



The DONAIT Project: Evaluating & Improving Eye Donation with a Novel “Donor Assessment & Identification Tool”

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Institutions & Collaborators



Background

Corneal transplants restore sight to patients with vision loss due to corneal blindness, but there is a significant unmet need for corneas^[1]. Over 6,000 people are on the waiting list with 59% waiting >18 months, leading to an annual shortfall of >1500 corneas^[2] or ~800 donors. Corneal transplant provides \$118,000 net lifetime economic benefit^[3] and transforms a patient's life. It is vital that we improve eye donation pathways to help more patients receive this sight-saving treatment.

Corneal transplant can only occur if a patient and/or their family agree to eye donation after death. One donor can help save or improve the sight of up to 10 people. Eye donations are also vital for research to help enhance patient care. Currently there are ~3000 eye donations per year in the UK (~1500 patients), only 0.3% of total deaths. In comparison, the US has a ~2.5% donation rate, which if achieved in the UK, would provide >15,000 corneas per year, eliminating the waiting list.

Eye donation can occur up to 24hrs after death if a patient meets nationally set criteria (JPAC). Current pathways are inconsistent across trusts and ineffective at identifying patients. Most rely on non-specialist local healthcare professionals to review a patient death for donation and refer onto the National Retrieval Centre (NRC) if eligible.

Currently little is known as to why the eye donation rate is so low. Factors could include: patient ineligibility, patient/family wishes, lack of staff awareness & limited system capacity to perform retrievals. Previous work in Southampton in a palliative care setting looked at this area^[4]. One of the striking findings was ~50% of patient deaths were eligible for donation but only 4% were referred.

Our project aimed to corroborate these findings for an in-hospital cohort and explore the potential for AI based medical record screening to evaluate patient deaths for eye donation.

Aims

- Problem scoping: evaluate eye donor potential for hospital deaths
- Solution exploration: design a digital tool to perform real-time screening of all deceased patients for eye donation
- Development plan: create a proposal and timeline for the build and deployment of the digital tool
- Implementation plan: map an envisaged future clinical workflow centred around the digital tool's output
- Results: increase identification & referral of eligible patients to NRC and reduce time from patient death to retrieval

Problem Scoping: Deceased Patient Audit

Methods

A retrospective audit of all adult hospital deaths in 2023 at UHS was conducted. Cases were identified via the hospital's electronic health records (EHR) with discharge destination as “died” plus emergency department deaths. We recorded patient demographics, date, time & location of death and admitting speciality. Hospital records of eye donations for 2023 were collected.

A random set of 100 patients was selected for a case note review of eye donation suitability. Two separate Specialist Nurses in Organ Donation (SNOD) reviewed the EHR, including clinical notes, test results, and GP records to assess suitability for eye donation according to JPAC guidelines. Medical contraindications, record of donation discussion, referral to NRC and completed donations were recorded. The organ donor register (ODR) was reviewed for each patient and any existing decisions were noted for eyes and other tissues.

Results

Total adult deaths were 2,391, with 30 eye donors (~50 corneas). The random sample of 100 patients was representative of the total cohort with no statistically significant difference in age or gender. Figure 1 shows 62% of patients would have been eligible for eye donation, 15% were eligible with a recorded wish for eye donation, but only 3% were referred.

