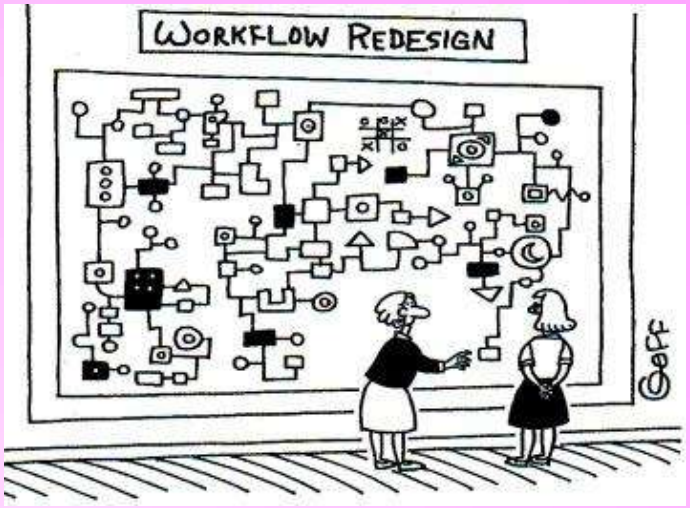
Implementing New Workflows With CIS



Dr. CHAN, King-chung Kenny

Associate Consultant

Pamela Youde Nethersole Eastern Hospital

Objectives

- Framework in understanding issue in implementing CIS
- Share our experience

The Washington Post

- … full-blown staff rebellion in … 2002 … forced Cedars-Sinai to shelve its $34 million computer system after three months.

- … electronic health record implementation is risky, …
- "Up to 30 percent fail."
- … viewed as an industry leader … no intention of trying again for at least a year.

Types of CIS Workflows

Low Yield

Bread & Butter

- Clinical notes & observations

White Elephant

- ?? All CIS

Easy

Difficult

Pearls

- Physiol
- Laborato results

Opening Oysters for Pearls

Oysters

re

- CDDS

High Yield

Is CIS a White Elephant?

INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS 78 (2009) 435–445

ELSEVIER

journal homepage: www.intl.elsevierhealth.com/journals/ijmi

Review

The impact of a Critical Care Information System (CCIS) on time spent charting and in direct patient care by staff in the ICU: A review of the literature☆

*Rebecca L. Mador, Nicola T. Shaw**

University of Alberta, Faculty of Medicine & Dentistry, Department of Medicine, Edmonton, AB, Canada

Results: In total, 12 articles met the inclusion criteria. Workflow analysis (66%) and time-and-motion analysis (25%) were the most common forms of data collection. Three (25%) studies found an increase in time spent charting, five (42%) found no difference, and four (33%) studies reported a decrease. Results on the impact of a CCIS on direct patient care were similarly inconclusive.

Avoiding a White Elephant

Dissatisfaction

Vision

Knowledge

\+

\+

\+

Changing workflow

\-

Cost

- Material cost
- Hidden Cost
  - Human resource
  - Disruption
  - New competence
  - Co-workers response

- Bottom-up approach

Human Resource

Personnel cost categories.

Pre-implementation	Implementation	Post-implementation
Project manager	User training	System administrator
Physician champion	Configuration	24-hour help-desk
Nurse champion	On-site support	Interface specialist
IT: programmer		Advanced configuration
IT: database		User training
Technical support staff		IT: programmer
Interface specialist		IT: database management
Network specialist		
Site visits		
Configuration training		
Configuration		
Superuser training		

This table gives an overview of the PDMS implementation phases, and the staffing need in each phase. Not included are the executive team and steering team or the PDMS vendor's staffing effort.

