

## How Many Scans Do Novices Need To Reach Competency In Ultrasound Imaging In Detecting Rotator Cuff Pathologies

Orthopaedics / Shoulder & Upper Arm / Epidemiology, Prevention & Diagnosis

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### Introduction

Ultrasound is commonly used for the evaluation of shoulders and is reliable and accurate in identifying full-thickness rotator cuff tears. Although the known guidelines suggest that a minimum of 150 to 300 scans under the supervision of a qualified musculoskeletal radiologist are needed to acquire proficiency in musculoskeletal ultrasound, there seem not many opportunities of training in ultrasound imaging for orthopedic residents.

### Objectives

The purpose of this study was to investigate the learning curve of ultrasound imaging in orthopedic residents. The primary objective of this study was to quantify the number of ultrasound scans that novices in ultrasound imaging to reach competency.

### Methods

From May 2013 to February 2014, we studied two three-year residents without previous experience with shoulder ultrasound and evaluated their ability to detect rotator cuff pathologies. Learning curves were plotted with the cumulative summation (CUSUM) analysis and an acceptable failure rate of 20% compared to arthroscopic findings. Downward, upward, and horizontal CUSUM trend indicated not-competent, exceeded-competency, and competency, respectively. Diagnostic accuracy and time-to-completion of scan was evaluated. Second part of this study was to evaluate the possible differences between the trainees. Two two-year residents performed ultrasound scans in consecutive 40 patients. Number of cases for self-confidence and diagnostic accuracy were evaluated.

### Results

CUSUM analysis showed a competency after a median of 26 scans to correctly diagnose partial-thickness tear, full-thickness tear, and no-tear in supraspinatus tendon and 21 scans in subscapularis tendon. CUSUM analysis revealed upward trend in detecting full-thickness tear of supraspinatus, and undetermined trend in partial-thickness tear. Diagnostic accuracy for detecting supraspinatus abnormalities was 85% and time to completion of scan was mean 14 minutes (range, 9-23). Two three-year residents answered 30 cases for self-confidence in ultrasound imaging for detection of rotator cuff tear. One two-year resident was not sure about his ultrasound imaging until 30 consecutive scans and the other two-year resident had self-confidence after 30 cases of scans. However, diagnostic accuracy between two-year and three-year residents showed no statistical difference (77.7% versus 85.1%).

### Conclusions

Overall learning curve of ultrasound imaging for rotator cuff pathologies was around

20-25 cases and the detection of full-thickness tear showed increased competency even in novice trainee. Diagnostic accuracy was 85% and it seemed comparable to previous literatures. Trainees showed self-confidence for ultrasound imaging after 30 scans and there was no difference in diagnostic accuracy between trainees.