

Point-of-Care Instruction versus In-Person Training for Prehospital Cervical Spinal Immobilization by Laypeople: A Randomized Controlled Trial

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Purpose: Traumatic spinal cord injury (TSCI) contributes most to years-lived-disabled resulting from road traffic injuries (RTIs), the greatest contributor to the global injury burden disproportionately affecting low- and middle-income countries (LMICs). Without robust emergency medical services in LMICs, trained layperson bystanders must respond to RTIs to provide early cervical spine (c-spine) immobilization. While in-person training for first responders is the gold standard, point-of-care (POC) instruction for c-spine immobilization for layperson bystanders may address scalability challenges associated with in-person training and longitudinal knowledge decay; however, POC instructional effectiveness for c-spine immobilization is unknown.

Methods: Using a randomized controlled trial design, healthy layperson participants were recruited to measure comparative effectiveness and longitudinal performance at 1- to 2-month follow-ups of POC instruction and in-person training for c-collar application on a healthy standardized patient by checklist and with a cervical range of motion (CROM) device to measure CROM restriction. Participants were randomized to four arms (3 instructional interventions and 1 control arm): POC audio instructions with flashcard reference (Group 1), POC flashcard reference alone (Group 2), in-person training (Group 3), and a control group without training or POC instructions (Group 4). POC materials were available at follow-up for Groups 1 and 2, given the inherent nature of POC instruction, while Group 3 participants had no re-training before follow-up. Proportions of successful c-collar application between arms were compared with pairwise 2-sided chi-squared tests. Secondary outcomes include application time/confidence, compared using Wilcoxon rank sum tests.

Results: 265 participants were recruited, 240 enrolled (median age = 19 years [interquartile range (IQR): 18, 21]; 68.8% (n = 163) women), and 3 were lost to follow-up (1.25%). Correct c-collar application at initial encounter and 1- to 2-month follow-ups is significantly higher for all 3 intervention arms vs control ($P < 0.001$). At 1- to 2-month follow-ups, POC audio instructions outperformed in-person training: follow-up: Month 1 = 64.5% (95% confidence interval [CI]: 45.4%, 80.2%) vs 59.1% [36.7%, 78.5%]; $P < 0.001$ and follow-up Month 2 = 86.9% [95% CI: 65.3%, 96.5%] vs 48.1% [29.2%, 67.6%]; $P < 0.001$. CROM device composite score threshold application ensuring c-spine motion restriction demonstrated Group 1 outperformed Groups 2-4 ($P < 0.001$). Confidence diverged at follow-up, with POC instruction increasing (to 7/10) vs in-person training decreasing (to 5/10) ($P = 0.012$). Median completion time is longest for Group 1 (284 seconds vs 49 seconds for Group 3).

Conclusion: POC instruction outperforms in-person training at longitudinal follow-up, demonstrating performance improvement in subsequent POC encounters, suggesting an alternative prehospital c-spine immobilization approach for resource-limited settings.

Proportion of Correct C-Collar Application at Initial Encounter and 1-/2-month Follow-Up

	Group 1 (audio kit) %, 95%CI, (n=)	Group 2 (flashcard) %, 95%CI, (n=)	Group 3 (in-person training) %, 95%CI, (n=)	Group 4 (control) %, 95%CI, (n=)
Initial encounter (n=237)	53.6% (39.9%, 67.9%) (n=56)	52.2% (38.9%, 64.2%) (n=66)	94.0% (82.5%, 98.4%) (n=50)	0.0% (0.0%, 6.9%) (n=65)
1-month follow-up (n=119)	64.5% (45.4, 80.2) (n=31)	51.5% (33.9%, 68.8%) (n=33)	59.1% (36.7%, 78.5%) (n=25)	9.1% (2.4%, 25.5%) (n=30)
2-month follow-up (n=118)	86.9% (65.3%, 96.5%) (n=25)	48.6% (31.7%, 65.7%) (n=33)	48.1% (29.2%, 67.6%) (n=25)	9.4% (2.5%, 26.2%) (n=35)

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