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NEEDLE IN A HAYSTACK: OPPORTUNISTIC SCREENING OF LUNG NODULES AMIDST COVID-19 USING DEEP LEARNING

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PURPOSE: Detection of pulmonary nodules is central to early diagnosis of lung cancer. Many types of observer error have been reported in literature. During the pandemic the radiology departments were stretched, and it is possible that the radiologists were primarily looking to either confirm or rule out COVID and missed nodules due to satisfaction of search and fatigue. This study was undertaken to estimate the magnitude of such errors.

METHOD: 1312 consecutive chest CT scans interpreted in two specialist radiology units during the months of May-Jun 2021 (peak of India’s 2nd covid wave) were used in this study. All scans were processed by qCT-Lung, a deep learning algorithm capable of flagging nodules. The radiology reports of the cases flagged by qCT were searched for findings suggestive of lung cancer. Cases for which nodules or mass were not mentioned in the report were re-read by an independent radiologist with qCT’s assistance. The radiologist was aware of the context and was asked to mark flagged lesions as Yes/no for nodules. They also rated the nodule for malignancy potential in a positive directed five-point Likert scale if the flag was correct and gave an alternative finding if incorrect.

RESULTS: 381 (29.0%) scans were flagged for nodules by qCT. 52 of these were also reported in radiology reports. Of the 329 scans re-read by radiologist, 65 (19.8 %) scans were reported as having nodules. These 65 scans had a total of 134 nodules. The median size (longest diameter) of these nodules was 14 mm (range: 7 - 33) and most (95) were solid nodules. The most common reason (94.5%) of false flag by qCT was ground-glass opacity with consolidation. 53 of 65 of the correctly identified scans were given malignancy rating of 1 or 2 (non-malignant or probably non-malignant). 10 were given a rating of 3 (could be malignant or non-malignant) and 2 were rated as probably malignant. Two cases of lung cancers were flagged by both qCT and reports.

CONCLUSIONS: Nodules were not reported in 65 scans. All of them can’t be considered as missed by radiologists. From the ratings provided by the radiologist doing re-reads - it is possible that previous radiologists could have not reported the nodule due to perceived malignancy risk. 12 scans had ratings that would have warranted follow-up action. False flags were mainly due to ground glass with consolidation. The occurrence of ground glass opacities in COVID could in part explain the high number of false flags in this study.

CLINICAL IMPLICATIONS: All scans had nodules with size > 6 mm and 26 had multiple nodules making the patients eligible for follow-up as per Fleischner guideline. Radiologist report only clinically significant findings focussing mostly on indication(s) of the scan. Taking a conservative approach and reporting all nodules irrespective of perceived risk will help clinicians plan follow-up. Algorithms like qCT-Lung can help readers in identifying all nodules.

DISCLOSURES: Employee relationship with Qure.ai Please note: 15/12/2020 Added 04/04/2022 by Vikash Challa, value=Salary Removed 04/04/2022 by Vikash Challa
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