Designing an ITU

Dr Paul McAndrew
Consultant in Anaesthesia & ICM
Sunderland Royal Hospitals

DH Department of Health

Health Building Note 04-02
Critical care units

Society of Critical Care Medicine

The Intensive Care Professionals

ICU Design Citation

Critical Care Designs

About Us

Consulting Services

Neil Halpern, MD

Academic Experience

Completed Projects, Consultations & Awards

Collaborative Relationships

Publications on ICU Design

Presentations on ICU Design

In The Media

Photo Galleries
- *MSK ICU 2007*
- *VA ICU 1999*
- *VA ICU 1995*

Video MSK ICU

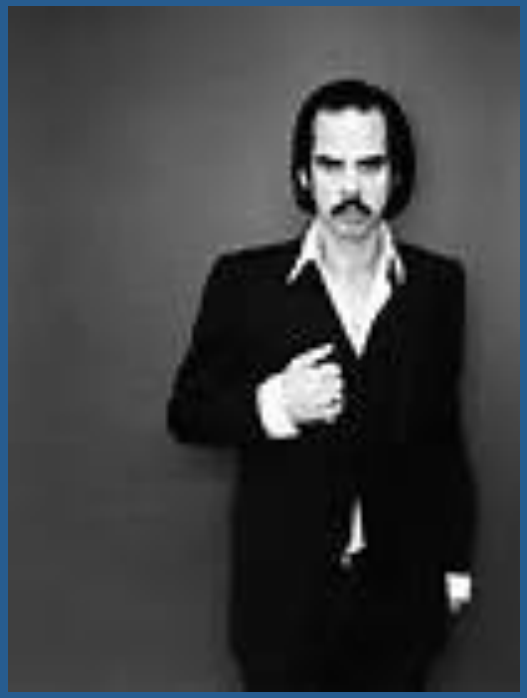
Contact Us

Critical Care Designs is a consulting firm that assists healthcare architects, hospital administrators and facility planners, and critical care (intensive care) clinicians (nurses and physicians) in designing new, or renovating or upgrading existing, intensive care units. Our focus is on innovation, efficiency, creating a healing and connected environment, and enhancing safety and security for all ICU users.

Dr. Halpern (r.) accepting ICU design award on behalf of Memorial Sloan Kettering Cancer Center at the Society of Critical Care Medicine 2009 Symposium in Nashville, TN.

You can visit your friends & neighbours…

“I would hate to think that my songs are giving advice to people”



Nick Cave

City Hospitals Sunderland chs

Achieving truly patient centric solutions: the road to travel

What is the road to travel?

Patient-centred or Patient-centric?

Patient centric or Patient centred?

- Does it matter?

Patient centric or Patient centred?

- Does it matter?

A great man once said…

- “Listen to your patient, he is telling you the diagnosis”
- William Osler

Born	July 12, 1849 Bond Head, Canada West
Died	December 29, 1919 (aged 70) Oxford, England
Residence	Canada United Kingdom
Nationality	Canadian
Fields	physician, pathologist, internist, educator, bibliophile, author and historian
Institutions	McGill University, Johns Hopkins School of Medicine, Johns Hopkins Hospital, University of Pennsylvania, University of Oxford
Alma mater	McGill University

http://en.wikipedia.org/wiki/William_Osler

Definitions – it depends where you look

- Patient-centred is “health care that establishes a partnership among practitioners, patients and their families (when appropriate) to ensure that decisions respect patients’ wants, needs and preferences and solicit patients’ input on the education and support they need to make decisions and participate in their own care.”

Institute of Healthcare Improvement, 2011

- Strategically focus on infrastructure, improvements, processes, and skills that make a difference
- Align your organization's day-to-day patient and family interactions with the goal of improved HCAHPS scores (or CG-CAHPS scores for clinicians and groups)
- Spread best practices for interpreting data and using measures for learning and improvement — especially how to achieve "data sanity"
- Create and reliably implement **Always Events®** — a framework developed by the Picker Institute that is now taught by IHI. An Always Event is an act or happening that should always occur when patients interact with health care professionals and the delivery system.
- Engage physicians, providers, patients, and families to come together and ensure safer and more effective care

The King's Fund

Ideas that change health care

"The government's vision is for patients and clinicians to reach decisions about treatment together, with a shared understanding of the condition, the options available, and the risks and benefits of each of those"

“Quality Indicators”

“Quality care is that which is safe, effective (i.e. evidence-based), patient-centred, timely, efficient and equitable.”

Intensive Care Society, 2013

http://www.ics.ac.uk/ics-homepage/guidelines-standards

[Accessed 24/3/2014]

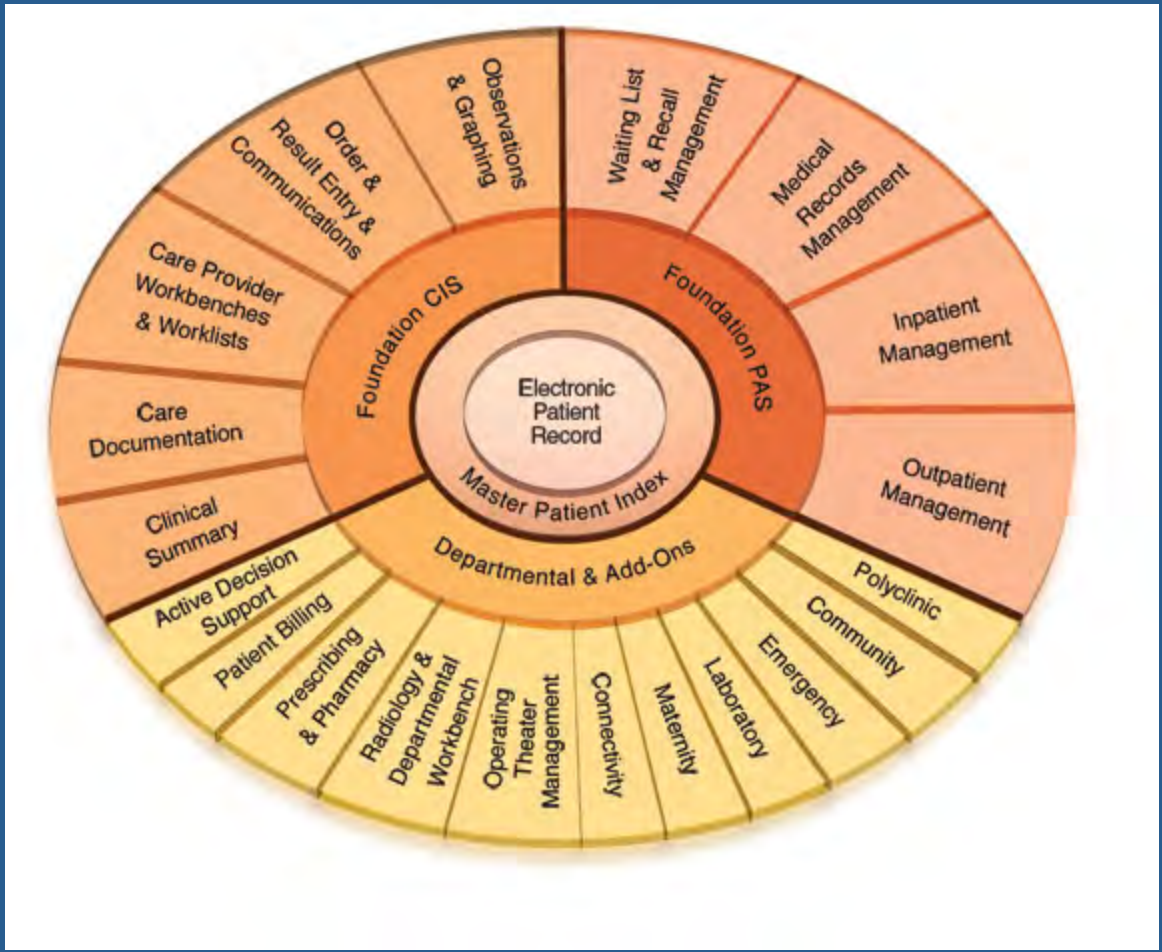
“Quality Indicators”

“Quality care is that which is safe, effective (i.e. evidence-based), patient-centred, timely, efficient and equitable.”

