HOPE for Stroke

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Health Outcome Prediction Engine

Aim:

Develop prototype
electronic clinical decision systems
which makes health outcome predictions
tailored to individual patients.

Peter Sandiford, Principal Investigator

PRECISION DRIVEN HEALTH

Waitemata District Health Board
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ORION HEALTH

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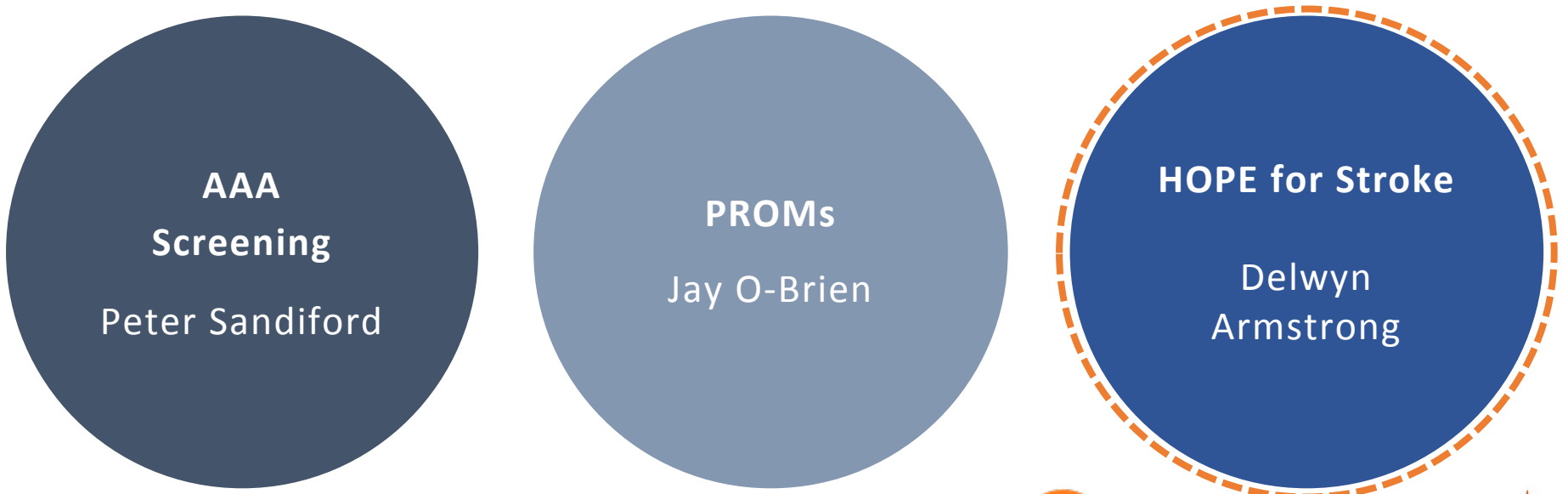
Health Outcomes Prediction Engine



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Why?

Patients and families want to know what to expect following a health event

Clinicians need to know most likely outcomes for this patient to plan care

Clinicians must rely on research and their own experience

Why stroke?

Affects about 800 people in Waitemata per year

Important condition which impacts independence and quality of life

Large range in outcomes

We have large, relatively rich clinical dataset

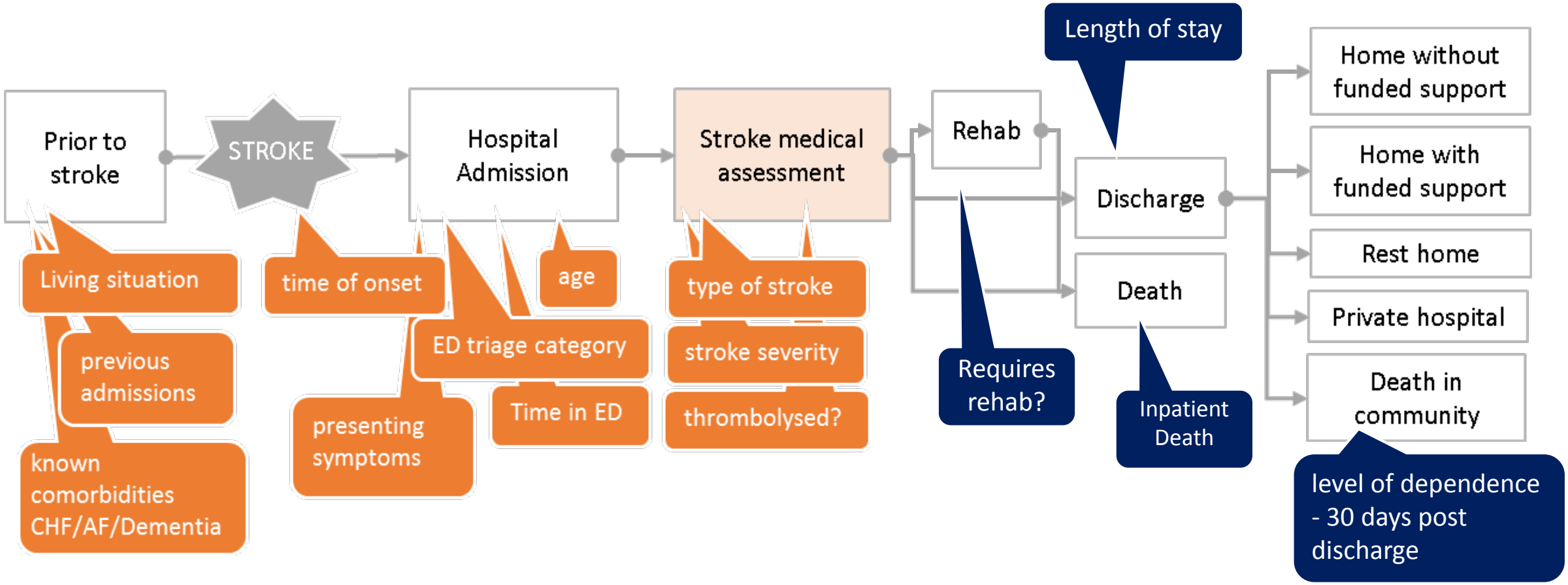
Relevant outcomes only known in local data