My Little White Elephant

- Web-cam to facilitate image capture
  - Documentation of wound / bed sore
  - Worries about patient privacy

- Main purpose now
  - Occasional video of seizure
  - Convince non-ICU doctors to use CIS

Picking up the Pearls

Unfreezing

- Burning platform

Moving

- “Roller coaster”

Refreezing

- Celebrating / Recognizing success

Burning Platform

- Recognise comfort zone
- Create a “burning platform”
  - Refurbishment of ICU
  - Critical incident / Sentinel event
- Capture the attention of all parties
  - ICU
  - Management
  - Non-ICU
- Change inevitable

Implementation

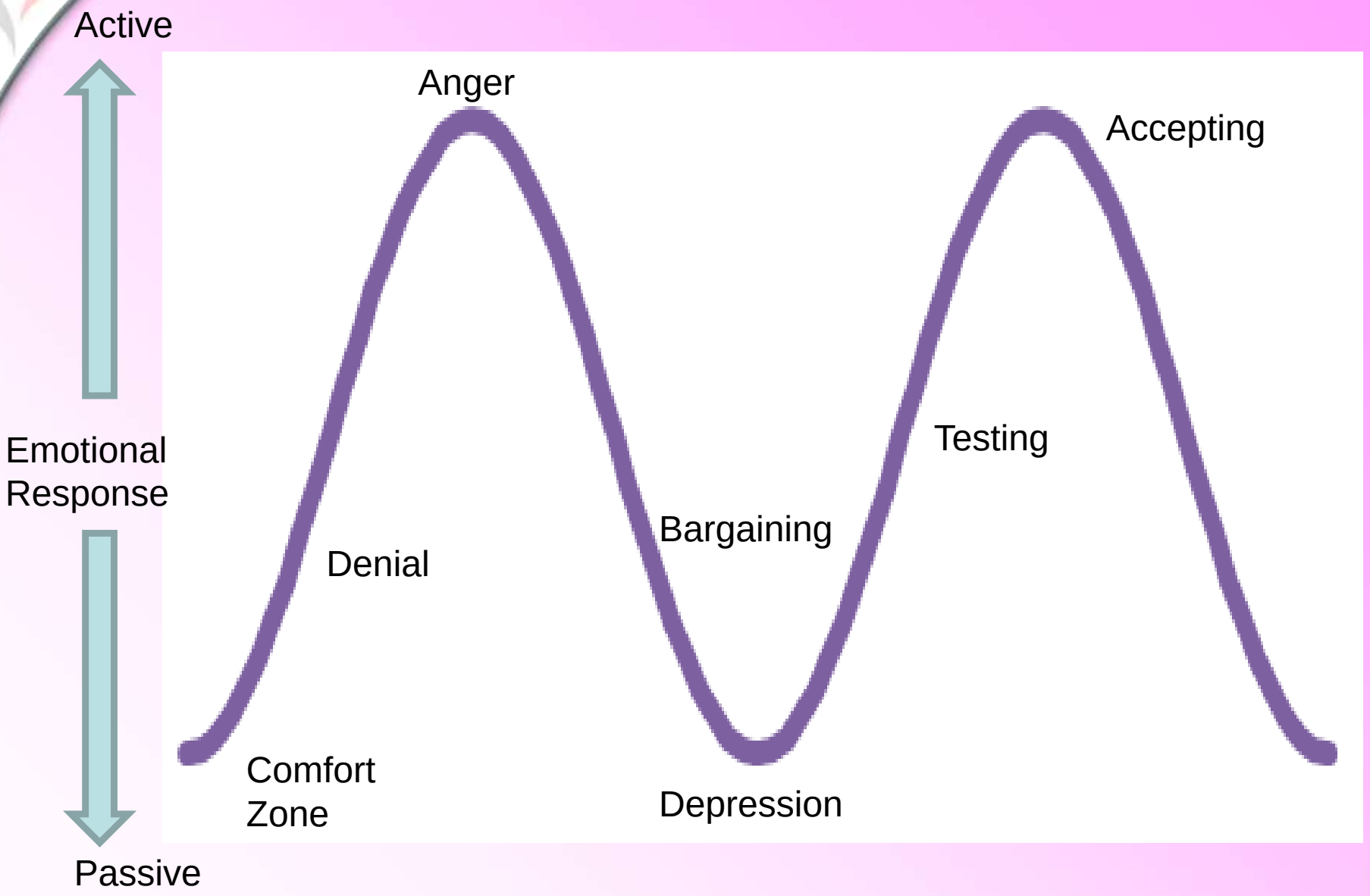
Radical

- Stimulate thinking
- Quick gain
- Higher risk
- Disruption
- e.g. CPOE

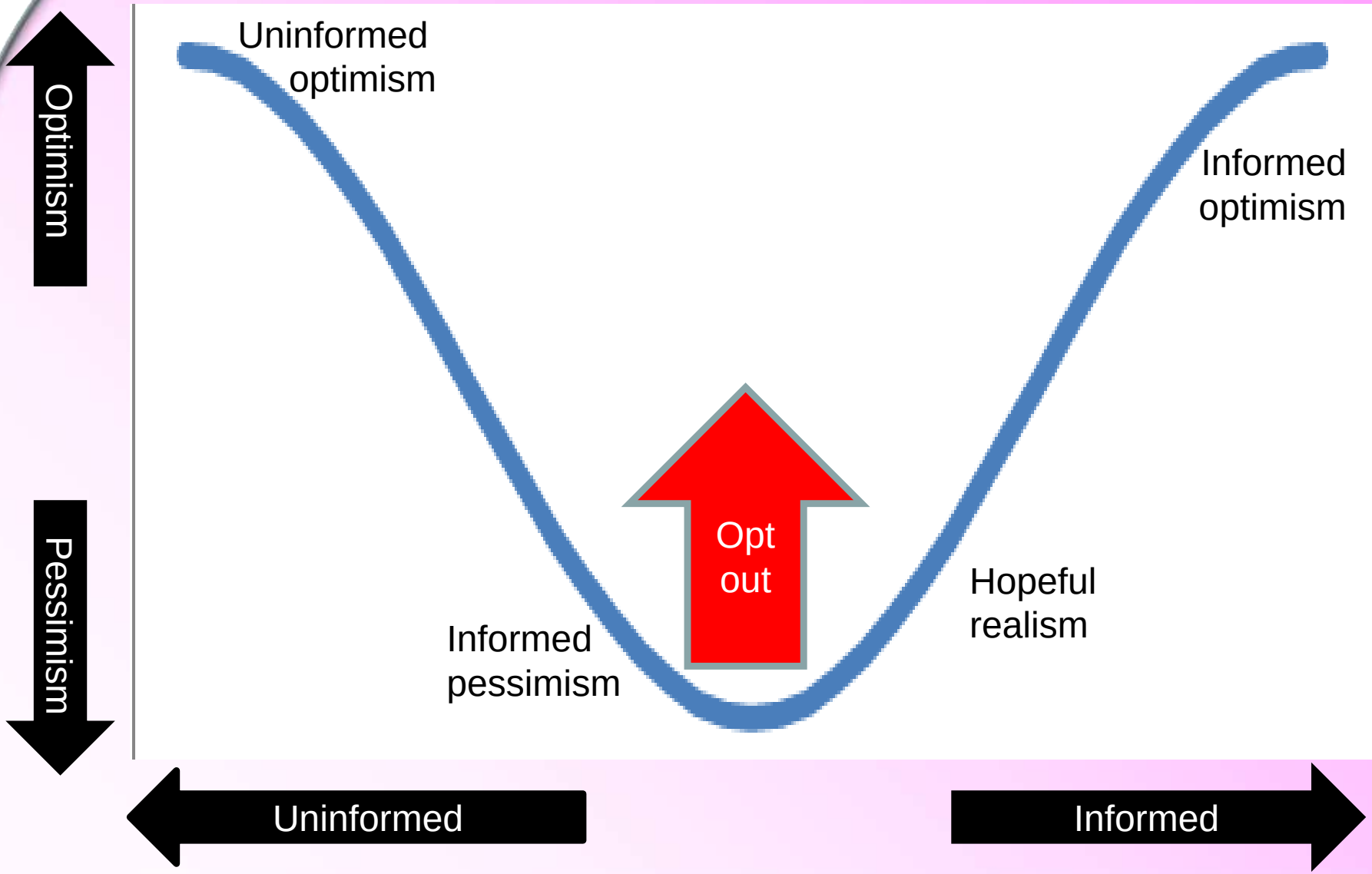
Transitional

- Habitual
- Lower risk
- Tunnelled vision
- Missed opportunity
- e.g. Insulin protocol

Roller Coaster - Staff



Roller Coaster - Manager



Project Manager

- Responsibility and accountability
- Manage implementation plan & relationships
- Attributes
  - Gain trust of stakeholders
  - Engage all parties
  - Transparency & Integrity

Implementation Plan

Best Practice & Research Clinical Anaesthesiology 23 (2009) 1–14

