

Gleave F¹, Bajre M¹, Phillips M², Graziadio S³, Buckley C³, Palmer A⁴, Price A⁴, **Rose J¹**

¹Health Innovation Oxford and Thames Valley, Oxford, Oxon, ²PRO-MAPP Ltd, Oxford, Oxon

³York Health Economics Consortium, University of York, York

⁴Oxford University Hospitals NHS Foundation Trust, Oxford

Optimising Preoperative Assessment Through a Digital Healthcare Platform for Triage and Stratification in Joint Replacement Surgery: A Real-World Evaluation

Introduction

The Nuffield Orthopaedic Centre (NOC) part of Oxford University Hospitals NHS Foundation Trust (OUH), is a specialist musculoskeletal hospital providing orthopaedic services, including joint replacement and quaternary bone infection services in the internationally renowned Bone Infection Unit. The hospital faced challenges with increasing elective capacity and reducing the backlog post-COVID due to preoperative assessment (POA) process constraints. Inefficiencies included multiple in-person visits before surgery, no personalised patient condition service, and no differentiation between high/low complexity cases. The NOC identified an unmet need for the digital collection of health screening data completed by patients when listed for surgery. Following the National Institute for Clinical Excellence guidance NG45 [1] and elements of the Centre for Perioperative Care CPOC guidelines [2], they wanted to identify required preoperative investigations intelligently. There was an unmet need for patients requiring investigation or treatment before surgery to be identified early in the patient pathway to prevent subsequent surgery postponement.



Objectives

To evaluate the implementation and impact of a digital healthcare platform in the Pre-Assessment Clinic Triage (PACT) pathway for triaging high-volume low complexity (HVLC) patients undergoing joint replacement surgery, compared to standard care at the NOC.



Methods

PRO-MAPP, a digital healthcare platform was used as an engagement tool for patients and healthcare staff, providing intelligent decision support to optimise the Preoperative Assessment Clinic Triage (PACT). It was used for POA triage and stratification of HVLC orthopaedic cases based on medical complexity. PRO-MAPP identifies medically complex patients and enables the scheduling of appropriate POA, either via telephone or face-to-face appointment, before surgery. Additionally, patient optimisation was started early in the clinic pathway, which is an evolution of current practice. This digital transformation of POA workflow allowed a more personalised approach to the individual needs of hip and knee surgical waiting list patients. A comprehensive cost-minimization analysis was conducted to evaluate the digital platform's impact. A decision-analytic model was developed, taking into account various parameters such as the number of perioperative tests, the type of POA appointment, and the average length of stay (LoS). The analysis compared PRO-MAPP with the standard care pathway, where all patients on the waiting list received face-to-face POA.



