Mark Smith
Medical Devices Integration: break through the barriers

TOPICS

1. Company Profile

2. Outline of current priorities in healthcare

3. The positive impact of technology

4. 6 steps to interoperability
    - Step 1 - Base Level MDI Connectivity
    - Step 2 – Advanced Level Interoperability versus Connectivity
    - Step 3 – The benefits of an interoperability platform
    - Step 4 – Continuous care versus punctual care
    - Step 5 – The benefits of teamwork
    - Step 6 – The financial benefits
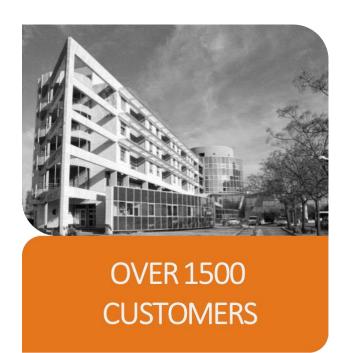
5. Interoperability & Benefits

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COMPANY PROFILE

About Enovacom

OVER 1500 CUSTOMERS

16 years of eHealth experience.

A software editor dedicated to healthcare information systems, Enovacom was founded in 2002 to facilitate and secure the exchange and sharing of health data.

➜ An ORANGE Business Services subsidiary

Europeen Leader

100% HEALTHCARE

140 EMPLOYEES

MARSEILLE   LONDON   TORONTO   MONTREAL

Our Customers

900
Public Institutions
600 hospitals
150 health centers
15 psychiatric centers
19 cancer treament centers
75 non-for profits institutions

300
Private Institutions
250 private clinics
3 groups of private clinics
2 groups of longterm care

Health institutions

Clinics

Laboratories

Governmental Agencies

Software Editors

+50
Clients in para-public healthcare, tele-health and laboratories
Blood banks
Tele-health Institutions
Healthcare claims - Insurance companies

+50
Association of privately owned labs

2

THE ISSUES TODAY IN HEALTHCARE

Key NHS Priorities

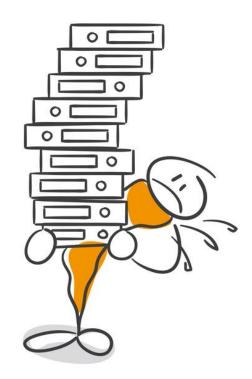- Improve patient's safety

- Resources

- Wholesale digitalisation

Before a digitized and organised IT system

- Medical records on paper

- Handwriting notes and readings

- Search for information difficult given th
many archives

After digitization………???

Issues facing Biomedical Engineers today : a changing landscape

- Different skill set required (Mechanical versus Software)

- The role of the engineer

- Environments of care

- Massive volume of types of new devices and IOT wearables

- Synergies with other operational depts. (IT, Nursing, Facilities Management)

- Urgency of support and response times

- Dealing with suppliers

And clinicians

TOP 3 Challenges of patient management

Resourcing | **Access** to patient data | **Tracking patients** throughout the journey

Being able to align resources to patient needs	31%
The accessibility of patient data	31%
Ability to track patients throughout their journey	29%
Being able to contact patients at short notice	28%
The transfer of patient data between departments or locations	26%
Patients missing appointments	11%
None of these	14%

According to a 2016 Lumeon study

Daily challenges for Clinicians

Did you know ?*
*The Gary & Mary West Health Institute - Harris Poll January 2015

Half of nurses said they have witnessed a medical error because of lack of device coordination.

91% of nurses report that if they could spend less time dealing with devices, they would spend more hands on time with their patients

90% of hospitals use six or more types of devices that could be integrated with EHRs

Only 1/3 of hospitals actually integrate medical devices with EHRs today

Fewer than 3 types of devices on average are integrated in hospitals investing in interoperability

The problems linked to new technology

Age old problems:

- Transcription errors when collecting patient's vital signs

- Time-consuming manual collection of data

1 nurse

out of 2

reported medical errors due to a lack of medical device co-ordination

Why is MDI so important to them ?

- Automation of vital sign collection means more "time to care"

- Reducing the number of errors and misinterpretation: increasing patients safety

- Delivering the right care, at the right place, at the right time, with a complete record of the patient pathway episode "care continuum"

- A 10% reduction in skilled staff is associated with a 12% increased risk of death.