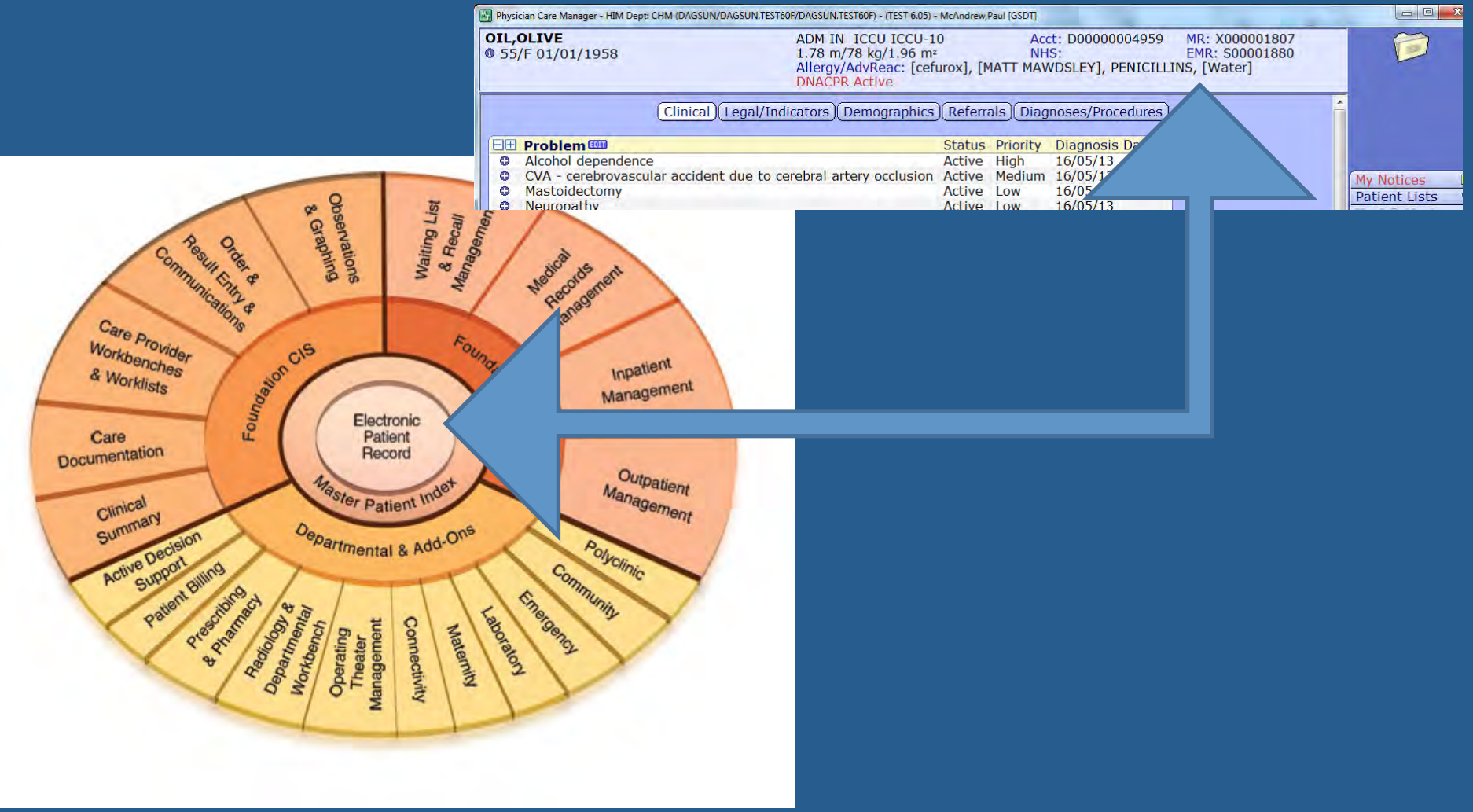
Whereas patient-centric is…

"Patient-centric does not imply a fixed set of guidelines; rather it is a fluid and still-evolving definition characterized by practices that benefit patients: ensuring that they receive the best treatment, at a reasonable cost, while putting into place strategies that will help individuals avoid becoming sick in the first place."

Patient-centric: the 21st Century prescription for healthcare, IBM, 2006



http://www.intersystems.com/trakcare/features/modules/index.html



http://www.intersystems.com/trakcare/features/modules/index.html

http://www.daman.dk/is-your-marketing-plan-truly-patient-centric/


ESICM
EUROPEAN SOCIETY OF
INTENSIVE CARE MEDICINE


Society of
Critical Care Medicine
The Intensive Care Professionals

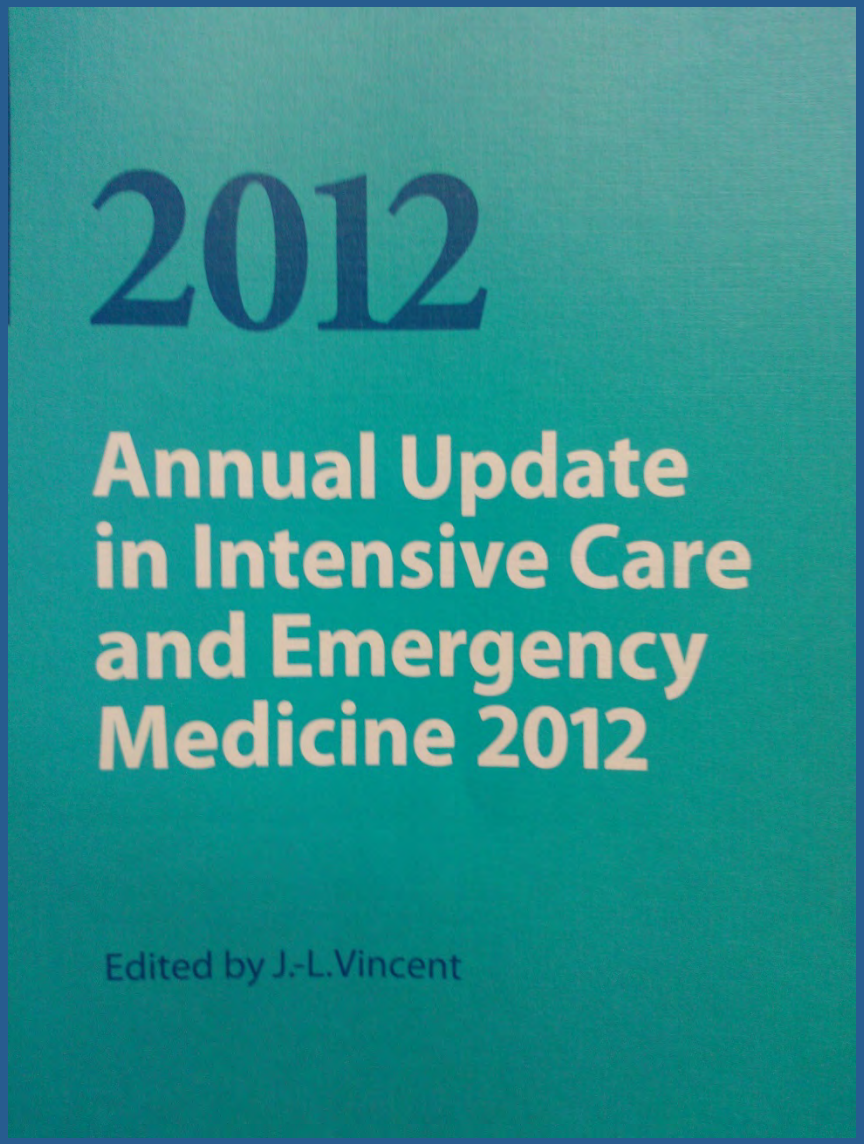

Institute for
Healthcare
Improvement


International Alliance of
Patients' Organizations


The Kings Fund
Ideas that change
health care

But, where is the guidance?

- Patient safety
- Patient outcome
- Patient rehabilitation
- Physical well being
- Psychological well being
- Staff morale & patient impact
- Environmental impact



- Recommendations on basic requirements for intensive care units: structural and organizational aspects

Intensive Care Med DOI 10.1007/s00134-011-2300-7 SPECIAL

A common stem?

- http://davidleescher.com/2012/03/03/how-patient-centric-care-differs-from-patient-centered-care-2/ [Accessed 23/03/2014]

Core differences

- Patient-centred care is retrofitting a noble idea into an antiquated delivery system
  - It involves thought and workflow processes which are unchanged, just moved around.
- Patient-centred medicine's use of technology is provider-focused, with information still emanating from the provider.

- Part of the patient-centric movement will be changing the mental framework of providers and the public to both transition true focuses on the patient.
- Patient-centric healthcare creates the information from the patient as source

Society of Critical Care Medicine

Special Article

Guidelines for intensive care unit design*

Dan R. Thompson, MD, MA, FACP, FCCM (Co-Chair); D. Kirk Hamilton, FAIA, FACHA (Co-Chair); Charles D. Cadenhead, FAIA, FACHA, FCCM; Sandra M. Swoboda, RN, MS, FCCM; Stephanie M. Schwindel, MArch, LEED; Diana C. Anderson, MD, MArch; Elizabeth V. Schmitz, AIA; Arthur C. St. Andre, MD, FCCM; Donald C. Axon, FAIA, FACHA†; James W. Harrell, FAIA, FACHA, LEED AP; Maurene A. Harvey, RN, MPH, MCCM; April Howard, RN, CCRN, CCRC; David C. Kaufman, MD, FCCM; Cheryl Petersen, RN, MBA, CCRN

Objective: To develop a guideline to help guide healthcare professionals participate effectively in the design, construction, and occupancy of a new or renovated intensive care unit.

Participants: A group of multidisciplinary professionals, designers, and architects with expertise in critical care, under the direction of the American College of Critical Care Medicine, met over several years, reviewed the available literature, and collated their expert opinions on recommendations for the optimal design of an intensive care unit.

Scope: The design of a new or renovated intensive care unit is frequently a once- or twice-in-a-lifetime occurrence for most critical care professionals. Healthcare architects have experience in this process that most healthcare professionals do not. While there are regulatory documents, such as the *Guidelines for the Design and Construction of Health Care Facilities*, these represent minimal guidelines. The intent was to develop recommendations for a more optimal approach for a healing environment.

Data Sources and Synthesis: Relevant literature was accessed and reviewed, and expert opinion was sought from the committee members and outside experts. Evidence-based architecture is just in its beginning, which made the grading of literature difficult, and so it was not attempted. The previous designs of the winners of the American Institute of Architects, American Association of Critical Care Nurses, and Society of Critical Care Medicine Intensive Care Unit Design Award were used as a reference. Collaboratively and meeting repeatedly, both in person and by teleconference, the task force met to construct these recommendations.

