around their use. Healthcare staff recognised the benefits of AI predictive tools in being able to 'detect deterioration quicker than you would currently do'(05-ID), which informed decisions around patient discharge: 'can you safely send them home (...) or do you want to keep them, in case they do deteriorate' (05-ID). They found AI predictive tools useful when explaining the potential risk of cardiovascular events to patients and encouraging medication adherence 'it does help so much convincing the patient to actually adhere to the medication' (07-Endo).

During COVID-19, AI prediction tools helped identify patients that might potentially need mechanical ventilation and ICU admission. Healthcare staff also felt it was important that AI predictive tools provided reliable information, that was easy to understand, and integrated with the current systems. A concern raised around the use of AI predictive tools was whether they might 'mislead junior doctors or doctors who would not have that much of a clinical sense and would totally depend on it' (07-Endo).

Conclusion This study demonstrated opportunities for the application of AI predictive tools in clinical practice. Concerns raised around the use of these tools should be considered by developers. We recognise that the perceptions of only a small number of clinicians were included mainly due to the increased time pressures on staff during the COVID-19 pandemic. Healthcare staff described essential features that will guide the future development of AI predictive tools with higher potential for application in real practice.

8 EVALUATION OF A TELEMEDICINE MODEL TO DELIVER CATARACT CARE USING IMAGING TECHNOLOGY INSTEAD OF TRADITIONAL F2F PATHWAYS

Pei-Fen Lin. *Moorfields Eye Hospital*

10.1136/bmjhci-2022-FCIASC.8

Objective To set up and establish a sustainable telemedicine model to deliver cataract care pathway, where the traditional face-to-face cataract assessment clinic is replaced with a telemedicine consult with imaging technology to develop a safe, efficient telemedicine care delivery model in contrast to the current established traditional face-to-face pathways. To study the efficacy, efficiency, safety, patient experience of the new service. To assess usability and review risk of digital exclusion with patients and staff.

Methods Patients referred for cataract surgery from the community are booked into a video clinic (AttendAnywhere) as per date of referral. Patients were not pre-called or pre-selected for the digital pathway. After video consultation and pt confirmed to have symptomatic cataract affecting quality of life, the patient is preliminary listed for cataract surgery and verbally consented. The patient then attends a cataract imaging hub where anterior segment and fundus high resolution photography and optical coherence scans were performed. In addition, patient blood pressure and blood sugar are obtained. The results of the assessments are reviewed by the surgeon remotely to confirm the stratification of the cataract and plan for surgery. Any patient with unexpected findings or abnormal vitals were brought back for face to face review. Post-op patients are follow-up in the community. All patient consultation and imaging were recorded in an electronic patient records (Medisfot) Prospective data collected on patient demographics, access to video consult, referral date, review date, stratification, and outcome of surgery. Patient experience assessed via a post video clinic survey.

Results 403 patients were assessed, 42 excluded from the final data analysis due to erroneous bookings into the clinic. Total 361 patients correctly booked for new cataract assessment were included. 9 patients were brought back for further assessment in a face-to-face clinic as additional abnormalities were found on imaging. 299 listed for surgery (conversion to surgery rate of 82%). Average age of the patient is 74 yrs old. 31% >75 and

17% > 80 years old. 24% patients were the presumed digitally excluded group e.g. elderly, language barrier, care home resident, patient with partial or lack capacity, and lack of technology. To date, 166 patients have completed their surgery and 6 week post-op follow up. 96% reported improvement of vision post surgery. 7% had post-op complications and 3 patients had intraoperative complications. Cases were stratified and operated appropriately by all levels of surgeons, 52% by trainees and 48% by consultants or consultant grade surgeons.

No attendance to the emergency eye care service within 1 month post-operation. Patient survey showed 95% satisfied with care, 57% preferred the video clinic method. 82% would have come to a face to face clinic via a carbon emitting mode of transport, 60% by car.

Conclusion Digital cataract service (DCS) has demonstrated it is safe; patients with abnormal findings on imaging clinics were correctly stopped from proceeding with surgery. 96% of patients reported improvement of vision post surgery, this is better than the national audit standard of 95%. 4% patients had post-op complications which is lower than the 14% audit standard.

DCS is effective as it has a high conversion to surgery rate at 82% compared to the national average of 74%. The stratification of patients and their cataracts enabled surgery to be carried out safely by all levels of surgeons.

For patient experience it shortened the overall assessment time to 1.5 hours compared to a 3–4 hour wait in a face-to-face clinic. It also maximises the efficient use of staff, equipment and space; patients are consulted/assessed at time of arrival with no idle staff in the process. 24% patients with demographics traditionally included in the digitally excluded group were able to access the service by proxy, it also enabled clinicians to bring care to patients' home environment.

Overall DCS provides a safe, effective, efficient way of delivering cataract care with reduced carbon footprint by minimising patient and staff travelling.

9 FREE TEXT NOTES ADDED TO A PATIENT'S ALLERGY STATUS IN ELECTRONIC PRESCRIBING SYSTEMS DIGITALLY ANALYSED FOR BETTER USABILITY

Ben Logan. *St. Helens and Knowsley Teaching Hospitals*

10.1136/bmjhci-2022-FCIASC.9

Objective Electronic prescribing systems often provide a drop-down list of medications and pre-specified reactions to record a patient's allergy status. This list is non-exhaustive; less common reaction types require the user to add a free text note.

The Careflow Medicines Management EPMA system provides decision support preventing a prescriber initiating a drug a patient has a recorded reaction to. Where a free text

reaction is recorded this functionality is not provided which results in increased risk to the patient.

