Breakout Session

Gender and Ethnic Disparities in Pain Management

Atul F. Kamath MD, Mary I. O'Connor MD

Published online: 29 January 2011
© The Association of Bone and Joint Surgeons® 2011

Abstract

Background Pain management is a complex and evolving topic. Treatment of pain must account for biochemical as well as social and economic factors. Sex, gender, and ethnic differences exist in the pathophysiology, diagnosis, and provision of care for patients with pain.

Questions/purposes We sought to identify the sex, gender, and ethnic disparities leading to care inequalities with respect to pain management. Our purposes were to (1) clarify the state of where we are now, (2) outline ways to approach where we need to go, and (3) generate solutions for how we get there.

Where are we now? Studies are beginning to uncover the biologic mechanisms underlying the pain response in sex, gender, and ethnic subgroups. Patient characteristics that increase the risk of postoperative pain are being identified.

Where do we need to go? Much work needs to be done in medical education with respect to sex, gender, and ethnic disparities in pain management. Research efforts must better describe differences in physiology of pain, incidence of pain, coping strategies, patient-doctor relationships, and

gender/ethnic-specific modes of care for the patient with pain.

How do we get there? Future work will involve combined efforts with pain/anesthesia specialty societies, developing a disparities and pain management curriculum for medical providers, endorsing health literacy, performing high-quality Level I/II research, and exploring systems processes in pain management in the acute hospital setting.

Introduction

Pain is a complex, multifactorial response to noxious stimuli from the environment. Individual patients experience pain in differing manners, and the processing, manifestations, and ultimate management of pain are highly variable. As the biochemical reactions to pain are being elucidated, the external and societal influences on pain management present a complex and intriguing issue (Fig. 1).

Pain is subjective, and the evaluation of pain is currently largely based on patient-derived assessments. As pain directly influences social behaviors, the goal of care is to match the individual patient needs and pain condition with an appropriate, patient-centered plan of care. Pain management should decrease pain, increase function, and improve quality of life. This care plan must also address the particular adaptations and responses to pain with respect to sex, gender, and ethnicity.

The management of pain is integrally linked to the treatment of the patient's underlying orthopaedic condition, and treatment success is related to the provider's ability to correctly identify and address disparities in care. With respect to sex (the chromosomal complement of an individual), gender (the influence of society on an individual),

One or more of the authors (MIO) was a paid consultant for Zimmer Inc (Warsaw, IN) during the last 12 months. One or more of the authors (MIO) is a board member of the American Association of Hip and Knee Surgeons and the Association of Bone and Joint Surgeons and a member of the Board of Trustees of *Clinical Orthopaedics and Related Research*.

A. F. Kamath
Department of Orthopaedic Surgery, Hospital of the University
of Pennsylvania, Philadelphia, PA, USA

M. I. O'Connor (✉)
Department of Orthopedic Surgery, Mayo Clinic Florida,
4500 San Pablo Road South, Jacksonville, FL 32224, USA
e-mail: oconnor.mary@mayo.edu

Fig. 1 A diagrammatic representation of potential sources of gender differences in pain is shown. Gender differences in pain generation have multiple overlapping causes. Image courtesy of Linda LeResche, ScD. Modified and reprinted with kind permission and copyright © 1992 of Springer Science + Business Media BV from Dworkin SF, Von Korff M, LeResche L. Epidemiologic studies of chronic pain: a dynamic-ecologic perspective. *Ann Behav Med.* 1992;14:3–11 (Fig. 1).

and ethnicity, we sought to identify the disparities leading to value-assigned inequalities in care provision with respect to pain management.

The purposes of our breakout session were to (1) clarify the state of where we are now, (2) outline ways to approach where we need to go, and (3) generate solutions for how we get there.

Where Are We Now?

The experience (perception) of pain involves a cascade of biochemical response to stimuli, which result in emotional responses, behavioral adaptations, and psychosocial coping strategies. Sex, gender, and ethnic/racial influences on pain pathways must be examined more closely. Discussion among physicians, social scientists, and epidemiologists in the breakout session on disparities in pain management first addressed the present state of knowledge in this area.