Predictive analytics

- Using what we knew in the data about patient groups (patient attributes) and what we know happened to them (outcomes)
- Creating rules (algorithms) which explain the relationship between patient attributes and outcomes
- Applying rules to new patients to predict their outcomes

Phase 1: Prepare Data

2800 strokes assessed in last 5 yrs



Phase 2: Develop Algorithms

- problem & approach

A wide predictive modelling project:

- Binary classification - rehab requirement
- Ordinal regression - level of dependence
- Regression - length of stay

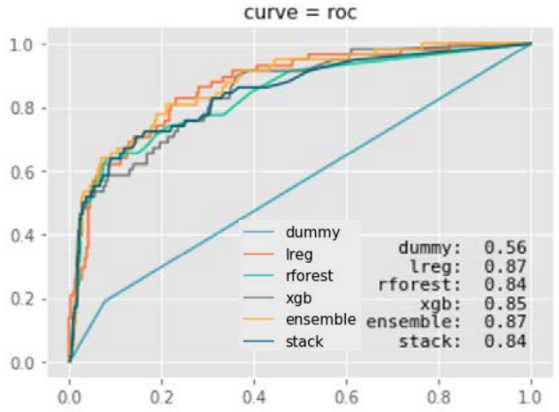
A state of the art predictive modelling strategy:

- Serialization of the whole workflow
- A large panel of models including random forest & gradient boosting
- Combining techniques such as stacking
- Bayesian optimization for fine-tuning

