



Better, faster decisions

Improving ED Flow & Safety with Predictive, Real-Time Technology

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About Alcidion



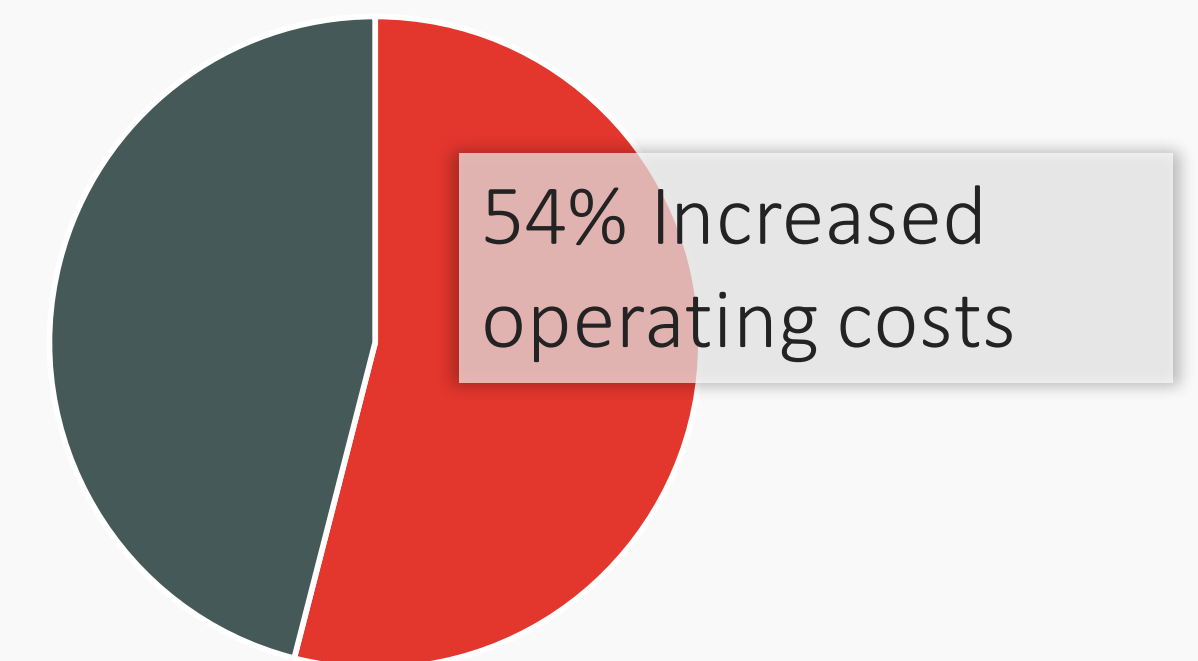
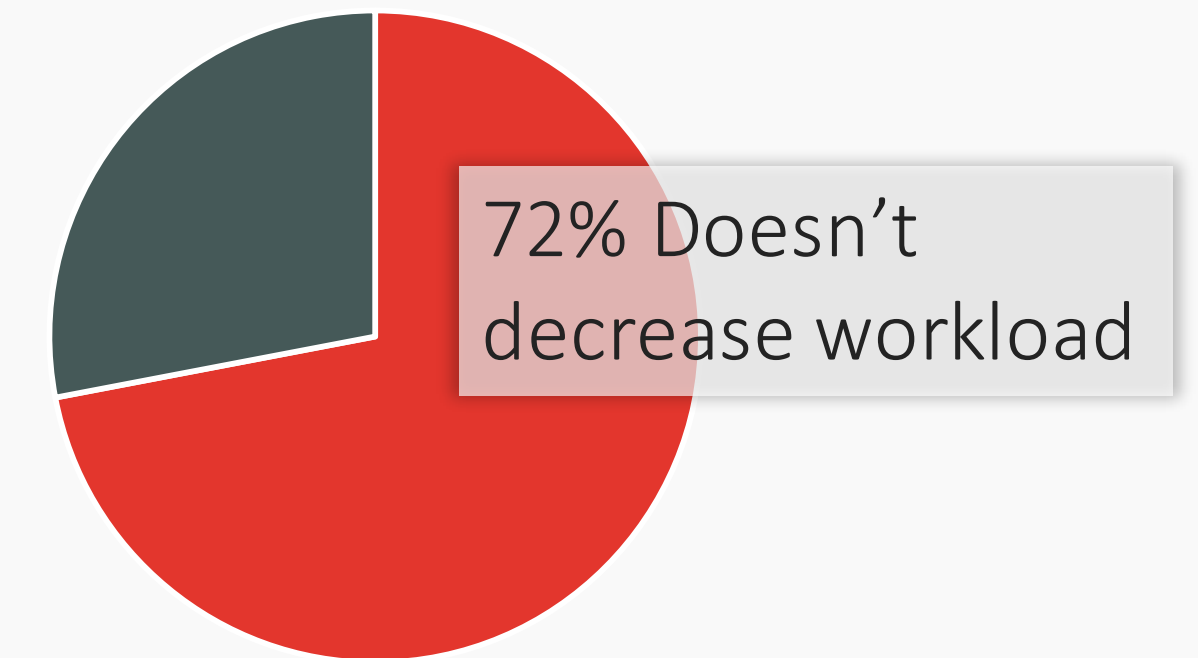
- ASX listed health informatics company based in Adelaide
- Proven track record in innovation
- Customers currently large public hospitals
 - Western Health (Vic)
 - Northern Territory
 - Royal Melbourne
 - Tasmania
 - Midcentral DHB, NZ
- Engagement with Calvary Care



Challenges of Healthcare IT



- Health IT systems slow down clinicians
 - Not integrated into workflows
 - Lack of focus on clinical productivity
 - Lack of focus on safety
- Lack of interoperability
 - IT vendors 'hide data' to prevent competition
 - Innovation is stifled
- Most data entered in EMRs is unstructured
 - Prevents clinical decision support & automation
 - Prevents machine learning



