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The correlation between ATLS and junior doctors' anatomical knowledge of central venous catheter insertion at a major trauma centre in South Africa

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ABSTRACT

Objective: To review the ability of junior doctors (JDs) in identifying the correct anatomical site for central venous catheterization (CVC) and whether prior Advanced Trauma Life Support (ATLS) training influences this.

Design: We performed a prospective, observational study using a structured survey and asked a group of JDs (postgraduate year 1 [PGY1] or year 2 [PGY2]) to indicate on a photograph the exact site for CVC insertion via the internal jugular (IJV) and the subclavian (SCV) approach.

This study was conducted in a large metropolitan university hospital in South Africa.

Results: A total of 139 JDs were included. Forty-four per cent (61/139) were males and the mean age was 25 years. There were 90 PGY1s (65%) and 49 PGY2s (35%). Overall, 32% (45/139) were able to identify the correct insertion site for the IJV approach and 60% (84/139) for the SCV approach. Of the 90 PGY1s, 34% (31/90) correctly identified the insertion site for the IJV approach and 59% (53/90) for the SCV approach. Of the 49 PGY2s, 29% (14/49) correctly identified the insertion site for the IJV approach and 63% (31/49) for the SCV approach. No significant difference between PGY1 and 2 were identified. Those with ATLS provider training were significantly more likely to identify the correct site for the IJV approaches [OR = 4.3, p = 0.001]. This was marginally statistically significant (i.e. p > 0.05 but < 0.1) for the SCV approach.

Conclusions: The majority of JDs do not have sufficient anatomical knowledge to identify the correct insertion site CVCs. Those who had undergone ATLS training were more likely to be able to identify the correct insertion site.

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Introduction

Central venous catheter (CVC) insertion is a commonly performed procedure in the trauma setting [1]. Over five million CVCs are inserted annually in the United States. However, CVC insertion is associated with significant complications in up to 15% of patients [2]. A good knowledge of the relevant clinical anatomy is essential if to reduce the incidence of a complication. [3–5]. Previous audits from our institution suggested that a significant number of emergency procedures are performed by junior doctors (JD) and this in itself is a risk factor for complications. There is a

paucity of literature focusing on JDs' anatomical knowledge specifically in relation to CVC procedure. The objective of this study was to assess the baseline anatomical knowledge amongst the JDs at a major university hospital in South Africa.

Materials and methods

Setting

This was a prospective, observational study performed in January 2015 at the Pietermaritzburg Metropolitan Hospitals Complex (PMBC) in South Africa. Ethics approval to conduct this study was formally granted by the Biomedical Research Ethics Committee (BREC) and University of KwaZulu Natal (reference number: BE083/14). The city of Pietermaritzburg is the capital of

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the province and the PMBC provide definitive surgical care that covers the western part of the province. It also serves as the referral centre for 19 other district hospitals within the province and covers a total catchment population of over three million. Our trauma service manages approximately 3000 cases per annum, with over 40% penetrating trauma. This is a direct reflection of the high incidence of interpersonal violence and serious crime experienced throughout the region.

Training

The Department of Surgery is an academic department under the auspice of the University of KwaZulu Natal and is responsible for both undergraduate and postgraduate training in general surgery. It is a Health Professional Council of South Africa (HPCSA) accredited institution for internship training. Internship training in South Africa lasts a period of 24 months, which spans two postgraduate years after medical school. JDs are defined as those in their first (PGY 1) or second (PGY 2) postgraduate years. License for full registration is only granted after satisfactory completion of the total of 24 months training, of which 4 months mandatory training in general surgery is required. Only PGY2s in this study would have had the opportunity to attend an ATLS provider course. The PGY1s would not have had the opportunity to attend the ATLS course at the time of study on induction day.

The study

A compulsory induction day for all JDs is held by the PMBC on the first of January each year. All JDs who were currently working within the PMBC and attended the induction day were eligible for inclusion in this study. JDs were all either in their PGY 1 or PGY 2, who qualified from one of the eight medical schools in South Africa.

Basic demographic data were collected from the attendance registration book. Every JD were given two photographs and asked to indicate (marking a cross on the site) the exact location of where they would insertion the CVC if it was their real patient encountered during their on-call duty when unsupervised. Figs. Fig. 1a, b and Fig. 2a, b were the original photograph used for this study, which JDs were asked to indication the site for CVC insertion for the internal jugular vein (IJV) and the subclavian vein (SCV) approach respectively.

The task was completed by each JD as a part of the induction programme. This was supervised by the primary author (JO) and reference materials including cellphones etc. were strictly prohibited.



Fig. 1. (a) Photograph used for the IJV approach (Right side). (b) Photograph indicating the correct site – Sedillot's triangle for the IJV approach.

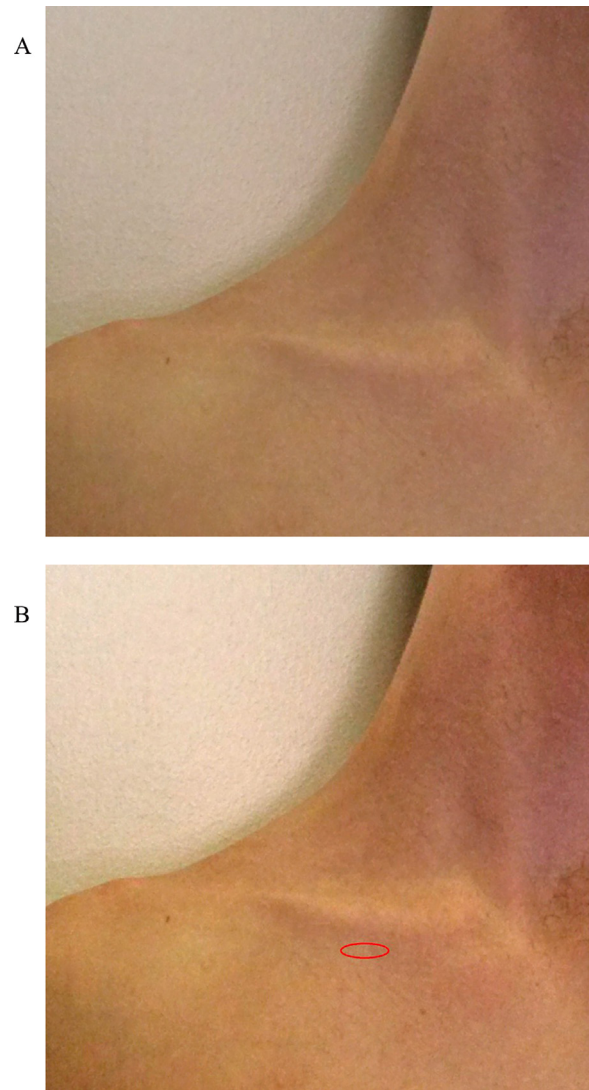


Fig. 2. (a) Photograph used for the SCV approach (Right side). (b) Photograph indicating the correct site of insertion for the SVC approach.

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