Phase 2: Develop Algorithms

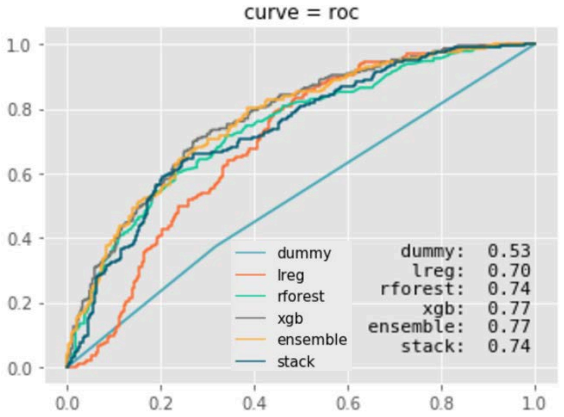
- models assessment

Inpatient death

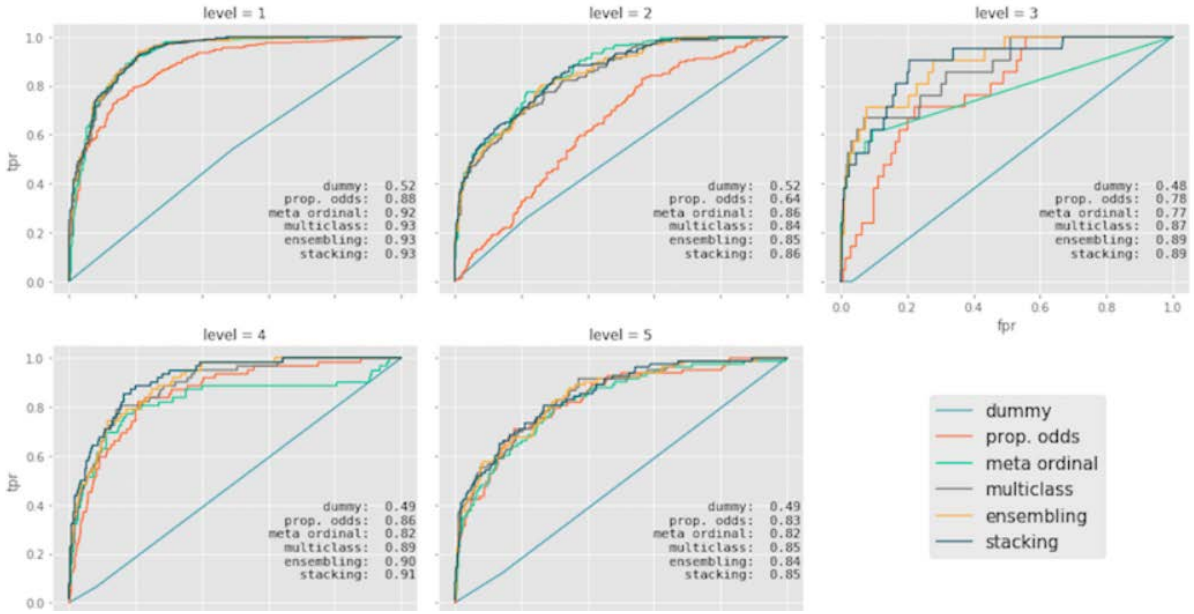


- Performance varies depending on the outcome
- Models combining is a performant strategy across all outcomes

