

Big Data and the Quality, Effectiveness and Cost of Care

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Health System Sustainability

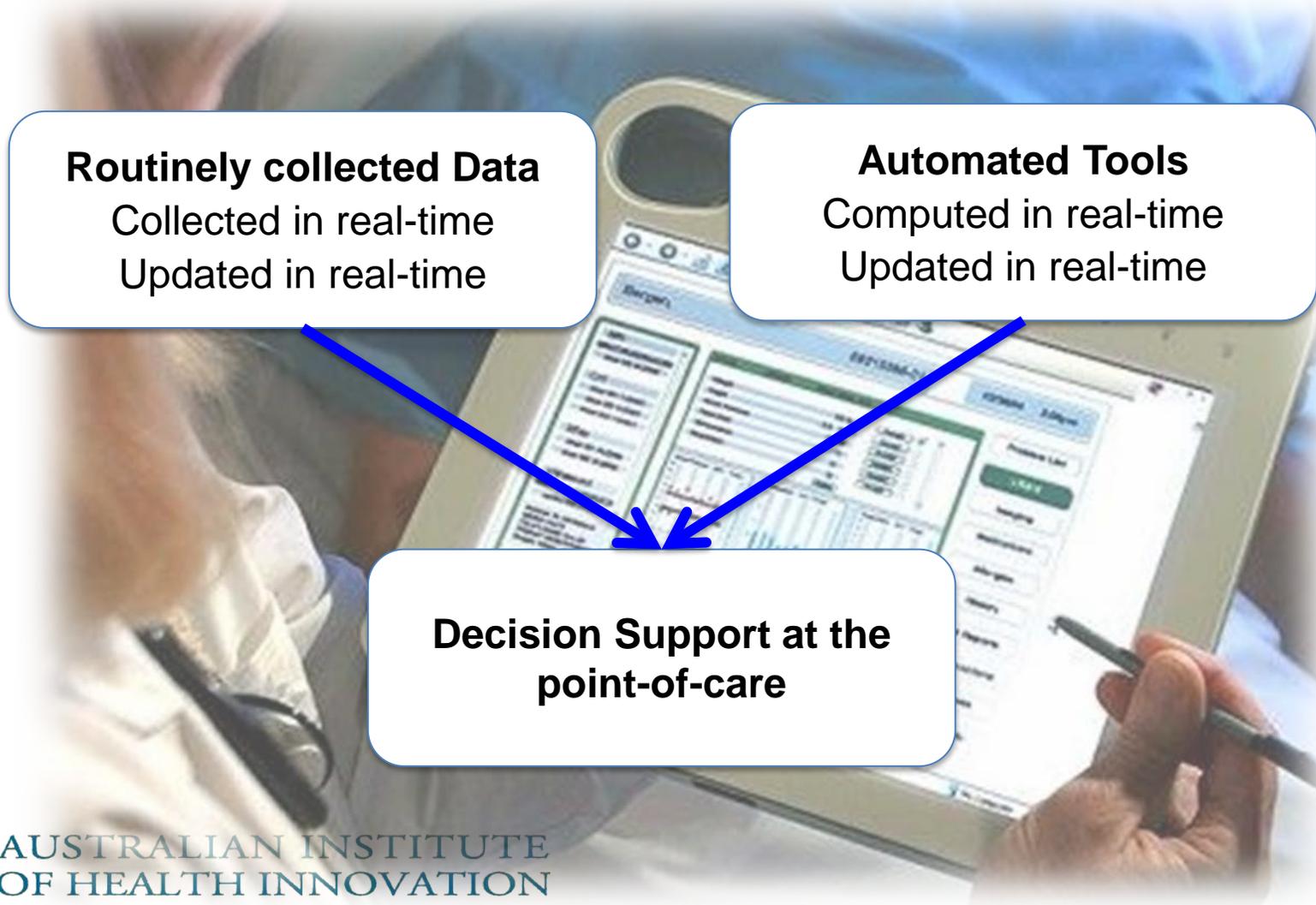
NHMRC Partnership Centre



The opportunity – a learning health system



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- **Large scale data analytics** is transforming many industry sectors, enabling more data-driven management, and identifying opportunities to improve quality and safety.
 - **Healthcare is a laggard** in comparison, lacking both the systems to capture accurate data, as well as the tools and culture to harness those data.
 - **The rapid digitization of clinical practice** is generating large scale data sets with the potential to change this.
 - **We lack clear evidence** about how data analytics should be translated into effective decision making and clinician behavior change.



