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The influence of culture, socioeconomic status and genetics on the perception of pain and efficacy of pain treatments

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The influence of culture, socioeconomic status and genetics on the perception of pain and efficacy of pain treatments

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THE INFLUENCE OF CULTURE, SOCIOECONOMIC STATUS AND GENETICS
ON THE PERCEPTION OF PAIN AND EFFICACY OF PAIN TREATMENTS

By:

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The Influence of Culture, Socioeconomic Status and Genetics on the Perception of Pain and Efficacy of Pain Treatments

The International Association for the Study of Pain (IASP) defines pain as: “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (n.d. a). Pain is often considered the fifth vital sign (Lynch, 2001) and is the most common reason people seek out medical help (Potter & Perry, 2009). In 1968 Margo McCaffery famously wrote “Pain is whatever the experiencing person says it is, existing whenever he says it does” (McCaffery, 1968, p. 95). Pain relief is a human right (American Pain Foundation, 2001). It is a nursing responsibility to assess pain in patients (Potter & Perry 2009). Furthermore, accurate assessment of pain is so important that Michigan nurses are required to take one continuing education contact hour every two years in pain and pain symptom management. This is the only specified area for continuing education in the state of Michigan (Public Health Code Act, 1978). Uncontrolled pain can have many sequelae including loss of function, loss of income and increased depression. Because pain has psychological, social, and spiritual as well as physical dimensions, it is greatly influenced by cultural factors (Fink & Gates, 2006).

Practice guidelines from the Agency for Healthcare and Research Quality require that clinicians assess patient’s pain at least once per shift. Additionally, pain should be reassessed after treatment is given ([AHRQ], 2011). In the past, immigrants were nearly forced to give up their culture and assimilate to an “American Culture.” However, today many more immigrants are holding on to their native cultures and traditions. By 2050 racial and ethnic minorities will constitute 50% of the United States population. With the

immigrant and minority populations growing rapidly, nurses must learn strategies for caring for patients from diverse cultures in order to provide safe and high quality health care.

The population of the United States is rich with immigrants who brought with them many different cultures. Many of these immigrants also have genetic variations that affect the way pharmaceuticals are metabolized in their bodies. Culture can be affected by socioeconomic status, race and gender. Some of the cultural traditions that are observed may have roots in these genetic differences. For example, studies have shown that 20-50% of people with Chinese-Asian heritage are “non-converters” of the CYP450 liver enzyme. This means that codeine (which is processed with this enzyme) will not work in 20 - 50% of these patients. Perhaps not coincidentally, many alternatives to “Western” analgesics are used by patients of Chinese-Asian descent (Cherniacka, Ceron-Fuentes, Floreza, Sandalsa, Rodriguez, & Palacios, 2008).

Nurses should have a basic understanding of these genetic differences in order to identify possible reasons for inefficacy of treatments. Many patients who consistently rate their pain as uncontrolled are labeled as drug seekers, when in reality, the patient could be a “slow metabolizer” and the medication is simply not working (Bonham, 2001). While it is impossible for a nurse to know all the genetic differences and their effects, nurses should be aware that they exist so that they can offer an alternative treatment.

When patients belong to a culture or speak a language that is different from that of their health care provider, the provider faces additional challenges in successfully assessing and managing the patients’ pain. In the United States, the largest single culture

is based on white Anglo-Saxon Europeans, known as WASPs. Approximately 75% of primary care providers are WASPs and 92% of nurses are WASPs and their primary language is English (Shavers, Bakos, & Sheppard, 2010). This means that most patients that will need special consideration of culture in their care also fall into a minority category, such as African American, Hispanic or Asian. Minority patients are at high risk for poor pain outcomes (Green et al., 2003).

The Effect of Cultural Barriers on Accurate Pain Assessment

It is human nature to project one's personal beliefs and values onto another person, even if the two people have never met before. As a nurse, overcoming one's biases and ethnocentric interpretation of interactions with patients is essential for an accurate assessment of a patient. Accurate communication can be very difficult between people who come from different cultures. Ironically, even defining exactly what constitutes "culture" can be somewhat difficult. Most definitions broadly define culture as being patterns that are used as models for learning behavior that are acquired and transmitted by symbols, including the distinctive achievements of human groups. This learned behavior is made into the traditions of a particular culture (Kroeber & Kluckhohn, 1952). It is very easy for misunderstandings to occur when people from such varied backgrounds, and who might not even speak the same language, attempt to communicate with each other. It is essential that nurses developed strategies, both verbal and non-verbal, to be able to communicate with patients (Gunnarsdottir, Donovan, & Ward, 2003).