Conclusions: Recommendations for the design of intensive care units, expanding on regulatory guidelines and providing the best possible healing environment, and an efficient and cost-effective workplace. (Crit Care Med 2012; 40:1586–1600)

Key Words: architecture; construction; critical care medicine; design; environment; healing; intensive care unit

Most healthcare providers have little experience designing and constructing an intensive care unit (ICU). These ICU Design Guidelines can make the process easier and the finished project more efficient, effective, safe, and patient centered. These ICU Design Guidelines are *performance guidelines* rather than *prescriptive guidelines*. A prescriptive guideline quantifies, as in the case of minimum square footage for a patient room, whereas a performance guideline describes functions to be accommodated. As an example, the space required for a patient room and medical equipment in a community hospital will be less than what may be required in a major tertiary care institution. In the case of a patient room, clinical protocols and equipment may evolve, rendering a prescriptive guideline obsolete (1). On the other hand, the prescriptive guidelines will describe things that must be done in the design of such space that may not be understood by the clinician, such as space for cleaning supplies and storage. This document proposes to describe *optimum* conditions rather than minimum requirements. The bibliography includes many tools that will round out the document and the process, and should be used in connection with this document.

The intent of these Guidelines is to offer a best practice approach as an alternative to the prescriptive minimum standards of The Facility Guidelines Institute (FGI) 2010 *Guidelines for Design and Construction of Health Care Facilities* (2). Other organizations, such as the National Health Service in the United Kingdom, have published guidelines to assist in the design of new ICUs, and these should be referred to in conjunction with these performance Guidelines (3, 4). Optimal design

*See also p. 1681.

Professor (DRT), Surgery and Anesthesiology, Albany Medical College, Albany, NY; Associate Professor (DKH), Center for Health Systems and Design, Texas A&M University, College Station, TX; Senior Principal (CDC), WHR Architects, Inc., Houston, TX; Senior Research Coordinator (S.M. Swoboda), Schools of Medicine and Nursing, Johns Hopkins University, Baltimore, MD; 2010-2011 Tradewell Fellow (S.M. Schwindel), Medical Planning Intern, & Intern Architect, WHR Architects, Inc., Houston, TX; 2008-09 Tradewell Fellow (DCA), WHR Architects, Inc., Houston, TX; 2006-2007 Tradewell Fellow (EVS), WHR Architects, Inc., Houston, TX; Director (ACS), Surgical Critical Care Services, Washington Hospital Center, Washington, DC; Design Leader (JWH), Healthcare CERN Architects, Inc., Cincinnati, OH; Educator and Consultant (MAH), Glenbrook, NV; Research Coordinator (AH), Department of Medicine, Pulmonary/Critical Care Medicine, Wake Forest University, Wake Forest, NC; Professor (DCK), Surgery, University of Rochester, Rochester, NY; and Cook Children's Health Care System (CP), Fort Worth, TX.

†Deceased.

The American College of Critical Care Medicine (ACCM), which honors individuals for their achievements and contributions to multidisciplinary critical care medicine, is the consultative body of the Society of Critical Care Medicine (SCCM) that possesses recognized expertise in the practice of critical care. The College has developed administrative guidelines and clinical practice parameters for the critical care practitioner. New guidelines and practice parameters are continually developed, and current ones are systematically reviewed and revised.

Dr. Anderson and Ms. Schmitz are full-time employees of WHR Architects. The remaining authors have not disclosed any potential conflicts of interest.

For information regarding this article, E-mail: thompdr@email.sccm.edu

DOI: 10.1097/CCM.0b013e3182413b32

BMJ Open. 2013 Jul 19;3(7). pii: e003134. doi: 10.1136/bmjopen-2013-003134. Print 2013.

A study protocol for performance evaluation of a new academic intensive care unit facility: impact on patient care.

Ferri M, Zygun DA, Harrison A, Stelfox HT.

Department of Critical Care Medicine, University of Calgary, and Alberta Health Services, Calgary, Alberta, Canada.

Table 2. Conceptual model for measuring impact of ICU design on patient care†.

ICU Zones	Structure	Process	Outcome
Patient Care	Single rooms ICU atmosphere Technology	Infection control practices Antipsychotic use Equipment usability	ICU acquired infections Less delirium Adverse events Qualitative findings
Clinical Support	Medication room ICU location	Less distraction Longer response time	Medication errors MET response time MET outcomes Qualitative findings
Unit Support	Provider areas	Provider area utilization	Nurse Absenteeism Provider impressions
Family Support	Family areas	Family area utilization	Overall score FSS-ICU Family impressions

† Table populated by the design elements (structure) to be evaluated by process and outcome measures.

Abbreviations: ICU, intensive care unit; MET, medical emergency team; FS-ICU, family satisfaction survey.

“We define clinical performance measures as process of care indicators and outcome measures from the perspective of patients, patient families and healthcare providers”

Improving Patient Safety Through Information Technology

22nd ESICM Annual Congress
11 - 14 October 2009
ESCIM VIENNA 2009 "Patient Safety & quality of Care in ICM"

Jean-Daniel Chiche

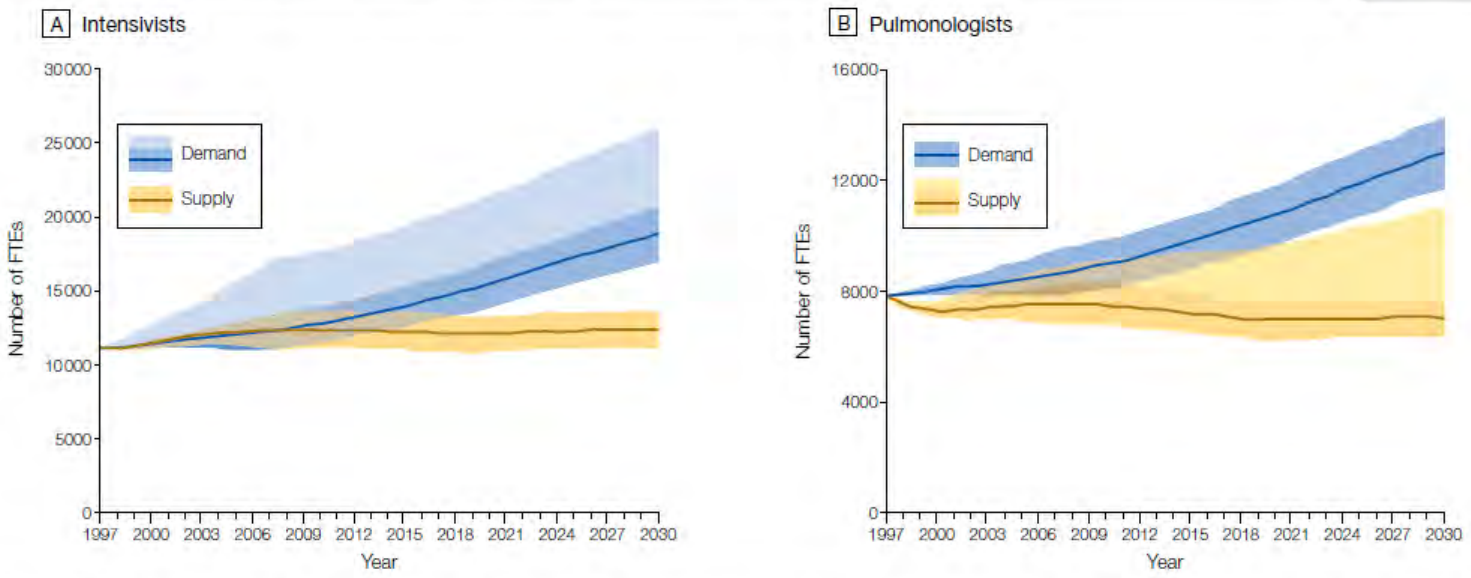
Patient Safety in the ICU

Medical Intensive Care & Dept. of Cell Biology
Cochin hospital & Cochin Institute , Paris-F

