



Dental Studies

A needle-free jet-injection system with lidocaine for peripheral intravenous cannula insertion: a randomized controlled trial with cost-effectiveness analysis.



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Abstract

Insertion of a peripheral IV cannula is a common, although painful, procedure. We tested the analgesic efficacy, adverse effects, and cost-effectiveness of a needle-free intradermal drug delivery system (Jet) with lidocaine for the insertion of an IV cannula (18-gauge; dorsum of hand). Four-hundred patients were randomly allocated to one of four groups: (a) no treatment, (b) Jet (J-Tip), National Medical Products Inc, CA; \$3.0 per device) with 0.5 mL of saline, (3) Jet with 0.5 mL of lidocaine 1%, and (4) Jet with 0.5 mL of lidocaine 2%. Pain was evaluated using a numerical verbal scale (NVS 0-10). A NVS ≤ 3 was considered as acceptable in this context. Incremental cost-effectiveness ratios were calculated. Without treatment, 42.4% of patients had a NVS ≤ 3 , 39.3% with saline, 60.7% with 1% lidocaine (relative risk [RR] compared with no treatment, 0.70; 95% confidence interval [CI], 0.53-0.93), and 86.7% with 2% lidocaine (RR, 0.49; 95% CI, 0.38-0.62). Nineteen and one-half percent of patients had a NVS >3 because of Jet treatment, 13.5% had local hyperemia, and 16.9% had minor local bleeding. Of all Jet treatments, 10.5% were technical failures, and there were 17.6% cannula insertion failures (10.1% without treatment [RR, 1.74; 95% CI, 0.92-3.32]). Compared with no treatment, costs to generate one additional patient with a NVS ≤ 3 were \$23 with lidocaine 1% and \$10 with lidocaine 2%. On insertion of an IV cannula on the back of the hand, 58% of patients report at least moderate pain. Lidocaine-Jet is analgesic; there is dose-responsiveness. However, Jet treatment is not painless, and costs incurred to achieve one success compared with doing nothing are not negligible. IMPLICATIONS: Insertion of an IV cannula is painful. Four-hundred patients were randomly allocated to test the analgesic efficacy, adverse effects, and cost-effectiveness of the needle-free intradermal drug delivery system (J-Tip); Jet). Jet with lidocaine is effective, but its application is not painless. Costs to achieve one patient with no more than moderate pain (numerical verbal scale ≤ 3 of 10) on insertion of an IV cannula are \$10.

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