Two exemplar problems

“Precision-medicine” for the clinical management of chronic patients with co-morbidities:

- When Gold-standard RCT evidence does not exist ...
- “Phenotype” data from similar patients may be found in the EHR.

Analytic and feedback tools for the optimization of clinical services:

- Predictive tools can help forecast LOS, discharge, readmission, death ...
- Comparative tools may help identify actionable variation

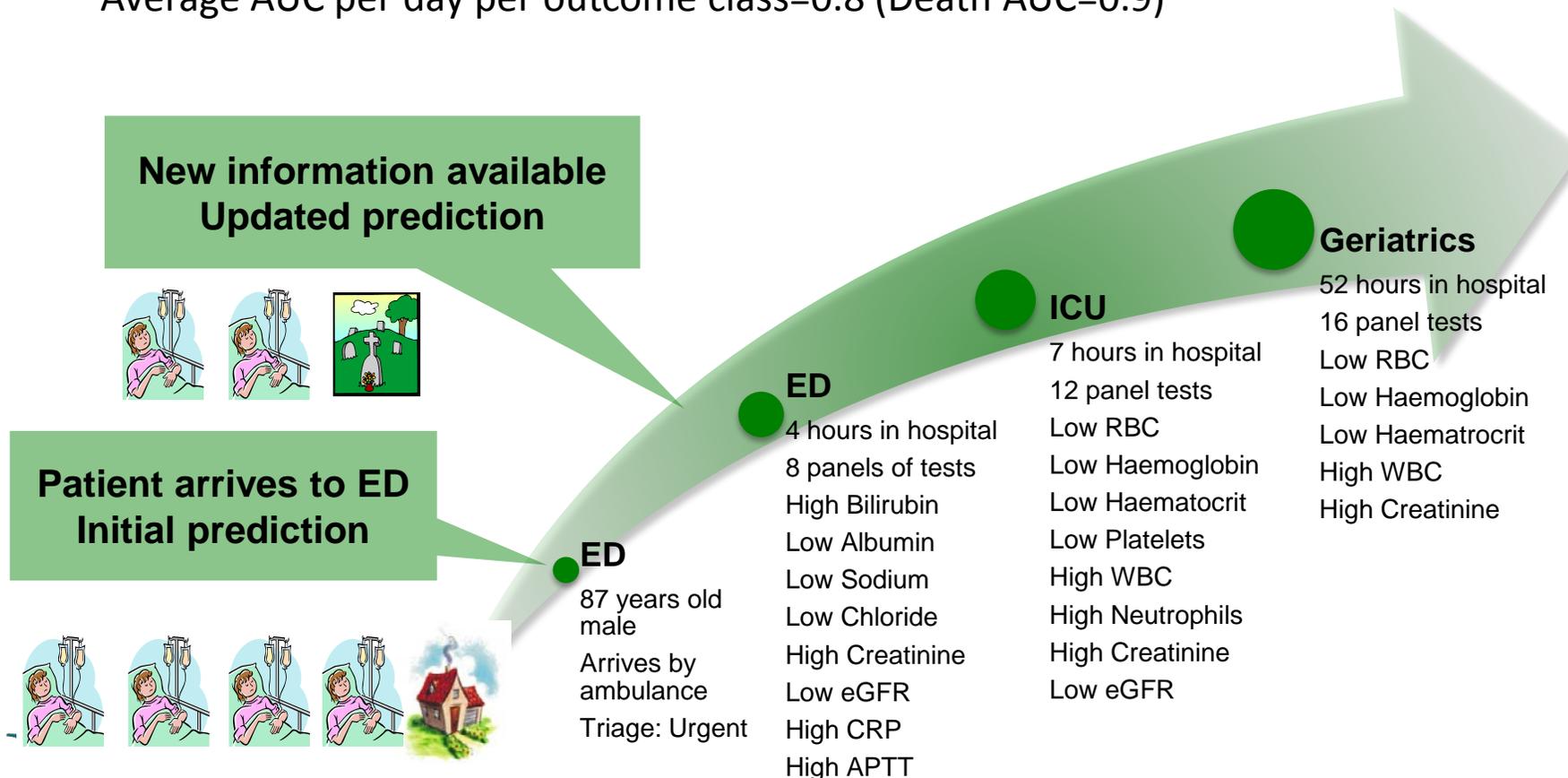
Forecasting patient trajectories



Will a patient be: in hospital, at home or dead in the next week?

