



## Simulated Artificial Intelligence Workflow Improves Report Value in Clinical Trials While Saving Radiologists Time

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### Introduction

Cancer patients enrolled in clinical trials require consistent lesion measurements on cross-sectional imaging, mainly on Computed Tomography (CT). Measurement inconsistencies in radiology reports render them less valuable for oncologists who objectively assess tumor response using imaging criteria, such as Response Evaluation Criteria In Solid Tumors version 1.1 (RECIST 1.1). We demonstrate how lesion measurement assisted workflows with Radiologist Extenders (RE) and worklist prioritization of incidental critical findings can improve patient care and decrease radiologist interpretation times.

### Hypothesis

A simulated Artificial Intelligence (AI) workflow with REs improves radiology report value with more consistent target lesion selection and measurements. Independent of RE educational level, measurements made in advance of radiologist interpretation save them time by not having to measure metastatic lesions.

### Methods

We describe a simulated AI workflow where REs identify and measure metastatic lesions on body CT exams prior to radiologist interpretation.

To demonstrate advantages of AI-assisted workflows on clinical trial CT exams, we assessed target lesion measurement concordance rates in relation to oncologist records and estimated radiologist time saved per study. We evaluated AI worklist prioritization by estimating the expedited notification time of incidental critical findings discovered by REs.

During exam interpretation, radiologists either approved or modified RE annotations. Once verified by radiologists, measurements were directly imported into PACS interactive reports as hyperlinks, reducing transcription errors.

Following exam dictation, radiologists recorded interpretation time and number of discrepancies (e.g. unmeasured or remeasured lesions, unidentified new lesions) relative to RE measurements. From this, we compared lesion identification and measurement discrepancies among REs from various educational levels.

### Results

REs assessed 925 chest abdomen pelvis (CAP) exams, 159 (17.2%) of which had target lesions specified in the PACS bookmark table. In comparison to unassisted radiology workflows, there was a three-fold improved concordance (66% vs 21%) of target lesion measurements with our tumor assessment radiologist in RE-assisted workflows. Interestingly, both workflows increased during the study, however, concordance proportion also increased (all department reports became more concordant). Radiologist dictation times decreased by 37%, going from 12 minutes (our established average time for exam dictation) to 7.5 minutes.

To date, REs have identified 22 incidental critical findings (e.g. pulmonary emboli, small bowel obstruction), helping radiologists prioritize their worklists by alerting them to these findings with an average referring clinician notification time of 3.8 hours earlier.

There was negligible difference in timing and discrepancies between REs among varying educational levels. All REs spent an average of 10.1 minutes assessing CAP CT exams, averaging less than one discrepancy (average of 7.5 lesions measured per patient) per study.

### Conclusion

We demonstrate how REs build on existing PACS automation advances by identifying and measuring previous and new lesions, simulating an AI workflow with numerous impactful advantages that improve patient care while enhancing productivity in radiology workflows.

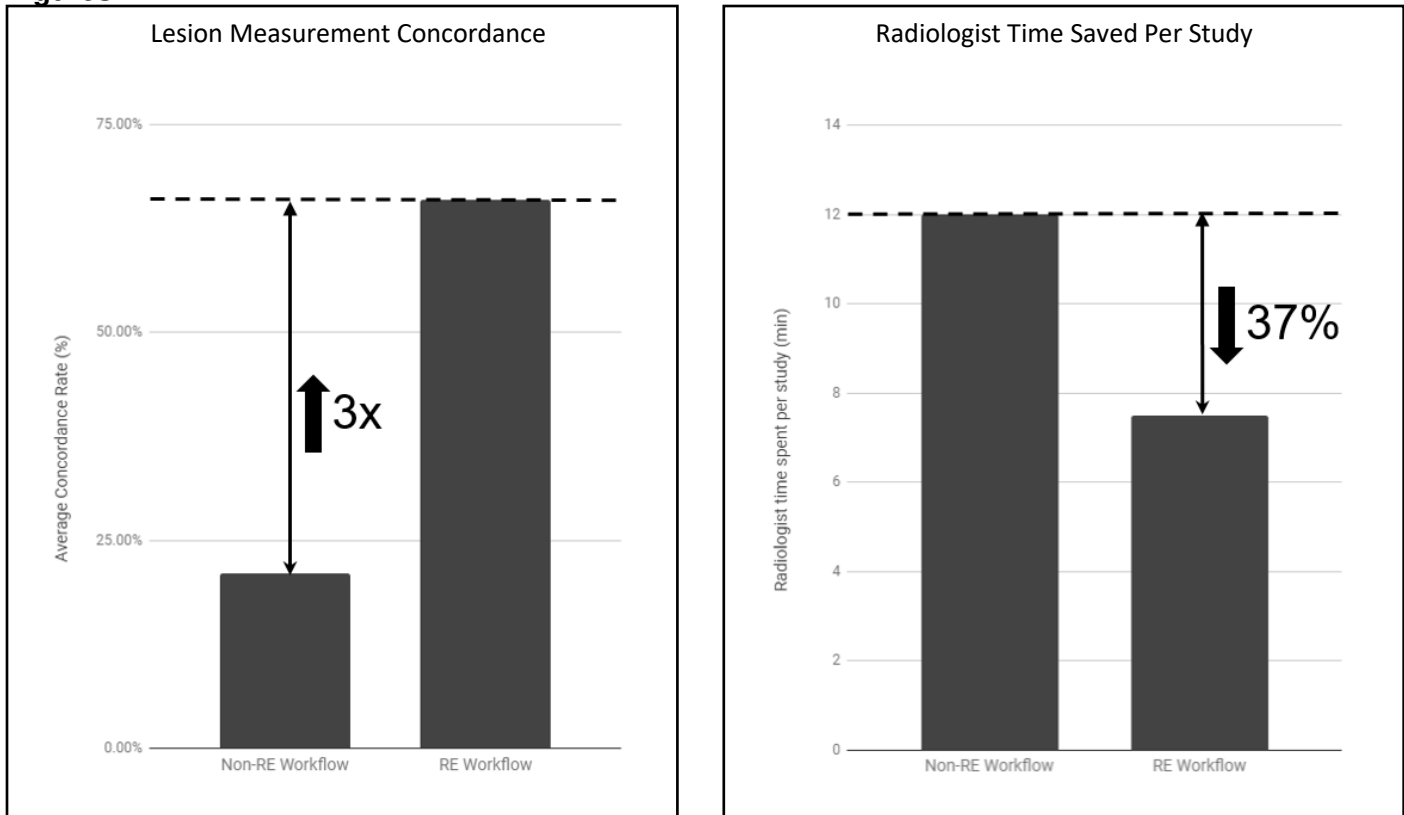
### Statement of Impact

Minimizing lesion measurement discrepancies between radiologist reports and oncologist records improves report value. While improving patient care, our simulated AI workflow also saves time in an otherwise extensive tumor assessment process. A pending business case analysis will likely show cost savings in both simulated and actual AI workflows.

### Keywords

artificial intelligence, radiologist extenders, RECIST, cancer clinical trials, critical findings

### Figures



**Figure 1a, (Left).** Comparison of Average Concordance Rates in RE- vs non-RE Assisted Workflows. Average concordance rate in an RE-assisted workflow improved three-fold with respect to our TMR (benchmark for assessing concordance in this study) due to frequent direct communication with oncology teams.

**Figure 1b, (Right).** Comparison of Time Spent by Radiologists per Study with RE- vs non-RE Assisted Workflows. Average time spent per study by radiologists decreased by 37% with REs in the workflow, improving radiologists' efficiency.