There is an increased prevalence of multiple pain syndromes among women [30], and a number of individual pain syndromes, such as fibromyalgia and tension headaches, have higher prevalences in women [2]. Women may report more disabling pain after knee surgery [19, 20]. Pain catastrophizers may be more often female or in ethnic, such as Hispanic, subgroups [11]. Predictors of increased post-operative pain after primary and revision TKA are female sex, young age, and increased preoperative pain [26]. A delay of surgical treatment resulting in more severe preoperative functional loss may contribute to a “never

catch-up syndrome” seen for women in the total joint arthroplasty literature [25]. Minorities may experience amplification of chronic mental health illnesses with the onset of acute pain, and they suffer greater interference with daily activities and missed work hours due to pain [31].

The neurologic pathways of pain have been well studied [22]. Along with multiple pathways of pain generation, there are multiple types of pain (eg, neuropathic). Biologic (nociceptive) aspects of pain underlie gender and ethnic responses. A lower threshold for pain in African Americans and Asians has been demonstrated [3]. Although ethnic differences exist in pain prevalence and the reporting of pain, it is unclear whether neurobiologic differences exist in pain generation and processing across races. It is also poorly understood whether differences exist in the placebo response with respect to sex, gender, and ethnicity or the effectiveness of multimodal pain treatment in gender and ethnic subgroups. Drug metabolism for pain medication differs across a number of factors, including sex [18], age, body mass index, and hepatorenal function. Effectiveness of certain medications, such as statin therapy for hyperlipidemia, may be less pronounced for women than for men [10]. Functional brain imaging is an evolving and promising research tool for sex, gender, and ethnicity studies.

Hormonal factors may play a role in response to pain, such as in the clinical expression of migraine pain [16]. Furthermore, life stages and associated hormonal milieu (puberty, pregnancy, menopause) may be more predictive of pain response than age alone [13]. Sex differences exist in the neurobiology of pain pathways, and work has been performed on the influence of hormones (eg, estrogen) on pain levels. In women, pain experienced is inversely proportional to estrogen level along the reproductive cycle [27]. Opioid (mu) pain receptor activation has been related to estrogen level across the sexes [27]. It is unclear whether the same mu receptor polymorphisms (eg, COMPT) exhibit differences across ethnicities, such as in genetic differences in nicotine receptor activation [14]. As testosterone levels in men decrease with chronic pain medication use and IGF-1 levels differ between men and women after TKA [19, 20], perhaps other pain-activated factors (eg, substance P) vary with respect to sex and/or ethnicity.

Formal instruction in pain management in provider education is lacking. Current curriculums in medical school usually include only several hours of dedicated pain management teaching, and there is little teaching in the psychosocial aspects of pain diagnosis and treatment outside of traditional pharmacology or psychiatry coursework. Other advanced-degree health professional schools devote limited time to pain management classes, and differences in quality and exposure to this topic likely exist across provider types.

Both overt and unconscious biases exist in provider delivery of pain medications. A discord has been demonstrated between physician and patient views of a given diagnosis [17], which may be compounded by patient or provider fears of addiction, efficacy, side effects, and cost. Fear and emotions factor into outcomes after total joint arthroplasty [12]. Minorities have higher rates of fear surrounding medical care, and minorities may more commonly suffer from helplessness and self-blame in the face of disease [23]. Patient trust may relate to prior experiences or a collective memory of adverse events (eg, Tuskegee experiments) that may have deep geographic and historical roots.

Access to care, including rehabilitation services, social support, and insurance restrictions, may complicate postoperative care. Minorities may be more likely to use acute-care settings over primary care offices for routine care [9]. Poor quality of health education and literacy for minorities and the notion that male patients “speak the same language” as physicians [4] when compared to female counterparts are problematic. Minorities may have more limited time for treatment and may sacrifice physical therapy sessions or psychiatry visits to attend work [21]. The overall lost work time is similar across the sexes, but men and women are away from work for differing conditions/reasons [28]. Women are more likely to access care for their pain, but this may be due to a higher incidence of reported pain events compared to men [24].

Where Do We Need to Go?

Delivery of care to patients with pain involves treating the entire patient, not simply the patient's pain or individual body part. Accurate communication and patient education protect against compliance issues and aberrant psychosocial responses or expectations of pain.

Pain in the acute setting must be distinguished from and managed differently from chronic pain. The practicing orthopaedist must be equipped to handle pain in relation to acute surgical problems, and better recognition must be made for pain as a “fifth vital sign.” A clearer definition for who is responsible for managing pain in specific clinical settings is needed, and appropriate management of narcotics to underserved populations awaiting surgery is justified. This may result in a better connection between the community or primary care provider and the orthopaedic surgeon.

