A Progressive Teaching Model to Evaluate Pelvic Landmark Localization by Medical Students

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**Introduction:** Using only student-mentor teaching in the training of psychomotor skills is no longer adequate in the modern educational system. Current teaching trends support the use of simulators, standardized patients and objective competency-based outcomes to assure safety and consistency in skills.

**Aim of Investigation:** To use calibrated anatomic pelvic models, human volunteers and consensus training in a 3 stage study to determine the level to which four osteopathic medical students localize pelvic landmarks.

**Methods:** In all stages, five pelvic landmarks were examined: anterior superior iliac spine (ASIS), pubic tubercle (PT), iliac crest (IC), posterior superior iliac spine (PSIS) and ischial tuberosity (IT). Positions were quantified into X-Y-Z coordinates by a 3D position capturing camera system. Examiner and landmark order were randomized for each evaluation. In stage 1, pelvic models were evaluated. The models’ hip bones were set to various degrees of rotation and shear to create coronal plane landmark asymmetries of 1-6 mm. In stage 2, 19 volunteers were examined. In both stages, consensus training routinely occurred. In stage 3, 40 volunteers were examined without consensus training. The degree of consistency in landmark localization among the students was assessed by the average deviation of the four examining digits in the coronal plane for each stage, landmark and left or right side combination. A random intercepts model was used to compare the consistency across stages. IRB approval from ATSU.

**Results:** Mean localization of all landmarks was most precisely performed in stage 1 (1.1 – 2.3 mm), was worst in stage 2 (2.5-8.4 mm) and then improved in stage 3 (2.2-7.1 mm). For ASIS and PT, changes between stage 1 and 3 were not statistically significant (\(P=0.10\) and 0.99, respectively). For IC and PSIS, localization was significantly worse from stage 1 to 2 (\(p<.0001\) for both) and did not statistically improve in stage 3. For IT each stage was significantly different (\(p<.0001\)): stage 2 worse than stage 1, stage 3 better than stage 2 but worse than stage 1.

**Conclusion:** Student localization of all landmarks was most accurate in stage 1. Accuracy decreased in stage 2 with the introduction of human volunteers but improved in stage 3 for some landmarks. ASIS and PT landmarks showed lesser changes between models and humans. PSIS had the greatest. Consensus training and objective feedback appeared to help refine student localization skills during stage 3.

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