AMA College of Physician survey on attitudes to EMRs (2014)

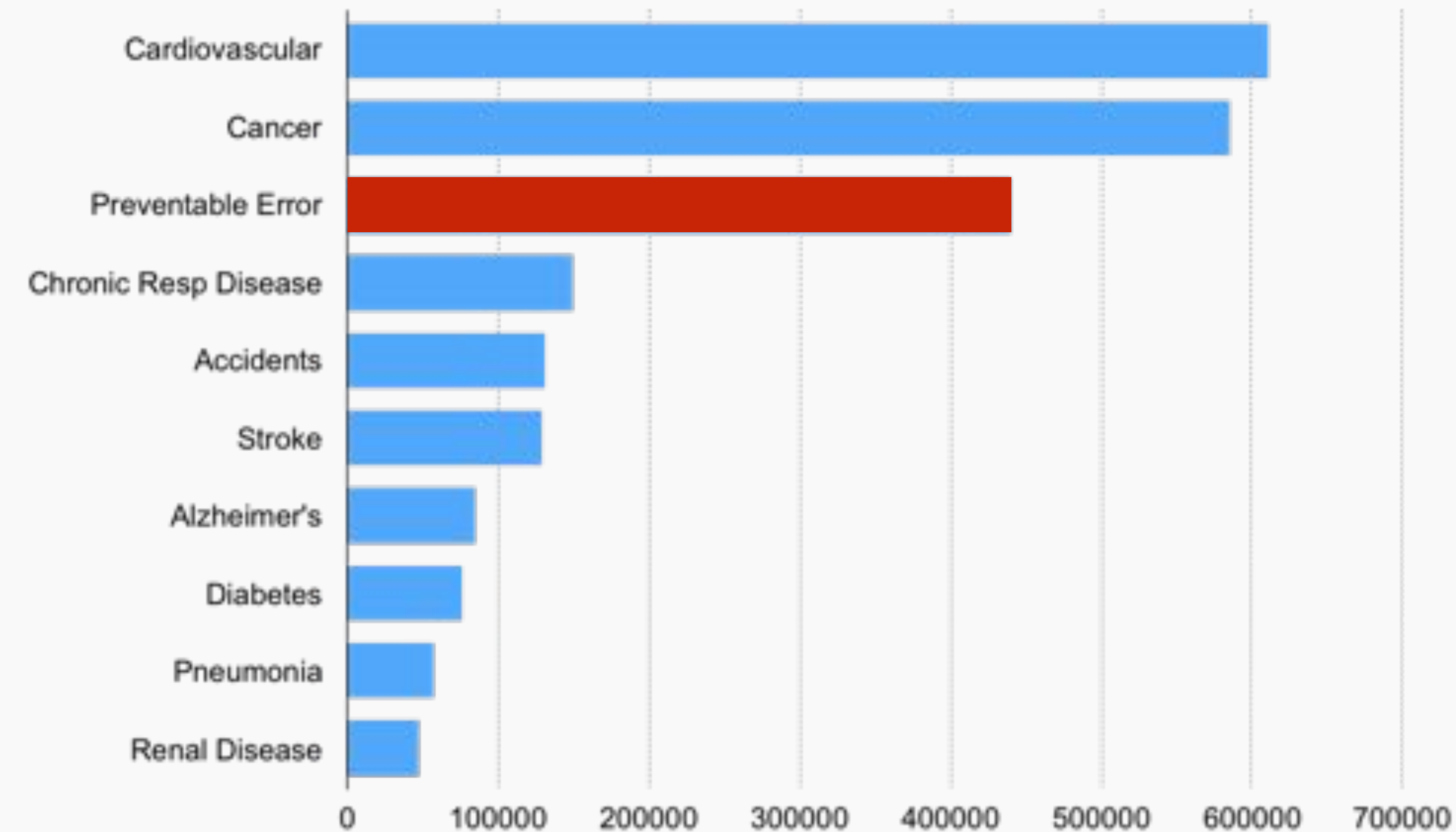
Paved with Good & Bad Intentions



- By early 2000's strong evidence of clinical benefits of Clinical Decision Support (CDS) integrated into EMRs
- The EMRAM & HiTech Act
- Data hiding as a strategy
- Benefits of CPOE meds
- “CDSs ... seem to reach a plateau with respect to their effectiveness when implemented in real-world settings” Am J Public Health. 2014. 104:e12–e22

HIMSS EMRAM	
Stage	Cumulative Capabilities
7	Medical record fully electronic; HCO able to contribute CCD as byproduct of EMR ; Data warehousing in use
6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS
5	Closed loop medication administration
4	CPOE, CDSS (clinical protocols)
3	Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology
2	Clinical Data Repository, Controlled Medical Vocabulary, Clinical Data Support System
1	Ancillaries– Lab, Rad, Pharmacy

