Perceived Need for Local Anesthesia in Tooth Drilling Among Anglo-Americans, Chinese, and Scandinavians

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This study explored ethnic differences in perceptions of pain and the need for local anesthesia for tooth drilling among age- and gender-matched Anglo-American, Mandarin Chinese, and Scandinavian dentists (n = 129) and adult patients (n = 396) using a systematic qualitative research strategy. Semistructured qualitative interviews determined: (a) the relative frequency of use or nonuse of anesthetic for similarly specified tooth drilling, (b) the reasons for nonuse of anesthetic as reported by dentists about their patients, and (c) the distribution of reasons for not using anesthetic. American dentists (n = 51) reported that about 1% of their adult patients did not use anesthetic compared with 90% among Chinese (n = 31) and 37.5% among Scandinavian dentists (n = 40). Of patients, Americans (n = 112) reported 6% nonuse of anesthetic for tooth drilling compared with 90% of 159 Chinese and 54% of 125 Scandinavians. Reasons among Anglo-Americans and Scandinavians were similar (ranked): the sensation was tolerable, to avoid numb feelings afterwards, and fear of injections. Danish patients were an exception; the fact that they had paid extra and out-of-pocket for anesthetic ranked second. In contrast, Chinese dentists made their decisions not to use anesthetics because they explained drilling as only a *suan* or "sourish" sensation, whereas injections were described as "painful." It was concluded that ethnic pain beliefs and differences in health-care systems are powerful psychosocial variables that affect pain perception and the perceived need for anesthetic.

Key Words: Dental pain; Local anesthesia; Ethnic differences; Cross-cultural comparison; Dentist–patient relationship.

Even though pain has elements of both physiological response and psychosocial conditioning, only a few studies have tried to reveal how pain attains meaning or emotional significance from the nature of the social or cultural context from within which it is experienced.[1-9] Even fewer studies have specifically investigated tooth-drilling pain and the use of local anesthesia in a cultural context[6,7,10]; and these were our own pilot studies. Research to explain the varying degrees of pain beliefs or expectations of pain requires sensitivity to the semantics about particular pain phenomena within the context of the pain or treatment. The use of questionnaire surveys requires that researchers have a priori knowledge of the variables that need to be explored and the questions that need to be asked, which can often induce bias especially in cross-cultural research. Thus, an improved strategy would be to first systematically discover and understand the semantics of the pain phenomena within a cultural context using qualitative research methods and then to validate the variables of interest to estimate the reliability of findings using ques-

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tionnaire methods. The aim of this first of two related studies was to establish and describe ethnic differences or similarities and their importance to the perceived need for local anesthesia for tooth drilling among adults using semistructured interviews. Quantitative validation of specific interview data findings among other results are presented in the following article.

METHODS

Subjects were 163 Anglo-Americans from Seattle, WA (n = 112) and Columbus, OH (n = 51), 195 Mandarin Chinese from Taipei, Taiwan (n = 140) and mainland China (n = 55) and 167 Scandinavians (n = 112 Danes from Århus, Denmark and n = 55 Swedes from Göteborg and Linköping, Sweden); a total of 129 dentists and 396 patients. The pool of subjects was drawn from public and private dental clinics in about equal proportions, with the exception of American clinics because in the US most are private practices. These particular ethnic groups were chosen because pilot data about them indicated wide variation in use of anesthetics.[6,7,10] Recruited subjects were age and gender matched to isolate the cultural variables by recruiting equally from each of four sample segments: men 44 yr or younger, men 45 yr or older, women 44 yr or younger, and women 45 yr or older. Ethnic groups were also approximately matched by occupations of informants across groups (eg, clerks, policemen, teachers, clergy, etc.).

Semistructured qualitative interviews of 51 Anglo-Americans, 31 Mandarin Chinese, 23 Danish, and 17 Swedish dentists (audiotaped) were used to determine: (a) the relative frequency of the use or nonuse of anesthetic for similar tooth drilling in adults, (b) the reasons for nonuse of anesthetic as reported by these dentists about their adult patients, and (c) the distribution of reasons reported by dentists for why some patients were not using anesthetic. All interviewed dentists had local anesthesia available and were experienced with its use. The following questions were included: "What percentage of your patients do not take anesthetic for routine dental work such as mesial or distal occlusal fillings?" and "Of those who don't use anesthetic, what reasons do they give, and how are these distributed by approximate percentage?" In another part of the interview, dentists were also asked "What do you say to a patient just before you give an anesthetic injection?" Unstructured follow-up questions were also employed to encourage details in answers to these questions, such as "Could you tell me more about 'such-and-such'?" In addition to asking dentists about patients, patients and dentists were asked directly, "Do you usually use local anesthetic for tooth drilling?" If patients required additional explanation, it was described as "more than a small filling."