PARIS DESCARTES

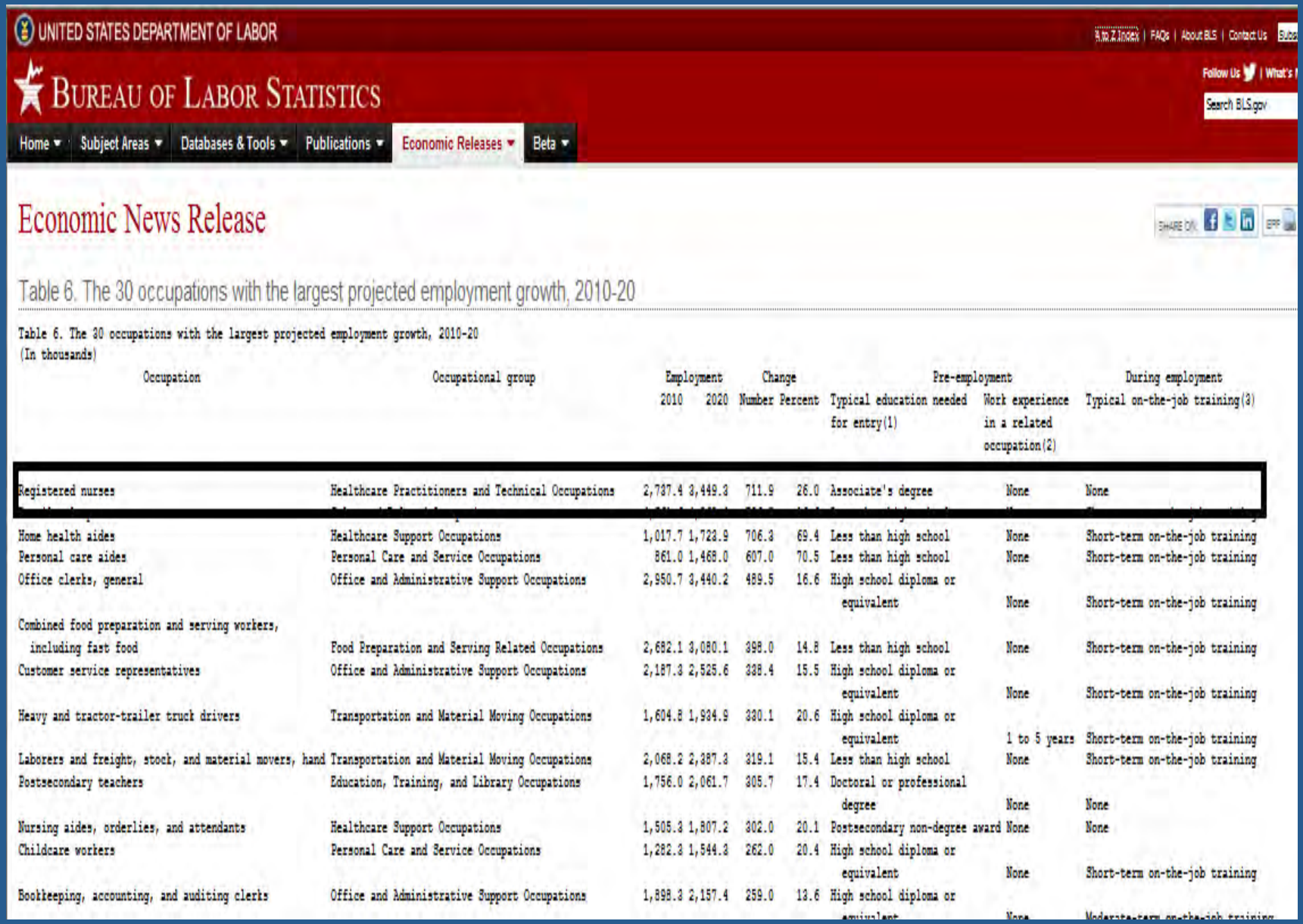
Institut Cochin
Inserm

Figure. Forecast of Supply and Demand for Intensivists and Pulmonologists Through 2030



FTE indicates full-time equivalent. The lines represent the base model while the margins of the shaded areas represent the widest upper and lower bounds of the sensitivity analysis. A, the darker demand bounds are generated by varying the disease-specific intensive care unit (ICU) use ±10% and the supply bounds are generated by varying the number of hours worked by specialists ±10%. The lighter upper demand bound represents an increase in the use of intensivists to 66% of all ICU patients. B, the demand bounds are generated by varying the disease-specific use of pulmonary services ± 10%. The darker supply bounds are generated by varying the number of hours worked by specialists ± 10% while the lighter upper supply bound represents reallocation of 50% of internal medicine hours by pulmonologists to pulmonary medicine.

Angus et al.



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Economic News Release

Table 6. The 30 occupations with the largest projected employment growth, 2010-20

Table 6. The 30 occupations with the largest projected employment growth, 2010-20
(In thousands)

Occupation	Occupational group	Employment 2010	Employment 2020	Change Number	Change Percent	Pre-employment: Typical education needed for entry(1)	Pre-employment: Work experience in a related occupation(2)	During employment: Typical on-the-job training(3)
Registered nurses	Healthcare Practitioners and Technical Occupations	2,737.4	3,449.3	711.9	26.0	Associate's degree	None	None
Home health aides	Healthcare Support Occupations	1,017.7	1,723.9	706.3	69.4	Less than high school	None	Short-term on-the-job training
Personal care aides	Personal Care and Service Occupations	861.0	1,468.0	607.0	70.5	Less than high school	None	Short-term on-the-job training
Office clerks, general	Office and Administrative Support Occupations	2,950.7	3,440.2	489.5	16.6	High school diploma or equivalent	None	Short-term on-the-job training
Combined food preparation and serving workers, including fast food	Food Preparation and Serving Related Occupations	2,682.1	3,080.1	398.0	14.8	Less than high school	None	Short-term on-the-job training
Customer service representatives	Office and Administrative Support Occupations	2,187.3	2,525.6	338.4	15.5	High school diploma or equivalent	None	Short-term on-the-job training
Heavy and tractor-trailer truck drivers	Transportation and Material Moving Occupations	1,604.8	1,934.9	330.1	20.6	High school diploma or equivalent	1 to 5 years	Short-term on-the-job training
Laborers and freight, stock, and material movers, hand	Transportation and Material Moving Occupations	2,068.2	2,387.3	319.1	15.4	Less than high school	None	Short-term on-the-job training
Postsecondary teachers	Education, Training, and Library Occupations	1,756.0	2,061.7	305.7	17.4	Doctoral or professional degree	None	None
Nursing aides, orderlies, and attendants	Healthcare Support Occupations	1,505.3	1,807.2	302.0	20.1	Postsecondary non-degree award	None	None
Childcare workers	Personal Care and Service Occupations	1,282.3	1,544.3	262.0	20.4	High school diploma or equivalent	None	Short-term on-the-job training
Bookkeeping, accounting, and auditing clerks	Office and Administrative Support Occupations	1,898.3	2,157.4	259.0	13.6	High school diploma or equivalent	None	Moderate-term on-the-job training

Last updated Feb 01, 2012

CENTRE FOR WORKFORCE INTELLIGENCE

Horizon scanning report: nursing

August 2013

A strategic review of the future healthcare workforce: Informing the nursing workforce – summary report

This paper was originally published in June 2013 and was republished in August 2013 to correct an editorial error relating to a statement made in the 'social' section of this document.

European Observatory on Health Systems and Policies

The Health Care Workforce in Europe

Learning from experience

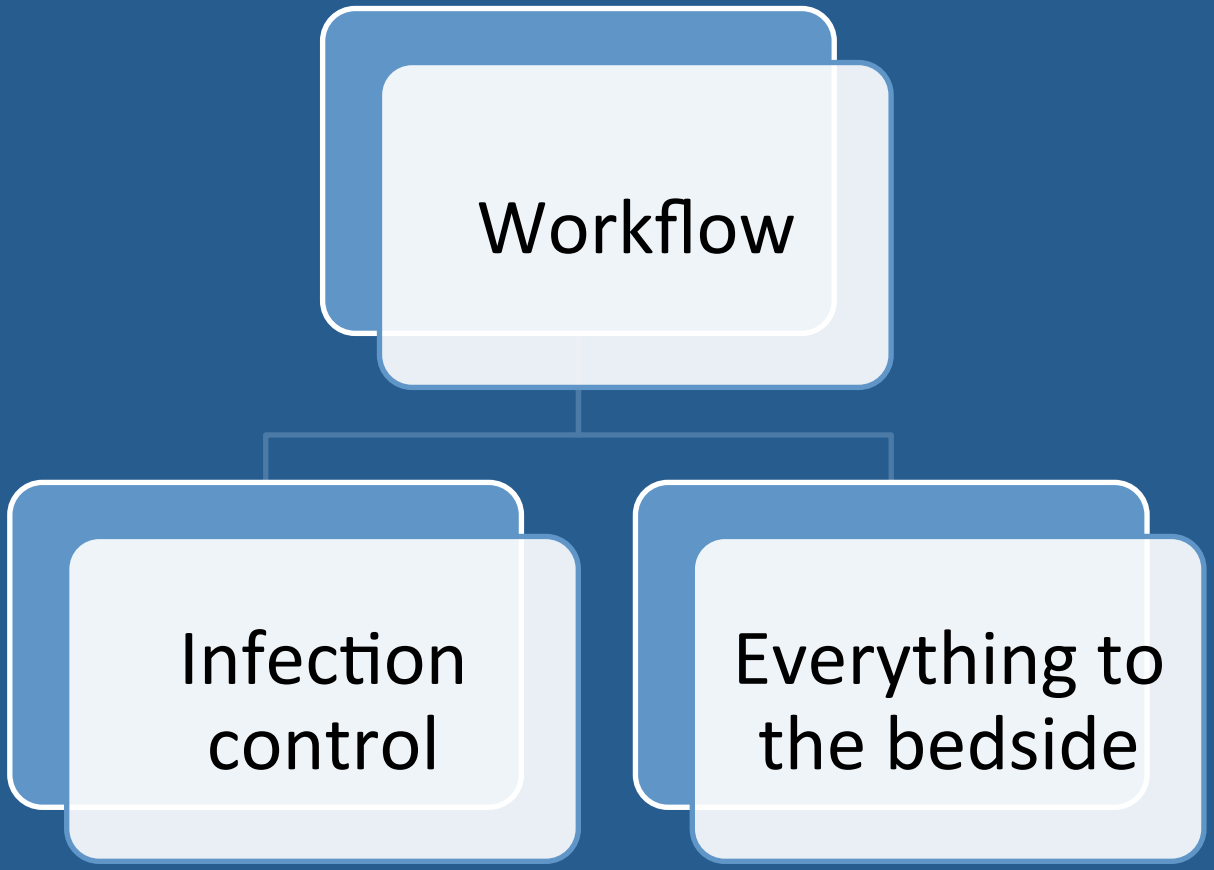
Designing to collect information?

- Big Data
- http://www.youtube.com/watch?feature=player_embedded&v=3Pkb65rwZVI
- David Leescher[Accessed 23/03/2014]

Patient centricity in critical care

- Bring everything to the patient to care for them?
- Remove everything that they don't need?

