Comparative Effectiveness Of A Mnemonic – Use Approach Versus Self-study To Interpret A Lateral Chest X-ray

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Background

The chest radiograph (CXR) is the most frequently performed diagnostic image in medicine.¹ A complete CXR consists of both an anteroposterior (AP) and a lateral projection.² An AP and lateral view CXR allows the clinician to examine the patient’s chest in three dimensions to better localize infiltrates and lesions.³ However, clinicians most commonly use only the AP view.⁴ The lesser used lateral view of the CXR contains valuable information on the thoracic cage, pleura, lungs, pericardium, heart, mediastinum, upper abdomen, trachea, and inferior vena cava.⁵ The lateral view allows detection of lesions behind the heart, near the mediastinum, or near the diaphragm.⁶ In addition to visualization of the tracheal air column, inferior vena cava, retrosternal space, posterior margin of the heart, and diaphragmatic contour.⁷ Although some studies show little value to the lateral radiograph in specific circumstances,⁸,⁹ most studies and expert opinions continue to show its importance.¹⁰,¹¹ By developing lateral CXR diagnostic skills and learning techniques, clinicians can avoid expensive imaging tests and unnecessary radiation exposure, which are often done because of inability to interpret the lateral CXR.¹²

Today, medical educators find it challenging to not only teach how to read CXR but also to evaluate proficiency, accuracy, and reproducibility in reading CXRs.¹³,¹⁴ Even among seasoned clinicians, there is significant variability in inter-rater reliability, proficiency, and accuracy.¹⁵,¹⁶ Although several medical education curriculums and training programs address how to interpret CXR, they often ignore the lateral view. While many clinicians admit characteristic knowledge is obtainable from the lateral view,¹⁷,¹⁸ there is little available educational material on how to reliably read a lateral CXR. Thus, the need for a more proficient training of medical trainees interpreting the lateral view of the CXR is apparent.

Objectives

Mnemonics are a commonly used teaching technique in various medical, psychiatric, and surgical fields. Mnemonics have demonstrably improved quality of care in residency programs through implementation in patient handoffs.¹⁹ However, there is a lack of user-friendly methods to develop proficient lateral CXR interpretation techniques.²⁰ In the current study, we hypothesize that a specific mnemonic for learning the lateral CXR will result in improved learning and interpretation of lateral CXRs compared to conventional, self-taught methods.

Design & Methods

After obtaining Institutional Review Board (IRB) approval, we recruited second-year osteopathic medical students in Yakima, Washington from 8/6/2011 to 6/27/2013 who completed courses in cardiovascular and pulmonary pathology. None of the students had received training in the mnemonic approach prior to our study, but all had some exposure to lateral CXR interpretation. This prospective randomized control pilot study assigned participants to either the mnemonic-use method group (MUM) or the self-taught, multi-modal educational group (STMM). Students were randomly assigned to each group and completed a pre-assessment to gauge their prior knowledge of lateral CXR interpretation.

GROUP 1: A board-certified radiologist (BCR) taught the MUM group the following mnemonic using the first eight letters of the alphabet (Figure 12. and 3). The alphabetical mnemonic is organized so that the first three letters correspond to opaque structures, and the next 4 letters refer to darker structures: A, B and C are the bright structures, D, E, F and G are the darker structures, and H is a reminder to assess the heart (cardiac silhouette) for any cardiac pathology such as chamber enlargement. The BCR instructed the MUM group how to assess each structure and region, based on each letter in the mnemonic. Pathologic conditions for each letter of the mnemonic were also reviewed.

GROUP 2: In the other classroom, a supervising student guided the STMM group to the approved web sites and teaching files recommended by the same BCR that taught the MUM group. The STMM group reviewed the websites and were instructed to follow all directions and recommendations on these websites (Table 1). Each student was asked to note the presence or absence of the following findings on each lateral chest view of the post-test: lung opacity, mediastinal or hilar mass, pleural or pericardial effusion, hilar hemi, pneumothorax or pneumomediastinum, and bone/soft tissue abnormality.

Discussion/Conclusion

Participants using the mnemonic scored significantly higher than the self-learning group. Our results indicate both groups of students showed some improvement in their understanding of lateral CXR interpretation; however, there was a significant difference in improvement between the MUM and STMM groups. As expected, both groups had similar pre- assessment scores; however, the MUM group showed overall improvement greater than 1% in the post-assessment compared to only 1% improvement in the STMM group.

Significance

Even with the positive results, our study had several limitations. The MUM group did have the BCR during the entire three-hours versus the STMM group which had a student liaison. In addition, student retention of this mnemonic was not measured, nor was follow up obtained to identify if it was used or useful in clinical rotations. Moreover, the usefulness of this method for teaching and learning lateral CXR interpretation may only be applicable to undergraduate medical education and may not be helpful in graduate medical education and beyond. On the other hand, the inexpensive and time-effective mnemonic does provide evidence to support future studies in graduate medical programs, fellowships, and refreshers for active attending physicians.

The lateral CXR is a valuable source of information that has become increasingly undervalued in the era of chest-computed tomography. Our results verify that a learning mnemonic can improve knowledge of lateral CXR in medical students and potentially increase the use and application of the lateral CXR for diagnostic imaging.

References