



Cambridge
University Hospitals
NHS Foundation Trust

Changing everything...


Dr Afzal Chaudhry, Director of Digital & CCIO

BSc MA(Med Ed) MA(Cantab) PhD FBCS FRCP FHEA FAcadMed FFCI

eHospital

Patients at the heart
of our digital hospitals

EMRAM 7
HIMSS SOLUTION

 @my_eHospital

Declaration of Interest

- I am a member of the:
 - UK & European HIMSS Advisory Council
 - KLAS International Advisory Board
- HIMSS have previously supported some of my registration & travel costs for attendance at their conferences

Thank you...

Professor Keith McNeil



Keynote address: Jeremy Hunt, Secretary of State for Health

”...He [Prof Wachter] said we needed to have a Chief Clinical Information Officer for the whole of the NHS and we were delighted to appoint Keith McNeil to that role after his fantastic work at Addenbrooke’s. ...”

Cambridge Biomedical Campus



- Two hospitals – Addenbrooke's & The Rosie
- 5 clinical divisions – women's & children's healthcare fully integrated

Cambridge University Hospitals (CUH)

1,200+

Beds



530,000+

Catchment population
as a District General Hospital



4 million+

Population for UK-
wide specialist care



126,000+

ED attendances



67,000+

Inpatient episodes



853,000+

Outpatient episodes



130,000+

Day case attendances



38,000+

Surgical operations



5,200+

Births



11,000+

Staff



AUD \$ 1.52b

Turnover



2019-2020 data

Our Digital Journey

High quality care underpinned by modern informatics tools

2010

- Multitude of clinical IT systems & aging technology
- Limited functionality, accessibility & poor integration
- Decades old - impending permanent loss of support
- No results reporting audit trail; no decision support etc.
- Unofficial HIMSS EMRAM Stage 1