Pain research is complex. Level I/II studies should focus on pain management regimens. Ideally, studies would be industry-independent. Such studies should include questions related to sex and ethnic effects on metabolism, along with neurobiologic/genetic differences across ethnicities.

Researchers must focus on time dependence of pain and response to treatment (eg, intraoperative, perioperative, 2 weeks postoperative). Identification of pain catastrophizers, understanding their pain generators, and developing tailored treatment algorithms will be important. Exploring comorbid mental health diseases (eg, depression) for all patients will help with predictive treatment models. This research should also examine the effectiveness of provider empathy, patient self-management, and reasons for why patient compliance may lag.

Future directions must identify and eliminate bias at a number of levels. Patient bias may involve distrust of remedies, medical systems, and physician roles. Minorities may underreport pain when dealing with opposite-sex providers or with physicians perceived to be of “higher status.” System/provider bias is evidenced by differential pharmacy opioid stocking rates by socioeconomic region [8] or emergency room analgesia discrepancies [29]. Differences in prescribing practices for white versus nonwhite patients have also been documented in postoperative patients, patients with cancer, and patients with chronic pain in the Veterans Affairs system. Physicians may routinely underestimate pain in nonwhite groups, and differentials may exist in referrals for nerve blocks or the propensity to increase pain medication doses. Despite data from the Veterans Affairs system showing no difference in drug diversion with respect to ethnicity [1], overt or unconscious concerns of providers regarding addiction, safety, and drug diversion based on ethnicity may influence prescribing practices. Furthermore, physicians may have limited exposure to certain minority groups based on location and scope of practice. “Cultural programming” [6] may bias interactions between the physician and patient. Minority patients with osteoarthritis may be less likely to know other minority patients who have undergone total joint arthroplasty [4].

Cultural practices, including complementary/alternative treatments and the role of prayer as pain-coping strategies, influence response and adherence to treatment. Alternative therapies should be explored as a means of providing more culturally competent care; such therapies must be studied to assess their effectiveness. Biofeedback, acupuncture, chiropractic care, yoga, nutraceuticals and dietary supplements, and anti-inflammatory diets all play into complementary and alternative medical options. Likewise, faith-based healing methods show strong cultural and ethnic influences. Increased education and training of providers are needed in these areas.

Pain metrics may need to be re-evaluated for their applicability, specificity, and validity for gender- and ethnic-related issues. They may be poor tools for longitudinal healthcare disparities research in studying subjective pain end points over time. A number of pain scoring

systems, including the Pain Anxiety Symptom Scale, visual analog scale (VAS), and fear score, have been used in the orthopaedic literature [12]. Targeted patient preference reports may more closely inform practitioners to patient concerns, and models of patient preferences-expectations (expectancy-value model [5], risk-return model [32]) may offer insight into compliance issues.

How Do We Get There?

The breakout session format is helpful for generating ideas and synthesizing themes or inadequacies in the literature. However, it is largely based on expert opinion related to the content and scope of the topics presented in the symposium. Moreover, practical limitations existed on the number of individuals in the breakout session; the presence of additional experts from other disciplines, such as pain management, anesthesia, physical medicine and rehabilitation, and primary care would have proved a more robust multidisciplinary review. Finally, although much work is now being done to examine gender and ethnic disparities in pain management, the recommendations from this session are limited by the historically limited studies on the topic, including the orthopaedic literature with respect to gender and ethnic functional and clinical outcomes.

An effective approach to tackling issues of sex, gender, and ethnicity in pain management should combine the efforts of the American Academy of Orthopedic Surgeons with those of other subspecialty groups such as the American Pain Society, American Academy of Pain Management, and the International Association for the Study of Pain. Combined projects might include research initiatives, pain treatment protocols, Continuing Medical Education/Maintenance of Certification/in-training examination programs, and dissemination of literature to both providers and patients.