The Results



Leading causes of death in the US

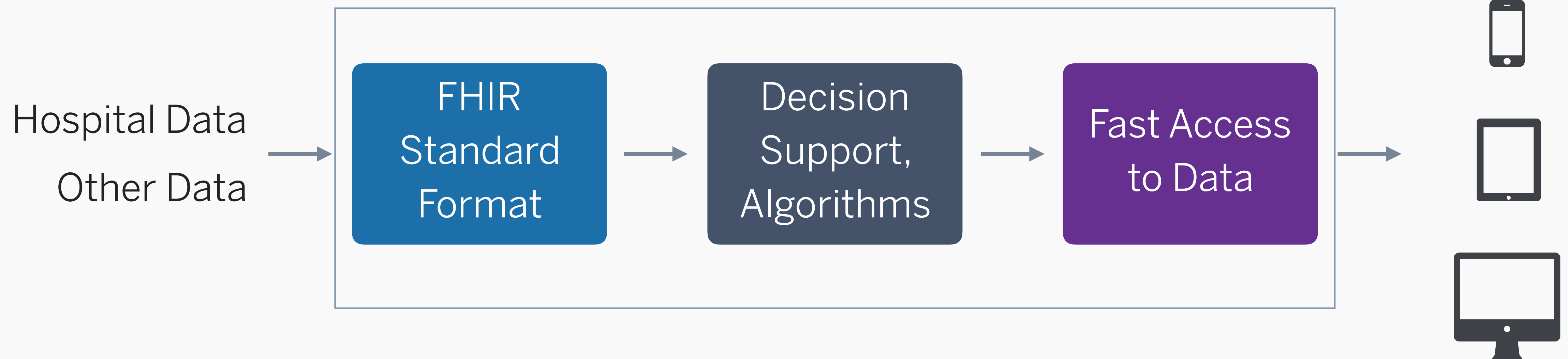
Patient harm 10-50%+ of multi-day episodes

Up to 40% of lab results are not seen

30% of AMI patients not on guideline meds

Mis- or late diagnosis in 10%–20% of cases

Miya Platform (v5.6)



- Open standards, real-time platform for healthcare decision support and analytics
 - Logistics – Blazingly fast, platform for innovation
 - Clinical risk – Make the right thing to do the easiest thing to do
 - Revenue – Track patient complexity
- In the cloud, on premise

Miya ED Clinical Risk Management

Elecs
25 min ago

FBE
12 min ago

Trop
18 min ago

Coag
37 min ago

X-Ray
25 min ago

CRP
5 min ago



SecondScreen

All Areas

All Patients

Area / Bed

My View

Home

Area / Bed / Home & Colors

Sex

Age

Room

DOB

Primary

Adults 3	Garner, Ellis URN: 1048399 Dr. MIDDLETON	M	29y	3	10:18 hours	EtOH 23:00: 09 Apr	Parac 14:58: 09 Apr	Bchem 14:58: 09 Apr	FBE 14:58: 09 Apr	4 of 4 unread		
Adults 5	Blackburn, Merrill URN: 282653 Dr. KARPATHAKIS	M	30y	4	5:11 hours							
Adults 6	Macias, Arline URN: 975822 Dr.	F	21y	5		XRay 23:58: 09 Apr				5 of 1 unread		
Adults 9	Garner, Linda URN: 1048696 Dr. MIDDLETON	F	27y	4	4:16 hours	XRay 23:47: 09 Apr	XRay 23:38: 09 Apr	Ddm 23:37: 09 Apr	FBE 21:18: 09 Apr	Bchem 21:18: 09 Apr	CK 21:18: 09 Apr	6 of 6 unread
Adults 11	Rios, Corine URN: 1047742 Dr. KARPATHAKIS	F	55y	4	5:11 hours	Umicr 23:00: 09 Apr	FBE 22:57: 09 Apr	Bchem 20:57: 09 Apr	Amy 20:57: 09 Apr	Umicr 18:00: 09 Apr	CT 11:37: 09 Apr	6 of 10 unread
Adults 20	Schwartz, Debbie URN: 181574 Dr. MIDDLETON	F	51y	4	4:45 hours	Bchem 22:58: 09 Apr	FBE 22:51: 09 Apr	Umicr 21:40: 09 Apr				3 of 3 unread
Adults 21	Vega, Lynnette URN: 708659 Dr.	F	36y	4	5:24 hours	Trop 10:00: 09 Apr	XRay 12:42: 09 Apr	XRay 12:40: 09 Apr	Trop 11:30: 09 Apr	FBE 11:30: 09 Apr	Bchem 11:30: 09 Apr	7 of 7 unread
Adults 22	Rodriguez, Claire URN: 967204 Dr. KARPATHAKIS	F	21y	4	4:56 hours	FBE 10:00: 09 Apr	BHCG 10:00: 09 Apr	Bchem 10:00: 09 Apr				3 of 3 unread
Adults 24	Alvarado, Madelyn URN: 194293 Dr. MIDDLETON	F	41y	2	12:54 hours	CT 17:51: 09 Apr	CT 17:51: 09 Apr	CRP 12:40: 09 Apr	Bchem 12:40: 09 Apr	FBE 12:40: 09 Apr		4 of 5 unread
Adults 25	Suarez, Junior URN: 923492 Dr. MIDDLETON	M	77y	4	4:04 hours	Umicr 22:50: 09 Apr	FBE 22:50: 09 Apr	Bchem 22:50: 09 Apr				3 of 3 unread
Adults 27	Fuentes, Bridgette URN: 416002 Dr. KARPATHAKIS	F	87y	3	7:12 hours	Bgroup 22:25: 09 Apr	CT 21:40: 09 Apr	XRay 20:50: 09 Apr	Bchem 19:30: 09 Apr	Amy 19:30: 09 Apr	FBE 19:30: 09 Apr	11 of 12 unread
Adults 28	Hensley, Gilda URN: 1026702 Dr. TOVEY	F	78y	5		CT 22:47: 09 Apr	XRay 22:41: 09 Apr	CT 21:52: 09 Apr	XRay 21:51: 09 Apr			4 of 4 unread
Adults 33	Rowland, Valerie URN: 480651 Dr. MIDDLETON	F	73y	5		FBE 23:00: 09 Apr	Coag 23:00: 09 Apr	Coag 23:00: 09 Apr	Bchem 23:00: 09 Apr	INR 23:00: 09 Apr		5 of 5 unread
Adults 34	Payne, Doreen URN: 194529 Dr. MIDDLETON	F	70y	3	11:24 hours	CT 21:54: 09 Apr	CT 21:53: 09 Apr	XRay 19:31: 09 Apr	XRay 19:30: 09 Apr	BGas 11:13: 09 Apr	Amy 12:40: 09 Apr	7 of 8 unread