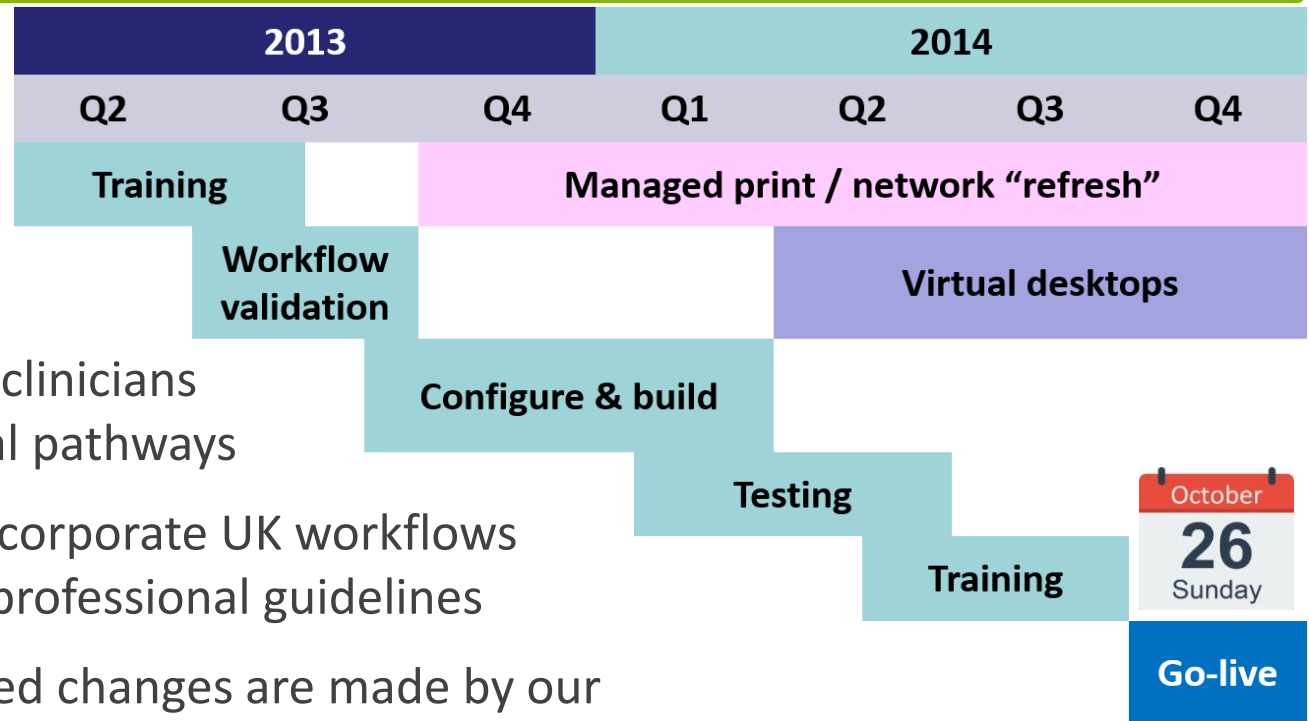
2011 - Procurement commenced

2012 - Preferred bidders (software & hardware)

2013 - Contracts signed

Implementation Timeline

100+ hospital staff
seconded to the
programme team



250+ sessions, 1000+ clinicians
validating 500+ clinical pathways

First Epic system to incorporate UK workflows
& local, national and professional guidelines

>95% of CUH requested changes are made by our
own Epic qualified staff within eHospital

99% of activity now in ONE system

26 October 2014 (go-live day 1)...

- PAS, bed management
- Enterprise scheduling
- All IP & OP care
- Care plans & pathways
- Clinical documentation
- Orders & results
- Standard clinical terms & coding
- Prescribing & formulary management
- Workflow management
- Medical devices integration
- Cardiology
- ED
- Intensive care
- Maternity
- Oncology
- Ophthalmology
- Pathology
- Pharmacy
- Radiology
- Surgical pre-assessment
- Theatres & anaesthetics
- Transplant

- Mobile & remote access
- Hydra (document import)
- Communicator

2016 & 2017...

- MyChart patient portal
- Welcome check-in kiosks

2018...

- CareEverywhere
- EpicCare Link

2020...

- GP Connect

Digital Environment

Fully integrated EPR
one patient, one record,
one system, one place
(integrated healthcare)



Same information viewed by the clinical team vital for patient care and safety

Integrated device 

All physiological monitors and ventilators in 40 theatres and 148 critical care beds integrated

Latest IT equipment

8,300+ new PCs

1,700+ mobile / handheld devices

Remote access - 2,500+ off-site daily

Use of mobile & handheld devices

Real-time information recorded
at the patient's bedside

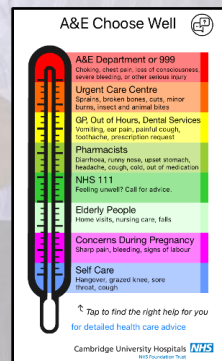


Releasing time to care
saving 124 WTE nurses through
documentation always to hand
& eliminating data transcription



Mobile apps factory

Clinical care &
clinical trials



Better for Our Patients

Electronic prescribing

100% reduction in sedation related prescribing errors in paediatrics
= 50 intensive care beds &
100 regular beds saved / year



Decision support

16% of allergy-related prescribing alerts have led to a change in prescription (preventing 850 + significant adverse reaction / year)



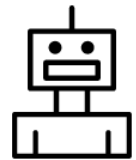
Self-check-in kiosks

in outpatient areas with on-screen maps & directions to clinics



Faster preparation of discharge medications

50% reduction in the time taken to prepare discharge medications interfacing directly to our dispensing robot in pharmacy



Rapid Response Team

Automated calculated warning scores drive workflows & alerts, >50% reduction in time to clinical review



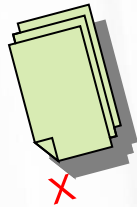
Routine review of best practice for intensive care ventilator tidal volumes
saving 2-3 avoidable ventilator-related deaths per year



Better for Our Hospital

Paperless processes

£470,000 saved annually in medical records with a 99% reduction in paper notes (inpatient & outpatient areas)



Clinical coding improved

Information reviewed in one system
Improved data quality & depth of coding
cumulative additional income (5.5 years
£87.3m – ROI >5,500%)



Pathway automation

75%+ automated opening & closing pathways (cancer & RTT) based on clinical activities / decisions



Real-time bed occupancy information

electronic bed status available to all
better management of high occupancy areas and discharge planning



Automated letter creation

80% of clinic letters in paediatric gastroenterology are given to the parents at the end of clinic – tools combining data from elsewhere in the patient's chart into a structured letter



Financial savings

£1.8 million average annual reduction in the financial gap between high-cost drug expenditure and income.

