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Reducing the pain of local anesthetic infiltration: Warming and buffering have a synergistic effect¹

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Study objective: To compare room-temperature unbuffered lidocaine, warm lidocaine, buffered lidocaine, and warm buffered lidocaine to determine which of the four solutions is least painful during infiltration.

Design: Randomized, controlled, double-blinded, volunteer study.

Type of participant: Thirty-two young healthy adults.

Main results: Each subject received four subcutaneous injections of 1 % lidocaine: room-temperature unbuffered, warm, buffered, and warm buffered. After each injection, participants recorded their perception of pain associated with infiltration of the solution on a visual analog scale. Mean pain scores for the four solutions were determined and analyzed. The mean perceived pain score for the warm buffered solution was significantly lower than for any of the other solutions (versus warm: $P=0.005$; versus buffered: $P=0.028$; versus room temperature: $P=0.001$). There was no statistically significant difference between either the warm solution or buffered solution and the room-temperature unbuffered lidocaine. The difference in mean pain score for the warm buffered solution, compared with those for the warm, buffered, and room-temperature solutions, suggests that warming and buffering have a synergistic effect.

Conclusion: Skin infiltration with warm buffered lidocaine is significantly less painful than infiltration with room-temperature unbuffered lidocaine, warm lidocaine, or buffered lidocaine.

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