



## Health Technology for Tomorrow

Seminar 1: 'The potential for wearable technology in ambulatory care: Isansys Patient Status Engine'

25 November 2016 Somerville  
College, Oxford

[www.oxford.dec.nihr.  
ac.uk](http://www.oxford.dec.nihr.ac.uk)

# The Patient Status Engine

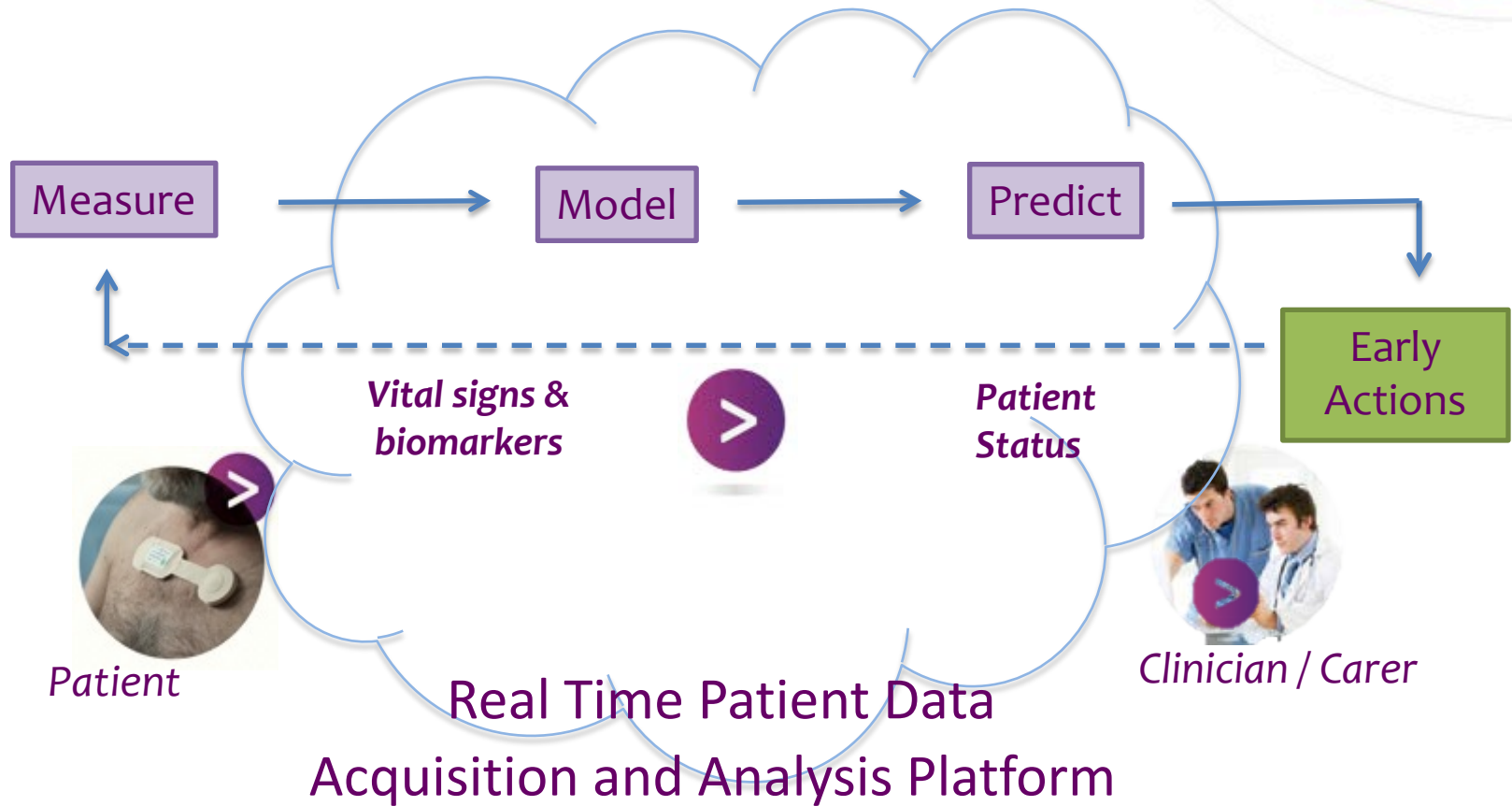
*Data driven digital  
healthcare: new methods for  
improved patient safety*

