



Virtual Therapist

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Problems

Cost of recovery and transparency

Private physiotherapy visits are significant costs to insurance and government agencies though there is no individual patient improvement tracking.

General specialist is not able to measure each and every attendant correct exercises execution and measure overall progress.

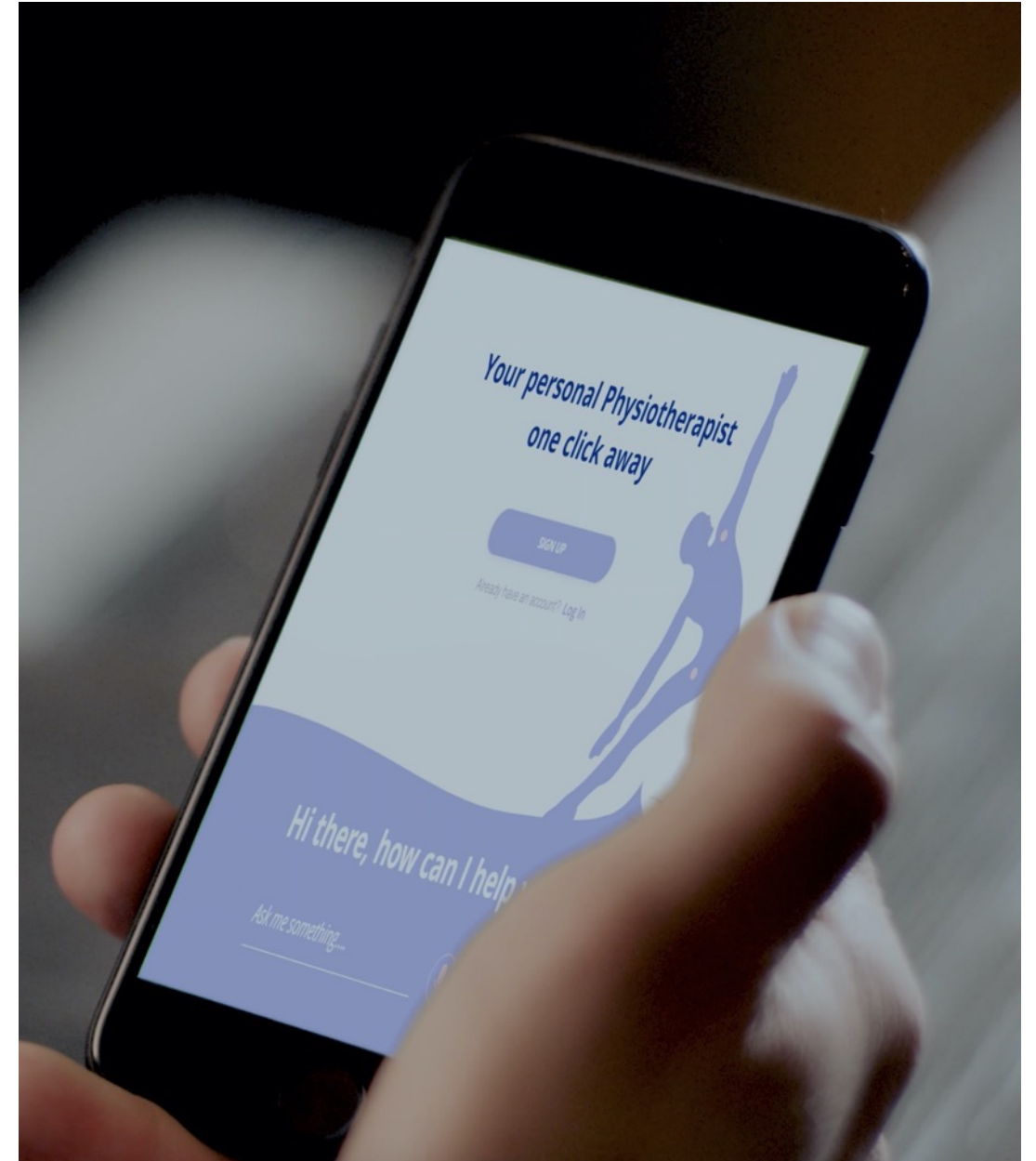


Solution

Virtual Therapist

A WEB application for healthcare providers and patients, which allows an individual to do physiotherapy exercises at home under AI control.