Original concept in Sunderland

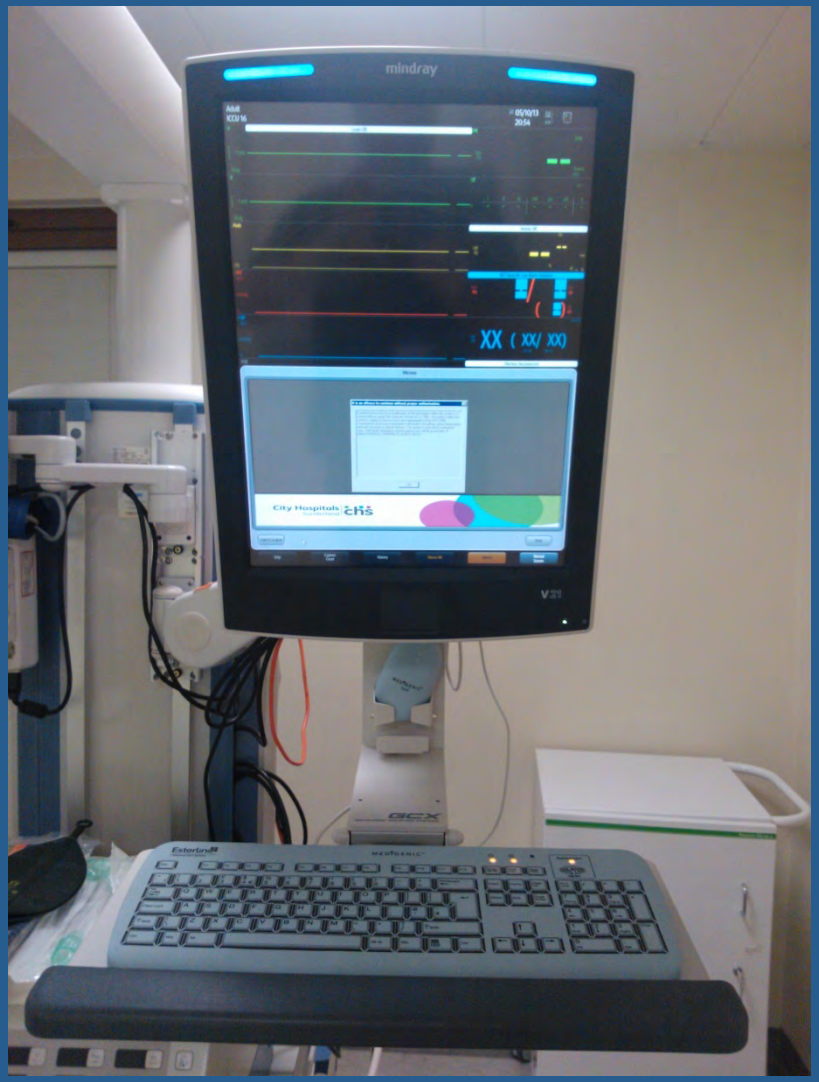


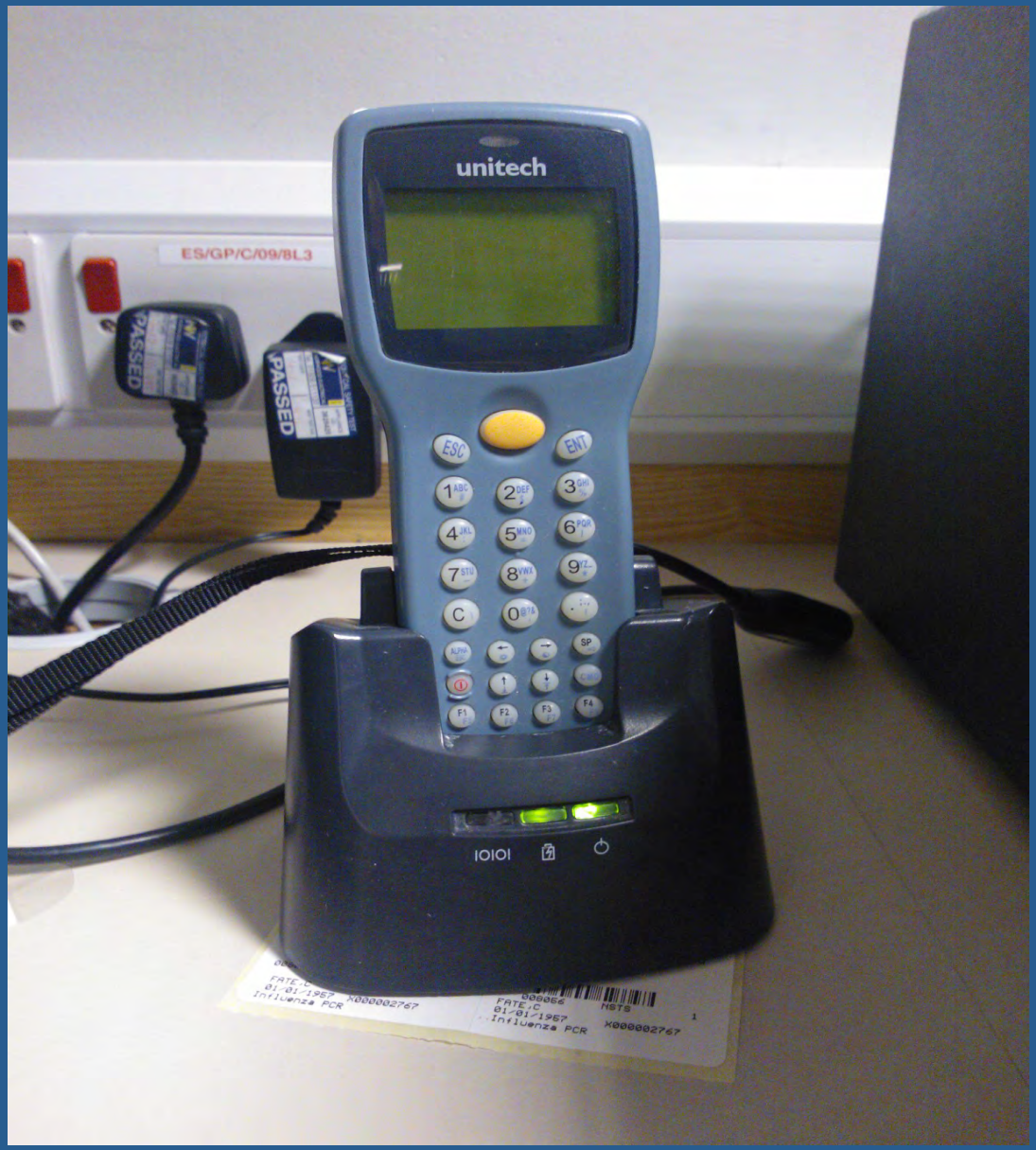

Bed 12b
Bed 12b

Our experience in Sunderland

April 2011

Our experience in Sunderland

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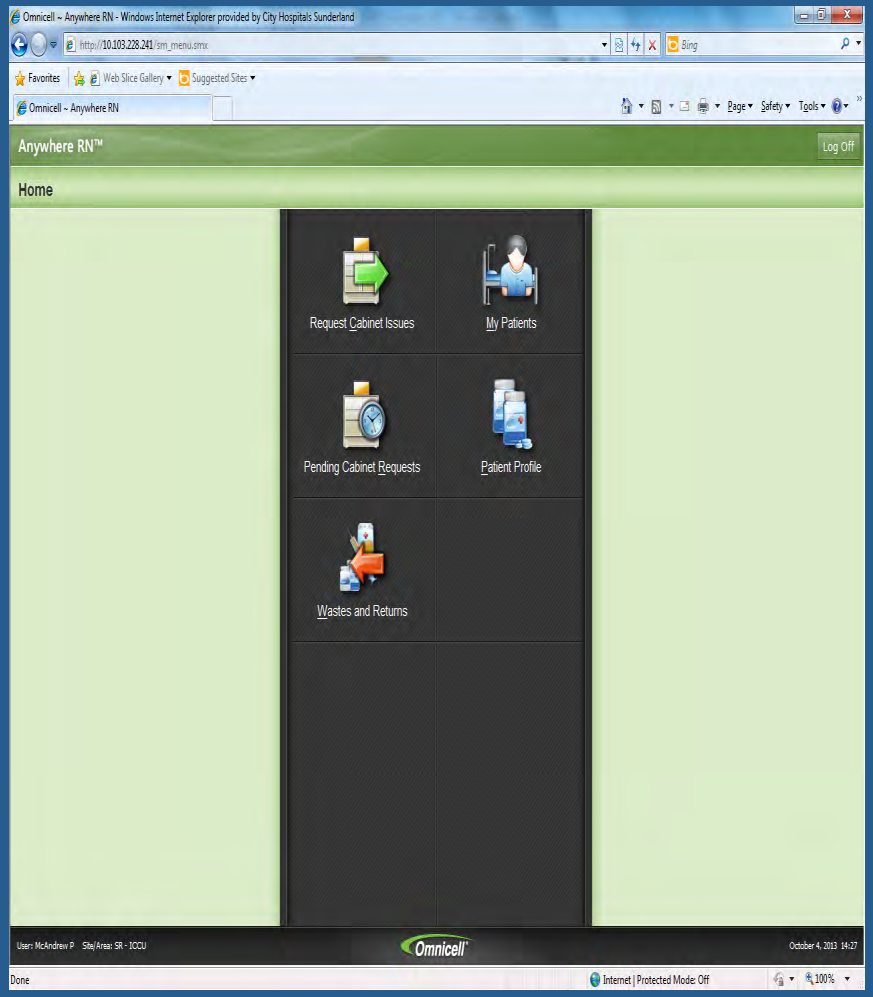