*Anywhere, Anytime, Accurate,  
Wireless Patient Monitoring*

- **Established in 2010 at Milton Park, Oxfordshire**
  - Clinical need and first customer identified by entrepreneurs with sector-leading expertise
  - Headquarters, manufacturing and development based at Milton Park, Oxfordshire (16 FTEs)
  - Development of 'Patient Status Engine' completed in 2013 (Second generation in 2015)
  - Bangalore subsidiary incorporated in 2015 (2 FTEs)
- **Patient Status Engine now shipping**
  - Germany, Norway, India, USA
  - ISO 13485 certification (Europe; Canada; SE Asia) gained in 2012 (subsequently recertified)
  - Designated a CE mark Class IIa medical device in 2012 (upgraded 2015)
  - FDA 510k filing Dec 2016
- **Strong commercial positioning**
  - Clinically validated, ISO certified and CE marked for European and other markets
  - Isansys IP throughout platform: - devices, software and processes
  - Meets immediate needs of clinical care teams
  - Offers significant benefits versus competitor systems

# Patient Status Engine

- Analysis & Prediction of Clinical Deterioration



# Patient Status Engine

## - What is it?

A complete end-to-end wireless patient data capture, analysis and delivery platform

*that is also a medical device (CE Mark Class 11a)*

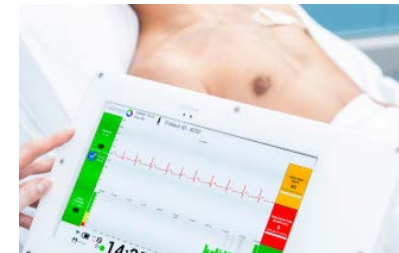
### Wearable sensors

- Smart patches & other wearables



### Patient Gateways

- Interactive bedside displays



### Lifeguard Server

- Data storage, analytics, forwarding
- Network control, logistics



Web  
Services

### User Interfaces

- Dashboards
- Charts
- Reports



# Patient Status Engine

## - What does it do?

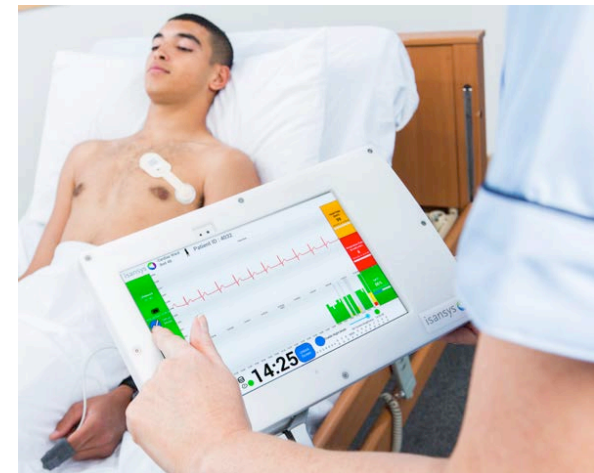
- ✓ Monitors patients continuously wirelessly and in real-time
- ✓ Provides accurate vital sign data, 24/7, for patients in hospital or at home
- ✓ Performs continuous “obs” with automatic data capture and data entry
- ✓ Presents the aggregated data from each patient on a dashboard (at the nurses' station or remotely on any authorised smartphone, tablet or other device)
- ✓ Carries out MEWS and NEWS score calculations and displays real time score
- ✓ Integrates with apps for alerting and escalation indications, e.g. RAPID Index
- ✓ Connects easily to EPR's and other IT through open API (programming interface) and web services