Virtual Therapist uses a pre-trained model that recognizes human joints or 'skeleton' from the patient's real-time video, then the exercises get recognized and execution accuracy evaluated.



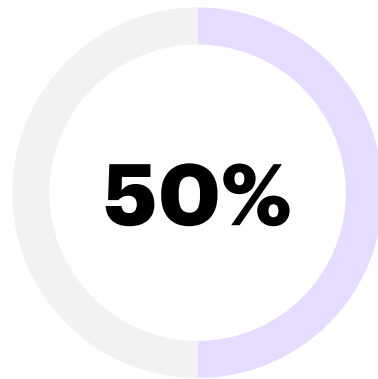
Business Case

It's hard to calculate cost of life or well-being

People not getting help

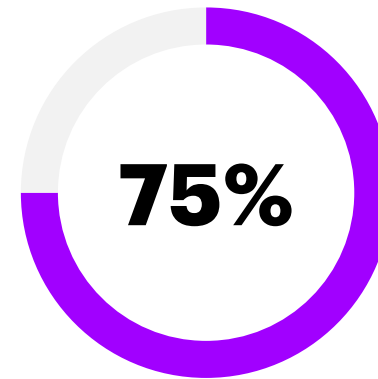


Patients wait an average of 24 days to schedule an appointment with a doctor, according to a study of commonly used specialty physicians in 15 major U.S. cities.

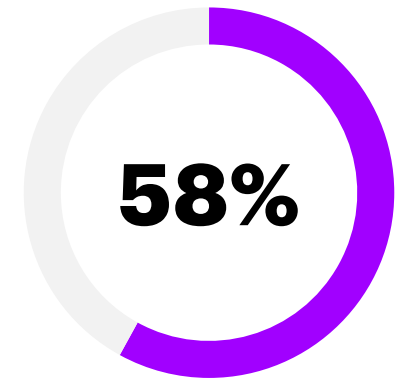


Tracking patient progress is now possible with tools, which give you at least 50% improvements on data analytics in individual patients

Save money



On administrative tasks and improve hospital space usage by 75%



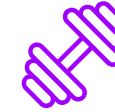
Reduce total cost of physiotherapy where a single PT session to a cost of around \$100 with minimal course of 10 sessions



Continuous tracking of patient's progress



AI accuracy tracking ensures that exercises are done correctly, and the patient does not hurt himself