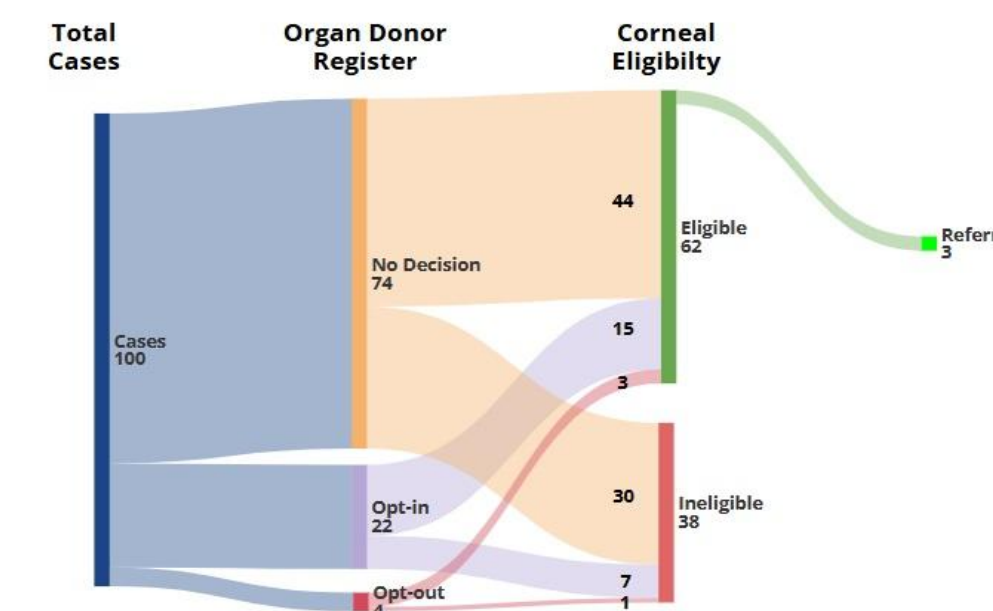


Figure 1: 100 patient review

Applying our findings to the total cohort, ~1500 patients per year would be eligible for eye donation with over 350 of these having registered a wish to donate their eyes on the ODR.

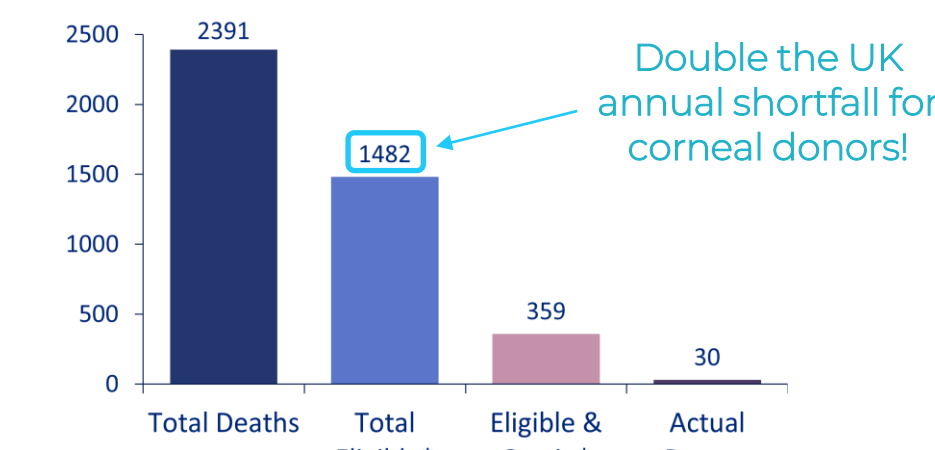


Figure 2: Annual Figures (*estimated)

Summary

Just 2% of eligible patients donated their eyes. Current manual systems are ineffective at screening hospital deaths for eye donation. By referring only eligible, opt-in patients, one hospital would generate 1/3 UK annual shortfall of corneas.

DONAIT: Donor Assessment & Identification Tool

DONAIT Features

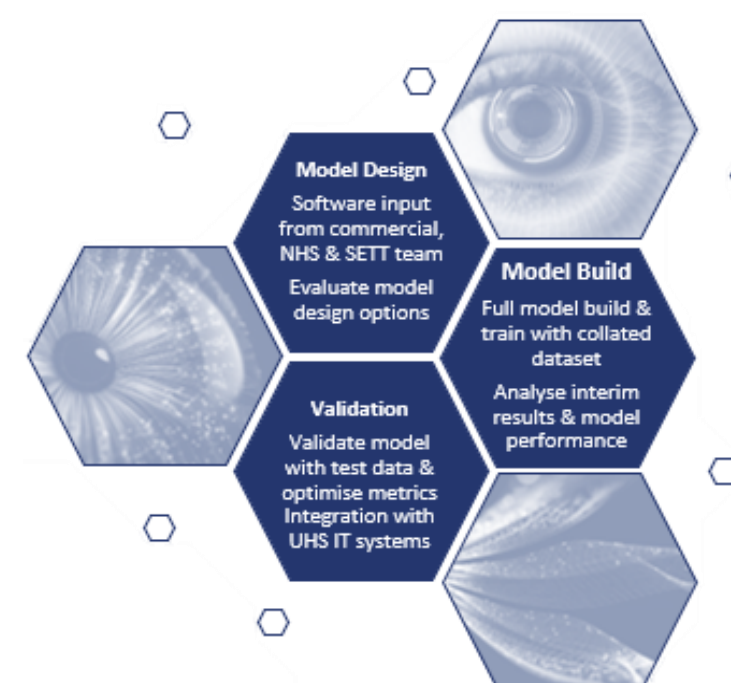
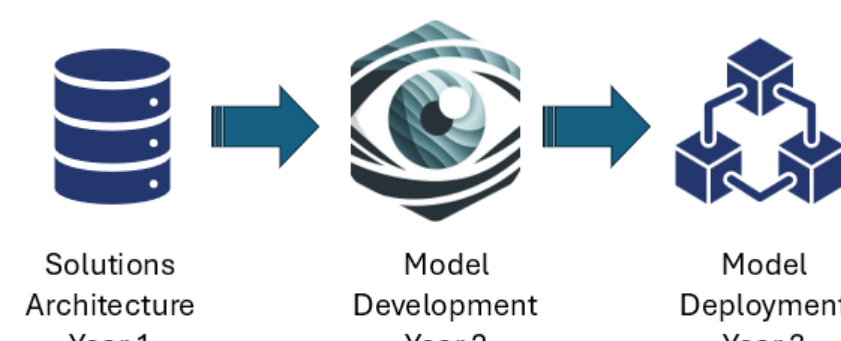
- All in-hospital deaths reviewed by DONAIT
- Screen local EHRs to review medical notes to assess eligibility for corneal donation
- Creates a likelihood score of patient being eligible
- Checks ODR for existing decisions
- Creates interactive & prioritised worklist of donor candidates to direct clinician review