# Patient Status Engine

## - What does it measure?

### Six Vital Signs

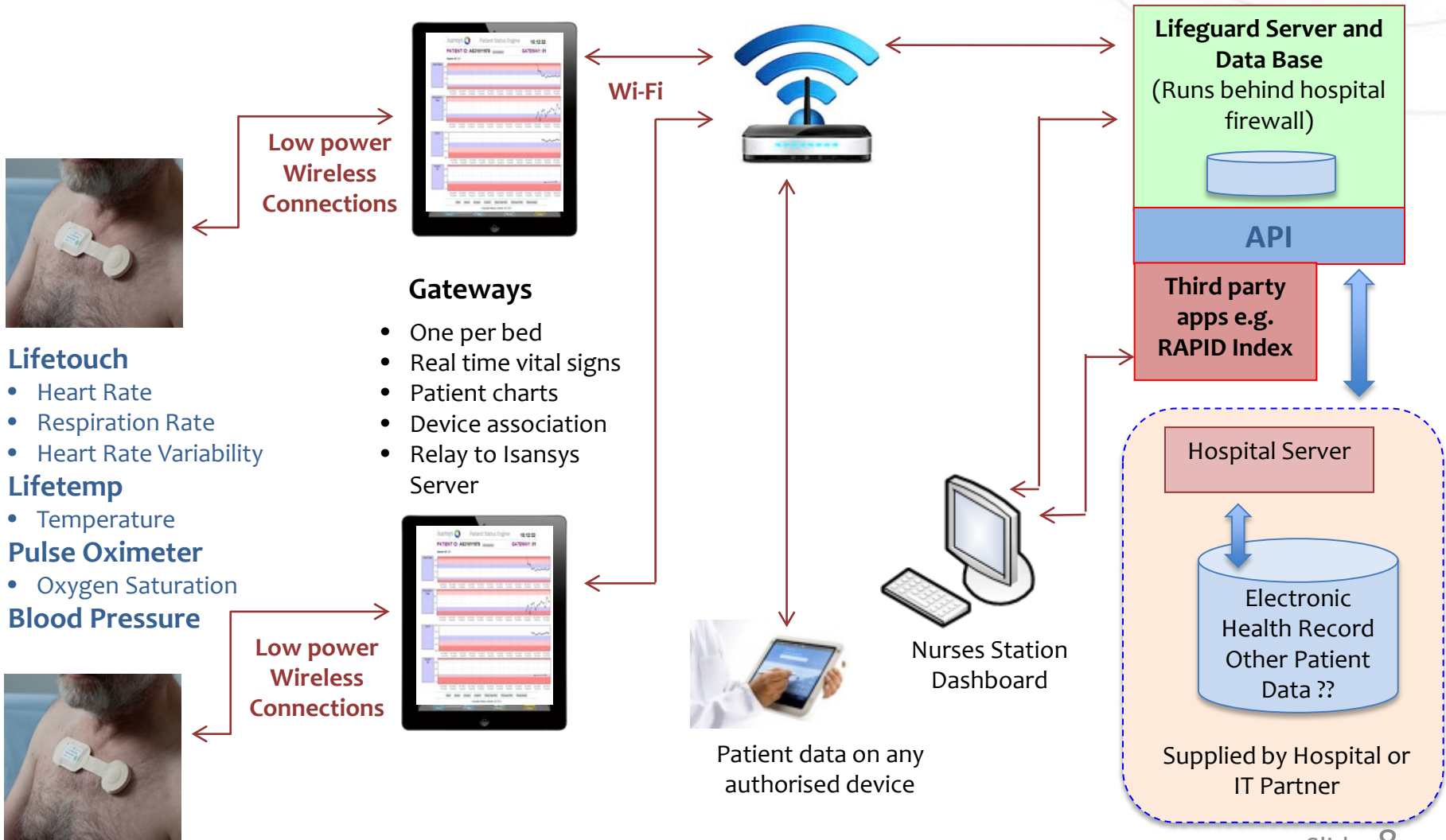
- ✓ **Heart Rate (continuous)**
- ✓ **Respiration Rate (continuous)**
  - ✓ + Real time heart rate variability (millisecond accuracy)
  - ✓ + ECG on request (on screen button - local or remote)
- ✓ **Temperature (continuous axillar)**
- ✓ **Oxygen Saturation (continuous)**
  - ✓ + PPG on request (on screen button - local or remote)
- ✓ **Blood Pressure (as required)**
- ✓ **Coma Score**
  - ✓ Manually entered score in accordance with local practice (4 point / 12 point)





