Impact of Central Venous Catheter Insertion Training Program on Success Rate and Complication Rate of Central Venous Catheter Insertion Procedure

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Background: Central venous catheter (CVC) insertion, a common invasive procedure among critically ill patients, is associated with complication rate up to 15%, depending on operator’s experience. A CVC insertion training program has been developed at Department of Internal Medicine, Siriraj Hospital since 2014, aiming to enhance the 1st year resident’s experience before their daily practice during residency training.

Objective: To evaluate the benefit of CVC insertion training program on the reduction of complications associated with the procedure.

Methods: We conducted a cohort study and enrolled medical patients who underwent CVC insertion during January 2010 - October 2017. Patients with CVC insertion performed before October 2014 were classified into the pre-training group. Patients with CVC insertion since October 2014 were in the post-training group. The primary outcome was success rate of CVC insertion performed by 1st year residents at one attempt. The secondary outcome was acute complications associated with the procedure including bleeding, hematoma, pneumothorax, internal organ injury, and arterial puncture.

Results: A total of 493 patients were enrolled, with 242 in the pre-training and 251 in the post-training groups. There was no significant different among baseline characteristics between both groups. The mean age was 67.5+17.1 years, while mean body weight was 58.6+11.4 kg and 53.3% were male. The leading indication for CVC insertion was hemodynamic monitoring. There was a significant higher procedure success rate by 1st year residents at one attempt among the post-training than the pre-training groups (20% vs 12%, P=0.03). The acute complications occurred in lower proportion among the post-training group, but not statistical significant (2.0% vs 5.0%, P=0.07). The catheter related blood stream infection rate was not different between the two groups (8.9% vs 9.7%, P=0.76).

Conclusion: CVC training program can improve the success rate of CVC insertion performed by 1st year residents and may decrease the procedure related acute complications.

Keywords: CVC insertion, CVC training program, Complications