- Automatic ordering to pharmacy via PAS interface
- Electronic controlled drugs register
  - Real time discrepancy alerts
  - No manual reconciliation

Time & motion

Integrated Critical Care Unit
Omnicell Time & Motion Summary Data

		BEFORE		AFTER	
Ref	Staff Task Description	DEPT	VALUE	DEPT	VALUE
1	**Drug ordering and restocking for ward stock**				
	Time taken to order medicines	Pharmacy	37:45		NIL
	Time taken to re-stock cupboard/item	ICCU	0:32	Pharmacy	0:29
2	**CD ordering and restocking at ward**				
	Time taken to order CD medicines (Full CD check and order)	ICCU	35:20	ICCU	**
	Time taken to re-stock CD locker-	ICCU	Not recorded	ICCU	Not recorded
3	**Adhoc drug ordering**				
	Time taken to order adhoc stock medicine	ICCU	25:05	ICCU	**
	Number of adhoc stock medicine orders		2/day		10/month
5	**Picking of medicines from ward stock**				
	Time taken to dispense medicines from ward stock cupboard -	ICCU	1:17	ICCU	0:38
	Typical number of meds dispensed from stock cupboard per day				186
6	**Issuing of CD's from ward stock**				
	Time taken to dispense CD from ward stock cupboard	ICCU	4:45	ICCU	1:11
	Typical number of CDs dispensed from stock cupboard per day				9
11	**Access to Emergency Medicines Out of Hours**				
	Time taken to access OOH medicine	NM	5:00	NM	**
	Number of OOH issues		4-5/week		

