# Search Pattern Training for Central Line Positioning on Chest Radiography

William F. Auffermann, MD, PhD; Elizabeth A. Krupinski, PhD; Srini Tridandapani, MD, PhD

*Department(s) & Institution(s) (For all authors): Department of Radiology and Imaging Sciences, Emory University School of Medicine, 1365 Clifton Road NE, Atlanta GA 30322, USA*

## Rationale:

Knowledge about the mechanisms of medical image perception have been extensively studied, but only recently used to develop focused perceptual educational tools. Many medical personnel are expected to be able to evaluate a chest radiograph for critical abnormalities before a final interpretation is rendered by a radiologist. One such interpretation task is the evaluation of central lines for appropriate positioning. The main goal of this study is to examine if focused search pattern training improves the ability of a novice to evaluate the position of central lines on chest radiographs.

## Methods:

Eighteen healthcare trainees and practitioners were enrolled, 5 were radiology technologists, 13 were nurse practitioner students. Participants were asked to localize the tip of central catheters on chest radiographs, record their confidence in localization, and determine whether or not the line was correctly positioned. The timing of search pattern training varied between control and experimental groups. An attentional control was provided for the group not receiving training. Performance at line positioning relative to training was examined. Specific metrics considered include: fraction of cases with correct tip localization, confidence in tip localization, and fraction of cases correctly identified as normally positioned catheters. Statistical significance was tested using the Wilcoxon rank-sum test. P-values of greater than 0.05 were considered statistically significant.

## Results:

Difference in median fraction of correctly localized catheter tips for control and experimental groups were 0.0 and 0.5, $p = 0.5000$ and 0.3805 respectively. Difference in the median confidence during localization for the control and experimental groups were 0.0 and 0.15, $p = 0.8792$ and 0.4355 respectively. Differences in true negative fraction for correct categorization of line positioning (correctly positioned versus malpositioned) for control and experimental groups were -0.0056 and 0.0722, $p = 0.7798$ and 0.2261 respectively.

## Conclusions:

The improvement in performance was greater in the experimental group when compared with the control group. However, these differences were not statistically significant at the Type I error level of 0.05. One possible explanation for these results is that the small sample size was not adequate to demonstrate a statistically significant training effect. Further study using a larger sample size may be useful to further examine this question. These results suggest that our knowledge of medical image perception may be useful for developing further educational tools for training in medical image perception and interpretation.