

Clinical Problem

- Ophthalmology is NHS's busiest outpatient service.
- Community optometrists send referrals to Single Point of Access for Referral and Coordination (SPARC) in North Central London.
- SPARC managed >63,000 referrals over 2.5 years with planned expansion to neighbouring ICBs.
- SPARC uses CrossCover as its referral management platform.
- Board 01 (Figure 1) has administrator-led manual workflows, which can take up to **2min 33sec** on average per referral.
- Increasing referrals + manual workflows = increased administrative burden + difficulty scaling.



Figure 1. CrossCover Referral Management Workflow.

Workflow	Average time taken
Manual	2 mins 33 secs
New LLM-assisted	1 min 34 secs
Time saved	59 secs

Table 1. Time-motion study results. On average, 59 seconds saved per referral with LLM-assisted workflow.

Next Steps and Opportunities

- Turn on Predict and Action with human-in-the-loop supervision (Figure 5).
- Co-create a policy for continuous monitoring, reporting and auditable event logs with MEH Clinical Safety Team.
- Work iteratively on workflow design (e.g. build retries for extraction failures) and UI improvements (e.g. explainability logs, verify on UI).
- Optimise prompts to include all categories of subspecialties in local pathways.
- Measure service efficiency, patient outcomes, workforce impact, cost-savings.
- Create an adoption framework, training documentation for SPARC staff.
- Map further user needs such as surfacing Reasonable Adjustment flags.
- With increasing confidence, automate Board 01 and move activities to Board 02.
- Enables scaling of SPARC team to neighbouring systems.

AI Solution

- CrossCover has an in-built AI tool that uses Gemini LLM with retrieval-augmented generation (RAG).
- Use the inbuilt AI to offer Smart Triage capabilities safely and effectively to improve workflows and reduce administrative workload.

Progress

- User-centred method: observed user workflows, conducted user interviews, time-motion studies and engaged service teams to find pain points and recognise opportunities.
- Align user needs with high-impact AI capabilities:
 - Extract, consolidate and link patient demographic information from referral to NHS Spine. (Figure 2)
 - Extract suggested Priority (Figure 3) and subspecialty (at least 70%) from referral and update Board 1. (Figure 4)
- Develop and validate a clinically realistic synthetic dataset for testing in Test environment (n=100).
- Develop and optimise LLM prompts through testing stages to correctly extract, consolidate and verify Demographics, Priority and Subspecialty information from referrals.
- Testing Stages:
 - Test in Test **[complete]**
 - Test in Live (test referrals in a demo board) **[complete]**
 - Test in Live (test referrals in Board 01); Predict only **[complete]**
 - Test in Live (real referrals); Shadow Mode - Predict only **[complete]**
 - Test in Live (real referrals); Shadow Mode with short live action bursts with SPARC team; Predict and Action **[in-progress]**
- Reasons for no-matches included: document processing errors, extraction failures, AI failed to run, AI prompt error, AI aborted without retry.
- No patient was incorrectly linked and no priorities were downgraded than referrer intended. 85% subspecialty matched in Live.
- Supervised Live test sessions to capture time-motion study showed average time per referral by 59 seconds (Table 1).
- Figure 5 shows proposed process map of LLM in Predict and Action mode.

Figure 2. Smart Triage PDS Matches - Outcomes by Testing Stage

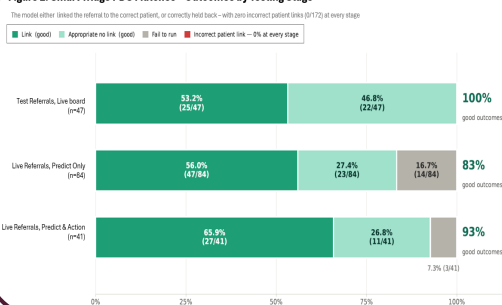


Figure 3. Smart Triage Priority Matches - Outcomes by Testing Stage

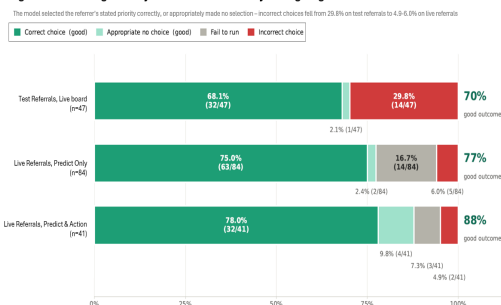
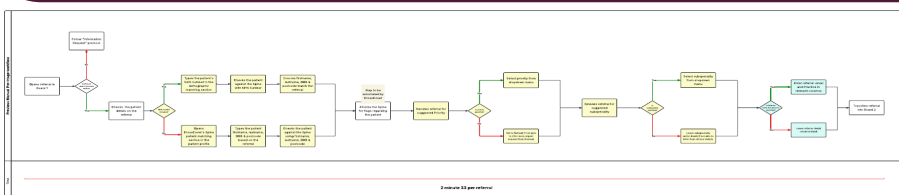
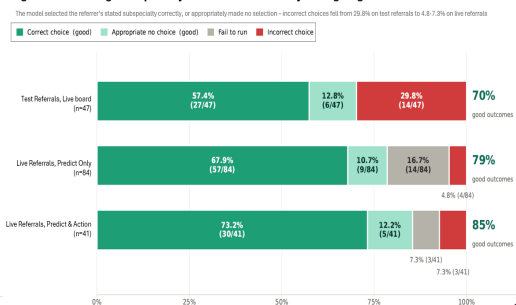


Figure 4. Smart Triage Subspecialty Matches - Outcomes by Testing Stage



An estimated **22 weeks FTE per year** can be saved next year (~77k referrals) at Moorfields Eye Hospital

Contact

Email: roycerajan@nhs.net

LinkedIn:
linkedin.com/in/
royce-rajani/



Figure 5. SPARC Team Process Maps of Manual (above) and proposed LLM-assisted human-in-the-loop (below) workflows.