Contents lists available at ScienceDirect

Best Practice & Research Clinical Anaesthesiology

journal homepage: www.elsevier.com/locate/bean

1

How to implement information technology in the operating room and the intensive care unit

Geert Meyfroidt, MD, Deputy Head of Clinic *

Department of Intensive Care Medicine, UZ Leuven – Campus Gasthuisberg, Catholic University of Leuven, Herestraat 49, 3000 Leuven, Belgium

Implementation Plan

- Step 1: from technology trigger to return on investment (ROI) analysis
- Step 2: the teams and their tasks
- Step 3: financial analysis
- Step 4: integration concept with existing IT
- Step 5: selecting the vendor
- Step 6: configuration and technical set-up
- Step 7: preparing and training the ICU team
- Step 8: go live

Refreezing

- Structure
  - Regular discussion in business meeting
  - Dedicated person for CIS issues
- Recognition / Reward
  - Outstanding team of HKEC
- Change in culture
  - Take time
  - New form still implemented as paper first

Opening the Oysters

Resource Limitation

- Infusion pump management

Technological Limitation

- Clinical decision support

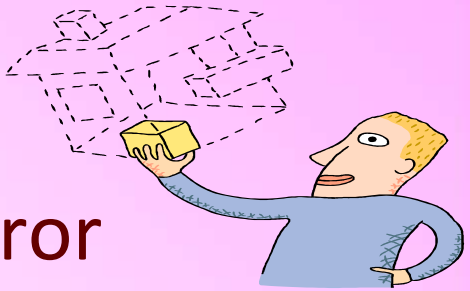
Human Resistance

- Computerized physician order entry

Human and Technology

- "To Err is Human" vs. "To Err is System"
  - Problems occur in both
- Training for CIS workflow
  - Allows human to suit the workflow
  - Understand the limitation of computer

- Ergonomics for CIS workflow
  - Design workflow to suit human
  - Understand common human error



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November 12, 2010 (Friday)

Prince of Wales Hospital Releases Investigation Report on Warfarin Incident

Prince of Wales Hospital today (November 12) released the investigation report on wrong dosage of anticoagulant Warfarin being given to an 84-year-old female patient.

The panel identified the following causes which contributed to the incident:

- The electronic prescription system is not user-friendly. The advanced options are especially difficult to use.
- There is lack of training on the proper use of the system.
- It is not easy for pharmacy staff to notice any abnormal prescriptions of Warfarin.
- The designated Warfarin clinic is saturated. Patients are managed in different clinics where doctors may not be familiar with the proper prescription of Warfin.
- The doctor failed to communicate clearly with the patient and relative about the correct drug dosage.