Accelerated Change Process

COVID-19 order set required, Infectious Disease team

Change request submitted to Bronze

Change request approved to Silver

Build configured, contents agreed by SME, testing complete

Approval by Infectious Disease team

Deployed into live

March 2020		
Wed 18	Thurs 19	Fri 20
14:00		
16:30		
16:30 (Wed) - 16:00 (Thurs)		
		13:30
		15:00

flowER'- Predicting ED Capacity

ED Dashboard

🔄 14:50:36 7th Sep

Recent Arrivals last hour: 3 | 1-2 hours ago: 18 | 2-3 hours ago: 20

Now: 81 in ED

Areas					Status
Whole ED	5	37	25	14	
Resus	0	2	0	0	
Area A	0	3	4	3	
Area B	0	1	3	2	
Area C	0	12	10	5	
Majors ABC	0	16	17	10	
Minors	2	6	4	1	
Paeds	1	0	1	1	
Ambulance Bay	0	0	0	0	
Unallocated	2	13	3	2	

Speciality Queues					Status
Emergency Medicine	5	34	24	14	
Acute Medicine	0	12	14	8	
Surgery	0	1	0	0	
Orthopaedics	0	1	0	1	
Gynae	0	0	0	0	
Paediatrics	0	1	0	0	
Psychiatry	0	0	0	0	
Other	0	0	0	0	

Record Action ↑

Forecast

Triage and Initial Assessment

Input	Whole ED	Amb Bay	Resus	Area A	Area B	Area C	ABC	Minors	Paeds	Unalloc
+1 hour										
+2 hours										
+3 hours										