SecondScreen V3.3.1.1

Logout

Please present your security pass to login

Disclaimer

Missed Results

Print Report

Showing 14 of 29 patients

Scroll Up

Scroll Down

Logout

Please present your security pass to login

Disclaimer

Missed Results

Print Report

Showing 14 of 29 patients

Scroll Up

Scroll Down

Filtering by Doctor: Van der Pennen

Reset My View

Bed / Area	Name & Details	Alerts	Triage	Att. Doc.	First Seen	LOS	Orders	Diagnostic Reports			
B28 Area A	Bagdatos, Martin URN 972623 29 yo M		1	Van der Pennen	OK	2h 15min	16 Orders 1 Collect	Elecs 10:12 15-Dec	LFT 10:15 15-Dec	FBE 10:02 15-Dec	5 of 5 unread
B28 Area A	Bagdatos, Martin URN 972623 29 yo M		2	Van der Pennen	10h 15min	2h 15min	16 Orders 1 Collect	Elecs 10:12 15-Dec	LFT 10:15 15-Dec	FBE 10:02 15-Dec	5 of 5 unread
B28 Area A	Bagdatos, Martin URN 972623 29 yo M	Alerts	3	Van der Pennen	OK	2h 15min	16 Orders 1 Collect	Elecs 10:12 15-Dec	LFT 10:15 15-Dec	FBE 10:02 15-Dec	5 of 5 unread
B28 Area A	Bagdatos, Martin URN 972623 29 yo M		4	Van der Pennen	OK	2h 15min	16 Orders 1 Collect	Elecs 10:12 15-Dec	LFT 10:15 15-Dec	FBE 10:02 15-Dec	5 of 5 unread
B28 Area A	Bagdatos, Martin URN 972623 29 yo M		5	Van der Pennen	OK	2h 15min	16 Orders 1 Collect	Elecs 10:12 15-Dec	LFT 10:15 15-Dec	FBE 10:02 15-Dec	5 of 5 unread
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Adaptive User Interface



1

Standard configuration for department

2

Stream specific elements

Patient Record

Overview

Admission History

Diagnostic Reports

Patient Details

Overview

Monitors

Hb
140

g/L

4 weeks 28-May-17

K+
5.2

mmol/L

4 weeks 28-May-17

PO4
1.1

mmol/L

4 weeks 28-May-17

Radiology
7Exposures
Last 12 MonthsCHADS2
35.9% Risk
20-Apr-2017

Pathology Results Since Admission on 25-May-2017

Report	Abnormalities	Age	Date	
Elec Electrolytes	K+, Na, Cr, AB	1 h 15 min	25-May-2017 08:32	View
FBE Full Blood Exam	Hb, WCC	1 h 15 min	25-May-2017 08:32	View
CRP C Reactive Protein		1 h 25 min	25-May-2017 08:22	View
Elec Electrolytes	K+, Na, Cr, AB	1 h 25 min	25-May-2017 08:22	View
FBE Full Blood Exam	Hb, WCC	1 h 25 min	25-May-2017 08:22	View
CRP C Reactive Protein		1 h 25 min	25-May-2017 08:22	View

12 More Results [View](#)

ED Episode Timeline

Elapsed Time

1 hr 55 min
of 4 hours

1 hr 5 min remaining

- Admission
1 hr 55 min ago 25-May-2017 07:43
- First Seen
1 hr 2 min ago Dr Fitzpatrick
25-May-2017 08:45
- Nurse Assessment
30 min ago 25-May-2017 09:17
- Medical Assessment
- Discharge

Recent Admissions

Legend: Hospital (Inpatient) Admission Emergency Admission

Click a dot to view in the Admission History



Diagnostic Imaging Since Admission on 25-May-2017

1-Feb-2016 11:30 am ago

Admission
Cardiology
Unstable Angina

9 d

Patient Appointments



Missed Results Tracking

V 3.0.0.00

Login



Miya ED Benefits



- Patient treatment commences an hour earlier, leading to faster recovery
- Redundant test orders are reduced – 5% savings in ED pathology costs
- Critical (abnormal) test results are properly witnessed for follow-on action
 - Without Miya ED around 40% of test ordered are not read
 - 18% of these will be critical
- Miya ED saves ED Heads/Senior Consultants several hours a day
- Care team satisfaction with Miya ED is very high – rated at better than 80% compared to other clinical systems at around 30%