The aim of this project was to identify recurring free text reactions and incorporate these into the system. Future avoidance of free text documentation will improve data quality and make reaction data available during built-in prescribing decision support.

Methods Free-text allergy notes added to the electronic prescribing system since implementation in March 2018 were extracted using structured query language. The data was cleaned and analysed using the Python.

Natural language processing techniques were employed to clean the data and reduce the dimensionality of the data set. A drug library extracted from the electronic prescribing system was used to tag medications within the text.

After pre-processing the most commonly occurring phrases were found by counting the most frequent bigrams present in the text. Further analysis was carried out using the apriori algorithm.

Results A total of 2872 notes were identified for analysis. The most common terms found were already included as part of the electronic prescribing systems allergy documentation system. This included the terms 'rash' and 'penicillin' which were recorded 480 and 400 times respectively. Of the top 20 most frequently appearing terms two were identified as not included in the system. These were 'swelling' which was recorded 320 times and 'pain' documented 210.

Applying a Bi-gram and filter identified that the term swelling was most often associated with the phrase 'ankle swelling' which appeared 60 times. The apriori algorithm identified an association between the terms ankle and swelling and amlodipine with high levels of confidence.

Pain was most often associated with the phrases 'chest pain' appearing 38 times and 'abdominal pain' or 'abdo pain' appearing a combined 55 times. Both are reaction types which cannot be documented in the prescribing system without the addition of a free-text note.

Conclusion Natural Language Processing can be applied to large sections of unstructured clinical documentation to quickly analyse themes and trends. With appropriate cleaning and manipulation of the data commonly occurring phrases relevant to clinical practice can be identified.

This permitted recurring drug reactions to be identified and added to the electronic prescribing system. It is hoped this will reduce the frequency of free-text notes added in the future and improve reaction documentation. It is anticipated that patient safety will be improved by making more reaction data available for electronic decision support.

Packages such as Python NLTK used for natural language processing are freely available and allow users to process data which would be too time consuming to process manually.

10 DEVELOPMENT AND EVALUATION OF A MACHINE LEARNING MODEL TO PREDICT POSITIVE URINE CULTURES IN THE OUTPATIENT SETTING AND MINIMIZE THE USE OF ANTIBIOTICS

Farah E Shamout, Phillip Wang, Nasir Hayat, Vee Nis Ling, Terrence Lee St John, Ghadeer Ghosheh, Lelan Orquiola, Vansh Gadhia, Zaki Almallah. *New York University Abu Dhabi*

10.1136/bmjhci-2022-FCIASC.10

Objective Excessive prescription of antibiotics is amongst the principal drivers of antibiotic resistance, which is considered a surging threat to global health. The most frequent resistant pathogens are usually linked with urinary tract diseases, such as urinary tract infections (UTI). Studies have shown that clinicians may prescribe antibiotics based on presenting symptoms due to the prolonged time required to obtain the final results of urine bacterial cultures. While many of the current approaches to ameliorate prescribing behavior are educational or regulatory, here we develop and evaluate a logistic regression model that detects the risk of positive urine cultures based on the patient's history and presenting physiological data extracted from the electronic health records, to help clinicians make informed antibiotic prescription decisions without the need to wait for urine culture results.

Methods We used an anonymized dataset collected between 2015 and 2021 in a multi-specialty large hospital with primary, secondary and tertiary care facilities. The retrospective study received approval by the Institutional Review Board (IRB) from both the research institution and hospital (IRB references: HRPP-2020-173 & A-2019-054, respectively). We included adult outpatient encounters associated with at least one urine culture test. For the input features, we extracted and pre-processed each patient's demographics (age, sex), comorbidities (diabetes millutus, hypertension, cancer and hyperlididemia), vital signs (pulse, respiratory rate, oxygen saturation, temperature, systolic blood pressure, diastolic blood pressure and fraction of inspired oxygen), instant urine dipstick test results, all collected prior to the acquisition of the urine culture, as well as diagnosis codes (ICD-10 codes) and procedure codes (hospital custom codes) from the patient's previous hospital encounter. We defined the output as a binary label indicating a positive or negative urine culture result by processing textual data within laboratory test results. We assume a positive urine culture if the concentration of urine pathogen is higher than 100,000 colony forming units per milliliter (CFU/ml). We split the dataset randomly into a training (70%), and test set (30%). We optimized a logistic regression model using the training set with stratified k-fold validation, and evaluated it on the test set with 95% confidence intervals computed using bootstrapping with 1000 iterations.

Results After applying the inclusion criteria, the overall dataset consisted of 11,388 patients with 17,452 unique encounters (56.1% females; mean age 49.1 standard deviation 17.5 years). Amongst all encounters, 2,431 (13.9%) were associated with a positive label. We evaluated the models on the held-out test set consisting of 5,236 encounters (14.2% of encounters had positive urine culture). The logistic regression model achieved a 0.851 (0.837, 0.865 95% CI) Area Under the

Receiver Operating characteristic Curve (AUROC) and 0.584 (0.546, 0.618 95% CI) Area Under the Precision Recall Curve (AUPRC). Amongst the female population, the logistic regression model achieved a 0.806 AUROC compared to a 0.905 AUROC amongst males. When investigating different patient age groups, the model achieved a 0.84 AUROC amongst patients younger than 40 years, compared to 0.848 AUROC amongst patients who are 40 years or older.

We binarized the predictions by adjusting the threshold to achieve approximately 80% sensitivity on the test set, which is a clinically acceptable level of sensitivity. Amongst the 4,460 encounters associated with a negative urine culture in