Davidhizer and Giger (2004) recommend six cultural categories to explore in order to aid in providing understanding between patients and their healthcare providers.

Table 1 lists these six recommended categories along with specific things for which to watch.

Table 1 Strategies to Aid Healthcare Workers Provide Culturally Sensitive Care	
Communication	language/dialect, willingness to share, gestures, eye contact, emotional expressiveness, reticence, respect, deference.
Space	comfort level and proximity to others, touch practices.
Social organization	family relations, role of elders, gender issues, religion.
Time	past versus present orientation, attention to schedules/timetables.
Environmental control	mastery of nature, health prevention values, health and illness beliefs.
Biological variations	appearance, genetic inheritance, disease susceptibility, nutrition

Nurses should anticipate common cultural barriers that can arise in health care settings, for instance, most Muslims prefer to be taken care of by a person of the same sex. Nurses should understand the most frequent patient-related barriers to pain management such as fatalism (this was meant to happen), fear of addiction, wanting to be a “good patient” and not complain, fear that treating the pain will mask the real problem and fear of harm to the immune system (Brant, 2001).

Nurses should also keep in mind the subjectivity of numeric rating scales and be aware of other indicators of pain. For instance, if a numeric pain tool that’s translated for a Chinese patient is presented horizontally instead of vertically, as Chinese is read, the patient could be confused about how to convey his level of pain (Beyer, Villarreal &

Denyes, n.d.). If a patient is reporting that his or her pain is a 3 or a 4 on the numeric pain scale, and yet they cannot perform activities of daily living, further discussion about the pain is needed. When some patients are asked to rate their pain on a numeric scale they will choose numbers that have spiritual or superstitious values rather than as a representation of their pain (Burhansstipanov & Hollow, 2001).

Many patients from different cultures will not use the “expected” words to describe pain, such as “burning” or “sore,” but rather, will use things with which they are familiar. Khari LaMarca who has created the Inter-Cultural Pain Action Network gives several examples of Native American’s descriptions of their pain. These include lightning striking trees, spider webs, drums, or animals not being able to behave normally (for example: salmon not being able to swim upstream). Unfortunately, many times healthcare providers do not understand what the patients are trying to say and instead label them as crazy and uncooperative (Kaegi, 2004). This has resulted in the patient’s pain not being treated (Brant, 2001).

Discrimination Based on Culture

All healthcare workers understand the extreme time constraints that come with patient care. Time constraints make communication difficult and so rather than trying to actually understand a patient; clinicians often rely on preconceived notions and stereotypes. The groups that have more negative stereotypes associated with them are also more likely to have worse outcomes. Many studies have shown that patients from racial and ethnic minorities receive fewer opioid analgesics, epidural analgesia and patient-controlled analgesia for labor or postoperative pain. They are also less likely to be prescribed Cox-2 inhibitors for arthritis pain and are more likely to have longer wait

times in receiving analgesics (Pletcher, Kertesz, Kohn & Gonzales, 2008). Studies have demonstrated that many health care providers tend to associate minority groups with drug-seeking and drug-abusing behaviors. The belief that certain minority groups are seeking medications to use for illegal purposes has resulted in fewer medications being prescribed for minority groups in compared to Caucasians. (Burgess, Van Ryn, Crowley-Matoka & Malat, 2006)

Access (Pharmacies stocking opiates)

A study done in Michigan found that pharmacies in lower-income but predominantly “white” zip codes (>70% whites) were 54 times more likely to have sufficient opioid analgesic supplies than pharmacies in similar lower-income but predominantly minority zip codes. However, locally owned pharmacies were more likely to have sufficient opioid supplies than chain pharmacies such as CVS. One explanation of this phenomenon is that the owners of the locally owned pharmacies are of the same culture and ethnic group as the customers they serve and so have no bias towards them. Whereas, the upper management at the chain pharmacies fear and distrust the customers that live near pharmacies in minority zip codes (Green, Ndao-Brumblay, West & Washington, 2005). This inadequate stocking of analgesics by chain pharmacies inherently causes lower quality of pain treatments.

