

Final year physiotherapy student's reliability in chest x-ray interpretation.

Introduction

Newly qualified physiotherapists in the United Kingdom (UK) who undertake out of hours "on call" duties are asked to manage patients with acute respiratory deterioration. In questionnaires conducted UK-wide both Gough and Doherty (2007) and Thomas et al (2008) concluded that physiotherapists are increasingly required to work competently and respond promptly in emergency situations. As part of the physiotherapy assessment, interpretation of an unreported chest x-ray (CXR) is possible and may influence patient management strategies. Sixty nine per cent of NHS Trusts providing an "on call" physiotherapy service rely on undergraduate teaching and experience to prepare newly graduated physiotherapists for out of hours work (Gough and Doherty, 2007). Medical students are also prepared for working in acute situations; a study by (Jeffrey, Goddard, Callaway and Greenwood (2003) revealed that medical students had poor ability to interpret simple CXRs when presented without any additional clinical information. To date there appear to have been no studies published that have evaluated the ability of newly qualified physiotherapists to accurately interpret CXRs. Therefore, the aim of the current study was to evaluate if final year physiotherapy students were able to accurately interpret CXRs.

Method

Study Design and Participants:

A prospective study evaluating final year physiotherapy student's ability to interpret CXRs was designed, and following ethical approval from the School of Health and Rehabilitation Ethics Committee, invitation to participate was by the year group email so all final year (Year 3) physiotherapy students were contacted, given an information sheet and invited to participate.

Outcomes and data collection procedures

After signing consent forms, participants were asked to complete a short questionnaire asking for details on their respiratory experience on clinical placement, any additional training in CXR interpretation received on placement and if they had an interest in specialising in cardio-respiratory physiotherapy. Participants were randomly assigned to start at a different CXR station, and given 5 minutes to write down their interpretation before moving on the next x-ray. Six standard posterior-anterior or anterior-posterior CXRs were selected from the School of Health and Rehabilitation, Keele University learning and teaching resources, representative of those used during teaching of the cardio-respiratory curriculum and common conditions encountered in clinical practice. The CXRs had been previously assessed by a radiologist or respiratory medicine consultant as typical of a single diagnosis. See table 1. Brief vignettes for each of the CXRs were created comprising a short history and the cardinal symptoms typical of the patient diagnosis.

Data analysis

Answer sheets were scored between 0 and 2, with 2 being in agreement with expert opinion, 1 being partially correct, for example the correct interpretation of abnormality but failed to diagnose, or missed some detail, such as the exact number of fractured ribs, and 0 being no consistency with expert opinion.

Total scores for each participant were calculated, with a maximum score of 12 being possible. The number of students achieving a correct, partially correct score or no consistency for each CXR were also calculated. Medians and ranges were calculated. The Mann-Whitney U test was used to test for inter-group significance.

Results

Twenty five participants were recruited from the cohort of 63 third year physiotherapy students. All the participants (n=25) completed the questions on the questionnaire, see Table 2, and twenty two participants interpreted all 6 CXRs. Three participants failed to give an answer in one station (one CXR); the unanswered interpretations were scored at 0. The 147 interpretations were scored 0, 1 or 2 by the research students and verified by the research supervisor.

The frequency with which students interpreted the CXRs as correct, partially correct or incorrect are shown in Table 3.

The data was not normally distributed therefore medians were calculated (see figure 1). The median total score for the whole group was 3 out of 12, (range 0 – 9). The median total score for the group of participants without cardiorespiratory placement experience or an interest in cardiorespiratory as a career (n = 13), was 3 (range 0 – 9), see Table 3. The mean score for the sub-group of students with cardiorespiratory placement experience or an interest in cardiorespiratory as a career (n = 12) was 4 (range 1-7). Non-parametric testing for significance was used and the difference between the groups was not significant (p=0.42952).