To more efficiently investigate the patterns of qualitative statements made, a computer software program was also employed. It aided the systematic coding of categories and the development of an understanding of these categories as ethnic themes using a custom-fitted indexing system for all the verbatim transcriptions of audiotaped interviews.[11]

Although the study aim was the discovery and description of important psychosocial variables about perceptions of pain and the need for anesthetic, the two following general hypotheses guided comparisons across ethnic groups: (a) there are ethnic differences in the use of local anesthesia for tooth drilling and (b) the reasons for nonuse of local anesthesia differ by ethnicity.

Percentages volunteered by dentists about their patients are presented as median scores, because they were ordinal estimates, whereas actual patient and dentist reports are in true percentages. In some cases, to determine the likelihood of occurrence of comparable phenomena across groups, bivariate odds ratios (OR) with confidence intervals at 95% were calculated with Chi-square (Yates' correction) or Fisher's exact tests for significance at $P = 0.05$.

RESULTS

Frequency Distributions for Nonuse of Local Anesthetic

American dentists (n = 51) reported a median of 1% of patients not using anesthetic compared with 90% among Chinese (n = 31) and 37.5% among Scandinavian dentists (n = 40). American patients (n = 112) reported 6% nonuse of anesthetic compared with 90% of 159 Chinese and 54% of 125 Scandinavians (Danes = 54/87; Swedes = 13/38). Danes were over three times less likely to use anesthetic than Swedes (OR = 3.2, confidence interval [CI] = 1.4–7.0, $P < 0.01$). Table 1 presents gender and age data by ethnic group for the use or nonuse of anesthetic for tooth drilling. Although not significant, Danish men were nearly three times more likely to report not using local anesthetic than were Danish women (OR = 2.7, CI = 1.1–6.7, P = 0.056). Danish patients 45 yr or older were less than half as likely to use anesthetic than Danes 44 yr or younger (OR = 2.1, CI = 0.9–5.0, P = 0.16) and Scandinavian patients generally followed the same pattern (OR = 2.2, CI = 1.1–4.5, P = 0.052). Ninety percent of American, 31% of Chinese, and 93% of Scandinavian dentists reported using anesthetic in dental treatment when having their own teeth drilled.

Table 1. Nonuse of Local Anesthetic for Tooth Drilling (*N* = 396 patients)—Frequencies by Age and Gender for Ethnic Groups Sampled in Seattle, WA, Columbus, OH, Taipei, Taiwan, Tianjin, People's Republic of China, Århus, Denmark, and Göteborg and Linköping, Sweden

Population	*Anglo-Americans (N = 112)*	*Chinese (N = 159)*	*Danes (N = 87)*	*Swedes (N = 38)*	*Scandinavians (N = 125)*
Men	5/59	72/82	29/39	7/21	36/60
Women	2/53	69/77	25/48	6/17	31/65
Age < 45 yr	4/58	70/81	23/40	6/14	30/67
Age ≥ 45 yr	3/54	71/78	31/44	7/24	37/58

Reasons for Use or Nonuse of Local Anesthetic

Thematic categories for reasons for use or nonuse of anesthesia for tooth drilling and category frequencies are presented in Table 2. Themes of reasons across cultural groups are described below in narrative form. Salient examples of categories are provided by ethnicity to illustrate category and subcategory content.

Biomedical, Ethical Justifications—Dentist Talks Patients into Using Anesthetic. Most categories reflected descriptions of nonuse of anesthetic because of the nature of the questioning, but nine Anglo-American, one Chinese, and five Scandinavian dentists said that they would talk their patients into using anesthetic for tooth drilling. They explained that they would be able to work without being nervous about patient reactions to pain and that reactions (jerking) might affect the quality of work or cause soft-tissue injury. Two Anglo-Americans and two Swedes also offered that the use of anesthesia improved patient trust in them.

Pain Tolerated—Anesthetic Unnecessary. A statement typical of this category reported by a 56-yr-old male American dentist was: "I think mentally they just told themselves, this will be no pain or the pain that will come is easily controlled . . . ." Similar to other Danish colleagues, a 37-yr-old female dentist, about the variation of pain perceptions among her patients, said

> Some think that it isn't necessary because they don't experience it (drilling) as intense pain. But I mean that there are differences in pain [perceptions] for people. Some feel it is pain that drives you out of your mind (*afsindigt ondt*).