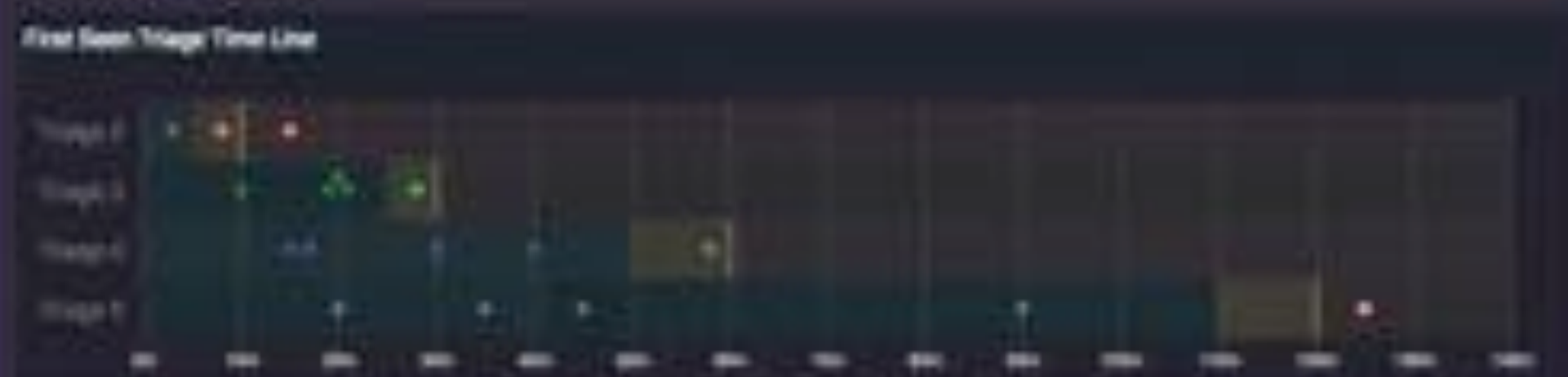
Real-Time Metrics



New Patients



Current Patients

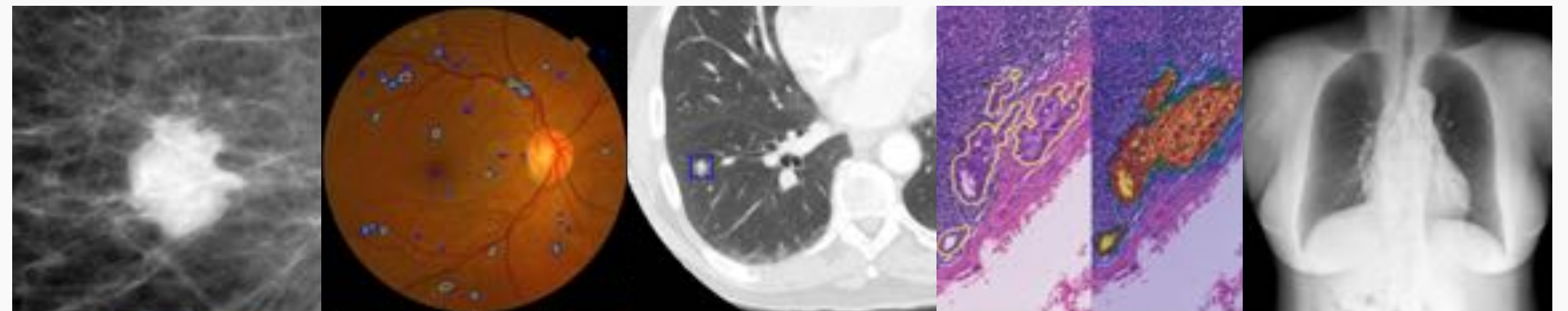
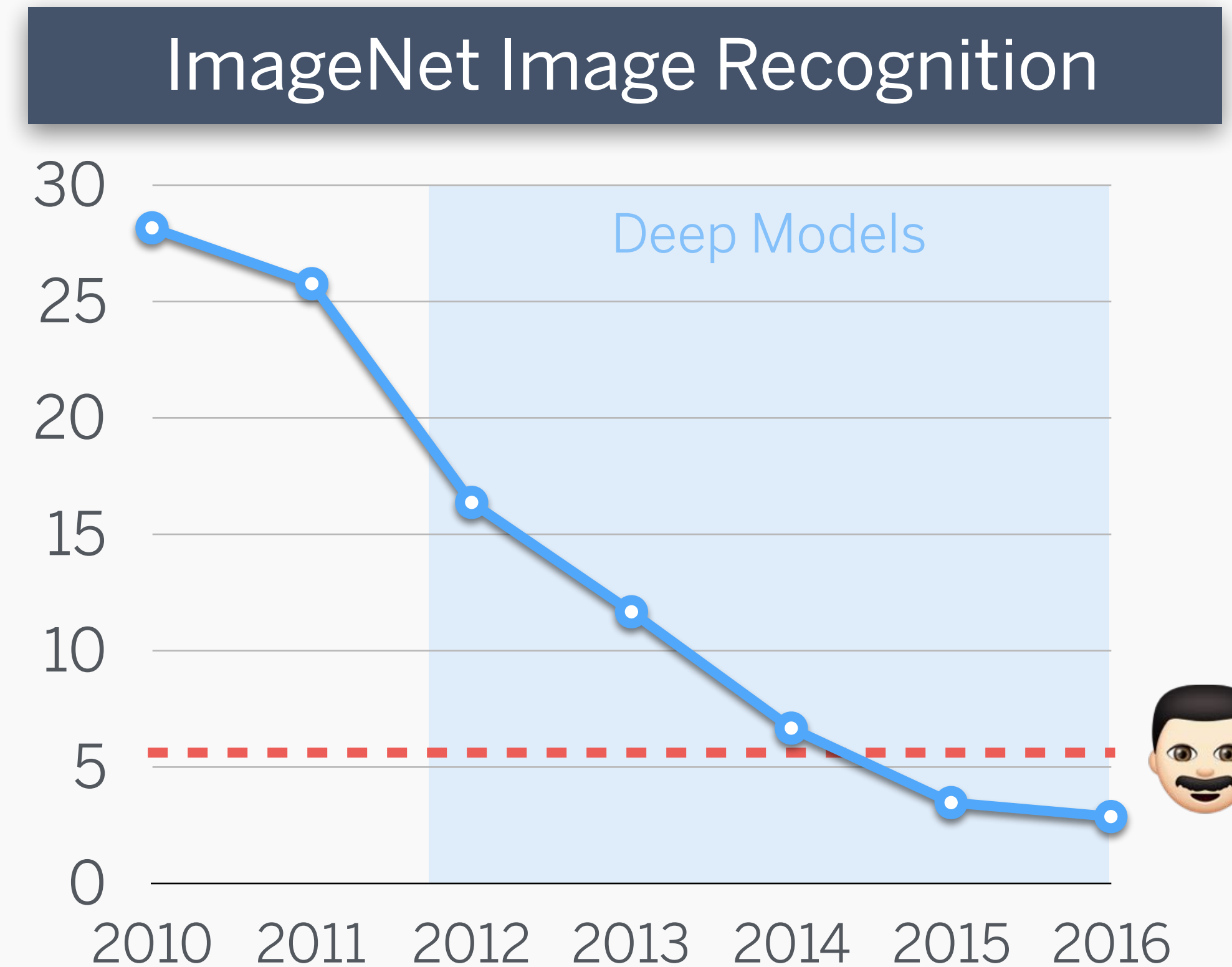




