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Improving Radiology Reports with AI & Common Data Elements

Artificial intelligence is revolutionising radiology, enhancing diagnostic accuracy, optimising workflow efficiency and improving patient care. However, integrating AI-generated insights into radiology reports presents challenges, particularly in ensuring consistency and interoperability across diverse healthcare systems. Traditional reporting methods often rely on free-text descriptions, which can introduce variability and reduce the clarity of findings.

Common Data Elements (CDEs) offer a structured approach to embedding AI-derived measurements into radiology reports. By defining standardised units of information, CDEs ensure that AI-generated data is recorded in a uniform manner, making it easier to interpret and compare across institutions. This standardisation not only enhances clinical workflows but also facilitates large-scale research and supports clinical decision-making. A recent study published in the *Journal of Imaging Informatics in Medicine* explores the role of CDEs in AI-integrated radiology, detailing their application in structured reporting and the benefits they offer in clinical practice.

Enhancing Standardisation with Common Data Elements

CDEs are predefined sets of data points that provide a standardised framework for recording information. Each element consists of a specific question paired with a structured response, ensuring uniformity in data collection and reporting. In radiology, CDEs define key parameters such as imaging techniques, anatomical measurements and diagnostic assessments. By using a predefined value set, CDEs minimise ambiguity and promote interoperability between healthcare systems.

The adoption of CDEs in radiology has been driven by collaborative efforts between professional bodies such as the American College of Radiology (ACR) and the Radiological Society of North America (RSNA). These organisations have developed repositories of standardised data elements, which can be used to enhance structured reporting. This approach is particularly valuable when integrating AI-generated results, as it ensures that findings are documented consistently and can be used reliably across different institutions.

With AI models increasingly capable of performing complex image analysis tasks—such as detecting abnormalities, segmenting anatomical structures and quantifying disease severity—ensuring that their outputs are recorded in a standardised format is critical. CDEs provide a mechanism for capturing AI-derived measurements in a structured and interpretable manner, improving the reliability and usability of AI-driven insights in clinical practice.

Integrating AI-Generated Findings into Radiology Reports

The integration of AI-generated results into radiology reports requires a framework that enables seamless data exchange between AI systems and reporting platforms. The AInSights platform, developed at the University of Pennsylvania Health System, provides an example of how this can be achieved. This system applies deep learning to segment anatomical structures, such as the liver and spleen, and generates quantitative measurements, including organ volume and attenuation.

To ensure that these AI-generated findings are incorporated effectively into radiology reports, the platform utilises CDEs and the Digital Imaging and Communications in Medicine Structured Reporting (DICOM-SR) framework. The AI-derived measurements are stored as structured data elements and automatically inserted into radiology reports, eliminating the need for manual transcription and reducing the risk of errors.

Furthermore, the integration process follows established interoperability standards, including AI Workflow for Imaging (AIW-I) and AI Results

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(AIR). These frameworks define protocols for exchanging AI-generated results with Picture Archiving and Communication Systems (PACS) and Electronic Health Records (EHRs). By using CDEs within these frameworks, radiology reports can incorporate AI findings in a standardised, automated and reproducible manner. This not only improves efficiency but also reduces the cognitive burden on radiologists, allowing them to focus on clinical interpretation rather than data entry.

Advancing Research and Decision Support with CDEs

Beyond their clinical applications, CDEs play a vital role in supporting large-scale research and data-driven decision-making. By harmonising AI-generated data across institutions, CDEs facilitate the aggregation and analysis of radiological findings for research purposes. This enables the development of predictive models, quality improvement initiatives and benchmarking studies.

For example, AI models designed to detect hepatic steatosis can automatically extract relevant measurements from medical images and integrate them into structured radiology reports. These standardised findings can then be used to identify trends, assess disease progression and enhance clinical decision-support systems. By ensuring consistency in data collection and reporting, CDEs enable researchers to conduct large-scale studies with high-quality, comparable datasets.

Moreover, CDEs align with the Findable, Accessible, Interoperable and Reusable (FAIR) principles, which promote data sharing and collaboration in medical research. By structuring AI-generated data in a standardised format, CDEs facilitate interoperability with existing data networks, such as the Observational Health Data Sciences and Informatics (OHDSI) framework. This integration enhances the potential for AI-generated insights to contribute to evidence-based medicine and healthcare innovation.

The integration of AI into radiology is transforming diagnostic capabilities, but its effectiveness depends on the ability to standardise and interpret AI-generated findings. Common Data Elements provide a structured approach to embedding AI insights into radiology reports, ensuring consistency, interoperability and efficiency.

By facilitating seamless data exchange, reducing transcription errors and supporting large-scale research efforts, CDEs enhance both clinical workflows and the broader impact of AI in medical imaging. In the future, the use of CDEs will be crucial in ensuring that AI-generated insights are standardised, interpretable and actionable across diverse healthcare settings.

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