

Workflow Improvement of Outpatient Physiotherapy Referrals for Patients with Pre-Operative Knee Osteoarthritis

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BACKGROUND INFO

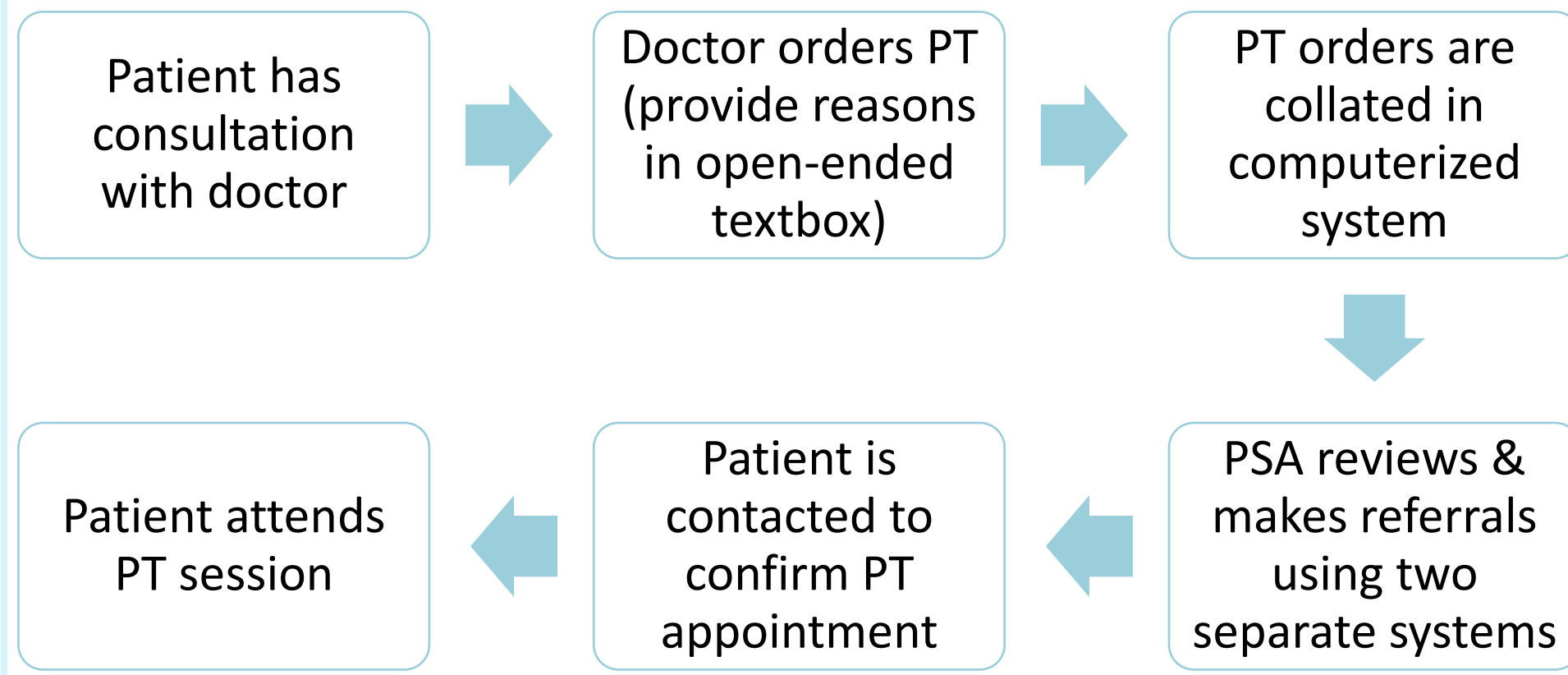
Company Information:

The Centre of Functional Mobility and Enabling Technology (CFMET) is one of the 6 Centres of Excellence under the National University Health System (NUHS). The Centres were set up to address current and emerging healthcare needs in Singapore.

Problem Background:

Osteoarthritis (OA) affects around 40% of adults in Singapore and is prevalent in up to 19.8% of people aged between 60-69 years. Lower-limb physiotherapy (PT) is crucial for the pain management and rehabilitation of OA patients pre-operatively and may be the only mode of treatment for those unable to undergo surgery. A dynamic patient referral system is key to ensuring that patients can get treated promptly.

