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A descriptive study of the accuracy of intercostal drain placement and factors influencing placement.

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Abstract

Background

South Africa's significant burden of trauma and respiratory disease requires a high rate of intercostal drain (ICD) insertions by emergency centre practitioners. ICD misplacement is associated with significant complications. The aim of this study was to assess ICD insertion site accuracy and the factors affecting accuracy by emergency centre doctors.

Methods

This was an observational simulation-based study. Using ultrasound and an invisible ultraviolet marker, the chest wall structures of two simulated patients of different BMI categories (low and high) were marked. Participants placed stickers bilaterally on both patients at their intended ICD insertion site. Sticker placements were photographed under ultraviolet light and analysed. Accurate placement (within the area above the 6th rib, posterior to pectoralis major and 1cm anterior to the mid-axillary line) and within the British Thoracic Society's 'triangle of safety' was noted. Comparisons of accuracy were made between participant rank (junior vs senior), participant experience (<30 vs >30 ICDs placed), BMI category (low vs high) and placement side (left vs right).

Results

Insertion site was accurate in 47% of placements and within the 'triangle of safety' in 51% of placements. Accuracy was associated with greater participant experience (61% vs. 37%, $p<0.01$), and left-sided placement (54% vs 40%, $p = 0.02$). No difference was found when comparing patient BMI category (low vs high, 43% vs 51%, $p=0.18$) or participant rank (junior vs senior, 41% vs 51%, $p=0.10$). Of all placements, 13% were over muscle or the diaphragm.

Conclusion

Overall accuracy of ICD insertion site was low, and accuracy was only associated with greater participant experience and left sided placement. Further studies to determine methods to improve ICD placement accuracy are needed.