Other Danes, like this 47-yr-old male, added that drilling did not last very long: "About 60% don't use anesthetic and about half of these say they can cope with the pain because it (drilling pain) doesn't last very long."

Swedish dentists agreed, but not necessarily because drilling was thought of as short term. Many dentists described patients who didn't think tooth drilling was especially unpleasant and who seemed completely relaxed and unworried. Most of these patients were described as older and were unused to using anesthetic. A 38-yr-old male said: "They have never had shots before and prefer not to. They've never been indoctrinated . . . ."

Some Chinese patients were also described as "not used to receiving anesthetic." One dentist said, "In general, patients don't yet have the concept of getting anesthetic for anything other than tooth extraction." Other older Swedish patients were described as having receding dental-pulp nerves, which reduces pain perception. Still, a 35-yr-old female dentist exemplified her Swedish colleagues stating: "Many of these patients force themselves to work without anesthetic. To sit and work on someone that is forcing themselves to [have drilling] without anesthetic is stressing. I don't like it and find it appalling."

Table 2. Reasons for Nonuse (or Use) of Local Anesthesia in Tooth Drilling by Frequency Obtained from Semistructured Interviews with 122 Dentists from Seattle, WA, Columbus, OH, Taipei, Taiwan, Århus, Denmark, and Göteborg and Linköping, Sweden

Reasons by Category	*Anglo-American (N = 51)*	*Chinese (N = 31)*	*Danes (N = 23)*	*Swedes (N = 17)*	*Scandinavians (N = 40)*
Dentist decides, talks patient into using	9	1	2	3	5
Pain tolerated, unnecessary/doesn't hurt	38	6	21	16	37
Avoid disturbing effects of numbness	39	1	14	15	29
Fear of injections	35	11	16	15	31
Barometer of trust (nonuse)	0	0	6	2	8
Dentist decides, patient tolerates pain	0	30	1	0	1
Economics—anesthesia costs extra	0	0	20	2	22

Avoiding Disturbing Effects of Numbness. Although nonuse of anesthetic among Anglo-Americans was rare, American dentists most frequently said that Anglo-American patients wanted to avoid the feeling of numbness after the appointment to have full control of their tongue, lips, and cheeks. These often have social implications such as embarrassment, as a 40-yr-old male Anglo-American dentist described:

> Yeah, the fatness, the heaviness, they're afraid that they're going to drool. They feel that it is unsightly, even though it doesn't show. You'll see patients covering their lip and their chin as they're leaving the clinic, you know, it's because it's like they're embarrassed because they think their lip looks like it is big and hanging down to their knees . . .

Swedes especially avoided losing sensory control as described by this 53-yr-old male dentist:

> . . . just this tingling [pins and needles feeling] and that the tongue is gone. They experience that as really troublesome. Most of them believe they can take the [drilling] pain. They think it is more unpleasant to get numbed up, especially in the lower jaw, but the upper jaw I'll numb up more often.

A 43-yr-old Swedish woman dentist also stated:

> They feel paralyzed in the face. And they'd like to think that when they leave the dentist, they are finished. They think they should not have to go to the dentist and take something home of it afterwards, [because] it is so horrible to be there.

Danish dentists made similar comments, but Chinese dentists did not. Other western dentists, such as this 54-yr-old male Anglo-American dentist, reported unwanted chemical effects: "They don't like the chemical feeling. They say, 'It just knocks me out.' They want to go home and sleep [and] their response is very dulled—until it's eliminated from the body . . . a general body response that's unpleasant."

Fear of Anesthetic Injections. Anglo-American dentists said their patients feared the pain of injections, usually pointing out that this anxiety was worse than the drilling sensations. A 59-yr-old male Danish dentist also reported: "Others are simply petrified about needles . . . [and say they] would rather die or give birth to a child." Most Swedish dentists specifically stated that they usually could convince patients who were afraid of injections to use a local anesthetic. In contrast, the association of *tong* (pain) with injections as described by Chinese dentists to their patients was the second most frequent reason among Chinese for not using anesthetic, as detailed below.

Although fear of pain from injections was most frequently noted, five American dentists also named fear of allergic reactions as a deterrent. One 50-yr-old female dentist reported,

> One woman doesn't use anesthetic because of fear of allergy. There's apparently some allergy to caines in the family. The mother is an RN, she had four kids. And one of the children died very young and there seemed to be some relation to lidocaine in the hospital. So the mother would never let any of the children have shots for their dental work. They just had to grin and bear it. One of them even had to go to the hospital to get general anesthesia, since she had quite a few lesions (cavities).