Time & motion

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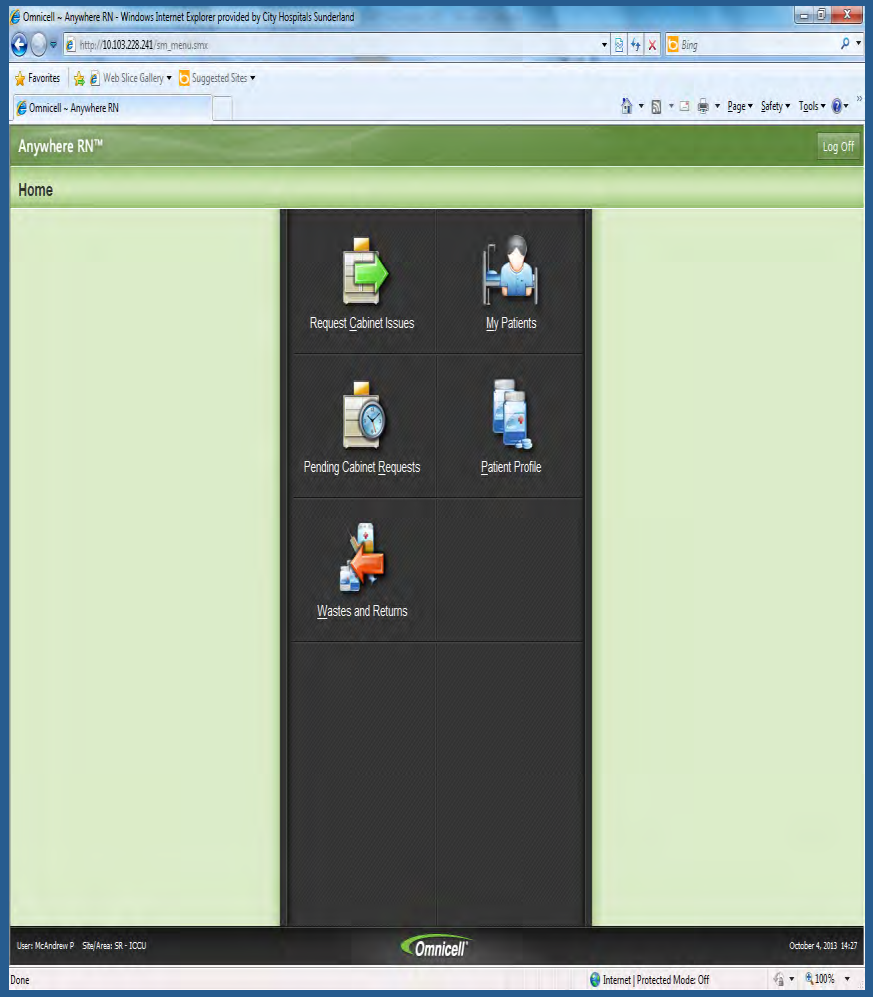
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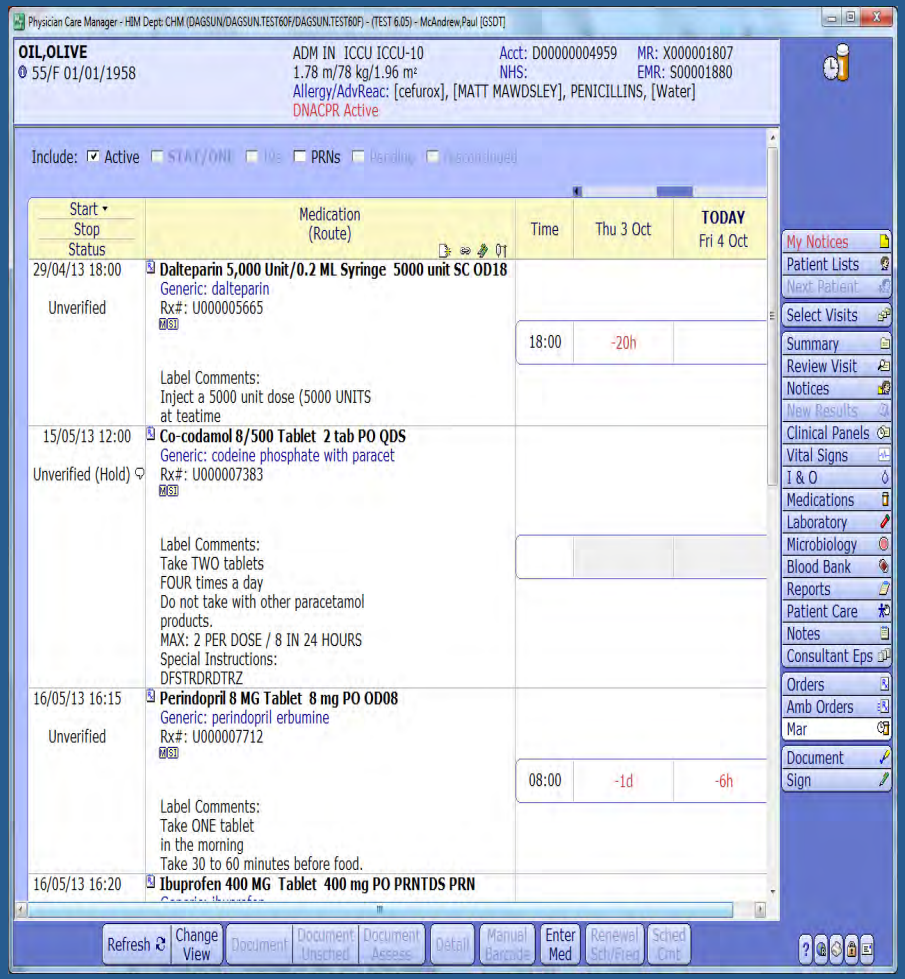
Request Cabinet Issues
My Patients
Pending Cabinet Requests
Patient Profile
Wastes and Returns
Omnicell
Done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NHS:
MR: X000001807
EMR: S00001880
Allergy/AdvReac: [cefurox], [MATT MAWDSLEY], PENICILLINS, [Water]
DNACPR Active
Include: Active PRNs
Start
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Status
Medication (Route)
Time
Thu 3 Oct
TODAY Fri 4 Oct
29/04/13 18:00
Unverified
Dalteparin 5,000 Unit/0.2 ML Syringe 5000 unit SC OD18
Generic: dalteparin
Rx#: U000005665
18:00
-20h
Label Comments:
Inject a 5000 unit dose (5000 UNITS
at teatime
15/05/13 12:00
Unverified (Hold)
Co-codamol 8/500 Tablet 2 tab PO QDS
Generic: codeine phosphate with paracet
Rx#: U000007383
Label Comments:
Take TWO tablets
FOUR times a day
Do not take with other paracetamol
products.
MAX: 2 PER DOSE / 8 IN 24 HOURS
Special Instructions:
DFSTRDRDTRZ
16/05/13 16:15
Unverified
Perindopril 8 MG Tablet 8 mg PO OD08
Generic: perindopril erbumine
Rx#: U000007712
08:00
-1d
-6h
Label Comments:
Take ONE tablet
in the morning
Take 30 to 60 minutes before food.
16/05/13 16:20
Ibuprofen 400 MG Tablet 400 mg PO PRNTDS PRN
My Notices
Patient Lists
Next Patient
Select Visits
Summary
Review Visit
Notices
New Results
Clinical Panels
Vital Signs
I & O
Medications
Laboratory
Microbiology
Blood Bank
Reports
Patient Care
Notes
Consultant Eps
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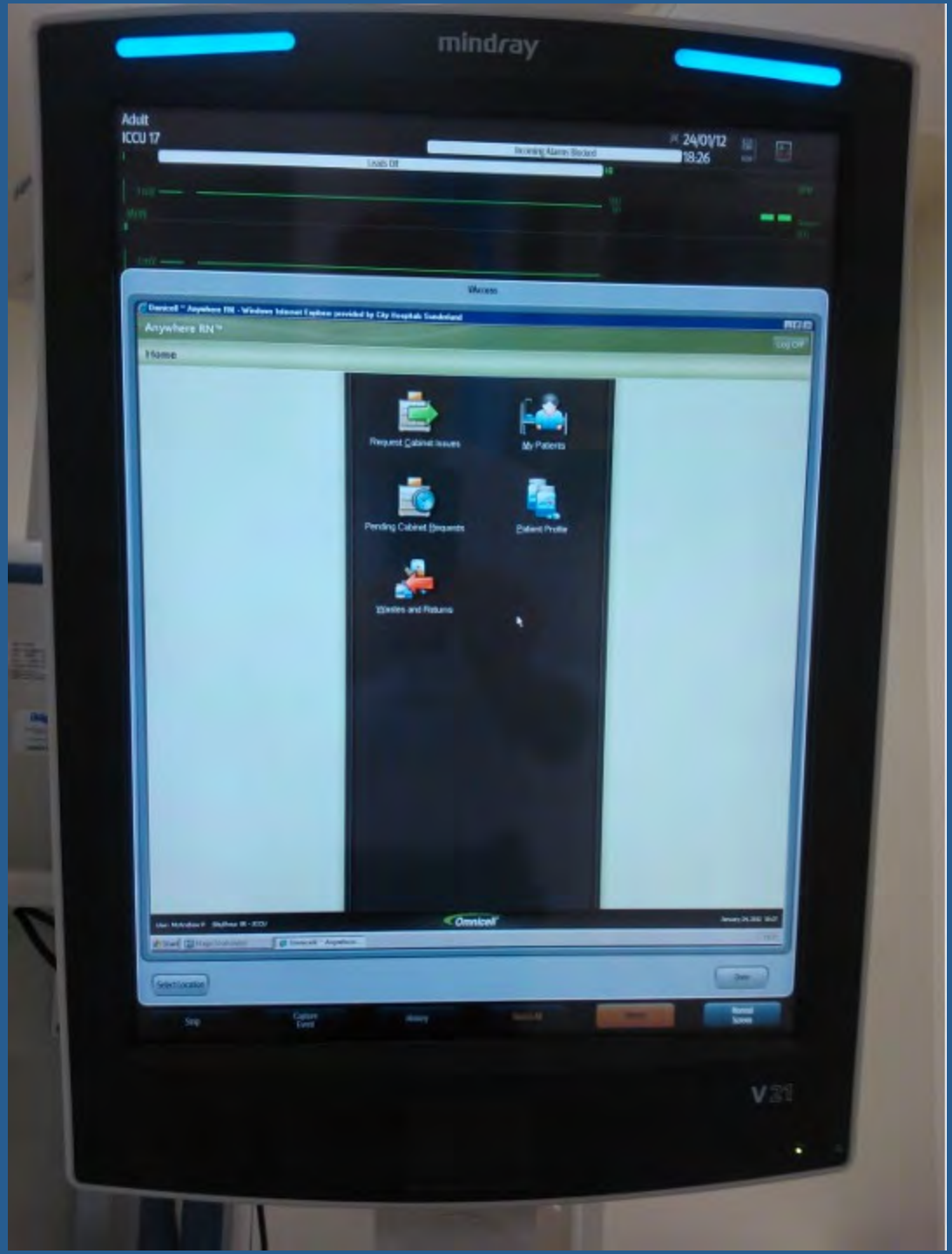
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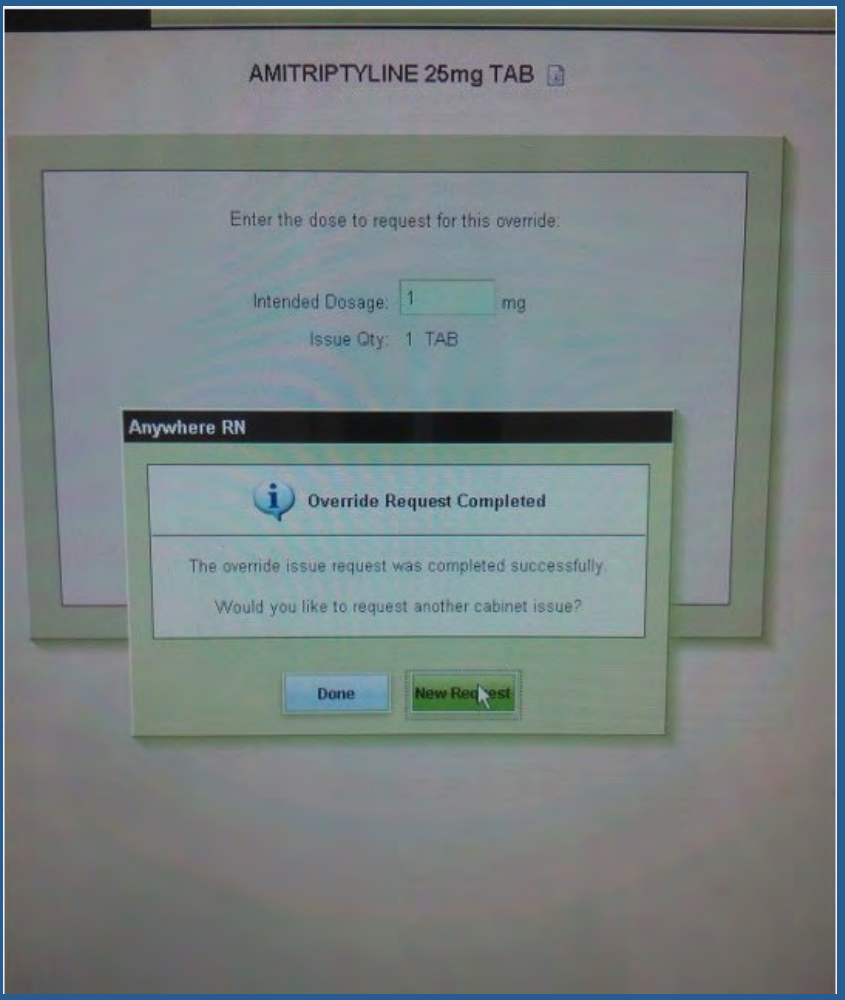
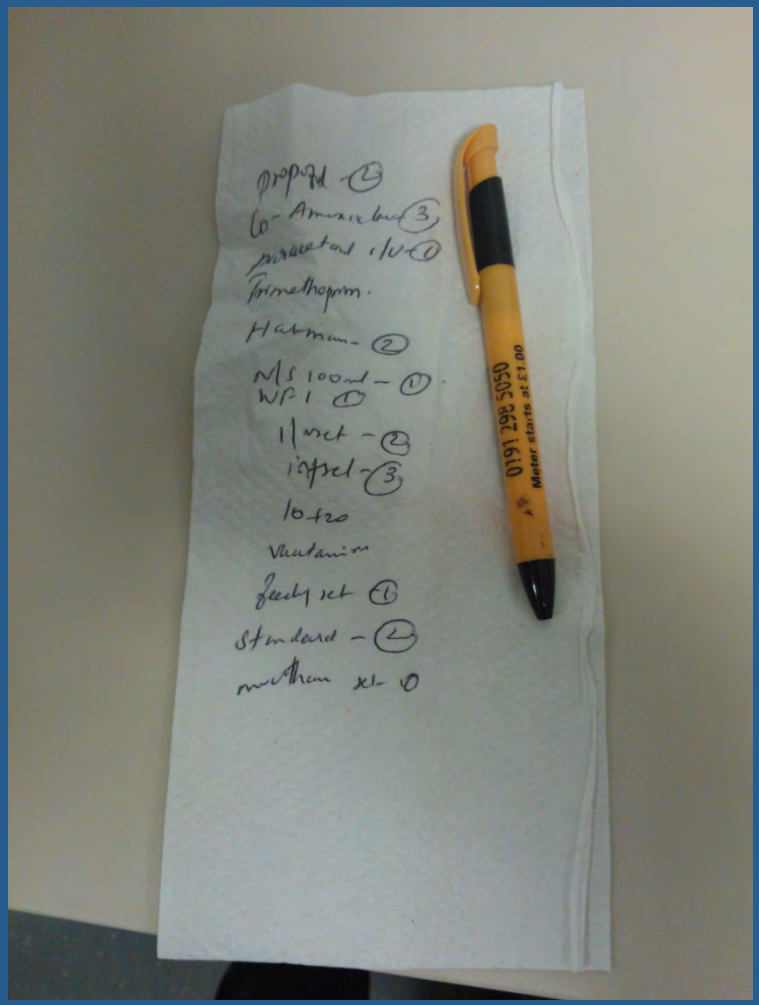
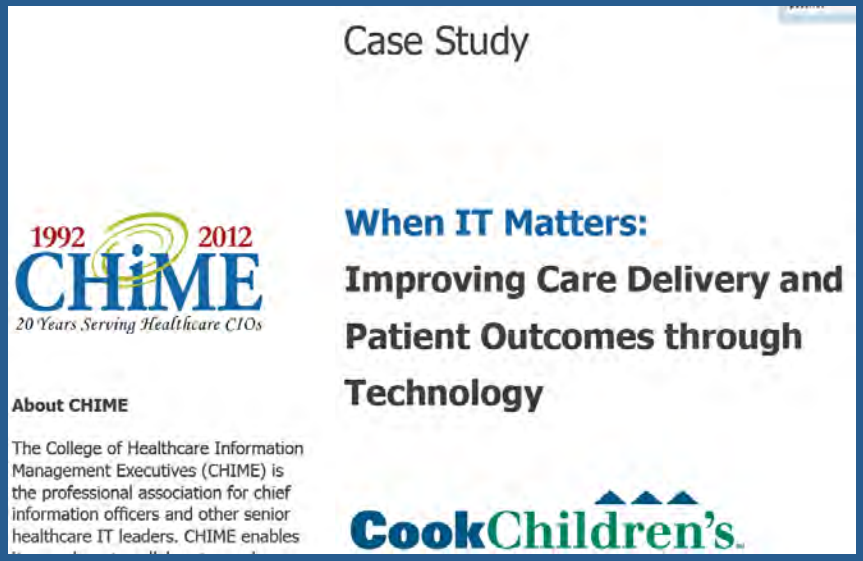
My Patients
Pending Cabinet Requests
Patient Profile
Omnicell


