may indicate neuropathic and nociceptive pain by location. Phenotyping

lung and prostate cancer in this way may enable pain treatments to be more targeted.

Examination of the three most commonly chosen pain sites in patients with lung cancer revealed that pain in the chest and back may be due to encasement of the primary tumor; tumor invasion of the parietal pleura and chest wall; and metastases to the ribs and thoracic spine (Hochberg et al., 2017; Potter & Higginson, 2004). Head pain may be due to brain metastases (Beckles, Spiro, Colice, & Rudd, 2003; Kvale, Selecky, & Prakash, 2007) or referred myofascial pain from the back, shoulders, and arms (Pancoast tumor invasion into the brachial plexus) (Hochberg et al., 2017; Jaeckle, 2010). Occiput and neck pain may be due to metastases to the cervical spine or compression of the spinal cord by the primary tumor (Brejt, Berry, Nisbet, Bloomfield, & Burkill, 2013) and/or sternocleidomastoid muscle spasm caused by splinting of the chest muscles from dyspnea and chronic coughing (Beckles et al., 2003). Interestingly, arm pain was described by neuropathic descriptors, such as *aching, burning, radiating,* and *tingling,* which is consistent with the pain of Pancoast tumor.

For prostate cancer, abdominal pain may be due to pressure from the primary tumor on the surrounding organs as well as impingement on the splanchnic nerves, which innervate the pelvic viscera and the sigmoid colon (Jaeckle, 2010; Johnson, 2010). Pain in the buttocks may be secondary to lumbosacral plexopathy with tumor impingement on the superior gluteal nerve, gluteus medius and gluteus minimus, tensor fascia latae, piriformis, and/or sciatic nerves; pain in the legs may be due to tumor impingement on the sciatic nerve, which branches into the common fibular and tibular nerves, and/or nerves that innervate the obturator internus, quadratus femoris, and the superior gemellus muscles (Brejt et al., 2013; Jaeckle, 2010). Also, the genitals, buttocks, and a portion of the posterior aspect of the legs are encompassed by the distribution of the second sacral dermatome (Wilkie, Corless, Farber, Forrest, & Holstein, 2018).

Examination of the frequency distribution of pain quality descriptors by pain location as well as their assignment to the four main domains of pain (sensory, affective, evaluative, and miscellaneous) for lung and prostate cancer enabled characterization of the sensory experience of the various pain sites. Further examination of the association between the sensory pain quality descriptors and neuropathic and nociceptive pain by location indicate that there may be elements of neuropathic and nociceptive pain in all seven of the most common pain sites reported by lung and prostate cancer patients.

There were several limitations of our study. The generalizability of our findings was limited by the use of a convenience sample. Future studies with larger samples should include reporting cancer pain by location separately for each type of cancer studied. We may then be able to determine the most common pain qualities for the most common pain sites for each type of cancer as well as for other chronic illnesses characterized by pain.

Implications for Nursing Practice

Implications for nursing may include requesting patients to map pain quality descriptors on MPQ body image drawings as part of the initial assessment of cancer or other chronic pain conditions and at future time points as needed. This practice has implications for identifying neuropathic pain. If pain is drawn in a radiating distribution and described using neuropathic descriptors, then pain medications specific for treating neuropathic pain may be needed. Also, worsening pathogenesis may be determined by repeated mapping of pain locations and pain quality descriptors with an increased need for analgesia and/or other pain relieving interventions.

Conclusions

Our findings from this study are important in that we were the first to characterize pain quality by location in outpatients with cancer and to establish a possible association of neuropathic and nociceptive pain in different pain sites. This level of pain characterization is highly innovative and has the potential to further the development of targeted treatments for cancer and chronic pain patients.

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