Most patients reporting allergies were described by these American dentists as having had an emotional reaction to an injection. A 53-yr-old dentist described this thusly:

> . . . if they say they're allergic, you know, I'll go along with that. But generally it's some sort of an experience where they might have passed out before, during or after, or usually it's at the time of the injection or something like that. But it has to do, I think, with the actual giving of the anesthetic, usually.

and a 74-yr-old dentist stated, "[I see] a few, and they're hyper about everything."

Barometer of Trust. A 51-yr-old Danish woman dentist described the use or nonuse of anesthetic for drilling as a "barometer of trust" in the dentist–patient relationship:

> It is trust in me treating them that makes it so that they feel they don't need anesthetic and it could be that they would want to get numbed up if they were with a new dentist just when they first start coming.

The same dentist reported that over half of her patients had fillings done without anesthetic, very near the median. A 36-yr-old male agreed, stating:

> The more secure and happy they are in the situation, the more they maybe will place themselves in the clutches of the dentist and accept that there is some pain; if they get a feeling that it would never get out of control.

Two Danish dentists and one Swedish dentist also reported that they had extracted teeth without anesthetic at the patients' request and that the patients showed no pain.

Dentist Decides No Anesthetic Needed—Patient Tolerates Pain. This was the most common category for nonuse of anesthetic among Chinese dentists. The Chinese dentists offered statements like, "Dentists don't use local anesthetic. Patients don't complain. Therefore, local anesthetic isn't used" and a kind of projected belief like, ". .the pain is only *suan* and is bearable." and, "There's no pain," or, as a 41-yr-old Chinese male dentist explained: "Patients feel that it (drilling) is something they should tolerate." Other than these Chinese dentists, only one Scandinavian dentist named this category. Also included in the category of the dentist deciding that no anesthetic was needed, one Danish and one Chinese dentist explained that one could better diagnose a tooth pulp problem if anesthetic was not used.

Economic Incentive—Anesthetic Costs Extra. This unique Danish category was illustrated by a 60-yr-old male dentist's description: "I don't press them to have anesthetic. I tell them, 'If you feel something, just say so and we'll get you numbed up. Otherwise, there's no reason for using money on anesthetic.' "

One 45-yr-old Danish male dentist rationalized taking payment by stating: "It takes skill and time to administer anesthetic, and since I have my staff to pay, why shouldn't I take a fee?" Another 37-yr-old male stated that a policy change to cover anesthetic would be ideal, but that it might be difficult, given that there are "other [policy] traditions" in Denmark. Two Swedish dentists also described two elderly Swedish patients who were under the impression that anesthetic was an additional, separate expense.

Preinjection Suggestions by Dentists

When asked about what they say before injecting, almost all American dentists said, "You'll feel a little . . ." ". . . pinch," " . . . discomfort," or " . . .uncomfortable." A few mentioned a nonspecific "You may feel it a little bit." Many shared beliefs of a 74-yr-old male: "I mean, if you tell them it's going to be painful, some people will make something that may not be painful, painful. Let them make their own assessment on that." and a 33-yr-old male said,

> I use [the word] discomfort. I encourage patients to express everything in terms they want to [use]. But I never say "Does this hurt?" I won't say, "I'm going to inflict hurt on you." I may inflict some [but] I say, "You may feel a little pinch," or "You may feel a little discomfort here," but [never] the word hurt, or stick, or cut, anything [like] it.

Danish dentists also usually described their shots to patients as "a little prick" (*stik*) or "pressure" (*tryk*), being careful to minimize painful associations. Swedish dentists' descriptions were similar to other western colleagues.

Common descriptions that Chinese dentists gave to patients prior to injections were: "You may feel a little pain (*tong*), but I'll try to reduce it to a minimum with my technique. Don't think about the pain (*tong*)." or "You won't feel pain (*tong*)." Chinese dentists also described the patients' reactions as, "They (patients) think that local anesthetic is very '*tong*', but the drilling is over very quickly." Most Chinese dentists (15/31) (11 males, four females) reported describing anesthetic injections to their patients as "painful," implying that injections were worse than drilling.

DISCUSSION

Our results indicate that there is clinical meaningfulness for a variety of powerful psychosocial and cultural influences that come to bear on the perceived need for anesthetic in tooth drilling. Although gender and age affected Scandinavians to some degree, pain beliefs by ethnicity and differences in health-care systems were variables with predictable outcomes across ethnic groups. This implies that given anatomic similarities, expectations developed from a person's upbringing and social environment about a clinical procedure such as tooth drilling can influence pain perception dramatically. Many Scandinavians and Chinese have been brought up to believe that tooth drilling does not hurt or that it is only minor pain. The opposite was found for the Anglo-Americans. This affects clinical decisions regarding the use of pain control.