CURRENT SYSTEM



Areas of concern:

- Patients secure appointments outside recommended 2-week SLA
 - Patients are missed out during the referral process
- PT appointments scheduled based on PSA's understanding/first-come, first-served
- Doctors enter minimal information or use unknown medical jargon in referral form

OBJECTIVES

- 1 Introduce priority system**
 - Speeds up process of scheduling PT appointments for the Patient Services Associate (PSA) department
- 2 Create structured form for doctors**
 - Streamlines patient details to only include relevant information needed for making PT referrals

METHODOLOGY

Identify problems

- Literature reviews
- Discussions with industry supervisor
- Shadow NUH PSA to observe referral process

Formulate solutions

- Obtain referral data from NUH rehabilitation staff
- Revise current Aurora interface
- Provide alternative system
- Create algorithm (Excel VBA)

Validate results

- Survey NUH doctors (qualitative)
- Analyse accuracy of prioritization using Kendall Tau distance (quantitative)

PROPOSED SOLUTIONS

1 Prioritization using VBA

- Streamline data collected from doctors to allow prioritization of patients
- Added fields: Pain level, WHO Analgesia Ladder, Duration of symptoms, Functional mobility level
- Each factor assigned a weightage to assess a patient's urgency for PT.
- Patients arranged in descending order beginning with highest score (most urgent first)
- PSA can sort patients with the click of a button
- The data will be gathered using the methods below

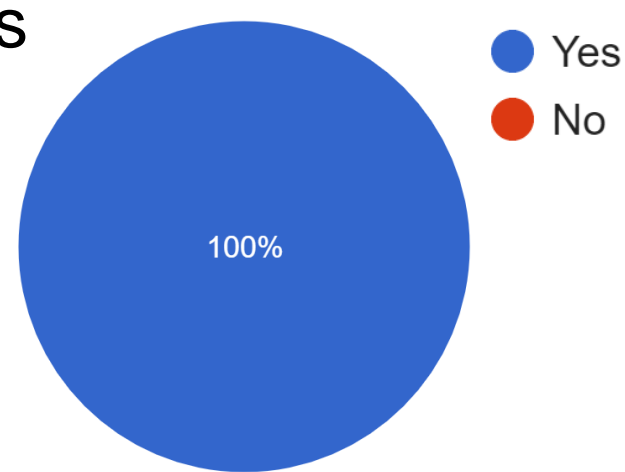
2 New Aurora interface, Excel User Form

Aurora revamp	Excel User Form
• End-goal solution	• Temporary solution while Aurora revamp is in development.
• Additional pop-up containing new required fields for doctor to fill in when ordering PT	• Doctors fill in Excel User Form containing the new fields and generate a unique string to be copied and pasted into the current blank text box
• Patient data downloaded by PSA will be included in the new columns	• When PSAs download the data, they will be given a VBA tool to split the string into the new information.

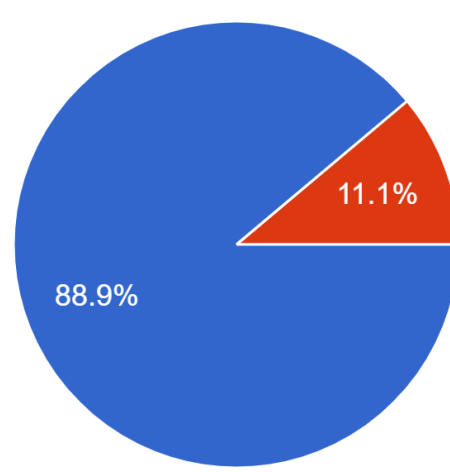
RESULTS ANALYSIS

1 Feedback from NUH doctors

100% of doctors surveyed advocate the implementation of the new Aurora design



88.9% of doctors surveyed advocate the implementation of the Excel VBA form



2 Accuracy of prioritization

Step 1:

- Create 5 dummy patients with randomized health conditions
- Ask 12 different doctors to rank patients according to priority

Step 2: Apply Kendall Tau logic (analyse similarity)

$$K(\tau_1, \tau_2) = \sum_{\{i,j\} \in P} \bar{K}_{i,j}(\tau_1, \tau_2)$$

- Results:
 - Average Kendall Tau distance = **0.10003**
 - Accuracy rate = **90%**

SKILLSETS ACQUIRED

ISE concepts applied

Operations Research

Used to create sorting algorithm

Modelling & Analytics

Used Python to assess accuracy of prioritization algorithm

New skills acquired

Microsoft Excel VBA

Used as a platform for handling and sorting patient data

Figma Prototyping

Used to build an interactive prototype for user testing