Language Barriers

Self-report of pain is considered the most accurate nursing assessment of pain, therefore it is necessary that good communication exist between the patient and the nurse. Accurate assessment can be difficult when cultural and language barriers are present (Wilson-Stonks, Lee, Cordero, Kopp, & Galvez, 2008). Interpreters and translation

services are vital to effective communication with patients whose language differs from the nurse's. Current accreditation and regulatory standards require health care providers to use competent medical interpreters (Office of Minority Health, 2001). Title VI of the 1964 Civil Rights Act states that recipients of federal funds may not run their programs in such a way as to create discrimination on the basis of race, color or country of national origin. The Office for Civil Rights at the Department of Health and Human Services enforces this act. Language is an aspect of country of national origin. Therefore, organizations that receive federal funding are required to provide language interpreters for access to its services (United States Department of Justice, 1964).

Even with an interpreter present, misunderstandings arising from the different nuances of words are magnified when the patient's primary language is different from the nurse's. Many words in one language do not easily translate into another and the true meaning is lost in translation. Furthermore, some languages have no equivalent for the English word "pain." Others have several equivalents for "pain," each with different connotations (Davidhizar & Giger, 2004). Nurses should be open to many different descriptions of pain, even if they are not the ones typically used.

Non-Western Medicine Treatments

Culture also influences beliefs about what pain treatments are appropriate. Pharmacology and surgery are emphasized in Western culture, whereas Eastern cultures tend to prefer medicinal herbs, touch, and energy therapies such as acupuncture and yoga (Cherniacka, Ceron-Fuentes, Floreza, Sandalsa, Rodriguez, & Palacios, 2008). Many people believe that the primary treatments for pain should be spiritual rituals or other acts that balance hot and cold or yin and yang (Unruh, 2007). Some of these therapies can be

quite disconcerting to nurses who are not familiar with them. For example many Chinese practice “cupping” to release pain from muscles. A small cup is heated in order to create a vacuum between the inverted cup and the patient’s skin. The suction from the cup is supposed to draw blood to that area reducing stagnation and ridding the muscle of pain. However, it leaves welts on the area where it was applied and these marks have been mistaken for signs of abuse (Cateret, 2010)(Figure 1).

Cao gio, also called “Ccining” is also used by many Asians. Oil is applied to the skin, and the coin is rubbed back and forth over a painful area until raw marks are seen. It is believed to help reduce inflammation. It also leaves welts that may be mistaken for signs of abuse (Figure 2).

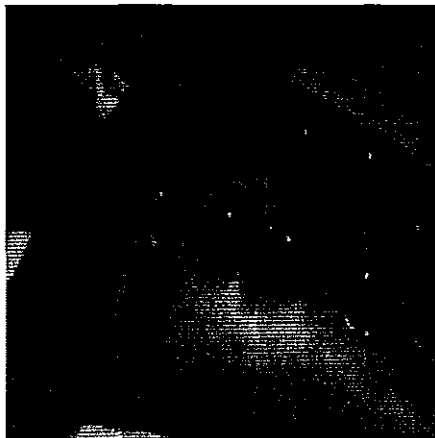


Figure 1



Figure 2

Nurses may automatically discourage patients from using alternative methods for treatment of pain. However, all folk remedies are rooted in someone’s cultural history,

and intolerance towards them is cultural discrimination. Additionally, this can create a barrier that hinders nurses' ability to help patients. If a nurse is not receptive to the idea of a patient practicing alternative therapies the patient may not inform his or her health care provider about these therapies. And yet, alternative therapies can interfere with medical therapy. For instance, if a patient is taking aspirin or warfarin and also does "coining" they could induce hemorrhaging (Cherniacka et al., 2008). Culturally based therapies also include religious based therapies. For example, members of the Church of Jesus Christ of Latter-day Saints will often request a blessing from a priesthood holder (Figure 3). Catholics often request to have Last Rites administered in the hospital (Figure 4) (Ondeck, 2003.)



Figure 3



Figure 4

Cultural traditions that have benefits, as shown by research, should be permitted. The nurse should even aid the patient to perform these traditions if needed. Cultural traditions that have been shown to have no benefit, but also no detriment to the patient, should also be allowed to be practiced. The very belief by the patient that these alternative therapies can help them has been shown to have a therapeutic effect. However, cultural traditions that are harmful to the patient's health should be discouraged through patient education and open communication between the healthcare providers and the patient (Narayan, 2003).