- Real-time transfer of data to disparate systems, and more data parameters not previously available, allows clinicians to make a better more informed decision.

- Explosion of software apps and IOT, eg Wearables, Remote Monitoring Devices as patients are more mobile.

And the IT Department

- New knowledge requirements

- Resourcing

- Security & Information Governance

- Budget constraints & competing project priorities

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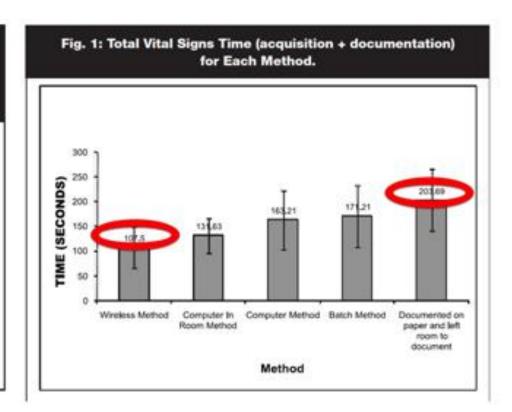## POSITIVE IMPACT OF TECHNOLOGY

How does technology help them?

UHCW seasonally adjusted mortality

Legend: SA-MR, mean, ucl, lcl, VitalPAC observations

Before tech

After tech

Technology Adoption Progress

Manual v Automation Collection

Error comparison

Time: manual v automatic

Table 1: Documentation Errors of Current Manual Vital Signs Documentation Workflow and Automated Vital Signs Documentation System.

Documentation Error	Methods		Total
Frequency (col. %)	Automated vital signs documentation system	Manual vital signs documentation	
With documentation error	3 (3.26)	7 (13.46)	10
No documentation error	89 (96.74)	45 (86.54)	134
Total	92	52	144

Fig. 1: Total Vital Signs Time (acquisition + documentation) for Each Method.

4

6 STEPS TO INTEROPERABILITY

Step 1 - Base Level MDI Connectivity

Definitions

Connectivity

Setting up a connection through which data is transferred between a Medical Device and a system.

A medical device's ability to communicate. No data integration.

The risks of a point-to-point solution

- The patient record can only receive a limited amount of data from:
  - Different devices
  - Various languages
  - Various entry points

- Managing and updating these communication protocols are difficult for a medical record publisher.

1. Connection directly from the devices

Direct Connection from the devices to the clinical information system

Advantages

Source Systems: Monitoring, Surveillance systems

Data is integrated into the patient's EPR file

Disadvantages

Vendor specific, can lead to equipment replacement

No data flow monitoring

Patient identity management

Sometimes the connection is simply not possible

2. Connection from the specialised CIS

Direct connection using the specialised Clinical IS

Advantages

Solution coming from a specific need

Ability to receive structured information

Disadvantages

The integration key information is usually the location and NOT the patient ID

Maintenance and development of libraries
vs the need for new functionalities

Vendor lock-in and unable to expand to other services

CIS systems are very expensive

Step 2 – Advanced Level Interoperability versus Connectivity

Definitions

Interoperability

A product's ability to work with other systems or products.

Being able to communicate, exchange and integrate information.

3. Using a centralised interoperability platform

Biomedical Interop Platform

Advantages

Controlled investment

Hospital-wide interoperability project

Any service – any device

Positive patient identification

Vendor neutral solution

Disadvantages

?

Key figures on medical device integration

Reason for Integrating Device with EMR	Percent Reporting "Yes"
Automatic Charting to the EMR	96.20%
Clinical Decision Support Purposes	33.10%
Enable Remote Support of Medical Devices	17.50%
Closed Loop Medication Needs	12.70%
Capturing Data for Research Purposes	8.60%

Step 3 – The benefits of an interoperability platform

The benefits of an interoperability platform

- Specifically manage the different exchange protocols

- Centralise the information on a central point

- Facilitate the use of equipment

- Secure data transfers

Step 4 – Continuous care versus punctual care

Different needs

- **Continuous or intensive care services** require the interfacing of a large volume of data: samples, filters, alarm processing, ...