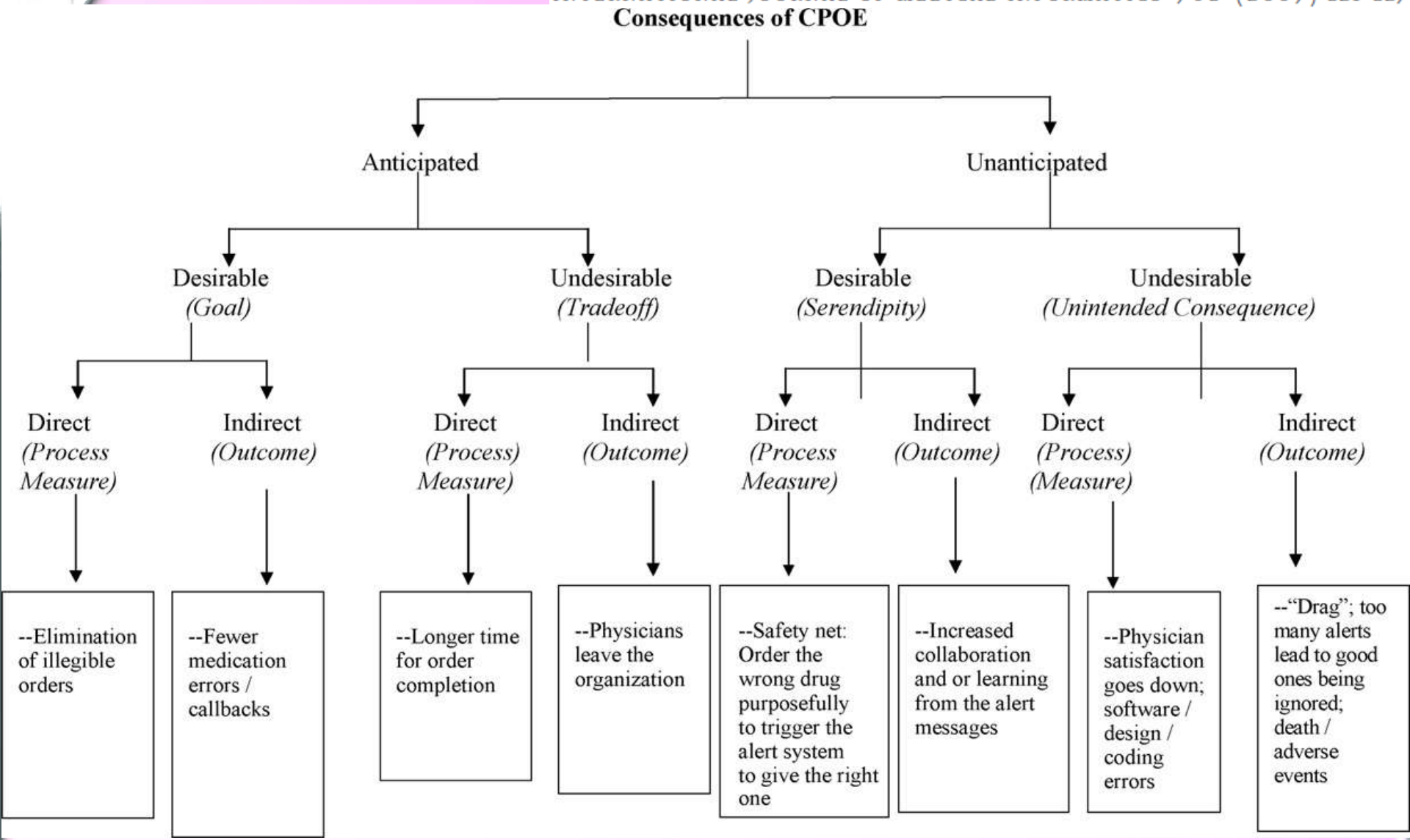
Common CIS Problem

- Changes in communication patterns and practices
- Awful workflow
- Problems related to paper persistence
- Overdependence on the technology
- Generation of new kinds of errors

