Triage Pulse Oximetry and the Chest X-ray Opacity Score in ED Patients with COVID-19 Pneumonia

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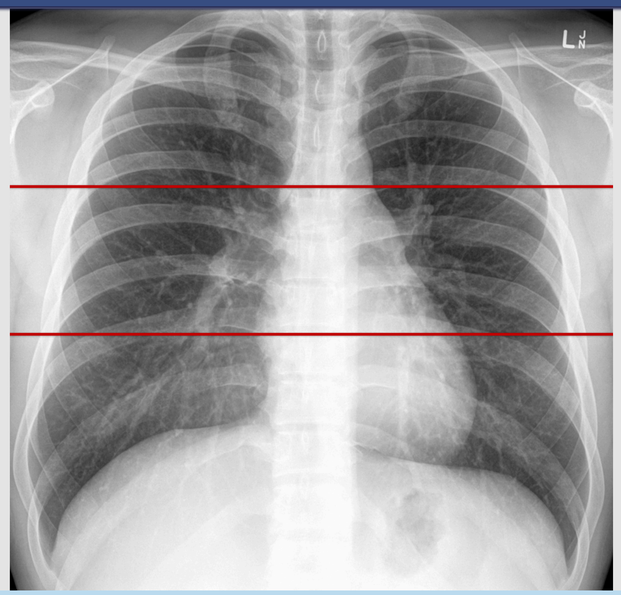
BACKGROUND

- Coronavirus disease 2019 (COVID-19) was first documented in December of 2019. It is highly contagious and in March of 2020 the World Health Organization declared the outbreak as a pandemic due to its rapid global spread.
- Plain radiograph is often used in the initial evaluation of chest pain and dyspnea. It can be done portably. Additionally, it is widely available, inexpensive, and quick.
- The initially CXR in combination with vital signs and clinical assessment often guide important decision for patient care such as admission and intubation.

METHODS

- A retrospective chart review was conducted for patients seen in April 2020.
- Inclusion criteria consisted of adult ED patients who were admitted with COVID-19 pneumonia.
- Demographic information, Emergency Severity Index (ESI), triage PO, Body Mass Index (BMI), comorbidities and intubation rates were analyzed using chi-square and student's t-test.
- An EM attending and senior EM resident determined the CXR opacity scores in severity ranging from 0 to 6. A kappa score was generated to assess interrater agreement.
- A linear regression model was done to assess the correlation between triage PO and CXR scores.
- The primary outcome was mortality.

THE CXR SCORE



- Various ways of scoring an CXR have been proposed dividing the lungs into either 4 or 6 sections.
- In our study each lung was divided into 3 zones as marked above. The top line is marked below the inferior wall of the aortic arch and the bottom line is marked below the right hilar structures.
- Each zone is then given a score of 0 or 1 based on whether opacities are present. CXR score range from 0-6.

RESULTS

- 306 patients met inclusion criteria
- Mortality was 21%
- 40.2% of patients were male
- Most patients were triaged as ESI 2 (36.3%) or ESI 3 (60.7%).
- The mean age was 61.9 ± 14.7 years
- The mean BMI was 30.1 ± 6.4
- The mean triage PO was 88.7 ± 3.9.
- Pneumonia on CXR was 85.3% bilateral, 6.5% left and 8.2% right. 43.5% of patients were given CXR opacity scores ≥ 3.
- The kappa score for CXR score agreement was 0.47.

RESULTS (cont.)

- The mortality group was associated with:
  - Older age (70.9 ± 11.3 vs 59.3 ± 14.6; P<0.01)
  - Hypertension (66.7% vs 49.2%; P <0.05)
  - Dialysis (12.7% vs 4.5%; P <0.05)
  - CXR score ≥ 3 (84.8% vs 62.5%; P <0.05)
  - Triage PO ≤ 85% (48.4% vs 21.9%; P<0.01)
  - Intubation (35.9% vs 10.3%; P<0.01)

- Smoking, BMI, asthma and diabetes were not associated with mortality.
- The R^2 correlation coefficient for triage PO and the CXR opacity score was 0.12.

CONCLUSIONS

- In COVID-19 pneumonia there was weak correlation between triage hypoxia and pneumonia severity based on the CXR opacity score.
- Increased mortality was associated with older age, hypertension, dialysis, triage PO ≤ 85%, need for intubation, and CXR score ≥ 3.

DISCUSSION

- Interrater reliability was low in our study. Future studies can compare scores of radiologist with ED physicians.

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