Solutions Architecture

Understand past and current workflows internally and link points with external organisations (NRC, retrieval teams). Create a clear envisaged future process map for clinical workflows.

Model Development

Collaboration between SETT, UHS digital and commercial partner Mazik Global to develop a trained & validated model to perform AI-enabled screening of local & national EHRs.

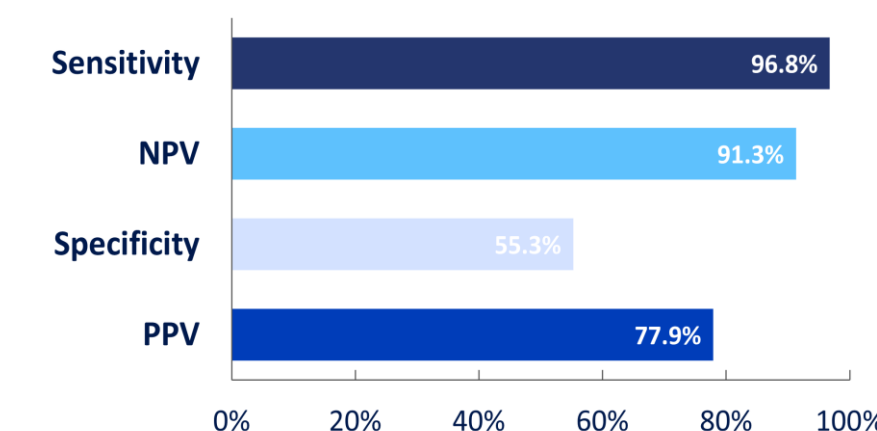


Model Deployment

Initial deployment of DONAIT will be for research. This enables safe evaluation in a prospective clinical environment and testing of envisaged workflows. It will include stress tests for model and clinical workflows, with high volume deaths or external factor stressors e.g. critical incident. We will test user interface with clinicians, error logs and IT support systems. These results will facilitate further model optimisation & workflow refinements.