Strategies to Reduce Cultural Biases in Pain Assessment

Self-Inventory

Mary Narayan, who is a transcultural nurse consultant, has created a self-inventory to help nurses explore his or her own biases and feelings concerning pain (2010). A nurse must be aware of his or her own biases before he or she can begin to understand a patient's. This questionnaire can assist nurses in identifying areas in which they might improve the ability to give quality care to culturally diverse populations.

<p>Table 2</p> <p>Self-Assessment Questions to Help Nurses</p> <p>Determine Their Cultural Norms Concerning Pain</p>
When you were a child, how did those who cared for you react when you were in pain?
How did they expect you to behave when you had a minor injury?
How did they encourage you to cope when you had severe pain?
How did they encourage you to behave during an injection or procedure?
When those who cared for you as a child were in pain, how did they react?
What words did they use to describe the pain?
How did they cope with their pain?
Do you tend to follow their example?
Consider a painful experience you've had as an adult (for example, childbirth, a fracture, a procedure).
How did you express (or not express) your pain?
Did the pain cause you fear? What were you afraid of?
How did you cope with the pain?
How did you want others to react while you were in pain?
Have you ever felt "uncomfortable" with the way a patient was reacting (or not reacting) to pain?
What did the patient do that concerned you?
Why did you feel that way?
Do you have "feelings" (make value judgments) about patients in pain who:
Behave more stoically or expressively than you would in a similar situation?

Table 2 Continued Self-Assessment Questions to Help Nurses Determine Their Cultural Norms Concerning Pain
Ask for pain medicine frequently or not often enough?
Choose treatments you don't believe are effective or with which you are unfamiliar?
Belong to a cultural group (ethnic, linguistic, religious,socioeconomic) different from your own?
Do you tend to feel certain reactions to pain are "right" or "wrong"? Why? What about these reactions makes them seem right or wrong?
Are some expressions or verbalizations of pain "right" or "wrong"?
Some descriptions of pain?
Some treatments for pain?

Tool to Aid in Discussion of Beliefs About Pain

Open interviews that allow for descriptive responses, rather than simple yes or no questions, can help in communication between nurses and patients from various cultural backgrounds. Dr. Lasch, a social worker from The Health Institute, which is part of the New England Medical Center, created the following tool that contains suggested questions to help identify a patient's beliefs about pain (2000).

Table 3 Tool to Elicit Beliefs About Pain
What name do you give your pain?
What do you call your pain?
Why do you think you have this pain?
What does the pain mean for your body?
How severe is it?
Will it last a short or long time?
Do you have any fears about your pain? If so, what do you fear the most?
What are the problems that your pain causes for you?
What kind of treatment do you think you should receive?
What are the most important results from the treatment?
What remedies have you tried to help you with your pain?
Have you seen a traditional healer for your pain?
Who, if anyone, in your family do you talk to about your pain? What do they know? What do you want them to know?
Do you have family and friends that help you because of your pain?
Who helps you?

Mitchell Weiss (1997), a psychiatrist who specializes in transcultural psychiatry and is a primary developer of the theory of Explanatory Interviews created The Explanatory Model Interview Catalogue (EMIC) for Cultural Study of Illness Experience. The questions are open ended to allow the patient to explain his or her feelings in his or her own term. Example questions that would be used in an explanatory model interview are included in Table 4.

Table 4 Explanatory Model Interview for Pain Assessment
What do you think is causing your pain?
When did it start? Why do you think it started when it did?
What do you fear most about the pain?
What problems does it cause you?
What have you used to help you with the pain? How does it help?
Who else have you consulted about the pain? A Family Member? A traditional healer?
What treatments do you think might help you with the pain?
Who helps you when you have pain? How do they help?

Cross Cultural Teaching Tools

The United States is such a uniquely diverse country that it is unrealistic to expect health care workers to know all the traditions of every ethnic or cultural group they could encounter in practice. Culture is also dynamic and is changing ever faster with the help of modern communication such as the internet and cell phones. Variations within a culture, especially socioeconomic class differences, provide remarkable variability. The impossibility of knowing the intricacies of each culture necessitate the use of tools to help health care providers better able to understand their patients' needs and comprehension of any instructions given. At the Family Practice Residency at San Jose Health Center a process-oriented model for teaching was created to elicit cultural, social and personal information relevant to the current interaction between a healthcare provider and the patient. The tool uses the mnemonic LEARN. L stands for Listen; especially try to understand the patient's perception of the problem E Explain your perceptions of the problem. A Acknowledge and discuss the differences and similarities R Recommend treatment N Negotiate agreement (Berlin & Fokes, 1983). This tool is very open ended which allows each party a chance to try to explain their perspective. Health care

providers who have used the LEARN tool have reported better acceptance and compliance with treatment plans in cross cultural patients. The biggest constraint on this type of open interview is the amount of time it takes (Narayan, 2010).