AMITRIPTYLINE 25mg TAB
Enter the dose to request for this override:
Intended Dosage: 1 mg
Issue Qty: 1 TAB
Anywhere RN
Override Request Completed
The override issue request was completed successfully.
Would you like to request another cabinet issue?
Done
New Request


0191 298 5050
Meter starts at £1.00

Bedside Medication Verification



Some of the limitations

- True point-of-care
  - Printers at every bedside
  - Scanners at every bedside
- Bar codes on drugs, syringes & containers
- Omnicell
  - Bedside cabinets that are electronic & cheap
- Ownership & leadership
- Different models of care
  - Europe vs. USA
- Behaviour

Scanners at every bedside

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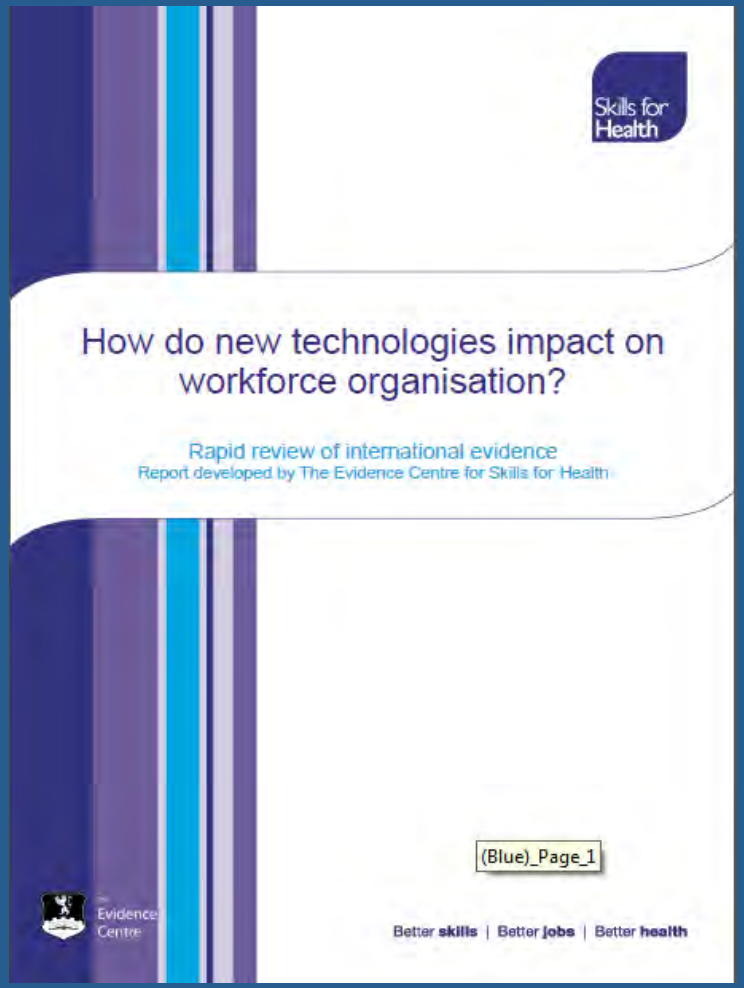
Medication Errors Occurring with the Use of Bar-Code Administration Technology

Pa Patient Saf Advis 2008 Dec;5(4):122-6.

- Dispensing Node
- Administering Node
- Failure to Scan Medications
- Workarounds and Overrides

"However the introduction of new technologies need not have a negative impact on patient care. In Ireland, research found that critical care nurses are able to transcend the obtrusive nature of technology to deliver expert caring to their patients. The study also found that life saving technology that supports the lives of critically ill patients can bring nurses very close to their patients and families"



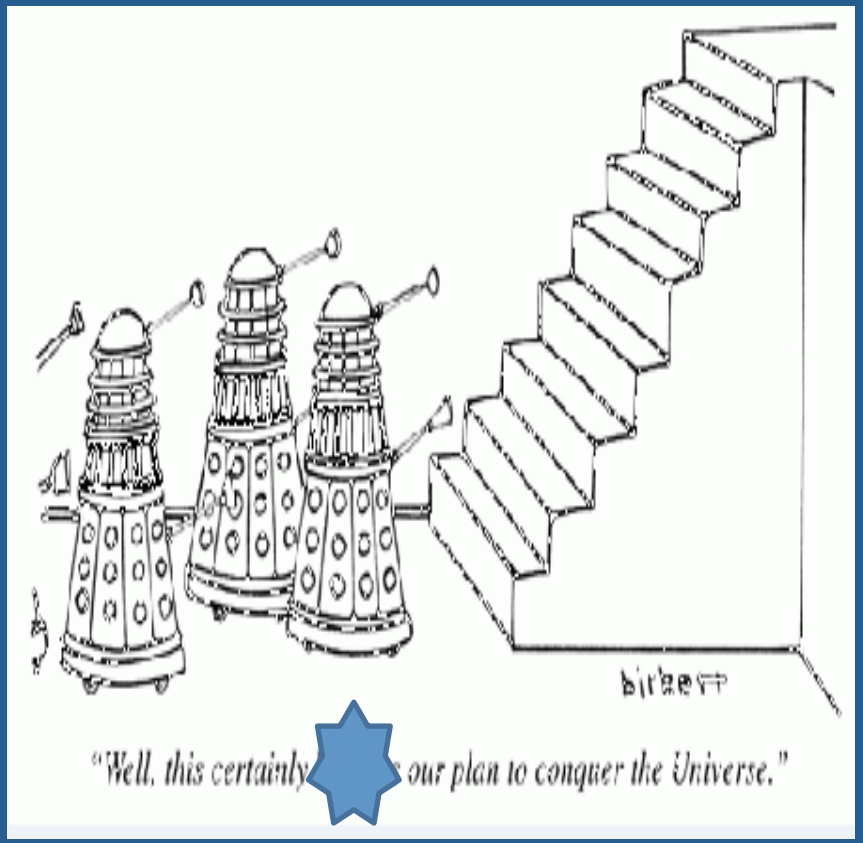
Frustrations

Cost

Software

Interface design

Proving the case



Dave Chase, Contributor

I power/cover disruptive innovators reinventing healthcare.

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The 7 Habits of Highly Patient Centric Providers

Forbes

Principle of consistency. Old habits from [other displays] will easily transfer to support processing of new displays if they are designed in a consistent manner. A user's long-term memory will trigger actions that are expected to be appropriate. A design must accept this fact and utilize consistency among different displays

Wickens, Christopher D., John D. Lee, Yili Liu, and Sallie E. Gordon Becker. An Introduction to Human Factors Engineering. Second ed. Upper Saddle River, NJ: Pearson Prentice Hall, 2004. 185–193.

7 habits

- **Patient-facing tools from a highly trusted source are easy to setup and use**
- **Multi-provider access via patient relationship management tools (not silo'ed patient portals)**
- **Trusted, curated health content should be made available**
- **Data is portable and communication is on the patient's terms**
- **Patient-generated data is sought & health records can be corrected**
- **Shared decision making should be valued and enabled with relevant tools**
- **Recognize the importance of caregivers as partners in the shared decision-making process**

“There is no unique picture of reality”

Stephen Hawking

Next steps

- “This is a plea for truly connected care”

Jean-Daniel Chiche

Vienna, 2009

- Societal lead
- Cross Industrial partnership
- Aim for a transparent interface at the bedside utilising the best the *Intensive Connection* has to offer
- Team work

Old term

- Bronze John
- Cramp colic
- Jail fever
- Long sickness

Old term	New term
• Bronze John	• Yellow fever
• Cramp colic	• Appendicitis
• Jail fever	• Typhus
• Long sickness	• Tuberculosis
• Patient centred	• Patient centric

Patient-centred Acute Care Training

THE COCHRANE LIBRARY

Independent high-quality evidence for health care decision making

IS THE COCHRANE COLLABORATION PREPARED FOR THE ERA OF PATIENT-CENTRED OUTCOMES RESEARCH?

By: Gerald Gartlehner & Maria Flamm
On: March 28, 2013, 09:24

"A grass-roots movement like The Cochrane Collaboration should provide an ideal environment to take the next step and foster the generation of methodologically sound reviews that also focus on patient needs."

Quo vadis?

- http://davidleescher.com/2012/03/03/how-patient-centric-care-differs-from-patient-centered-care-2/ [Accessed 23/03/2014]

Achieving truly patient centric solutions: the road *that remains* to travel

‘Do not go where the path may lead, go instead where there is no path and leave a trail’

Ralph Waldo Emerson