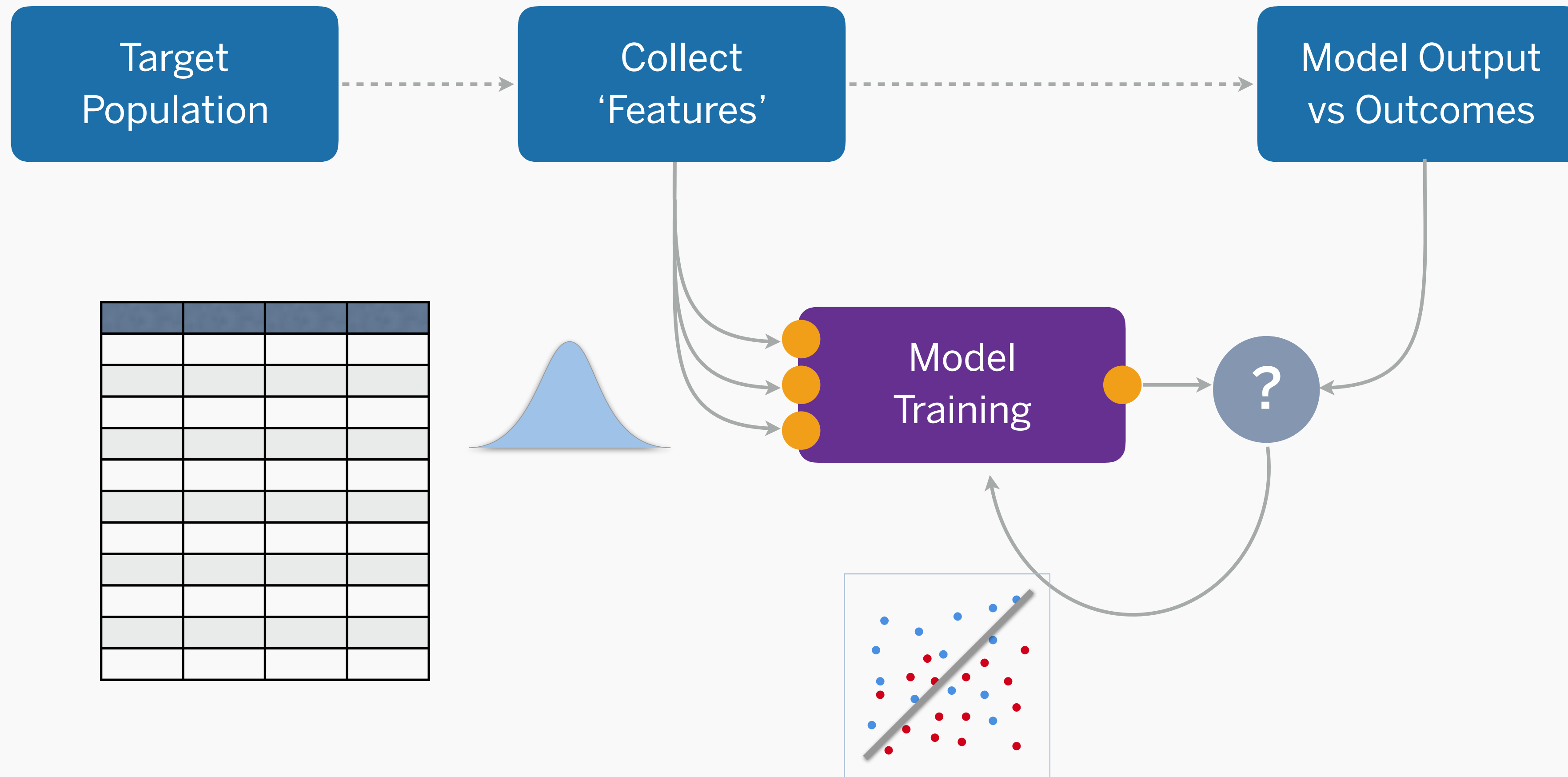
Predictive Analytics

Deep Learning Performance

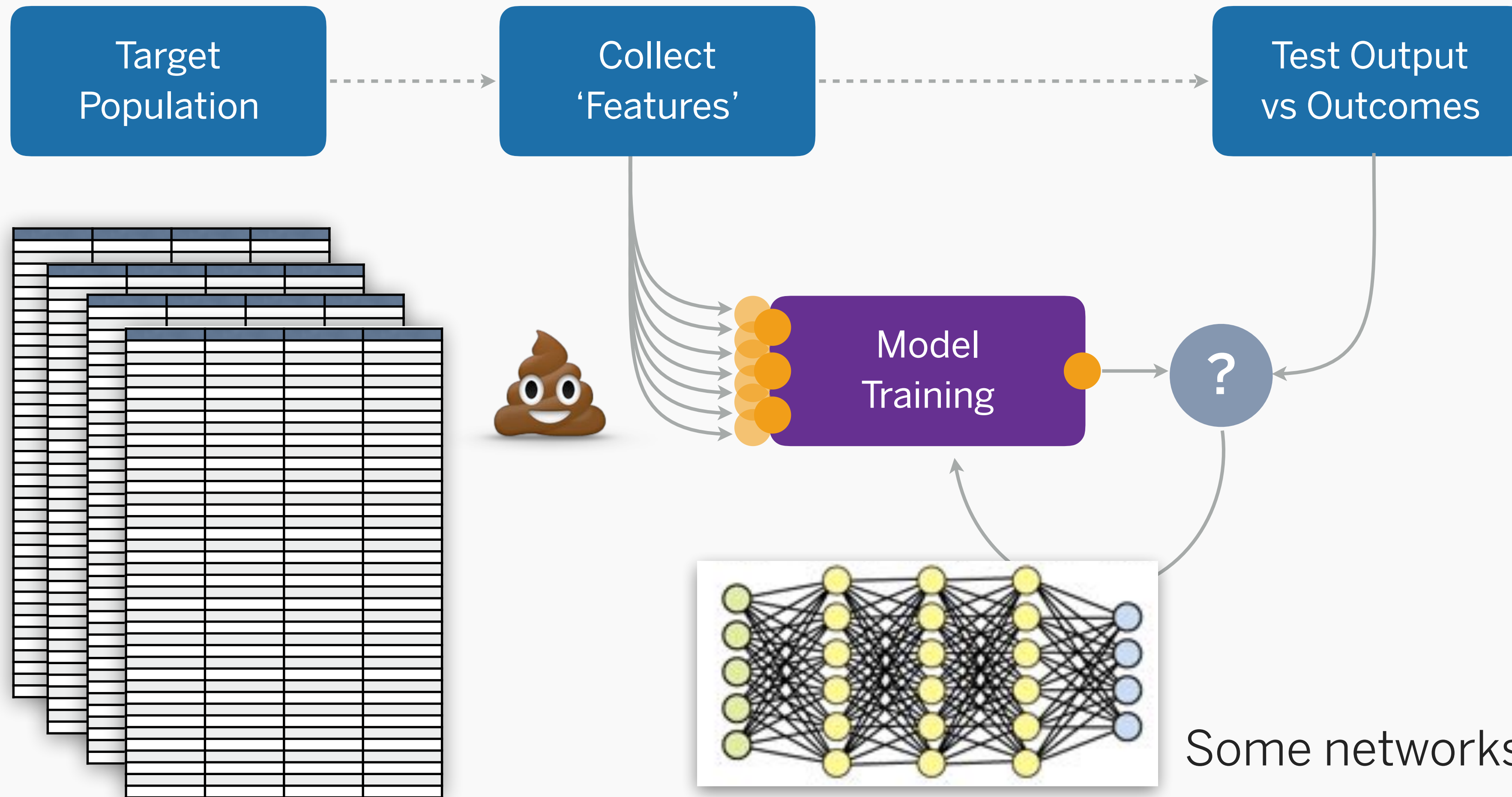
- Good at perception type problems
- Image recognition is a 'solved problem'
- State of the art performance
 - Mammographic mass classification
 - Diabetic retinopathy
 - Lung nodule detection on CT
 - Breast cancer metastases detection in lymph nodes
 - Skin lesion classification