A teaching curriculum on pain management for primary care physicians, anesthesiologists/pain specialists, and orthopaedists regarding sex, gender, and ethnic pain issues is important to advance provider knowledge. For the practicing orthopaedic surgeon, a primer on the top five issues in pain management may provide useful guidelines and enhance their knowledge base. Potential covered topics may include when sex, gender, and/or ethnicity concerns may be important in terms of pain management, how to gauge patient compliance, assessing efficacy of pain medications, directed information from pain specialists, and protocols for dealing with chronic versus acute pain (and, within acute pain, topics may include care of patients with acute fractures versus postoperative care of patients with total joint arthroplasty). The management of the “addicted” patient and threshold for referral to pain

specialists should be added. Along with education of providers, education of patients is of high importance. This includes expanding health literacy for common orthopaedic issues and pain management. Importantly, cultural competency in training [15] must teach core clinical skills of empathy and sex, gender, and ethnicity awareness in practice. The healthcare provider must receive formal pain management training that respects sex, gender, and ethnicity in its scope.

Effective research would ideally be independent from industry sponsorship and utilize quality metrics in pain evaluation and control. Research work must include quality Level I/II studies addressing both inpatient/acute-care research and community-based outcomes. Longitudinal, epidemiologic studies with pain as a primary variable of interest, along with qualitative assessments of physician-patient interactions, will improve our focus. The genetic response to pain and the biologic pathways of potential sex, gender, and/or ethnic differences may prove key research targets. Ultimately, research may afford better predictive models for screening “at-risk” patients and shed light on the optimal timing for surgical interventions in relation to sex-, gender- and ethnicity-specific influences on pain.

The role of the drug development industry in furthering research will be an evolving topic. Equal ratio across genders and ethnic groups must be sought in randomized controlled trials. A number of pharmaceuticals, including certain cardiovascular and other medications withdrawn from the market, may preferentially and adversely affect women [7]. Dosing calculations for medications should take into account sex and/or ethnic variables, along with traditional weight-based and clearance systems. Drug marketing should more appropriately address the health literacy and needs of gender and ethnic populations.

Multidisciplinary pain forums must connect the patient (individual), society (group), and providers (system). This nexus must include primary care, orthopaedics, rheumatology, pain management, anesthesia, psychiatry, and pharmacy. Comanagement of acute-care patients may provide better care. Likewise, preoperative counseling and expanded social supports for “pain-catastrophizing” patients may foster a sense of improved patient education, patient-centered care, and advocacy.

Finally, work must be done to improve system processes of pain assessment in the hospital setting. Standardized, visual (eg, VAS) feedback for real-time pain control, time-sensitive responses to pain medication requests, and teams designed specifically to address pain in the acute postoperative patient may advance care while increasing patient satisfaction and governmental compliance requirements.

Acknowledgment We thank Kelly Viola for her assistance with manuscript preparation.