Socioeconomic Status

Many multicultural patients are also minorities and also fall into lower socioeconomic categories (Meghani, Byun & Gallagher, 2010). Because of this, many multicultural patients face more obstacles obtaining health insurance and healthcare services than their Caucasian counterparts. As a result, many multicultural patients use the emergency department as their primary care provider. This results in inconsistent care for chronic conditions such as chronic pain (Meghani, 2011).

Many studies have shown that in emergency departments minorities receive fewer prescriptions for opioids compared to Caucasians, even for the same injuries and diseases. Minorities also have longer times between entering an emergency department and receiving treatment for pain. There are several proposed explanations for this phenomenon. One is that most multicultural patients live in areas that are medically underserved compared with Caucasian patients, and so there are simply not enough staff to care for them in a timely manner (Meghani, Byun & Gallagher, 2010).

In studies of chronic pain sufferers African American patients more frequently than Whites reported the belief that pain medication could not control their pain. Hispanics and African Americans more frequently than Whites reported fear of addiction to pain relievers (Shavers, Bakos & Sheppard, 2010). It is important for healthcare providers to be aware of these concerns in order to be able provide the appropriate treatment.

Uncontrolled pain affects every facet of a person's life. It can contribute to depression, inability to perform activities of daily living and obesity. Pain is associated with anxiety, problems maintaining physical function, relationships, and employment. Therefore, pain management needs to be multidisciplinary and a patient might need to see several different practitioners. If they have to pay a co-pay for each practitioner, low income patients might be forced to forgo appointments with the referred specialists. Many minorities and lower income people use the emergency room as their primary care provider and could never afford to receive care from a physician that they were referred to from the ER (Meghani, 2011).

There is still an emphasis on solely controlling pain with medications rather than non-pharmaceutical interventions such as chiropractor, acupuncture, massage etc. Insurance companies will not cover many of these "alternative treatments" even though studies have shown many of them work better than pharmaceuticals for certain types of pain (Tan et al., 2007).

Patients from minority cultures, including African Americans, low-income, and less-educated individuals are more likely than their white counterparts to have to choose between buying food or buying medication. They also more frequently face having to choose between buying medication for chronic conditions, such as diabetes, or buying pain medication. This means that many patients from different cultures selectively forgo pain medications to be able to afford treatments for other more life threatening diseases. This leaves many patients without adequate pain control. Some patients try to substitute over-the-counter medications rather than the more expensive prescribed ones (Kurlander, Kerr, Krein, Heisler, & Piette, 2009).

Insurance and Out of Pocket Costs Limiting Adequate Treatment

As stated previously in this paper, patients that are categorized as needing special considerations based on culture, often are also in the categories of poverty and are minorities. Patients that fall into these categories often do not have insurance, or are underinsured. In 2010 46.7 million Americans (15.4%) were uninsured and 59.1 million (19.5%) were underinsured. Minority populations account for one quarter of these uninsured and underinsured (Cohen & Martinez, 2010).

Many of these same patients also have the most physically demanding jobs. The poor and minorities tend to suffer from more severe uncontrolled pain, have more chronic untreated or inadequately treated comorbid conditions and more work related injuries. Many studies have demonstrated a correlation between these combined factors and the increased amounts of pain reported by racial/ethnic groups (Meghani & Cho, 2009). In other words, patients from minority cultures experience more pain because they are at risk for more injuries and have less access to medical providers than their Caucasian counterparts (Portenoy, Ugarte, Fuller & Haas, 2004).

Patients from minority cultures are also likely to wait until they are much more sick before they seek out healthcare. Many of these patients use the emergency room as their primary care provider because they are guaranteed service regardless of their ability to pay. Once they finally seek care in the emergency room, these patients are then more likely to be admitted to the hospital to bring their condition under control. Lack of a primary care provider will create gaps in care which will result in worse treatment outcomes (Salimah & Meghani, 2011).