Building Statistical Models



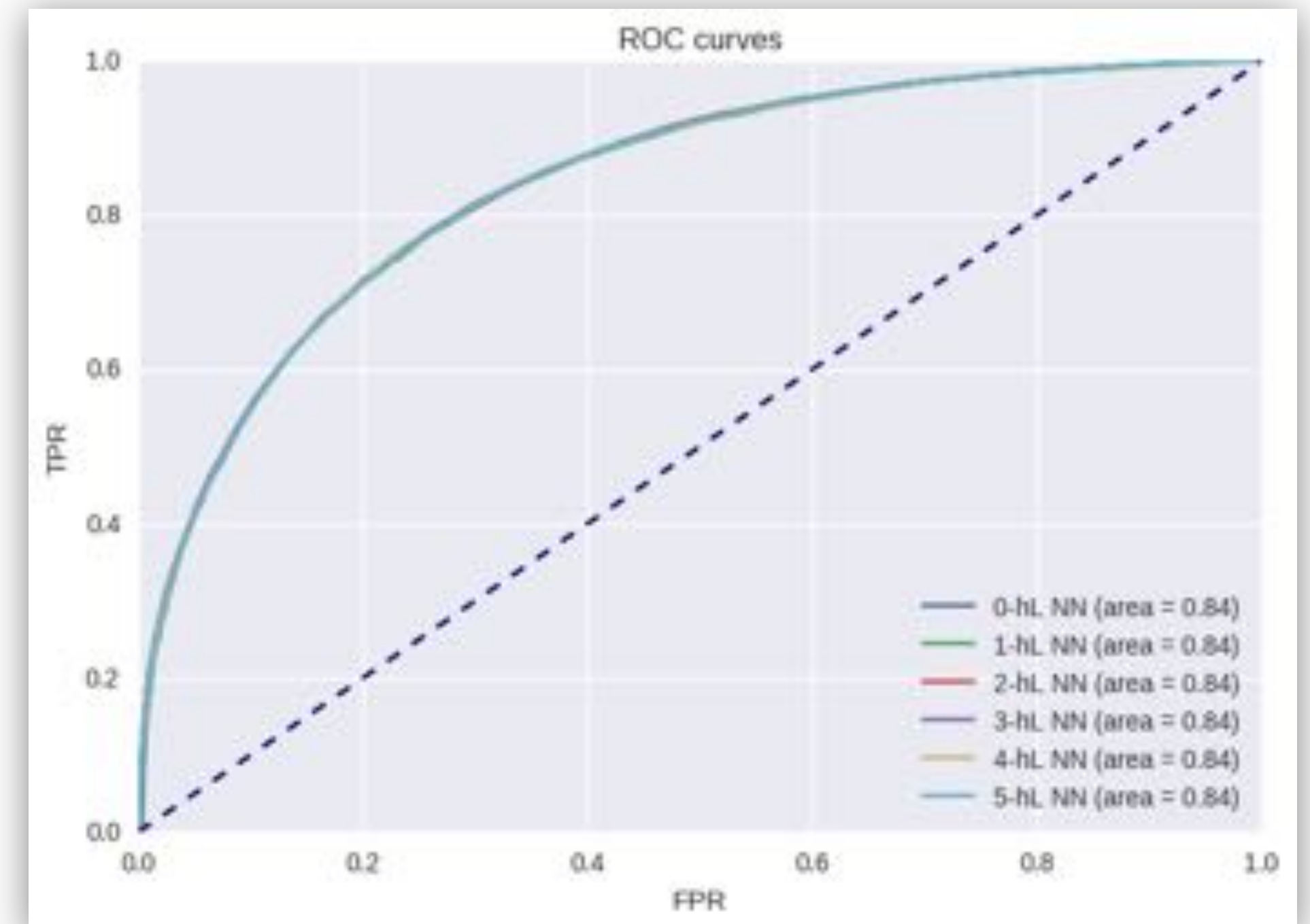
Training Deep Models



Some networks 10^{10} weights

Prediction for the ED?

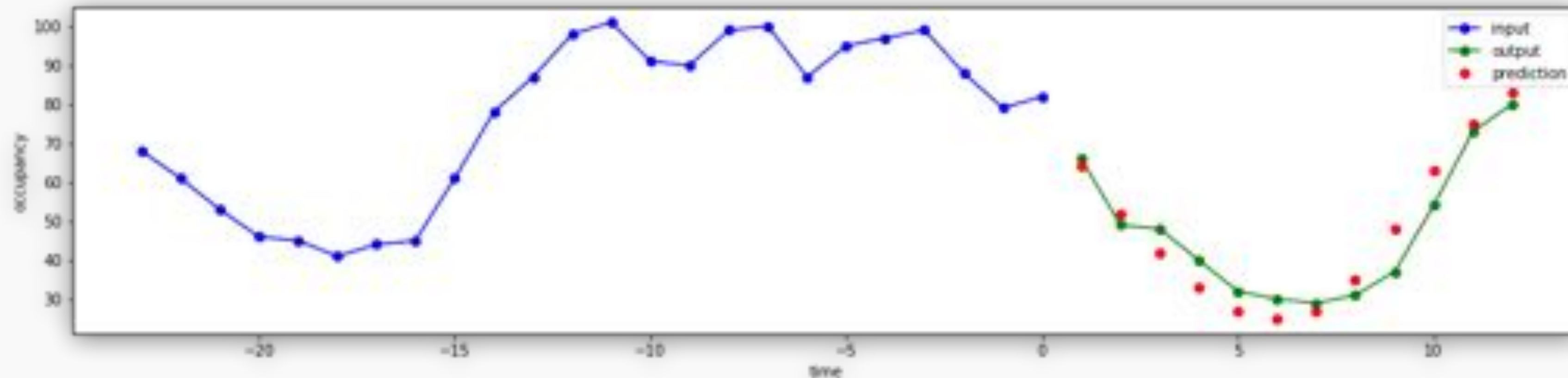
- We can now use more contextual data for prediction
- Per patient prediction of admission & destination
 - Age, triage, presenting problem
 - Previous visits, labs, medications
 - Problem list (or ICD codes)
- ED Occupancy
- Resource utilisation
- Detection of patients ready for discharge