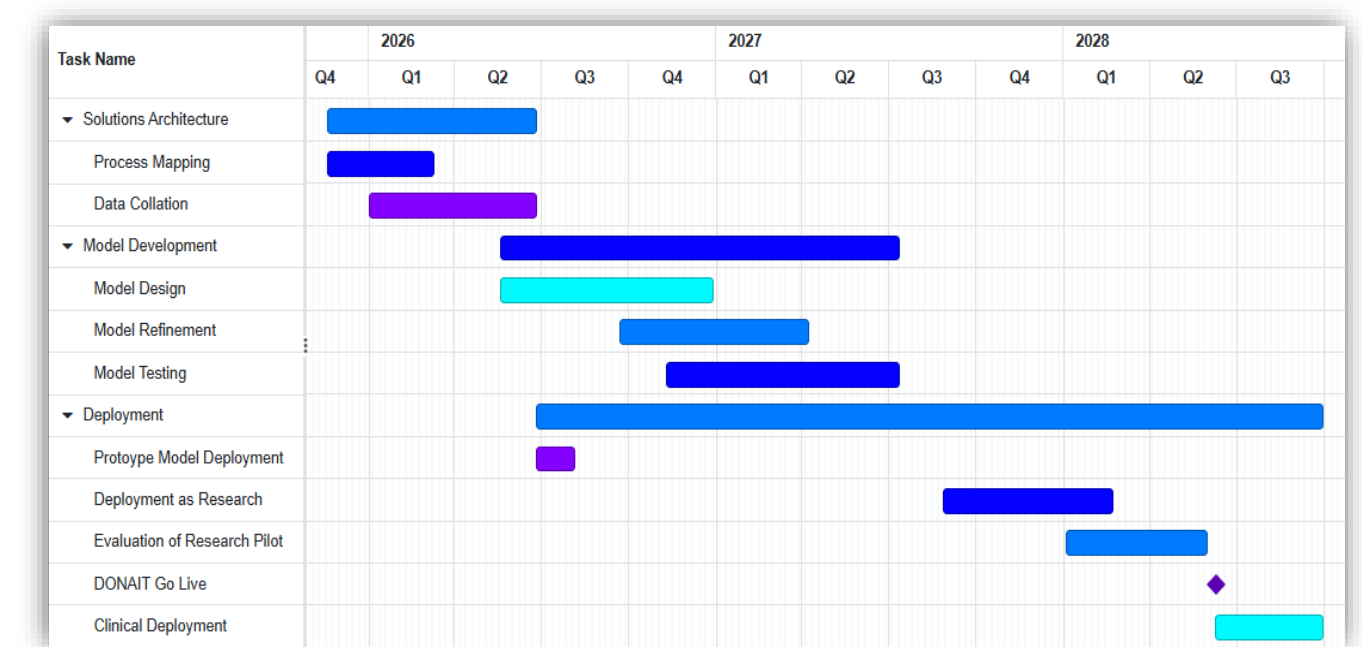
Prototype Model Results

Initial prototype model development has used ICD codes and a rule-based algorithm to assess patients for donor eligibility producing the following results:

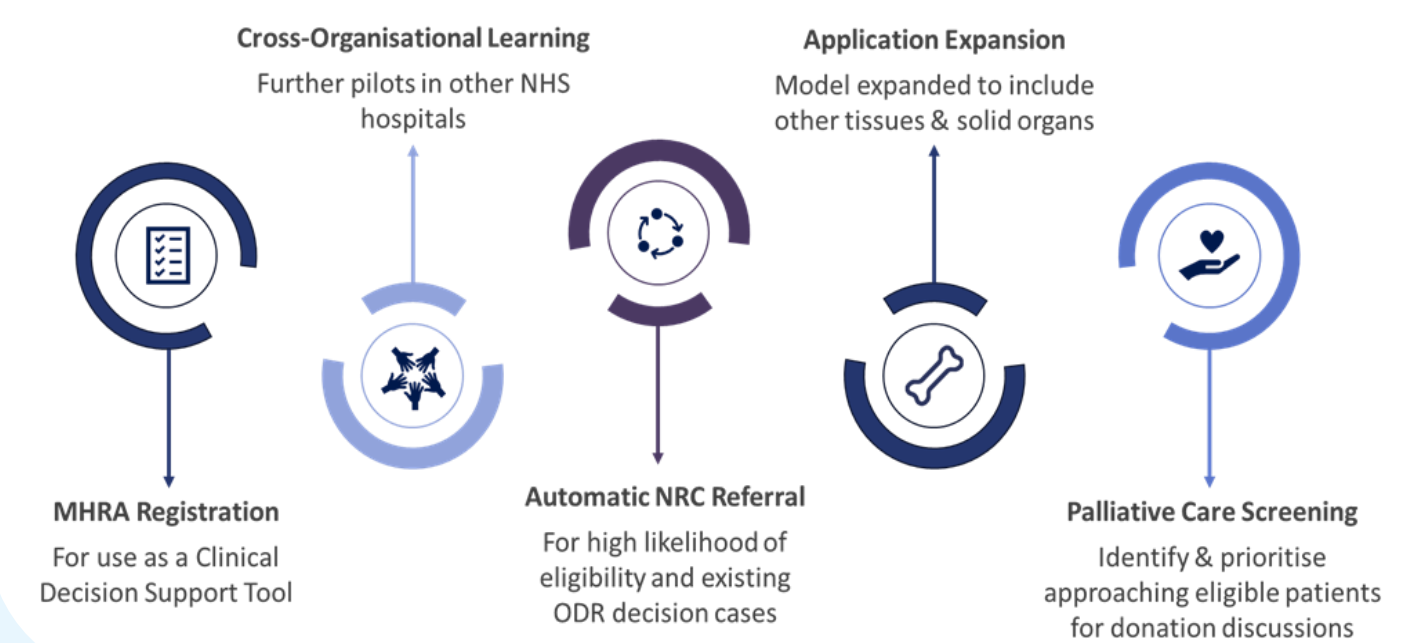


Future Work

Ongoing Project Timeline



DONAIT: Future Applications



Acknowledgements

Team Members

Project Supervisor: Prof Parwez Hossain
SNODS: Rachel Clare, Claire Davies, David Thompson
ACF: Borna Assarian

References

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