Rehab requirement

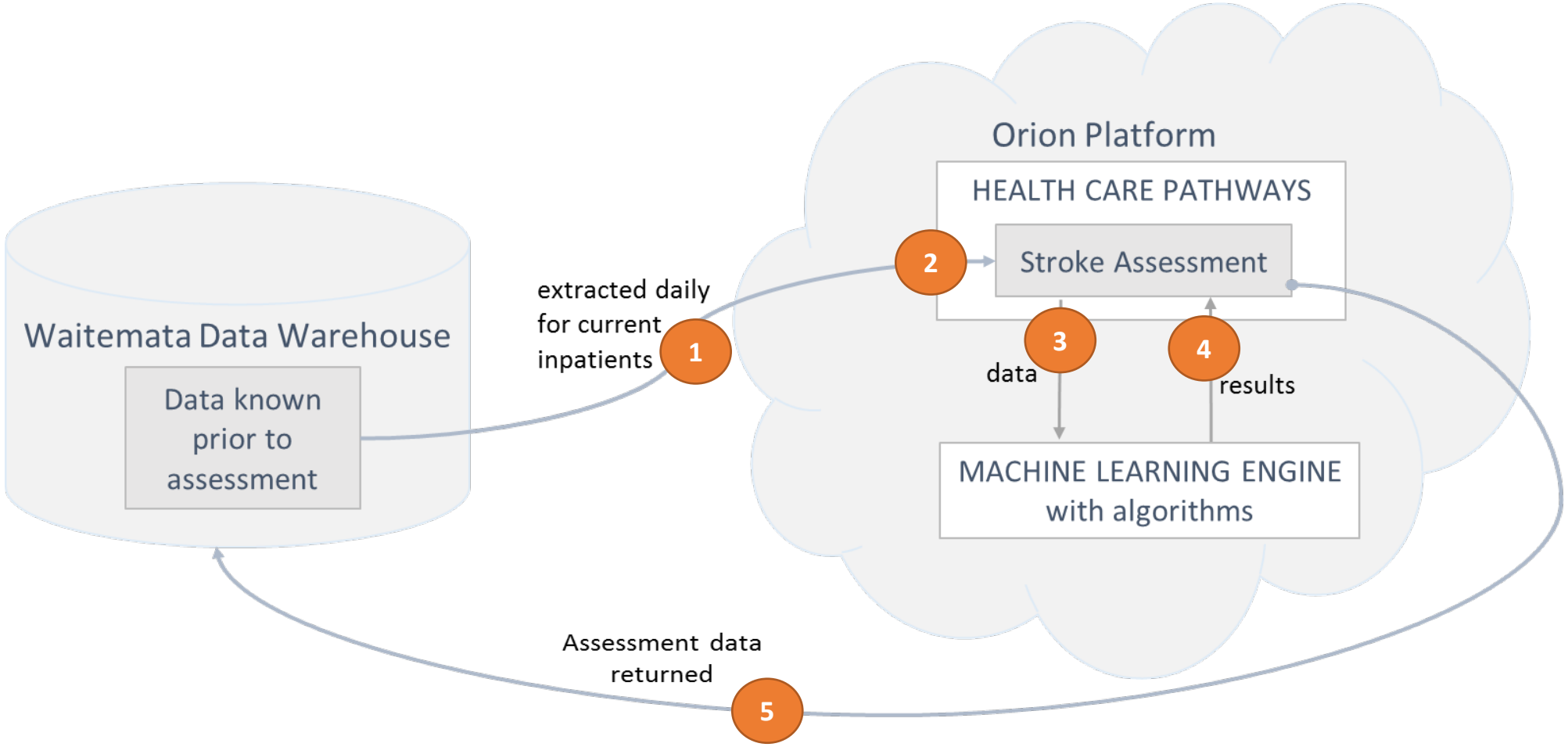


Dependence level 30 days post-discharge



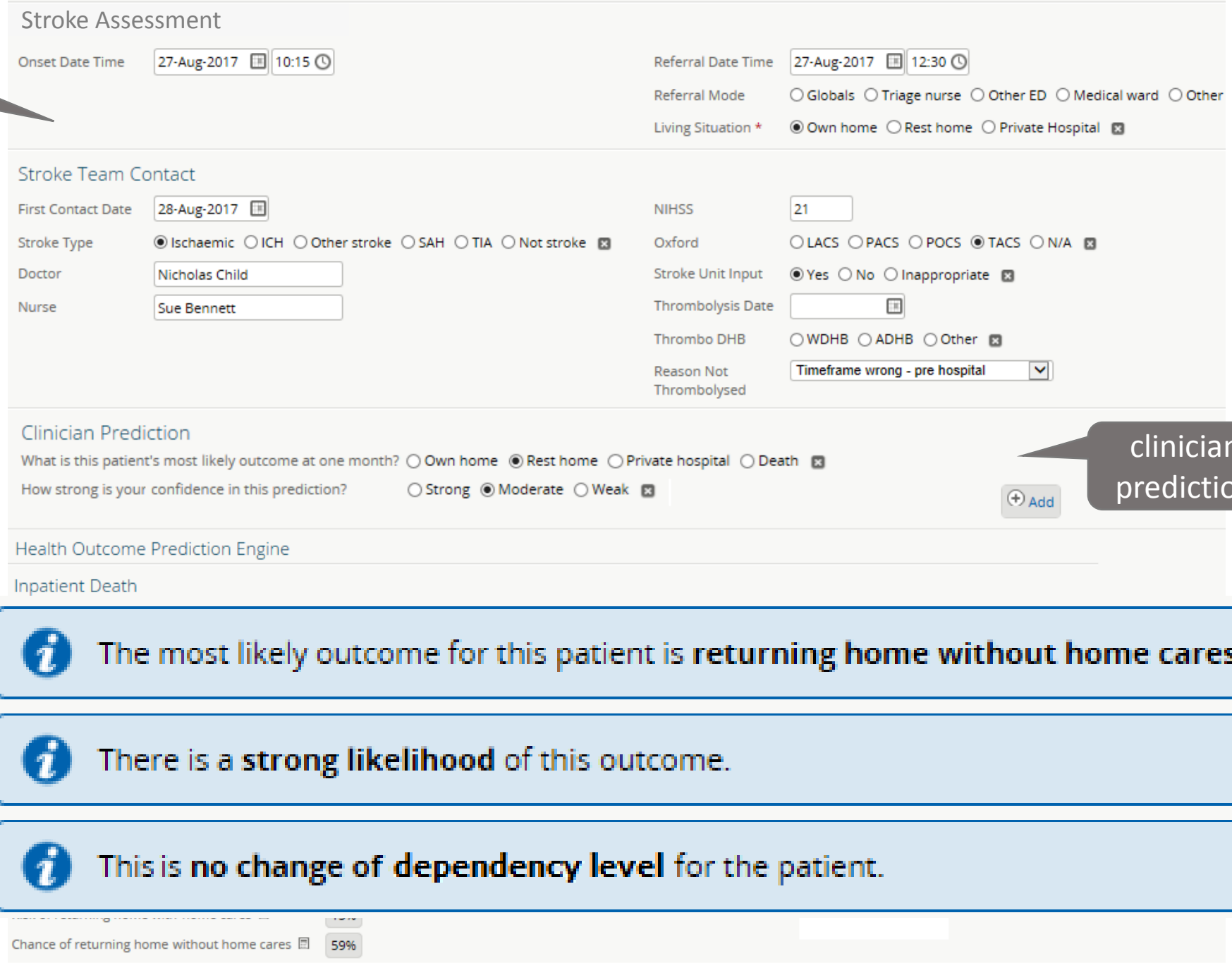
Phase 3: Develop system –

Outcomes delivered to clinical workflow



Phase 3: Develop system

stroke assessment



clinician prediction

engine predictions

Stroke Project

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Delwyn Armstrong, Head of Analytics, WDHB
Quentin Thurier, Data Scientist, Orion Health
Kevin Ross, Director of Research, Orion Health

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