Individual exercise plan for every patient



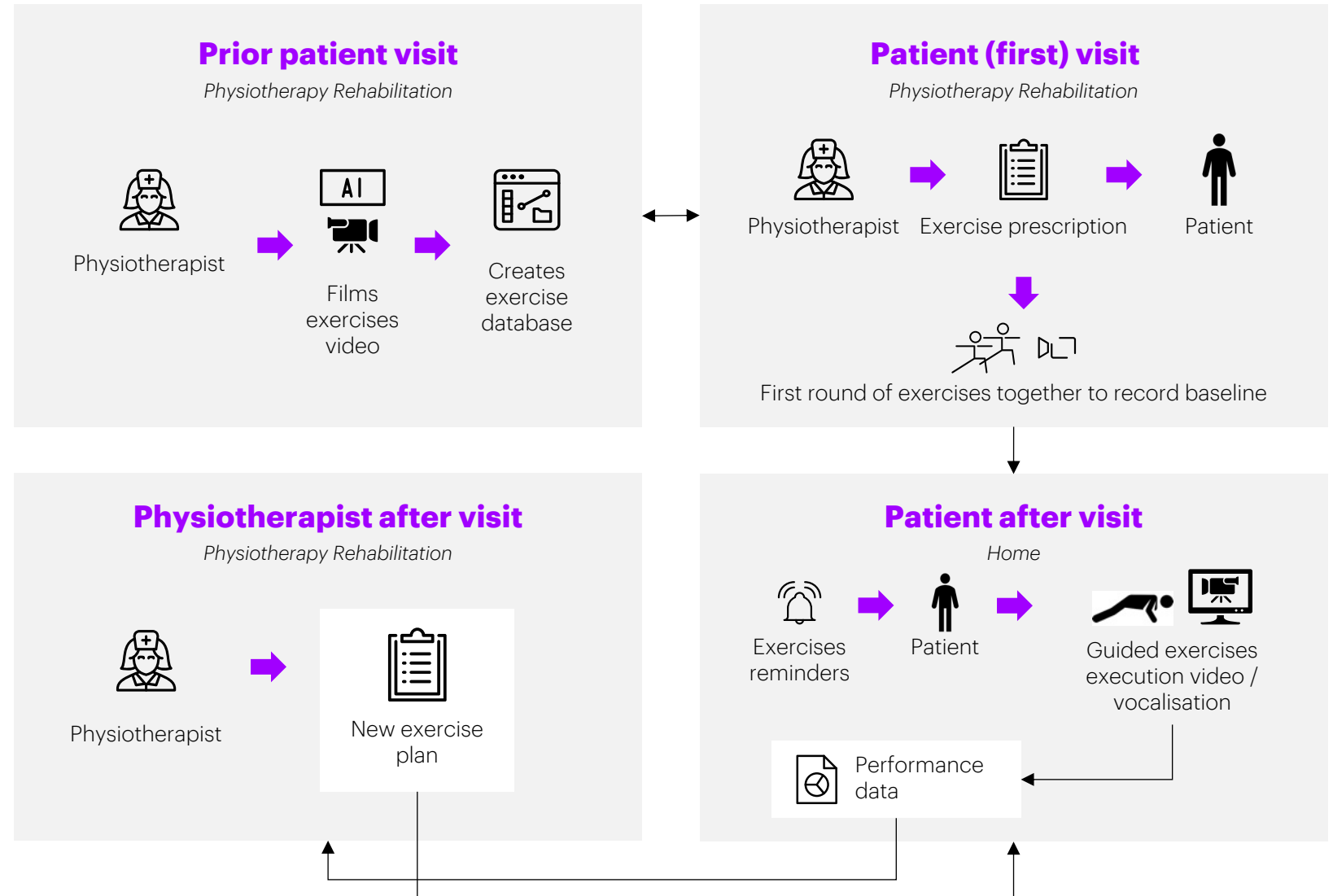
Cost-effective treatment and flexibility of time for both patient and therapist



Makes doctors, nurses, physiotherapists closer and more available to the patients

Therapist Workflow

1. Physiotherapist makes a database with exercises
2. Exercise prescription to patient
3. First round of exercises is done with physiotherapist
4. AI records patient baseline to track progress
5. Patient does exercises at home led by virtual assistant and execution quality monitored by AI
6. Patient shares experience
7. Physiotherapist prescribes the next treatment if necessary



Exercise Tracking

Functionalities

- 1 Visual and voice exercise instructions from application
- 2 Patient's live video on the screen (visible only to patient)
- 3 Displaying the skeleton and measurable motion angles simultaneously with/on the video (quantity of visible points and angles could be individual for every initial position)
- 4 Real-time exercise evaluation, recorded to database as patient progresses
- 5 Real-time graphical representation of evaluation result: by text and pointing at the problematic joint
- 6 Reminders and alerts for patient
- 7 Performance data transfer to therapist
- 8 Text feedback from patient to therapist



Exercise Tracking Assumption



We can recognize exercises, which:

- start from one of our basic initial positions*
- (most exercises)
- have only one person in the frame
- are recorded in a brightly lit places
- but without light sources in the camera view

*basic positions:

- standing on both legs full-face (with a face to camera)
- standing with right/left side to the camera
- lying on the belly
- lying on the back
- lying on side
- standing on the knees and hands



We can't track now:

- toes and hands
- exercises in sitting positions and with equipment usage (e.g., wheelchair or anything which is an obstacle to recognize a full skeleton requires a new type of AI model)
- very complex exercises (e.g., exercise with long different sequence of many different elements)

Open Topics



Decision on development of a WEB page for therapists and patients



Specify exercises type and requirements:

- Sitting initial positions (an additional dataset should be collected if needed)
- Equipment (anything that is an obstacle between camera and patient affects skeleton recognition negatively)
- Recognition of a wheelchair patient requires a new type of AI module and an additional specific dataset
- Other starting positions except 6 listed above (an additional dataset should be collected if needed)



Informing the therapist about low activity/performance (notification)



What type and how detailed patient's performance data is needed to therapist (accuracy, progress, activity, what time frame)



Electronic health system in the Netherlands to discuss possibilities to integrate Virtual Therapist