Genetics

Some cultural groups' reluctance to use pain medications may be related to genetic differences that make them more likely to experience adverse effects. For instance, some patients do not produce certain enzymes and therefore metabolize drugs more slowly than is typically expected based on drug trials that were performed on predominately Caucasian males (Munoz, & Hilgenberg, 2005). For example, many Chinese-Asian patients cannot convert codeine into the morphine like metabolites that give the drug its analgesic property, making them less likely to receive adequate pain relief and more likely to have gastrointestinal problems (Johnson, 1997).

Codeine is a "pro-drug" that must be metabolized by the cytochrome P-450 liver enzyme CYP2D6 to be changed into a form that has analgesic properties in the body. Codeine itself has a much lower ability (200 times lower) to be able to attach to the opioid receptors than its metabolite. Therefore, if a patient does not have the CYP2D6 enzyme they likely will experience negligible pain relief and more adverse drug effects. This phenomenon has led some patients to be labeled as "drug seekers" when in actuality they are not receiving any therapeutic affect from the drug (Eckhardt, Li, Ammon, Schanzle, Mikus & Eichelbaum, 1998).

The genes that code for these liver enzymes can make over 100 different combinations, called allelic variations. Each of these variations metabolizes drugs in a slightly different way. The alleles have been categorized into three or four (depending on which genetic system is used) general identifiers based on the rate of metabolism and the amount of the active form of codeine in the blood at a given time (Drendel, 2007). These categories are nonfunctional, reduced function, and duplicated alleles, sometimes referred

to as high function. Each person receives two alleles, so if a patient has all nonfunctional alleles then their phenotype would also be nonfunctional and they would receive no benefit from a drug such as codeine. On the other end of the spectrum, if a patient has all high functioning alleles they may process the medication rapidly, have rapid onset of pain relief, but also have rapid onset of excretion from the body. Knowledge of a patient's phenotype would allow healthcare providers to tailor treatment.

In December 2004, the biotech company Roche Genomics introduced the Amplichip CYP450, which could allow clinicians to test patients for many of these genetic variations. Potentially this test could allow health care providers to prescribe completely individualized pharmaceuticals for each patient based on their geno and pheno types (Sweeney, 2007). However, the test has some limitations. For example, it does not cover some rarer genotypes, and some of the genes purposes that it does test for are not completely understood at this time. The test is also fairly expensive, costing anywhere from \$600 - \$1,300 (Wikipedia, n.d.). Most insurance companies still do not cover the price of the test because the test is "experimental, investigational or unproven" (Drendel, 2007).

Patients who are mostly European descent most commonly have two functioning alleles and so experience pain relief from codeine and similarly processed medications. It is estimated that two non-functioning alleles occur in 6% to 10% of non-Hispanic whites, 50% of people of Asian descent, 2.2% to 6.6% of Hispanics, and 1.9% to 7.3% of African American populations (Lotsch, Skarke, Liefhold, & Geisslinger, 2004).

There are many alternative analgesics that do not require CYP2D6 conversion to an active pain reliever and so could potentially eliminate the problem of some patients

not receiving adequate treatment. Hydrocodone is able to bind to opiate receptors both in its original form and in that which it is metabolized. Oxycodone is also able to bind to opiate receptors in both its original form and its first metabolized form. However, oxycodone is processed a second time by a different CYP pathway in liver. First through CYP3A, this accounts for approximately 50% of the dose. Then it is processed through the same CYP2D6 enzyme as codeine and is changed to oxymorphone. While patients who are low CYP2D6 processors will not be able to receive the benefit of oxycodone in this form, this only accounts for about 10% of the analgesic of oxycodone (Schwarz, 2003). It is still important for healthcare providers to be aware of this because patients who are considered poor metabolizers will need higher doses of oxycodone. In one study the “poor metabolizer” of the group required the highest dose of opioid, had the poorest pain control, and required the most breakthrough pain medication (Drendel, 2007).

There are also more than 100 variations of the μ opioid receptor (OPRM1), which is the primary binding site of opioid analgesics (Ikeda, Ide, Han, Hayashida, Uhl, & Sora, 2005). The most common variation (SNP A118G) decreases the potency of opioids by a factor of 2 to 3. Depending on ethnicity, the allele can be found in 2% to 48% of the population (Drendel, 2007).

All of this is very difficult to memorize and most patients will not choose to have the genetic test to determine their phenotypes. Therefore, it would be helpful to develop a list of alternative analgesics that work in different ways so that an effective analgesic can be prescribed for a patient. The nurse should be aware of the basic medications in this table and the suggested analgesic alternatives.