# Patient Status Engine

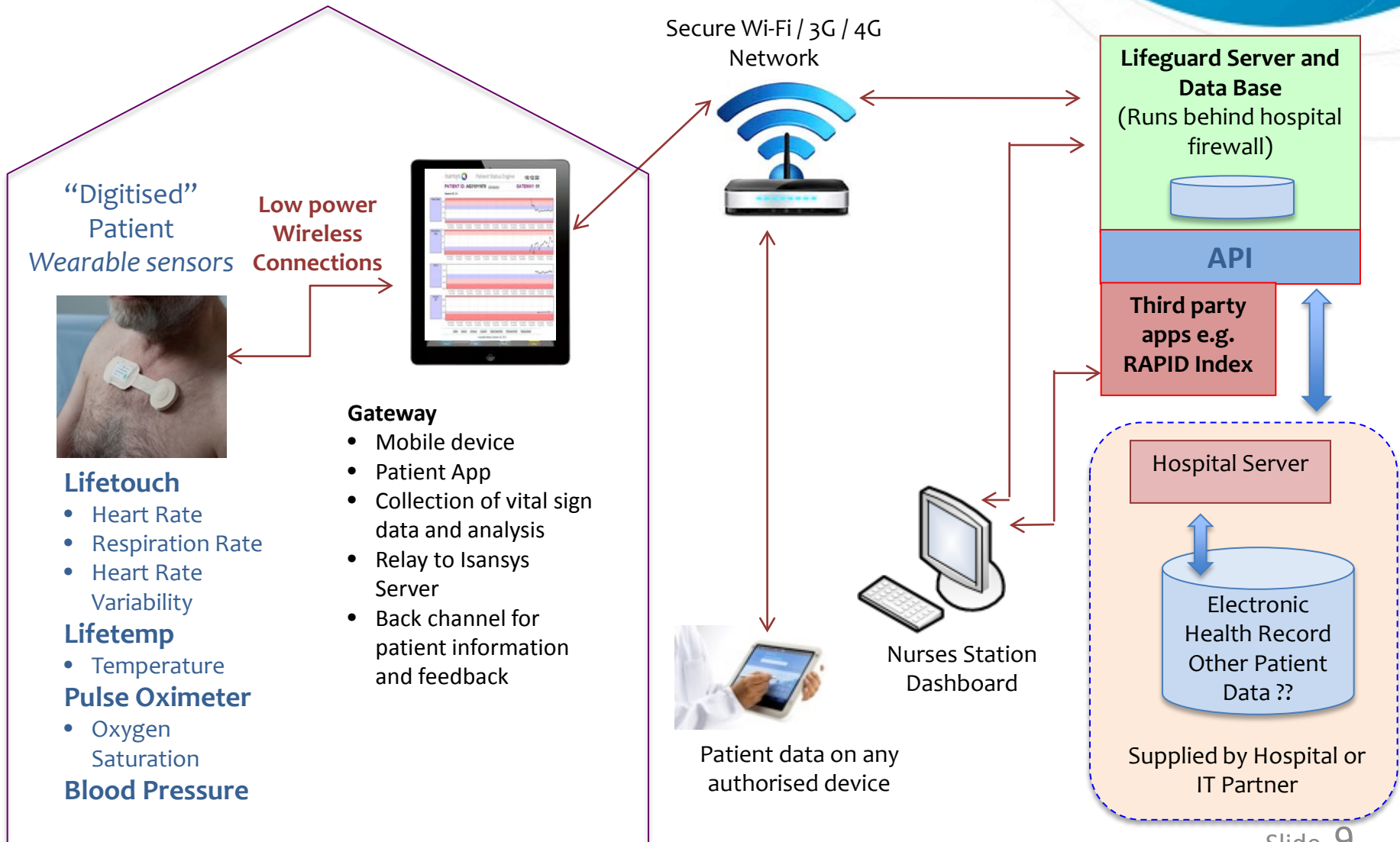
## - In-hospital architecture





# Patient Status Engine

- @Home architecture – simple network change

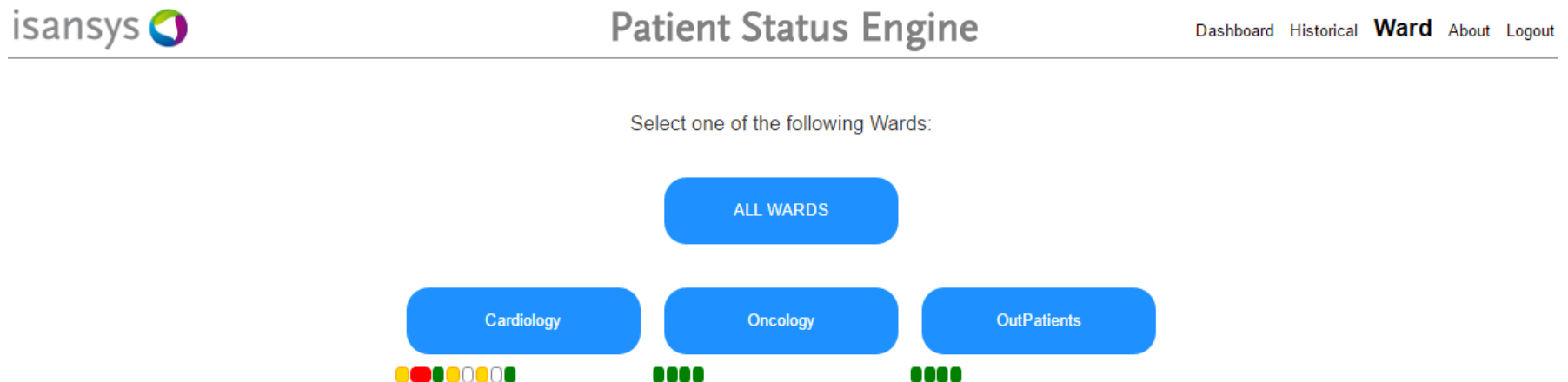


# Simple and secure operation

- Local or remote user login




- Multiple Ward Views



# Real-time Patient Dashboard

- Local and remote views of all patients

Bed		Heart Rate	Respiration Rate	Temperature	SpO2	Blood Pressure	Early Warning Score	Show empty beds <input type="checkbox"/> 10:22:46	
●	Cardiology_1a L7169554	77	11	36.6	93	Last Data: 10:19:40 Jun 10th	7 /15	<b>Cardiology</b> EWS Ward Overview  ● Gateways not talking to Server Cardiology_7a - Last Data: 09:45:35 Jun 10th  ● Gateways not charging Cardiology_6d  ⚠ Leads off Cardiology_2a - Last data: 10:21 Jun 10th  ✳ Out of range	
	Cardiology_1b L3679854	77	16	35.6			1 /9		
	Cardiology_2a L0077556	66	15	36.3	Leads off		0 /9		
	Cardiology_3a L0563275	53	9	36.4		Last Data: 03:40:32 Jun 10th	1 /9		
	Cardiology_4b L2300124	56	9	35.8	96		/		
	Cardiology_5c L6888786	60	12	36.5			0 /9		
	Cardiology_6d L3393207	66	13				/		
●	Cardiology_7a L2469152	Last Data: 09:45:35 Jun 10th	Last Data: 09:45:35 Jun 10th	Last Data: 09:45:35 Jun 10th	Last Data: 09:45:35 Jun 10th	Last Data: 09:45:35 Jun 10th	/	5	10

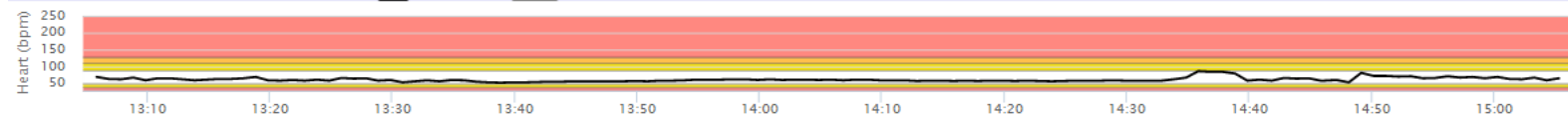
At nurse station, or any connected device including tablets and smart phones

