IMPLEMENTATION OF COMMON DATA ELEMENTS IN AN INTERACTIVE MULTIMEDIA REPORTING SYSTEM

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PURPOSE:

• The RSNA defines common data elements (CDEs) as “standardized sets of questions and allowable answers used to express observations in diagnoses”.

• CDEs are a vital component of structured reporting as they provide details about a disease using standardized terminology that can be indexed, searched and transmitted across electronic health record systems.

• However, widespread adoption and implementation of CDEs remains limited.

• A framework for using CDEs in an interactive multimedia reporting environment is presented in this exhibit.

Example of CDE from https://radelement.org
METHODS:

• An interactive multimedia reporting system was developed that works as follows:
  1. Record key images and voice descriptions of image findings
  2. Tag the images with metadata using natural language processing (NLP) that describes anatomy, pathology, and common data elements (CDEs)
  3. Assemble multimedia report with related information arranged in graphical timelines

Step 1: Record images/voice

A metastasis is identified in liver segment 4.

Step 2: Tag with metadata

Disease metrics and series/image numbers are transmitted automatically using PACS API.

Step 3: Assemble multimedia report
METHODS:

- The metadata that tags each finding consists of Anatomy and Pathology (aka, Diagnosis) terminology referenced to an ontology (i.e., controlled vocabulary).
- Anatomy and Pathology labeling triggers the display of relevant CDE menus to guide and inform radiologists about what to say about a particular diagnosis.
METHODS:

• As the radiologist dictates additional information about a finding, the NLP searches the transcribed text for CDE elements to populate the appropriate fields in the multimedia report.

• Signed reports only display selected CDEs.
METHODS:

• The ontology used to label each finding consists of hierarchies of Anatomy and Pathology terms.

• CDEs applied to a parent term within the hierarchies may be transmitted to a child (i.e., inheritance) or blocked by design.

Each anatomy term is associated with a pathology tree. Rightmouse button click accesses CDE authoring tool.
METHODS:

• The authoring application that supports CDEs allows for menus of questions and answers to be constructed with the following options:
  • Pick list with single answer
  • Pick list will multiple-choice answers
  • Fill-in-the blank field with free text
  • Fill-in-the blank field with disease metrics
METHODS:

• CDEs may be applied to the following to allow for versatility in their application:
  • Anatomy terms
  • Pathology terms
  • Anatomy-Pathology term combinations

• CDEs are cross-referenced to multiple ontologies, including SNOMED, RadLex, ICD-10, and others.

• CDEs applied to a particular anatomical term, for example “muscle,” may be transmitted to all occurrences of muscle terminology across the ontology (i.e., transference).
RESULTS:

- The ontology used in the reporting process currently consists of 1794 Anatomy terms and 21,821 Pathology (i.e., Diagnosis) terms.

- A total of 1387 CDEs have been implemented in the system to date.

- CDE sources include the RSNA’s RadElement repository, American College of Radiology’s RADS reporting systems, and the College of American Pathologists’ Cancer Protocol Templates.

- The principles of inheritance and transference of CDE properties provide for an efficient way to manage and maintain the ever-growing CDE library.
CONCLUSIONS:

• Common data elements are an essential component of radiology reporting and data science initiatives.

• A practical and efficient method for implementing CDEs in an interactive multimedia reporting environment has been demonstrated.