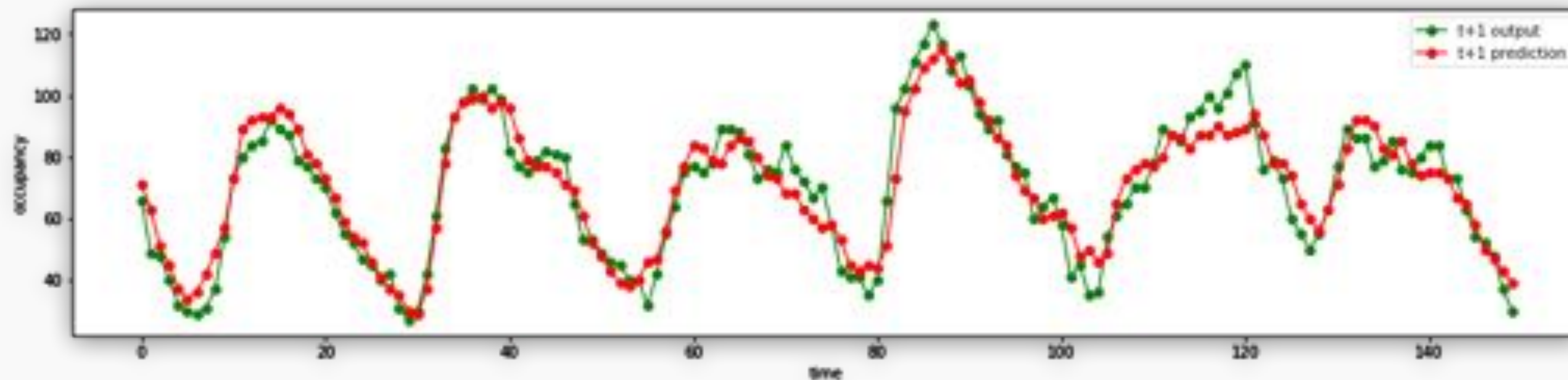
Admission Prediction AUC=0.84

Occupancy Prediction

- 12 hour occupancy prediction model



- Multiple models (e.g. 1, 3, 6, 12, 24 hour models)



Physician Utilization



Legend: Triage 1, Triage 2, Triage 3, Triage 4, Triage 5

Chance of ED Block - Next 6 hrs

78%

Wasted Minutes Last 24 hrs

258

Wasted Minutes by Specialty Last 24 hrs



Predicted Admissions by Specialty - Current Patients





Better, faster decisions

Thank You