- **Point-of-care services** will transmit information in a periodic manner, but there will be **less data exchanged** simultaneously

In both cases: need to identify the patient and to transmit the validated information to the target system/s

Continuous care

Patient are monitored **permanently**, devices are « plugged »

When?

- Data is regularly written on medical record either paper or paperless. Nurse & physicians are taking care of patient and

Which devices ?

- Monitors // Gateway
- Ventilators, respirators // Pumps // ECG –EKG
- Dialysis machine

Which Departments ?

- ICU ;
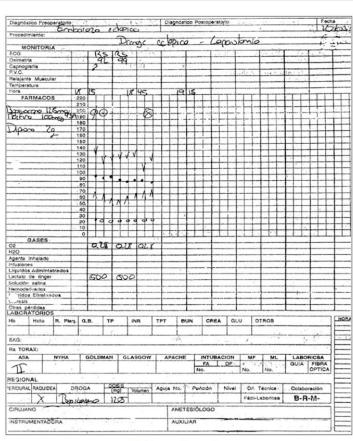- Specialized departments

ICU (Intensive Care Unit)

ANESTHESIA RECORD — sample record for C-section/spinal anesthesia, showing pre-procedure, obstetric, labs, monitors and equipment, anesthetic technique, airway management, vital signs chart, and fluid totals sections.

Manual Charting....

Fig. 1 - Anesthesia record.

Punctual Care

- A **periodic** collect of vitals signs

When?
- During Nurse ward rounds
- ED Patient Admission
- Transfer to another department

Which Devices?
- Spotcheck Monitor (NIBP)

Which Department?
- All departments

Punctual care - Record

		8		9	10	11	12	13	14	15	16	17	18	19

CHU BICETRE — J+ :

Etiquette — Date : — Lit n° : — IDE / Puer. : — AS / AP : — Poids / SC : — Feuille n° :

CONSTANTES
- Fréq. Cardiaque
- Fréq. Respiratoire
- $SpO_2\%$
- $TcPO_2 / TcPCO_2$
- E.T. $CO_2\%$
- P.V.C.
- P.I.C. / P.P.C.

T° couveuse

T°	TA
40°	150
39°	
38°	100
37°	
36°	50
35°	
34°	00

- Glycémie (mmol/l)
- Hémocue (g/dl)
- Périmètre Ombilical (cm)
- Eval. Douleur :

NEURO
- Pupille D^{te}/G (+/-)
- Convulsions
- Conscience / Glasgow

Elements to consider

- All care services aren't equal in terms of computerisation as well

Medical Record

Anesthesia Software

Resuscitation record
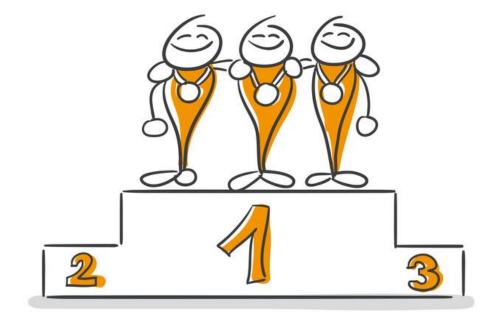
Emergency Medical Record

Step 5 – The benefits of teamwork

A project for everyone

- **3 teams impacted:** biomedical, IT department and clinicians

- **Define the roles & responsibilities** of everyone involved

- Choose a **single** source

- **Anticipate:** who manages what? What about maintenance?

Every team wins

- **Biomedical:**
  - Provide a highly responsive services to meet clinicians needs
  - Structured & non-invasive way
  - Traceability & security

- **IT department:**
  - Industrialisation of the medical device connection solution
  - Cost optimisation opportunity

- **Clinicians:**
  - More time to care
  - Time saving
  - Quality gain

NHS England London @NHSEnglandLDN   3 Mar

"On average a district nurse only spends 21% of their time with patients as they spend most of their time filling forms" @tkelsey1 #eHW15LDN
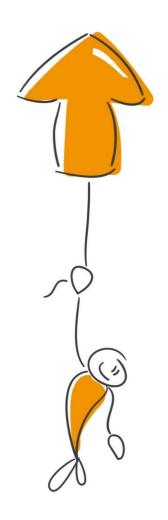
Step 6 – The financial benefits

