

Novel Application of Exhaled Carbon Monoxide Monitors: Smoking Cessation in Orthopaedic Trauma Patients

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Background/Purpose: Smoking is associated with increased complications in fracture care, including increased infection rate, wound healing difficulties, and perioperative morbidity. Recent data demonstrate that trauma patients may be more interested in quitting than the general public. Physician-assisted quit rates approach 6%, which is not much better than the unassisted quit rate of 3%. Nationally based quitline (1-800-Quit-NOW) referral, however, results in a quit rate approaching 30-40%. An exhaled carbon monoxide (CO) monitor is an inexpensive (~20 US\$ per use), quick (<1 min), and easy-to-use tool to assess smoking status. Use of an in-office exhaled CO monitor in orthopaedic trauma patients may enhance interest in smoking cessation and increase referral to a quitline. We hypothesize that the use of a CO monitor will increase willingness to quit smoking, and increase patient referral to the national quitline when compared to standard of care.

Methods: We prospectively approached 134 patients at their first postoperative clinic visit for participation in our study; 124 (93%) participated. Current smokers were defined as those having smoked more than 1 cigarette in the last 6 months (including those who had recently quit). A 21-question survey was administered to each patient with questions relating to demographics, smoking habits, and interest in quitting smoking. The survey addressed the smoking patients' readiness to quit by measuring the previously defined transtheoretical stage of change and a 10-point Likert scale describing willingness to quit today. At survey conclusion, exhaled CO was measured with results explained in a standardized fashion (Pico+ Smokerlyzer, Bedfont Scientific). After exhaled CO was explained, stage of change and willingness to quit was reassessed. Additionally, a yes/no/no change question asking if the CO reading increased their willingness to quit was administered. Wilcoxon signed rank sum test and logistic regression was utilized to determine primary outcome (readiness to quit, increase in stage of change). Linear regression and multiple regression models were utilized to determine relationship of exhaled CO and other outcome variables.

Results: 95% of respondents were regular smokers (46% up to ½ pack/day, 49% ≥1 pack/day smokers). Use of the exhaled CO monitor



The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

increased willingness to quit in 70% (95% CI .600-.785) of participants still smoking, and increased willingness to quit on average, .83 points on a 10-point Likert scale (95% CI .599-1.067) ($P < 0.001$). 15% of patients modified their stage of change towards quitting. 40% of patients after exhaled CO monitor requested referral to the quitline (compared to participant-reported 4% presurvey referral to a cessation programs, $P < 0.001$). Anecdotally, most participants were very interested in the device and their reading, expressing concern with their result. The value of exhaled CO was not associated with any measured outcomes.

Conclusion: The use of an exhaled CO monitor increased the willingness to quit in 70% of patients, but the effect size was relatively small (.83 points on a 10-point Likert scale). However the use of the CO monitor resulted in a large increase (40% vs 6% baseline) in referral to the national quitline. Use of a quitline typically increases the chance of smoking cessation by 10 times the baseline rate, suggesting that this finding may be clinically important.