Feasibility of Cross-Vendor Linkage of Ophthalmic Images with Electronic Health Record Data - An Analysis from the IRIS Registry

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Purpose: To link ophthalmic imaging data that are compliant with the universal Digital Imaging and Communications in Medicine (DICOM) standards at the individual patient level in the American Academy of Ophthalmology IRIS® Registry (Intelligent Research in Sight).

Design: A retrospective study using de-identified EHR registry data.

Subjects, Participants, Controls: Patient records within the IRIS Registry database.

Methods: DICOM files of several imaging modalities were acquired from two large retina ophthalmology practices. Metadata tags were extracted and harmonized to facilitate linkage to the IRIS Registry using a proprietary heuristic patient-matching algorithm, adhering to HITRUST guidelines. Linked patients and images were further assessed by image type and clinical diagnosis. Reasons for failed linkage were further assessed by examining patients' records.

Main Outcome Measures: Success rate of patient clinicoimaging linkage and patient characteristics of linked and unlinked subjects.

Results: 2,287,839 DICOM files from 54,896 unique patients were available. Of these, 1,937,864 images from 46,196 unique patients were successfully linked to existing patients in

the registry. After removing records with abnormal patient names and invalid date of births, our algorithm's success linkage rate to the IRIS Registry was 93.3% for images. 88.2% of all patients at the participating practices were linked to at least one image.

Conclusions: Using identifiers from DICOM metadata, we created an automated pipeline to connect longitudinal real-world clinical data comprehensively and accurately to various imaging modalities from multiple manufacturers at the patient and visit level. This curation process has produced an enriched and multimodal IRIS Registry, enabling enhanced research and advanced analytics with an important future application in artificial intelligence algorithmic development requiring large linked clinicoimaging datasets.

Precis

We comprehensively and accurately linked ophthalmic images using Digital Imaging and Communications in Medicine (DICOM) metadata with patient-level clinical records from the American Academy of Ophthalmology IRIS® Registry (Intelligent Research in Sight).