We **simultaneously** predict the probability of discharge, readmission and death **for each of the next 7 days**, throughout the patient's hospitalisation.

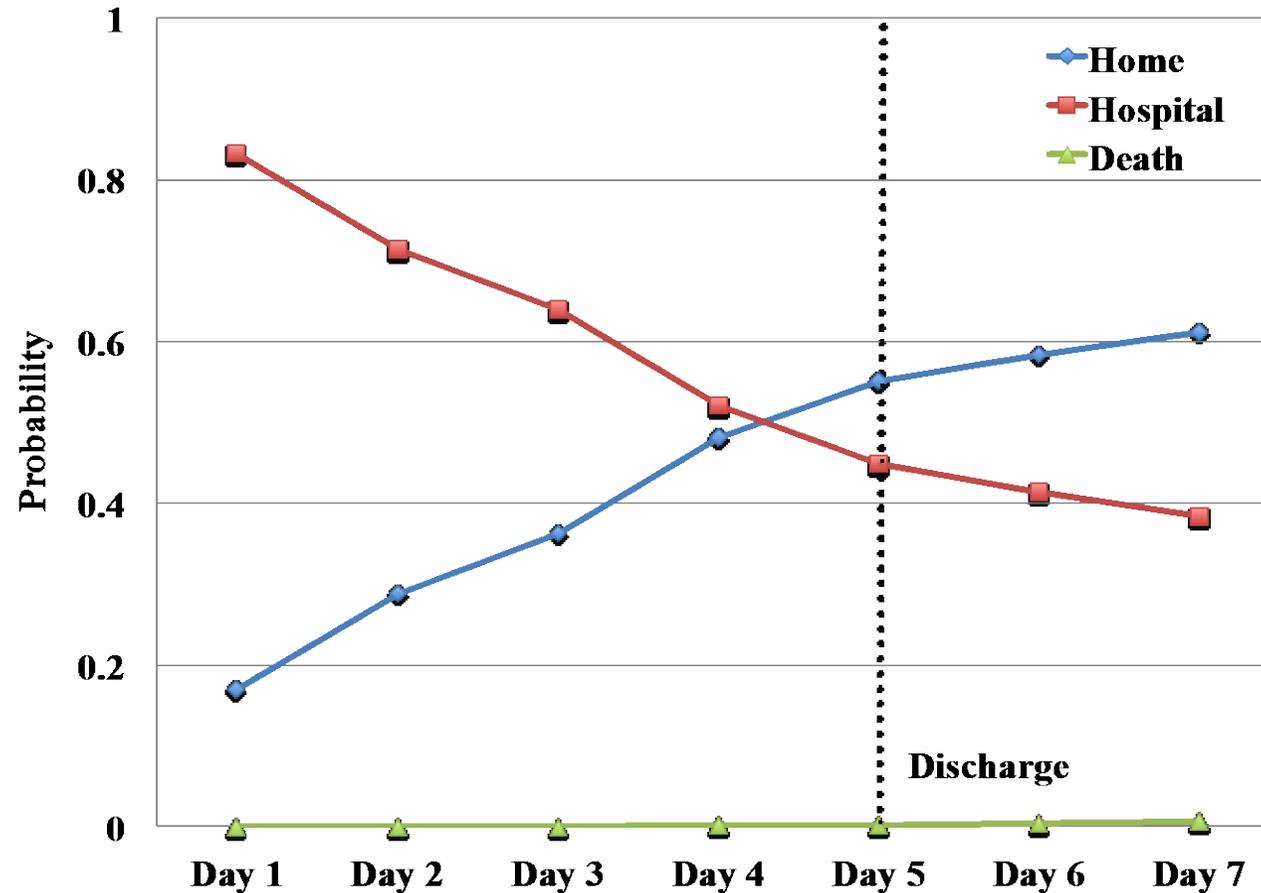
Average AUC per day per outcome class=0.8 (Death AUC=0.9)



Forecasting patient trajectories

Will a patient be: in hospital, at home or dead in the next week?