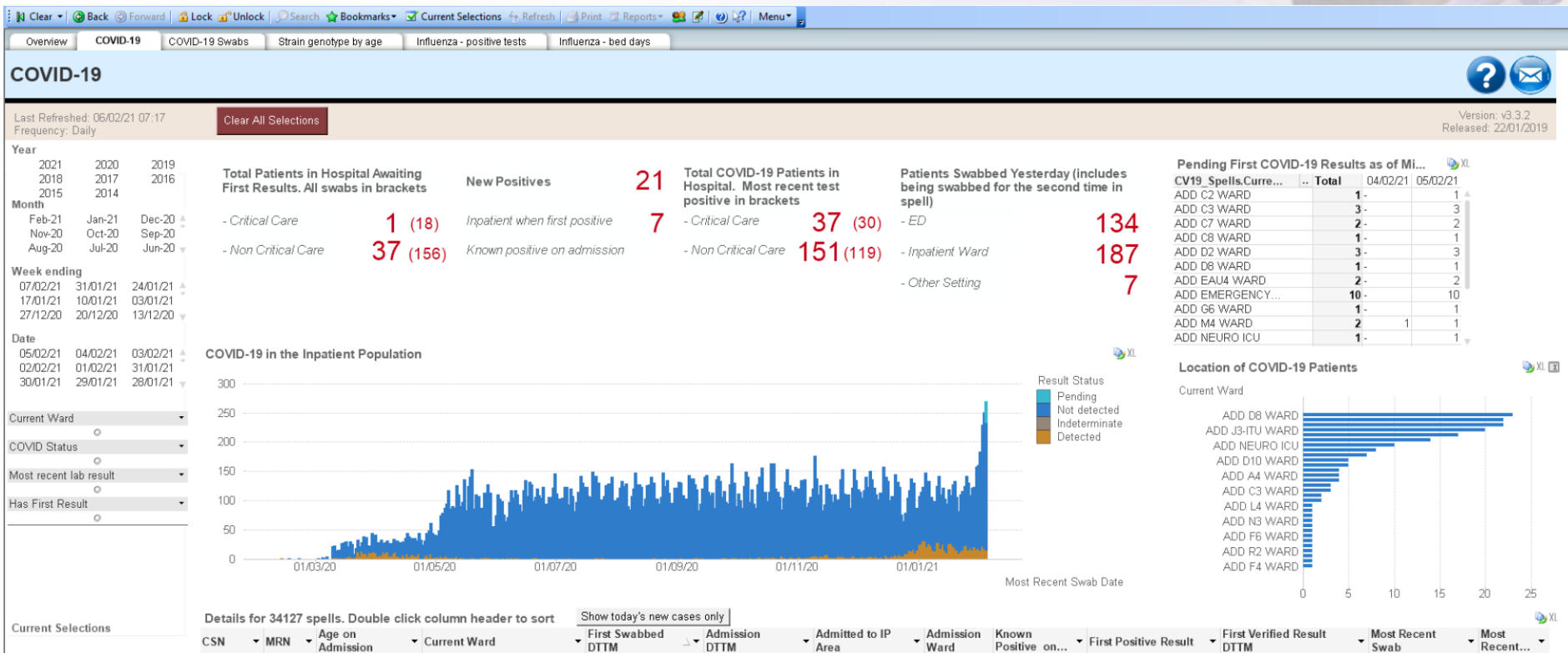
Undergoing Tests and Treatment

Throughput	Whole ED	Amb Bay	Resus	Area A	Area B	Area C	ABC	Minors	Paeds	Unalloc
+1 hour										
+2 hours										
+3 hours										

Waiting for Admission or Discharge

Output	Whole ED	Amb Bay	Resus	Area A	Area B	Area C	ABC	Minors	Paeds	Unalloc
+1 hour										
+2 hours										
+3 hours										

COVID-19 Tracker



Epic – Electronic Patient Record
Recording of all clinical care of our patients in one fully integrated electronic patient record system.



Care Everywhere

Our digital connection with other hospitals worldwide, enabling real-time sharing of records to advance patient care.



Joined-up healthcare for our patients

MyChart
Patient portal enabling our patients to access their hospital information digitally.



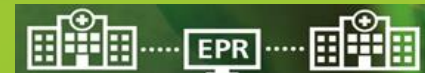
EpicCare Link

Digital portal providing GPs and community nurses access to their patient's hospital information.



GP Connect

Integration with GP services to enable CUH clinicians to view the last 3 encounters in the GP record



MyChart patient portal

- First UK fully integrated patient portal
- Enabling / empowering patients in their own care
- Dec 2018 - 3,223 Dec 2019 - 22,429 Dec 2020 - 83,880
- ~138,000 results released automatically per month



Appointment details



Current conditions



Clinical correspondence



Vital signs



Test results



Medications



Known allergies



Demographics



Pre-visit questionnaires

Scanning for Safety

Patient wristband scanning & close loop administration

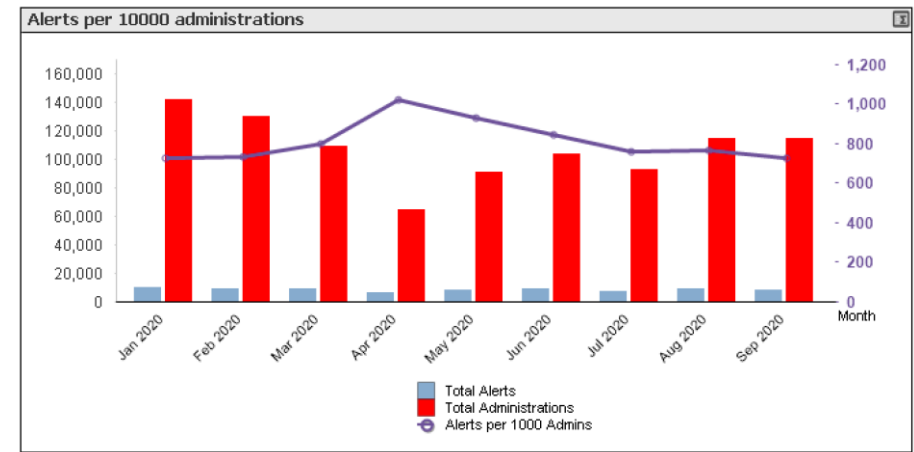
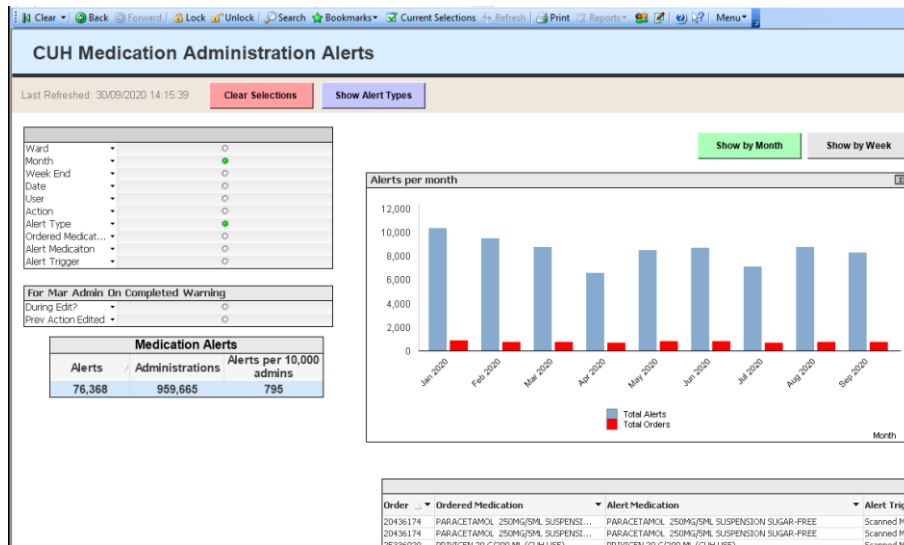
Aim:

- barcode medication administration, transfusion & sample collection scanning - all 56 inpatient areas including critical care & ED
- breast milk in NICU & areas with communally stored milk

Outcome:

- Positive patient assignment from 'start to finish'
- System performs '5 rights' checks - failures trigger alerts to be professionally actioned
- National blueprint with NHS England

Scanning for Safety - Alerts & Overrides



Activity	Jan 20	Feb 20	Mar 20	Apr 20	May 20	Jun 20	Jul 20	Aug 20	Sept 20
No order	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
No active order	0.9%	0.9%	1%	1.1%	1.2%	1.2%	0.8%	1.1%	1%

- Saving 2,600+ lost bed days per year from adverse drug reactions

Saving Lives from Sepsis (I)

Since the introduction of sepsis alert...

Aim:

- earlier identification & treatment of patients with sepsis
- delivered through strong clinical engagement & enhanced digital decision support systems

Outcome:

- **70% increase** in patients receiving antibiotics within 1 hour of ED arrival
- **50% increase** in adult inpatients receiving antibiotics within 60 minutes of the alert triggering
- **At least 64 lives** saved from sepsis in 2018/19
- National blueprint with NHS England

Saving Lives from Sepsis (II)

Value in healthcare...

- achieving the best possible improvement in health / wellbeing outcomes relative to the amount of resource consumed

♥ Robyne Toseland ♥ @glitterykisses · Sep 13

I suffered sepsis for the first time last year, & @CUH_NHS were honestly amazing! ❤️ Resus started treatment immediately & everyone involved, from the rapid response nurses to @JVFICU were incredible! Thank you all SO much! Honestly the most poorly I have ever felt!

Debs @DebsKeppey · Sep 13

In July members of this brilliant team diagnosed my sepsis within 15 minutes of me arriving at A&E. Treatment started, seen by three doctors and consultant within an hour. Lifesavers. #WorldSepsisDay2018 #AlwaysAsk #SepsisAwareness



CUH @CUH_NHS

🌞🌞 to our brilliant team in the emergency department. They've done some outstanding work to raise awareness of #sepsis symptoms, and the importance of starting treatment within one hour. 🕒 #WorldSepsisDay