There are also political-policy related incentives for or against using local anesthetic for such a procedure. Present results also have immediate policy implications in Denmark, where despite broad National Dental Health Insurance coverage, patients are required to pay for "pain free" fillings, unlike other nations in the study. Danish national insurance does, however, cover the use of local anesthetic in the cost of tooth extractions but not root canal therapy. A history of traditional nonuse of local anesthesia for dental fillings in Denmark[12] indicates that the process of fee-schedule negotiations between the Danish Dental Association and officials representing the National Health Insurance provide economic reinforcements to maintain the current fee schedule. That some older patients in Sweden were under the impression that one still needed to pay for local anesthesia separately, despite a change in practice dating back to the late 1940s and early 1950s,[13] indicates a need for direct verbal communication or printed information for older patients.

Because there are economic incentives for patients not to use local anesthetics for tooth drilling in Denmark, it is remarkable that it is also here that nonuse of anesthetic was also considered a "barometer of trust" in the dentist–patient relationship. Even though there is no previous literature directly linking trust in dentists with altered pain thresholds, it is possible that if a patient's level of relaxation is increased the pain threshold can be modified, according to the Gate Control theory of pain.[14] It is striking that almost all Scandinavian dentists chose local anesthesia for their own dental treatments, whereas only about one-half of their patients did. American and Chinese dentists more closely paralleled their patients' preference or nonpreference for anesthetic. One might surmise that armed with knowledge about the possibility for pain-free treatment, and in the case of the Danes cost-free pain-free treatment, that patients might choose more often to be anesthetized. On the other hand, in Sweden, where there are no economic influences on choice of anesthetic, 34% of patients chose not to be anesthetized for routine fillings, which is evidence for Scandinavian pain beliefs that anesthetic is often not necessary. Still, Danes were three times less likely to use anesthetics than Swedes, which offers some evidence that public policy can have a very strong influence on pain treatment choice at the individual level.

Phenomena as described by the Chinese are also potentially important with regard to pain perception, the need for anesthetic, and the dentist–patient relationship. The Chinese concept of *suan* or "sourish" sensation in tooth drilling has previously been described,[6,7] and it is usually thought of as tolerable. Thus, the Chinese concept of *suan* directly impacts the expected interactions between patients and dentists from within the cultural framework. Unless it is *suantong,* or sourish pain, most of the Chinese dentists describe tooth drilling as only "sourish," whereas injections are usually described to patients by their dentists as outright "painful" (*tong*). There are no attempts to cognitively diminish the sensation of injections by Chinese dentists as the western dentists do when describing it only as a "pinch" or a quick, short "discomfort." Our data are also in agreement with previous data,[15] indicating that Mandarin Chinese do not require local anesthesia for tooth drilling and that injection pain is perceived as relatively more painful than tooth drilling pain. Studies of dental anxiety in Asiatic patients also suggest that communication between dentist and patients is "one way," with dentists deciding when pain control is appropriate.[16,17] Present data suggest that this one-way communication works for some patients but that undue fear of injections may be reinforced in other patients by Chinese dentists. There may be other cognitive mechanisms, such as trust in authority, working for Chinese patients that decrease pain perceptions, which need to be explored in future research.

Cross-cultural interpretation of pain resulting from injections as worse than or producing more anxiety than tooth-drilling sensations indicates that the psychosocial component of pain perception is heavily tied to the patient's expectations and gradients of anxiety, which are usually shaped by the social values and norms of the ways people expect to be treated and are expected to behave. The possibilities for learning anxiety or pain beliefs through social interactions with dentists or friends and family who express their own ways of thinking about pain and coping are enormous. Self-fulfilling prophecies[18] or similar expectation phenomena[19–21] are thus perhaps the mechanisms that drive cultural coping strategies, for better or worse. Encouraging a patient to express concerns or discomfort, whether about anxiety or pain, allows the practitioner to communicate without bias and in terms with which the patients feel most comfortable. This can improve the feeling of trust in the interaction, which can in itself have healing effects.[22] However, when negative expectations hinder adequate care, specific psychosocial strategies must be employed to reframe the patients' expectations of the event they perceive as painful or anxiety provoking, keeping in mind the patient's cultural background and assumptions. If provided with adequate information and choices about local anesthesia, some patients might choose differently than their dentists or third-party insurers have come to expect from them.

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