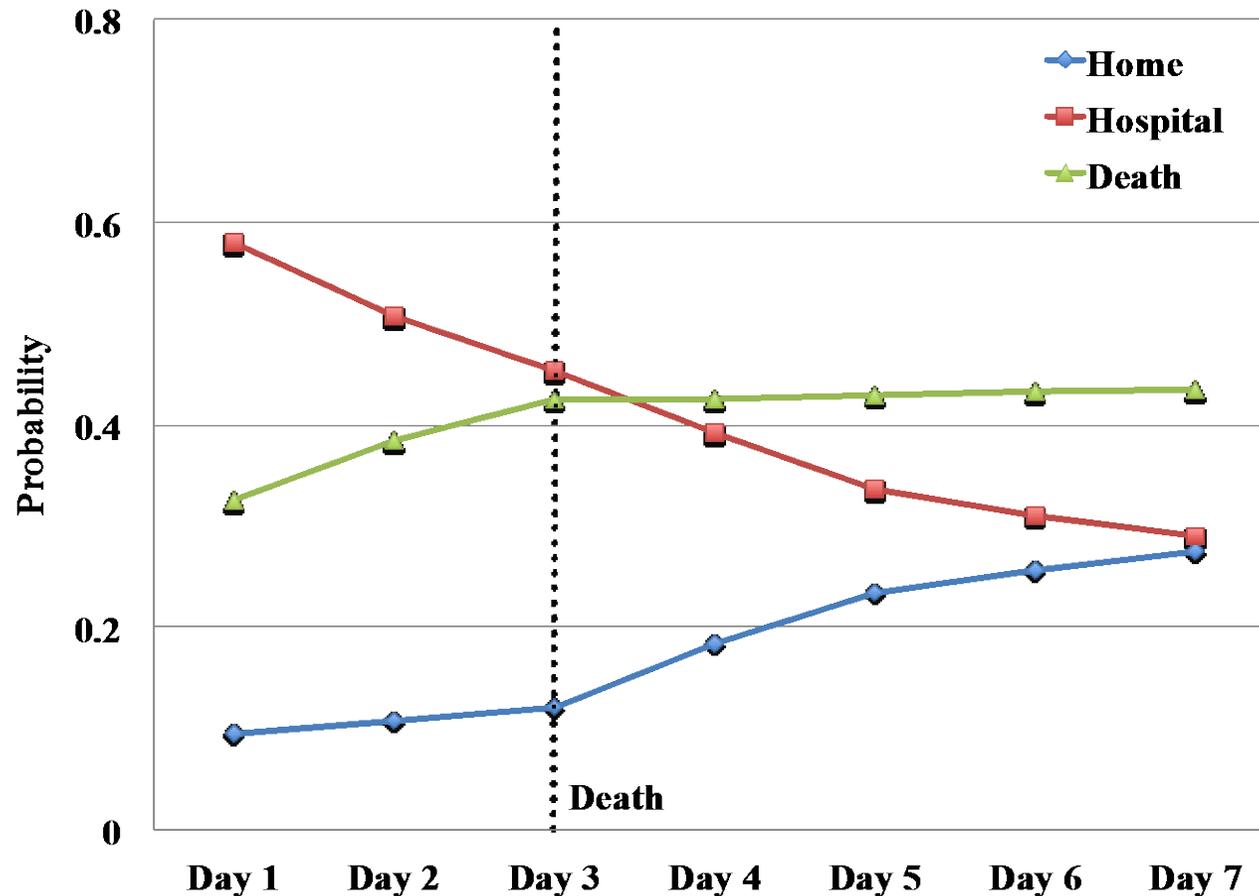
B. Expected Discharge



Forecasting patient trajectories

Will a patient be: in hospital, at home or dead in the next week?

D. Expected Death



FMU 1.2 Focus Questions

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1. How effective is predictive analytics in identifying and managing high-risk chronic disease patients?
 2. What impact can analytics have on quality and efficiency of health service and hospital performance e.g. for feedback or benchmarking?

Work Plan – Year 1

1. Undertake **systematic reviews** to identify evidence of impact of analytics on process, financial or clinical outcomes; current models of integration of analytics into workflows (including feedback, benchmarking).
2. In-depth **case studies** with system partners or early adopter organisations, using qualitative research methods.
3. In collaboration with system partners, **identify highest priority candidates** for implementation trials of analytics interventions e.g.:
 - **Risk-algorithms and tools** to identify patients with higher than expected risk for their cohort.
 - **Dashboards** that support optimisation of clinical services designed both for service and patient level decision-making.

Questions for Discussion

Early thoughts on specific exemplar problems in

- care of the chronically ill
- health service optimization

Which members of the partnership Centre are interested in participating?

What resources and external networks do we have that would allow us to proceed quickly?



MACQUARIE
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Thank you



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