A concret ROI: evidence from the US

7% of the nurses' time is spent capturing vital signs manually

Salary of a nurse: $ 33.94 / h

A 175-bed hospital employing 140 nurses can save

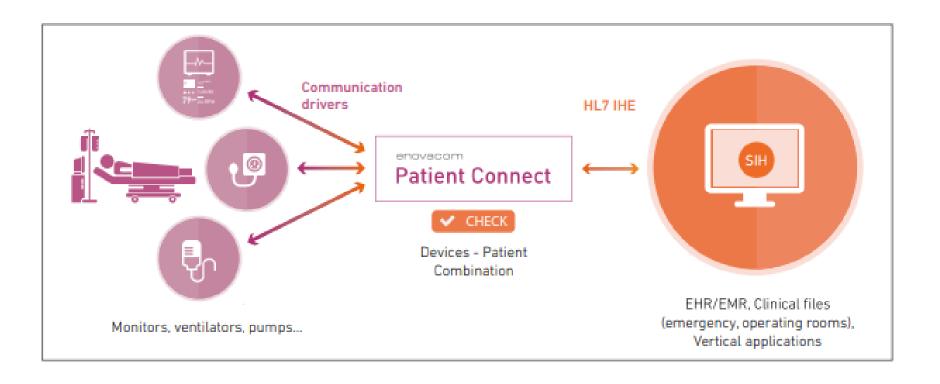**$ 500,000 per year**

5

ENOVACOM SOLUTION

Patient Connect

- Integrate patient vitals securely in your **EPR** or specialised applications

AUTHENTICATE
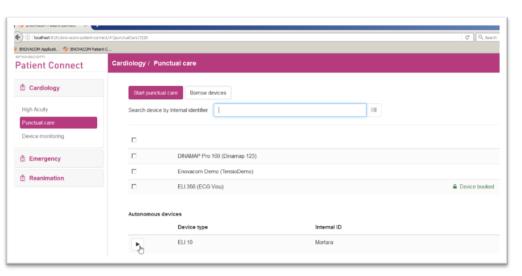
IDENTIFY

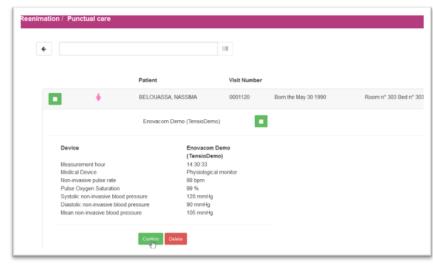ASSOCIATE

INTEGRATE

Solution overview

Autonomous or punctual care workflow

- ✔ Automatic and secured data collection
- ✔ Universal exchange platform for all the wards and departments
- ✔ Patient Identity Vigilance
- ✔ Centralized information collection

- ✔ Manufacturer independant
- ✔ Audit and report device usage
- ✔ Track your devices
- ✔ Integrate devices with your various clinical systems

Strong interoperability with ALL the players
Software vendors & medical device manufacturers

250+ medical devices available

Wirral University Teaching Hospital

🏷 **Hospital introduction**

One of the 16 digitally advanced acute trusts with Global Digital Exemplar status - recognized NHS provider delivering exceptional care, efficiently, through the use of world-class digital technology and information

CERNER Millennium pilot site, using device connectivity solution from CERNER (I-BUS) for some biomedical devices

🏷 **Project**

WUTH invested £0.5M in brand new SERVO-Air and Servo-U ventilators from MAQUET and the existing device connectivity solution was unable to integrate those devices within the timeframes needed

Enovacom responded with delivered POC within 1 month, project was delivered 2 months later

🏷 **Benefits**

100% software based solution,
Ease to use and to manage by internal staff

Info

One of the biggest and busiest acute NHS trusts in the North West.

920 beds

NHS
Wirral University Teaching Hospital
NHS Foundation Trust

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Our latest white paper on medical devices connectivity

Thank you for attending

Any questions ?

Meet us on Boot F09

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