References

1. Becker WC, Fiellin DA, Gallagher RM, Barth KS, Ross JT, Oslin DW. The association between chronic pain and prescription drug abuse in veterans. *Pain Med.* 2009;10:531–536.
2. Berkley KJ. Sex differences in pain. *Behav Brain Sci.* 1997;20:371–380; discussion 435–513.
3. Campbell CM, Edwards RR, Fillingim RB. Ethnic differences in responses to multiple experimental pain stimuli. *Pain.* 2005;113:20–26.
4. Chang HJ, Mehta PS, Rosenberg A, Scrimshaw SC. Concerns of patients actively contemplating total knee replacement: differences by race and gender. *Arthritis Rheum.* 2004;51:117–123.
5. Feather J. Using macro variables in program evaluation. *Eval Program Plann.* 1982;5:209–215.
6. Gardenswartz L, Rowe A. Diversity management: practical application in a health care organization. *Front Health Serv Manage.* 1994;11:36–40.
7. Government Accountability Office. Drug safety: most drugs withdrawn in recent years had greater health risks for women. Report GAO-01-286R. 2001. Available at: <http://www.gao.gov/products/GAO-01-286R>. Accessed November 22, 2010.
8. Green CR, Ndao-Brumblay SK, West B, Washington T. Differences in prescription opioid analgesic availability: comparing minority and white pharmacies across Michigan. *J Pain.* 2005;6:689–699.
9. Halbert CH, Armstrong K, Gandy OH Jr, Shaker L. Racial differences in trust in health care providers. *Arch Intern Med.* 2006;166:896–901.
10. Karp I, Chen SF, Pilote L. Sex differences in the effectiveness of statins after myocardial infarction. *CMAJ.* 2007;176:333–338.
11. Keefe FJ, Lefebvre JC, Egert JR, Affleck G, Sullivan MJ, Caldwell DS. The relationship of gender to pain, pain behavior, and disability in osteoarthritis patients: the role of catastrophizing. *Pain.* 2000;87:325–334.
12. Lavernia CJ, Alcerro JC, Rossi MD. Fear in arthroplasty surgery: the role of race. *Clin Orthop Relat Res.* 2010;468:547–554.
13. LeResche L, Mancil LA, Drangsholt MT, Saunders K, Korff MV. Relationship of pain and symptoms to pubertal development in adolescents. *Pain.* 2005;118:201–209.
14. Li MD, Beuten J, Ma JZ, Payne TJ, Lou XY, Garcia V, Duenes AS, Crews KM, Elston RC. Ethnic- and gender-specific association of the nicotinic acetylcholine receptor alpha4 subunit gene (CHRNA4) with nicotine dependence. *Hum Mol Genet.* 2005;14:1211–1219.
15. Lundine K, Buckley R, Hutchison C, Lockyer J. Communication skills training in orthopaedics. *J Bone Joint Surg Am.* 2008;90:1393–1400.
16. Marcus DA. Interrelationships of neurochemicals, estrogen, and recurring headache. *Pain.* 1995;62:129–139.
17. National Community Pharmacists Association. Take as directed: a prescription not followed. 2006. Available at: <http://www.ncpanet.org/pdf/adherence/patientadherence-pr1206.pdf>. Accessed November 22, 2010.
18. Oertelt-Prigione S, Regitz-Zagrosek V. Gender aspects in cardiovascular pharmacology. *J Cardiovasc Transl Res.* 2009;2:258–266.
19. Pagura SM, Thomas SG, Woodhouse LJ, Ezzat S. Women awaiting knee replacement have reduced function and growth hormone. *Clin Orthop Relat Res.* 2003;415:202–213.
20. Petterson SC, Rasis L, Bodenstab A, Snyder-Mackler L. Disease-specific gender differences among total knee arthroplasty candidates. *J Bone Joint Surg Am.* 2007;89:2327–2333.
21. Poleshuck EL, Green CR. Socioeconomic disadvantage and pain. *Pain.* 2008;136:235–238.
22. Riley JL 3rd, Robinson ME, Wise EA, Myers CD, Fillingim RB. Sex differences in the perception of noxious experimental stimuli: a meta-analysis. *Pain.* 1998;74:181–187.
23. Riley JL 3rd, Wade JB, Myers CD, Sheffield D, Papas RK, Price DD. Racial/ethnic differences in the experience of chronic pain. *Pain.* 2002;100:291–298.
24. Robinson ME, Riley JL 3rd, Myers CD, Papas RK, Wise EA, Waxenberg LB, Fillingim RB. Gender role expectations of pain: relationship to sex differences in pain. *J Pain.* 2001;2:251–257.
25. Santaguida PL, Hawker GA, Hudak PL, Glazier R, Mahomed NN, Kreder HJ, Coyte PC, Wright JG. Patient characteristics affecting the prognosis of total hip and knee joint arthroplasty: a systematic review. *Can J Surg.* 2008;51:428–436.
26. Singh JA, Gabriel S, Lewallen D. The impact of gender, age, and preoperative pain severity on pain after TKA. *Clin Orthop Relat Res.* 2008;466:2717–2723.
27. Smith YR, Stohler CS, Nichols TE, Bueller JA, Koeppel RA, Zubieta JK. Pronociceptive and antinociceptive effects of estradiol through endogenous opioid neurotransmission in women. *J Neurosci.* 2006;26:5777–5785.
28. Stewart W, Ricci J, Chee E, Morganstein D, Lipton R. Lost productive time and cost due to common pain conditions in the US workforce. *JAMA.* 2003;290:2443–2454.
29. Tamayo-Sarver JH, Hinze SW, Cydulka RK, Baker DW. Racial and ethnic disparities in emergency department analgesic prescription. *Am J Public Health.* 2003;93:2067–2073.
30. Von Korff M, Stewart WF, Simon DJ, Lipton RB. Migraine and reduced work performance: a population-based diary study. *Neurology.* 1998;50:1741–1745.
31. Ware JE Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. *Med Care.* 1996;34:220–233.
32. Weber E, Blais A, Betz N. A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors. *J Behav Decis Mak.* 2002;15:263–290.