Utility of CDE Definitions and FHIR Structure for Representing Chest CT Findings

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Background/Problem Being Solved

Accurate reporting of chest CT scans is critical for optimal patient care. The American College of Radiology/Radiologic Society of North America Common Data Elements (CDEs) project provides an organized ontology for radiology reports, facilitating clinical workflows by structuring diagnoses, anatomical locations, and other relevant details. Fast Healthcare Interoperability Resources (FHIR) offers a standard for transmitting and integrating this information with other patient data. Our study explores the potential of combining CDE and FHIR standards to enhance the exchange of structured radiology data.

Intervention(s)

We collected a sample of outpatient chest CT reports using a specialized radiology report search engine (mpower Nuance). Findings from each report were manually identified and recorded with attributes such as measurements, anatomical location, disease severity, size, and volume. Each finding was associated with a CDE definition from the RadElement repository and a staging repository of proposed definitions. We documented whether findings could be encoded with a CDE definition and identified attributes not covered by existing CDEs. Negative findings, such as "clear lungs," were also noted.

Barriers/Challenges

The primary challenge was the incomplete coverage of existing CDE definitions, requiring the use of proposed definitions to encode a broader range of findings. Anatomy-based negative statements posed another challenge, as they are not consistently represented in current CDEs.

Outcome

In 82 chest CT reports, we identified 1,190 findings (average 14±3 per report). Using published and proposed CDE definitions, 83.2% of findings were encoded as FHIR Observations. This included common radiology findings such as pulmonary nodules and pleural effusions. Anatomy-based negative statements occurred at a rate of approximately six per report.

Conclusion/Statement of Impact/Lessons Learned

CDE-labeled FHIR Observations can encode most findings in chest CT reports, improving compatibility and data exchange across healthcare systems. As the CDE library expands, more comprehensive representation of radiology results will be feasible. The study also highlights the need for standard methods to represent anatomy-based negative statements.

Keywords

Applications; Clinical Workflow & Productivity; Enterprise Imaging; Standards & Interoperability; Systems Management