# Real-time Individual Patient Charts

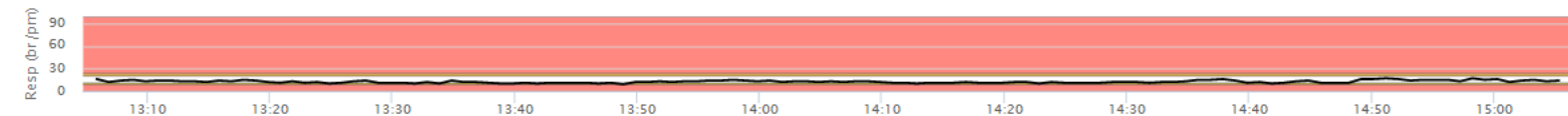
- Anytime, anywhere, on any screen

**Patient Details** Ward: Cardiology Bed: Cardiology\_1a Patient: L4536677 Age Range: All Session Start: Friday 10th June 2016, 12:45 EWS Type: NEWS Time Range: Time Range 2 hours 15:05:20

**Lifetouch** ID: 3184  87% [Setup](#) Status: Receiving data

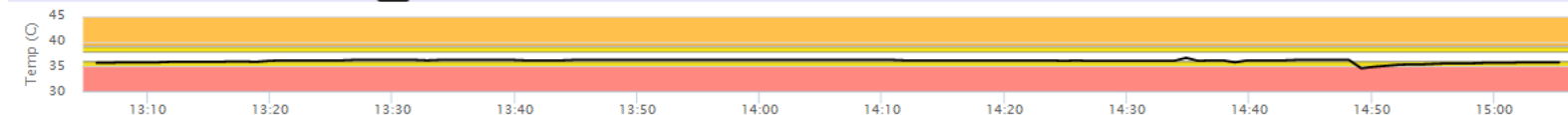


**Heart Rate**  
(bpm)  
**66**



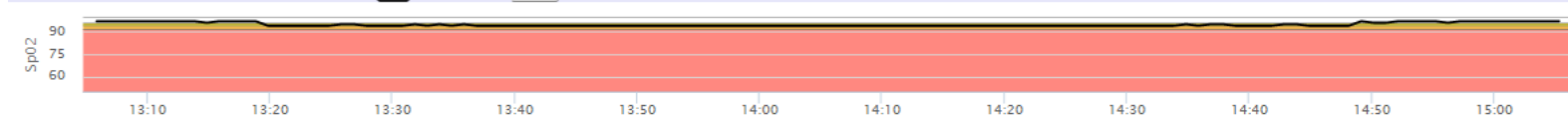
**Respiration Rate**  
(breath/min)  
**14**

**Lifetemp** ID: 5400  52% Status: Receiving data



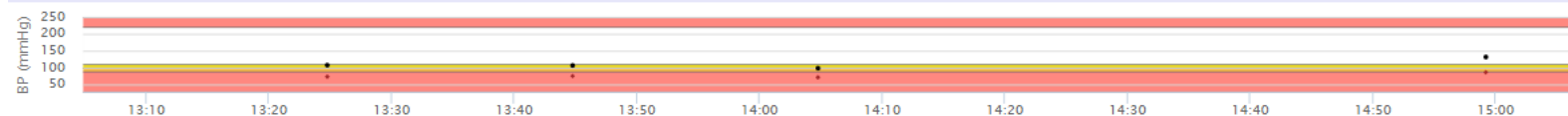
**Temperature**  
(Celsius)  
**35.8**

**Pulse Oximeter** ID: 380784  < 10 mins [Setup](#) Status: Receiving data



**SpO2**  
(%)  
**97**

**Blood Pressure** ID: 772639 Status: Receiving data



**Systolic/Diastolic**  
(mm Hg)  
Last Data: 14:59:14 Jun 10th

**Early Warning Score**



**EWS**  
**2 /15**



# Case Study – Paediatrics

- Real-time adaptive & predictive indicator of deterioration

Birmingham Children's Hospital   
NHS Foundation Trust



- *Partners: Birmingham Children's Hospital, McLaren Applied Technologies, Aston University, Isansys*
- *Development of new patient pathway based on wireless wearable sensors*
- *800+ patients to date*
- *500million+ heart beats logged*
- *New data driven self-learning personalised Early Warning Score*