Show this thread

CUH Retweeted

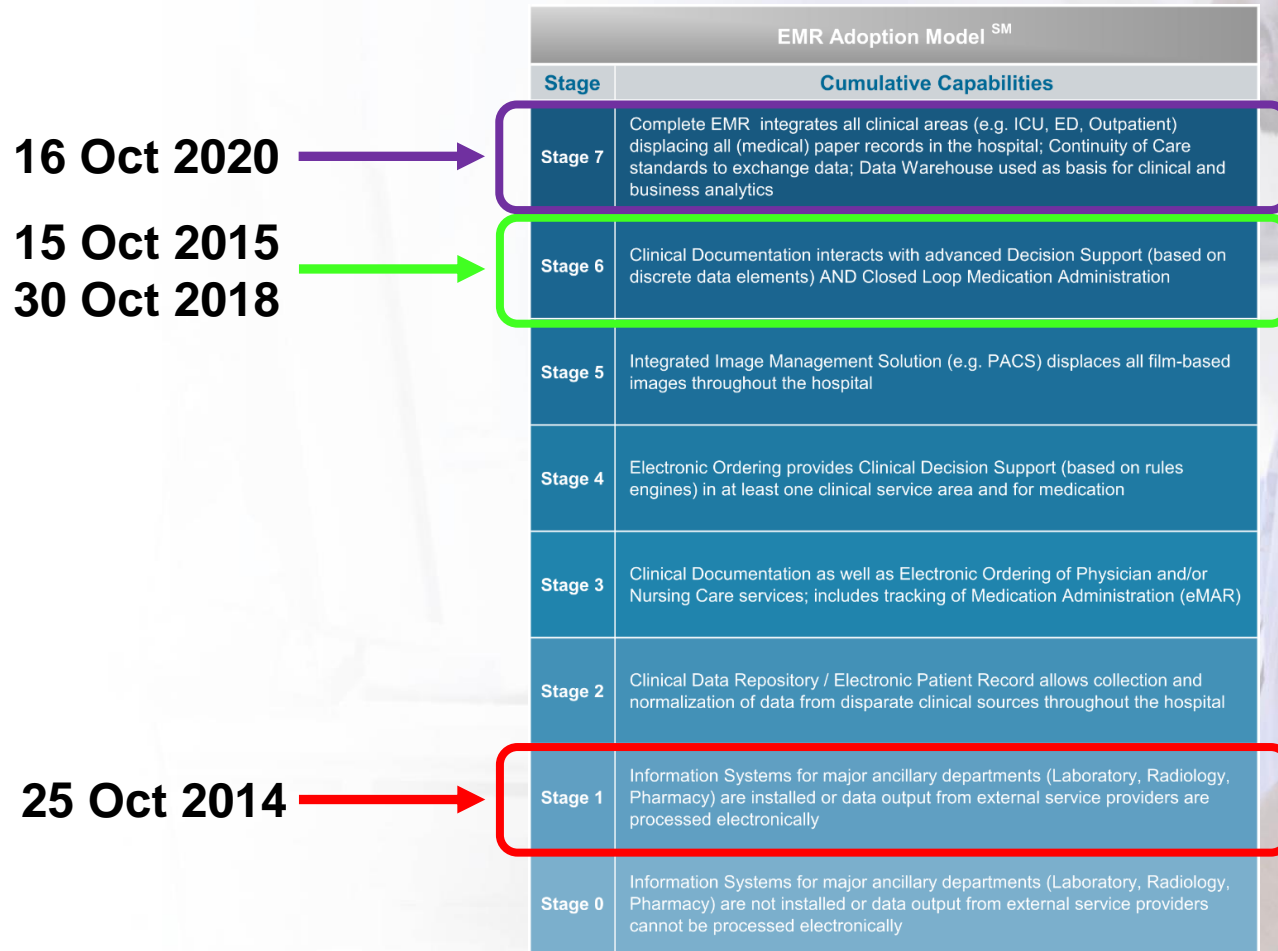


Sammy Davis @SammyDDavis · Sep 13

Sepsis is the worst thing that has ever happened to me but also one of the best things. The worst is the pain and the long recovery. The best is that it's given me a new zest for life & shown me how much love & support my family, friends & all the @CUH_NHS staff have to give.



HIMSS EMRAM



**Healthcare Information & Management Systems Society (HIMSS)
Electronic Medical Records Adoption Model (EMRAM)**

<https://www.himssanalytics.org/europe/electronic-medical-record-adoption-model>

Staff experience & engagement

Item	April 2015	March 2016	May 2017	May 2018	June 2019
Staff can find relevant patient info easily	+44	+60	+63	+69	+74
Staff are satisfied with the support available for issues / changes that arise	-8	+18	+25	+31	+39
Staff who are confident that the Epic system supports them in caring for their patients	+25	+55	+61	+66	+71
Staff can login to the Epic system quickly	+48	+66	+59	+58	+33
Staff can access the reports or metrics in the system that are relevant to their role	+37	+50	+51	+60	+70

