# Size doesn't matter: Needle gauge and injection pain

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**Many dentists prefer using smaller gauge (27- or 30-gauge) needles for anesthesia injection, believing that needles with a smaller diameter result in less injection pain than wider diameter needles. For this study, three dentists in a general practice administered 930 injections to 810 adult patients using 25- and 27-gauge needles for mandibular inferior alveolar block injections and 25-, 27-, and 30-gauge needles for maxillary buccal infiltration or palatal injections. Patients, who were blinded as to the needle gauge, were asked afterward to rate the injection pain on an 11-point scale (0–10). There was no statistically significant difference in perceived injection pain based on needle gauge when analyzed for injection location (mandibular, maxillary posterior, maxillary anterior, and palatal), injection side, patient gender, treating dentist, or overall. These results indicate that when it comes to injection pain and needle gauge, size does not matter.**

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The discovery of local anesthesia in the late 1800s revolutionized the practice of dentistry, making it possible to perform dental procedures relatively painlessly and simultaneously allowing for longer and more complex procedures. Despite the relative comfort that accompanies anesthetized dentistry, local anesthesia usually requires a needle injection that patients may find uncomfortable or even painful. Many practicing dentists prefer narrow diameter (27- or 30-gauge) needles to wider diameter (25-gauge) needles, presuming that patients perceive less pain when a narrow diameter needle is used.[1] Disadvantages to narrow diameter needles include concerns about possible needle deflection, breakage, and lack of hematic aspiration.

This study sought to discover if there was a difference in pain perception with various needle gauges. Patients were asked to rate perceived pain on an 11-point scale after receiving dental injections that utilized standard 25-, 27-, and 30-gauge needles. It was hypothesized that needles with wider gauges would be considered to be significantly more painful than needles with narrower gauges, as the wider-gauged needles would necessarily create a larger mucosal puncture.

## Materials and methods

Three dentists in a general practice administered 930 injections to 810 adult patients prior to routine dental procedures that included restorations, fillings, crowns, and root canal therapy. Topical anesthetic (Benzo-Jel, Henry Schein, Inc., Melville, NY; 800.472.4346) was administered to the injection area (to ensure clinical relevance). At that point, lidocaine with 1:100,000 epinephrine (Cook-Waite, Eastman Kodak Company, Rochester, NY; 800.933.8031) was administered in maxillary injections, using 25-, 27-, or 30-gauge short needles (Monoject, Kendall Healthcare Products Company, Mansfield, MA; 800.962.9888), and mandibular injections, using 25- or 27-gauge needles (Monoject) (30-gauge long needles are unavailable) that were selected randomly before the injection. Patients were asked to rate the pain of the injection on an 11-point scale (with 0 indicating no pain and 10 indicating severe pain) just after the injection and were blinded to the gauge of the needle. Doctors were not blinded to the needle gauge since the gauge can be perceived by the needle's appearance and its relative stiffness during use.

## Results

Patient responses were analyzed based on different needle gauges, patient gender, injection location (maxillary posterior, maxillary anterior, palatal, or mandibular), injection side (left or right), treating dentist, and overall (see Table 1). Tables 2 and 3 show the results based on patient gender. Based on these criteria, the responses showed no significant difference in terms of perceived pain. In short, the authors could not find any significant difference based on needle gauges. Under clinical conditions, pain perception is not affected by different clinically available needle gauges.

## Discussion

There have been several studies showing no difference in pain perception based on needle gauge, although none of those were as large as the present study. Brownbill *et al* studied 138 children and reported no difference in pain perception between 25- and 30-gauge needles.[2] A 1983 study involving 30 patients showed no perceived difference in pain perception between 27- and 30-gauge needles.[3] Four years earlier, Fuller *et al* reported that six dentist-patients showed no difference in pain perception from 25-, 27-, and 30-gauge needles.[4] Mollen *et al* examined 36 patients in 1981 and reported no difference in pain perception between 25- and 27-gauge needles.[5]

Because there was no perceived difference in pain perception due to needle gauge, clinicians should use other factors to make needle gauge decisions. Mala-med has reported that smaller-gauge needles are more likely to break during use and are more likely to deflect, leading to inaccurate injections.[6] He recommends wider-gauged needles, even though most studies have shown no difference in terms of aspiration reliability between needle gauges.[6-8] Since aspiration with a narrower-gauged needle requires additional pressure, there is an increased likelihood of the harpoon becoming dislodged from the stopper in the cartridge.[6] Conversely, some dentists prefer being "forced" to give a slower injection with narrow diameter needles because they require more pressure than

wider diameter needles. Slower injections usually are less painful and less likely to cause unwanted drug interactions than faster injections.[9]

## Conclusion

There is no statistically or clinically significant difference between perceived pain of injection based on the needle gauges commonly used in dentistry. The old adage "size doesn't matter" certainly is true when it comes to needle gauges. Since there are other advantages to wider-gauged (25-gauge) needles, including less likelihood of breakage or deflection and less pressure necessary for aspiration, practicing dentists may prefer to choose wider-gauged needles.

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**Table 1.** Overall results for needle gauge and pain.

| Needle gauge | Pain | | | | | | | | | | | *n* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 25 | 74 | 34 | 123 | 32 | 37 | 7 | 21 | 4 | 7 | 3 | 1 | 343 |
| 27 | 75 | 39 | 146 | 26 | 64 | 11 | 18 | 4 | 7 | 0 | 1 | 391 |
| 30 | 61 | 25 | 54 | 15 | 17 | 7 | 10 | 3 | 3 | 0 | 1 | 196 |

$c^2$ (Chi-square distribution value) = 30.6
df (degrees of freedom) = 20
$p = 0.06$

**Table 2.** Perceived pain in female patients.

| Needle gauge | Pain | | | | | | | | | | | *n* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 25 | 32 | 21 | 61 | 20 | 26 | 4 | 15 | 3 | 7 | 2 | 1 | 192 |
| 27 | 39 | 22 | 85 | 18 | 41 | 6 | 12 | 3 | 4 | 0 | 0 | 230 |
| 30 | 35 | 19 | 38 | 8 | 12 | 6 | 7 | 1 | 3 | 0 | 0 | 129 |

$c^2 = 25.8$
df = 20
$p = 0.17$

**Table 3.** Perceived pain in male patients.

| Needle gauge | Pain | | | | | | | | | | | *n* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |
| 25 | 42 | 13 | 62 | 12 | 11 | 3 | 6 | 1 | 0 | 1 | 0 | 151 |
| 27 | 36 | 17 | 61 | 8 | 23 | 5 | 6 | 1 | 3 | 0 | 1 | 161 |
| 30 | 26 | 6 | 16 | 7 | 5 | 1 | 3 | 2 | 0 | 0 | 1 | 67 |

$c^2 = 26.6$
df = 20
$p = 0.15$

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