A small sub group (n = 3) on respiratory clinical placements with access to CXR in the weeks immediately preceding the study scored a median total score of 5 (range 4 - 7), this sub group was considered too small for statistical comparison.

Discussion

The results of the study indicate that final year physiotherapy students had a poor ability to diagnose from CXR and a vignette. The physiotherapy students with respiratory placement experience in CXR interpretation or interest in pursuing a career in cardiorespiratory scored slightly higher, but the

results were not statistically significant. The small group of participants who had a respiratory placement in the weeks immediately prior to the study scored higher than the rest of the cohort

These results are consistent with previous research on final year medical students who did not perform well when interpreting simple CXRs (Jeffrey, Goddard, Callaway and Greenwood, 2003). Physiotherapists working in respiratory “on-call” or emergency duties may be called upon to review unreported CXR during their initial assessment. NHS Trusts rely on undergraduate teaching and clinical placements to prepare their new graduate staff members for out of hours working (Gough and Doherty, 2007. Thomas et al., 2008). The results of this study suggest that the formal undergraduate curriculum does not adequately prepare students for CXR interpretation after graduation.

The results comparing the amount training with total scores supports the finding by Jeffrey, Goddard, Callaway and Greenwood (2003) study demonstrating no correlation between amount of medical student formal teaching and ability to interpret CXRs accurately. The lack of significant difference between the current study’s sub-groups may reflect the time period (almost 12 months) between the formal CXR teaching and the current study.

A small sub-group (3 participants) who had a respiratory placement just prior to the study scored substantially higher than the rest of the cohort, although this sub group was too small for statistical comparison there is evidence that greater exposure in a quality driven and meaningful environment increases learning (Patton, Higgs and Smith, 2013).

It has been noted that greater experience in reading CXRs will make an individual more reliable in their interpretation. Satia et al (2013) and Eisen, Berger, Hedge and Schneider (2006) found that Foundation Year 2 doctors were more reliable than medical students and other researchers found

that greater experience increased the correct CXR interpretation of pneumonia (Ojutiku, Haramati, Rakoff and Sprayregen, 2005; Hopstaken, Witbraad, van Engelshoven and Dinant, 2004) and congestive cardiac failure (Feldmann, Jain, Rakoff and Haramanti, 2007). Emergency department junior doctor's findings were considered unreliable in their CXR interpretation (Gatt et al., 2003) and frequently misinterpreted life threatening abnormalities (Mehotra, Bosemani and Cox, 2009).

As training physiotherapy students at the point of care can be challenging given the increased demands on clinical educators (Patton, Higgs and Smith, 2013), those running on-call training packages for new graduates may need to consider innovative learning and teaching methods; utilising e-learning packages which have been demonstrated to improve medical students CXR interpretation skills (Tamaklo, 2012) could be one method to enhance skills.

The differences in the type of pathology and number of students correctly interpreting the CXR are interesting. Participants found fractured ribs most easy to interpret followed by the "black lung field" problems of pneumothorax and hyperinflation. Problems generating an increase in lung field opacity were less often correctly interpreted which was consistent with but more pronounced than the Jeffrey, Goddard, Callaway and Greenwood (2003) findings. The reason for this inconsistency is not clear.

Limitations and recommendations

This was a small study using CXRs limited to respiratory problems and a small number of participants from one cohort of final year physiotherapy students making analysis of the results less robust. The study assumes that the CXRs were accurately interpreted before being added to the School's learning and teaching resources and is a possible source of error. Before a larger study is commissioned an exploration of employer expectations of newly qualified physiotherapists is recommended.

Conclusions

Physiotherapists being called, out of hours, to patients with acute respiratory deterioration may have access to an unreported CXR to assist in their assessment process. More recent exposure to an undergraduate cardio-respiratory clinical placement may result in improved reliability post-graduation; however most newly graduated physiotherapists are unlikely to be able to interpret CXRs reliably and may require training to do so.

Key words

Physiotherapy respiratory assessment, Chest x-ray interpretation, reliability.

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