Net promoter scores: +50 is excellent; +70 is exceptional, n = 1,774 – 1,888

Lessons (I)

- Change of mindset - digital underpins everything - it is not a bolt on
- Understand
 - your staff and their roles
 - your clinical, administrative & operational workflows / SOPs
 - define / describe 'who', 'what', 'when' and 'why'
 - Epic is typically the 'how'

Lessons (II)

- Staff engagement & change management
 - Make it real - stories relating to ever-increasing high-quality care
 - 'Too much' is not enough
 - Dress rehearsals for operational readiness (incl. infrastructure)
- Become more educated in defining 'value' and measuring benefits

Current Projects / Plans (I)

MyChart enhancements

- self scheduling of appointments
- uploads of own data / wearables

More device integration

- Infusion pumps
- Remote monitoring on-site and offsite

Registries & population health

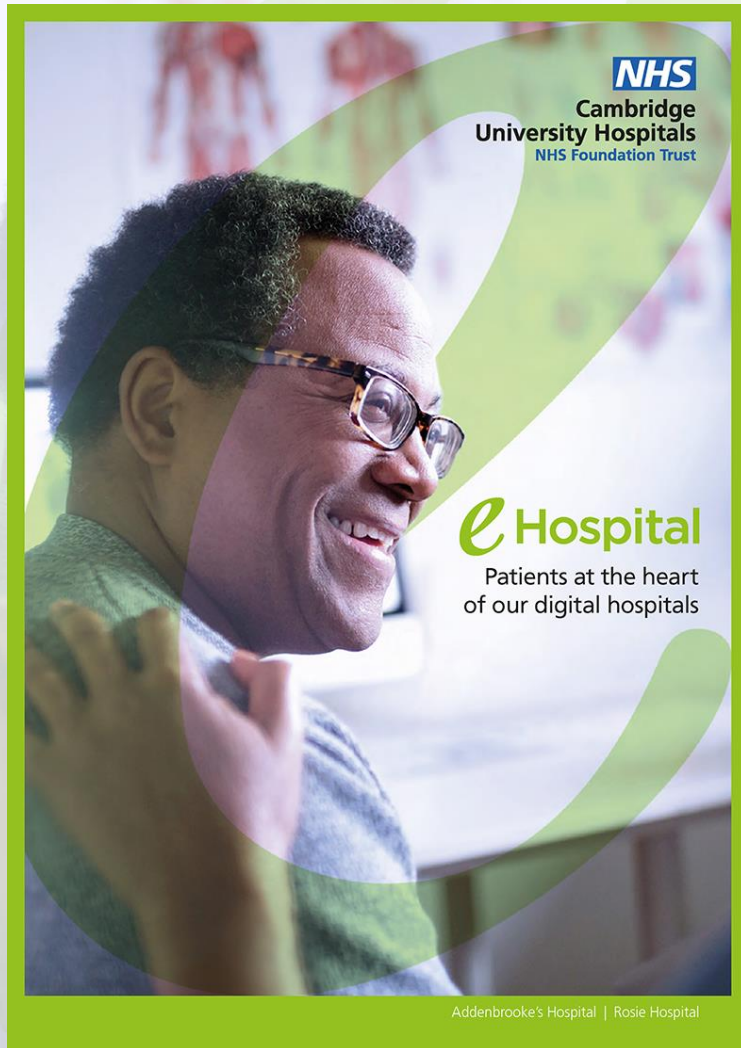
- Expanding interoperability
- Move towards broader cohorts and earlier intervention

Current Projects / Plans (II)

Analytics & Research

- Data stewardship & governance
- Automated pipelines of clean curated data for self-service tools
- NLP / data mining of current / legacy records
- Predictive modelling evolving to prescriptive care
- Project Inner Eye - Dr Raj Jena
 - <https://www.microsoft.com/en-us/research/project/medical-image-analysis/>
 - <https://www.cuh.nhs.uk/news/hancocks-high-tech-visit/>

Further Information



eHospital brochure

(Sept 2019):

'Patients at the heart of our digital hospitals'

www.cuh.nhs.uk/ehospital

ehospital@addenbrookes.nhs.uk

@CUH_NHS

@my_eHospital