# Case Study – Advanced Liver Disease

- New data driven diagnostic / predictive biomarker



## LIFETOUCH®: A NOVEL REMOTE MONITORING DEVICE TO IDENTIFY PATIENTS WITH ADVANCED CIRRHOSIS MOST AT RISK OF DECOMPENSATION – A PROOF OF CONCEPT STUDY

*Devnandan A Chatterjee, Helen Jones, Angela Gallego León<sup>2</sup>, Graziella Privitera, Rajiv Jalan, Rajeshwar P Mookerjee*  
*Institute of Liver and Digestive Health, University College London Medical School, Royal Free Hospital Campus, London, UK*  
*<sup>2</sup>Isansys, Milton Park, Abingdon, Oxfordshire, UK*

- *Lifetouch data provides same information as MELD Test for advanced liver disease patients*
- *Analysis of 10 - 20 minutes of data from Lifetouch same as blood test taking hours in the lab. Patients can now remain at home.*





# Case Study – Early Detection of Sepsis

- Cancer patients @home following chemotherapy

Queen Elizabeth Hospital Birmingham 

Part of University Hospitals Birmingham  
NHS Foundation Trust

- *Compromised immune systems can lead to neutropenic sepsis*
- *Patients at home*
- *Early detection allows patients to be treated in the community*
- *Data collected for 21 days with Lifetouch and Lifetemp*







# Case Study – Critical Care Monitoring

- Advanced notice of deterioration in adults



- *Early warning of deterioration in tertiary care patients*
- *Initial pilot August 2016 - Two patients lives saved through early detection of serious deterioration*
- *November 2016 – Commercial implementation to provide PSE to all patients*



# Patient Status Engine

## - How is it deployed?

- Simply, quickly and seamlessly
- No additional infrastructure required. Wifi good but not essential.
- PSE can operate in stand-alone mode. No EPR is necessary.
- Stage 1: Initial “calibration” deployment
  - *Install instance of Lifeguard Server on hospital IT system (2-4 hours – carried out remotely)*
  - *Install 5 -10 trolley mounted Gateways in wards of your choice (1-2 hours)*
  - *Initial user training (1 – 2 hours)*
  - *Accurate real-time patient data now available - at the bedside, at the nurse station and on any authorised mobile device*
  - *Devise new pathways and work flows enabled by the PSE. Test health economic scenarios*
- Stage 2: Scaling deployment
  - *50 - 100 Gateways. Fixed or mobile or combination*
  - *Implement new pathways and work flows (including e.g. patients at home)*
- Stage 3: Full deployment

# Patient Status Engine

## - Why chose it?

- ✓ Automatic *and* manual data capture and entry  
= *e-obs for free !*
- ✓ The PSE platform is open  
= *add new devices, integrate with best-in-class clinical decision support tools such as RAPID Index*
- ✓ It's a platform not a product  
= *configurable, expandable, future proof*
- ✓ Digitises the patient producing detailed and dynamic physiological images  
= *observe and audit the patient's journey at each point on their care pathway and quantify outcomes*
- ✓ Easy & simple transition of patient to home  
= *Patient at home with high-accuracy continuous monitoring, early deterioration alerts*
- ✓ Its all about the data  
= *accurate, secure, scalable, affordable (managed service models)*
- ✓ Provides a direct route to efficient paperless wards  
= *better obs and huge time savings*
- ✓ It's the future of patient monitoring in hospital, at home, anywhere  
= *all other systems are only halfway measures and don't enable fundamental (and much needed) change*



*New generation healthcare*

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## Health Technology for Tomorrow seminar series **SAVE THE DATES**

25 November 2016: The potential for wearable technology: Isansys Patient Status Engine

23 February: Applications for ultrasound in primary care 27

April: Topic TBC

25 May: (as part of EurOOHnet conference) Topic TBC

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