TABLE 5		
Opioids and the Enzymes That Affect Their Metabolism		
Drug Type	Opioid	Metabolizing Enzyme
Opium alkaloids	Codeine	CYP3A4, CYP2D6, UGT2B7
	Hydrocodone	CYP2D6, CYP3A4, other minor non-P450 enzymes, UGT family enzymes
	Morphine	UGT1A3, UGT2B7
	Oxycodone	CYP2D6, CYP3A4, UGT family enzymes
Semisynthetic derivatives	Dihydrocodeine	CYP2D6, CYP3A4, UGT2B7
	Hydromorphone	UGT1A3, UGT2B7, dihydromorphinone ketone reductase
	Oxymorphone	UGT2B7, UGT1A3
Phenylheptylamines	Methadone	CYP3A4, CYP2B6
Oripavine derivatives	Buprenorphine	CYP3A4, CYP2C8, CYP3A5, CYP3A7, CYP2C9, CYP2C19, CYP2C18, UGT family enzymes
Phenylpiperidines	Fentanyl	CYP3A4
	Meperidine	CYP3A4, CYP2B6, CYP2C19
	Remifentanyl	Nonspecific blood and tissue esterases
	Sufentanyl	CYP3A45

TABLE 5 Continued		
Opioids and the Enzymes That Affect Their Metabolism		
Diphenylpropylamine derivatives	Loperamide	CYP2B6, CYP2C8, CYP2D6, CYP3A4
	Propoxyphene	CYP3A4
Others	Naloxone	UGT family enzymes, mainly UGT2B7
	Naltrexone	Aldo-keto reductase, UGT family enzymes
	Tramadol	CYP2D6, CYP2B6, CYP3A4

Pharmacogenetic Differences Between the Sexes

Women report experiencing pain more often and with greater intensity than men suffering similar ailments. Gender influences not just the perception of pain, but also how a patient copes, an individual's preferred medications, and even the analgesic doctors prescribe (Jones & Zachariae, 2004). Females require twice the dosage as males to experience the same amount of pain relief. Morphine binds to μ opioid receptors to decrease pain. Males have more of the μ receptor than females (Wiesenfeld-Hallin, 2005). Rates of absorption and transit times for opioids are nearly twice as long females (91.7 hours) than males (44.8 hours). Oral contraceptives can also affect the bioavailability of a drug (Zhang et al., 2007). The typically higher percentage of body fat in women increases the onset of action and prolongs duration of lipid soluble drugs, and most drugs are lipid soluble (Soldin, & Mattison, 2009).

Studies have also demonstrated that CYP enzymes are influenced by hormones. Estrogen has been shown to bind and modulate membrane ion channels and receptors,

which affect the heart and opioid receptors (Tsuchiya, Nakajima & Yokio, 2005). The number of opioid receptors and dopaminergic function is also influenced by female hormones. These fluctuations can lead to higher rates of adverse drug reactions in women under anesthesia, such as dyspnea. These fluctuations can also lead to increased chronic pain (Soldin, Chung & Mattison, 2011).

Determining pain medication according to genomics has a long way to go. Although the knowledge in this field is growing by leaps and bounds very few individuals have had their entire genetic sequences mapped out. In the fall of 2008, the number of complete human genetic sequences nearly doubled from four to seven, out of an estimated world population of 6,840,507,000 (Miaskowski, 2009).

Summary

The United States has a very diverse population with immigrants from all over the world. Many of these immigrants practice the rich cultural traditions of their homelands. It would be impossible for a nurse to be able to know the intricacies of each individual culture. Therefore it is important to be able to gain information about the patient through open interviews. A nurse should also be aware of his or her biases in order to recognize the possibility of projecting his or her own feelings concerning pain onto a patient. Cultural traditions that are not harmful to the patient should be accommodated if at all possible. Patients that need special considerations due to cultural traditions are also usually minorities and often fall into lower socioeconomic categories. Patients that share the same cultural traditions often come from the same geographic area and frequently have a similar genetic makeup. Nurses should be aware of certain differences in genetics that correlate with ethnicity, and that can affect metabolism of medications that the

patient is prescribed, thereby reducing treatment efficacy. Nurses should know that alternative medications are available for patients that are not receiving adequate relief from pain.

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