Figure 2: Patient Pathway for the Analysis through PACT

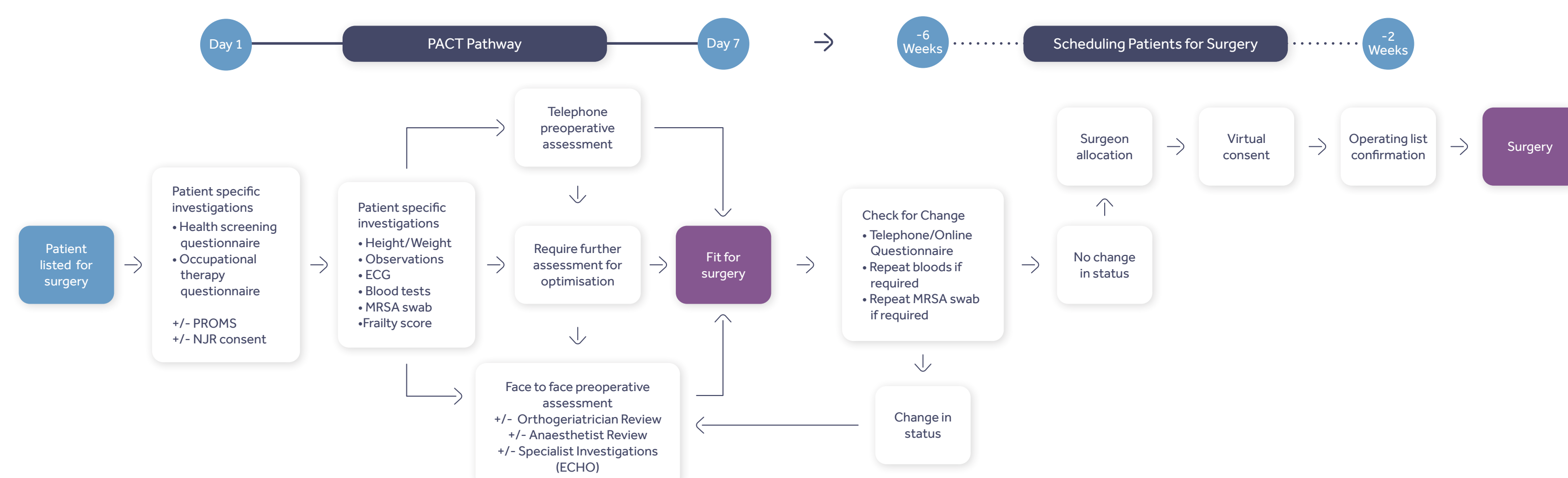
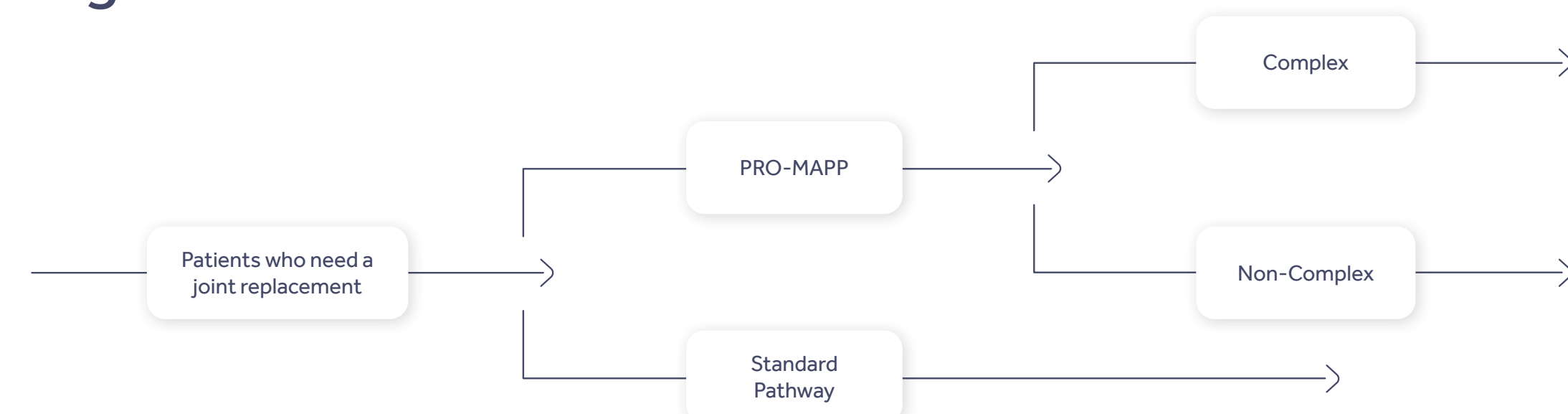


Figure 1: Decision tree model



Results

The health economic analysis demonstrated that PRO-MAPP in the PACT pathway was more cost-effective than the standard pathway. The decision model showed an average cost saving of £152 per patient on the joint replacement surgical waiting list across all metrics except for LoS. When LoS was included, the model reported a cost saving of £769 per patient. During this real-world evaluation, 734 patients were triaged by PRO-MAPP. The PRO-MAPP and the standard pathways used a hypothetical cohort of 1,000 patients based on real-world evidence collected.

Table 1: Total model results

Total costs	PRO-MAPP	Standard pathway	Difference
Total cost per person	£2,958	£3,728	-£769
Total cost per cohort	£2,958,279	£3,728,223	-£769,944

Table 2: Cost breakdown

Cost breakdown	PRO-MAPP	Standard pathway	Difference
Patient management	£100,680	£153,000	-£52,320
LoS post-surgery	£2,671,534	£3,289,433	-£617,899
Preoperative tests	£146,950	£234,790	-£87,859
Preoperative appointments	£19,583	£51,000	-£31,416

The real-world evaluation showed that using PRO-MAPP to triage and stratify patients on the surgical waiting list has several benefits, including:

- Facilitating appropriate triage: prioritising face-to-face assessments for patients with conditions that require it.
- 75% of patients added to the joint replacement surgical waiting list who were triaged by the digital platform were suitable for a telephone POA
- Starting preoperative patient optimisation earlier in the clinical pathway
- Reducing patient cancellations caused by delayed investigations in the clinical pathway
- Better utilisation of resources and theatre capacity
- Increasing the pool of patients declared 'fit for surgery' to assist elective recovery
- Improving compliance with personalised assessment planning
- Reducing the administrative burden on specialist preoperative nursing staff
- Digitising the pathway, reducing footfall, and improving the carbon footprint.



Environmental Sustainability

51,381.6 km of travel was saved due to reduced patient travel for hospital appointments. Considering that the average car in the UK emits 171 grams of CO2 per km [3], this evaluation has reduced 8.8 tonnes of CO2 emissions.

Patient Feedback

A patient engagement survey provided positive feedback; 100% of patients were very satisfied or satisfied and 92% of patients stated that the questionnaire was easy or very easy to complete.

Conclusions

This study concludes that integrating PRO-MAPP into the joint replacement surgery pathway is cost-effective. Using PRO-MAPP in the PACT pathway facilitates early POA and appropriate triage, personalisation of patient care, reduction of surgery postponements, and optimisation of resource utilisation and theatre capacity. The findings highlight the importance of digital solutions in streamlining preoperative assessment processes, ultimately leading to enhanced efficiency and cost savings. A business case is being developed for future adoption across OUH.