- Remind users about them

Consequences of COPE

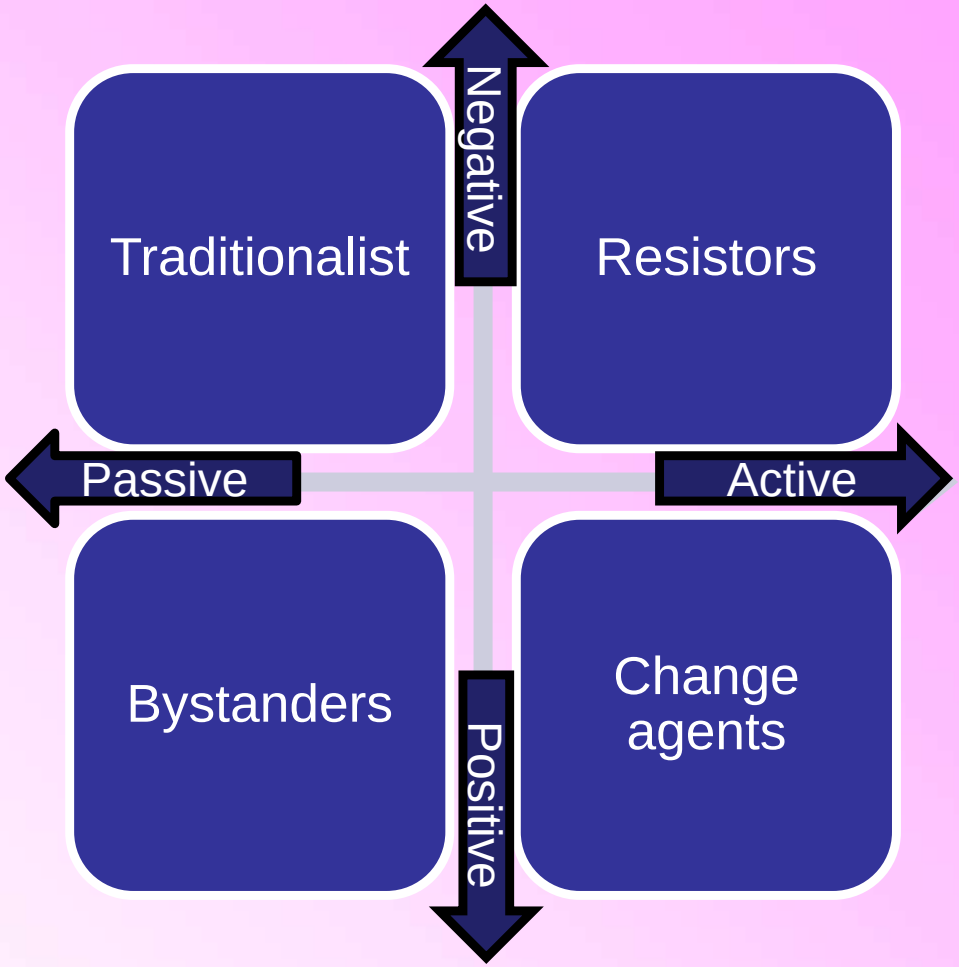
INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS 76S (2007) S21–S27



CIS Champions

- Behaviors / Motivation consistent with the vision
- Curious & active with implementation
- Emotionally connected
- Attributes
  - Proficient technical & influencing skills
  - As role model & mentor
  - Willingness to take additional responsibility
  - Comfortable to embrace and advocate system

Reaction to Changes



Bread and Butters

- Improving return
  - Creative use
    - Design of layout
    - Order set
    - Mission control type of hand over environment
  - Data mining

Philips CareVue Chart - [ICU_D10 - D10-06 [redacted] | Gender: Female | Age: 88 years [redacted] | Adm. Date: 22/02/2008 17:05]

File Edit View Patient/Chart Document Tools Window Help Kenny King Chung Chan

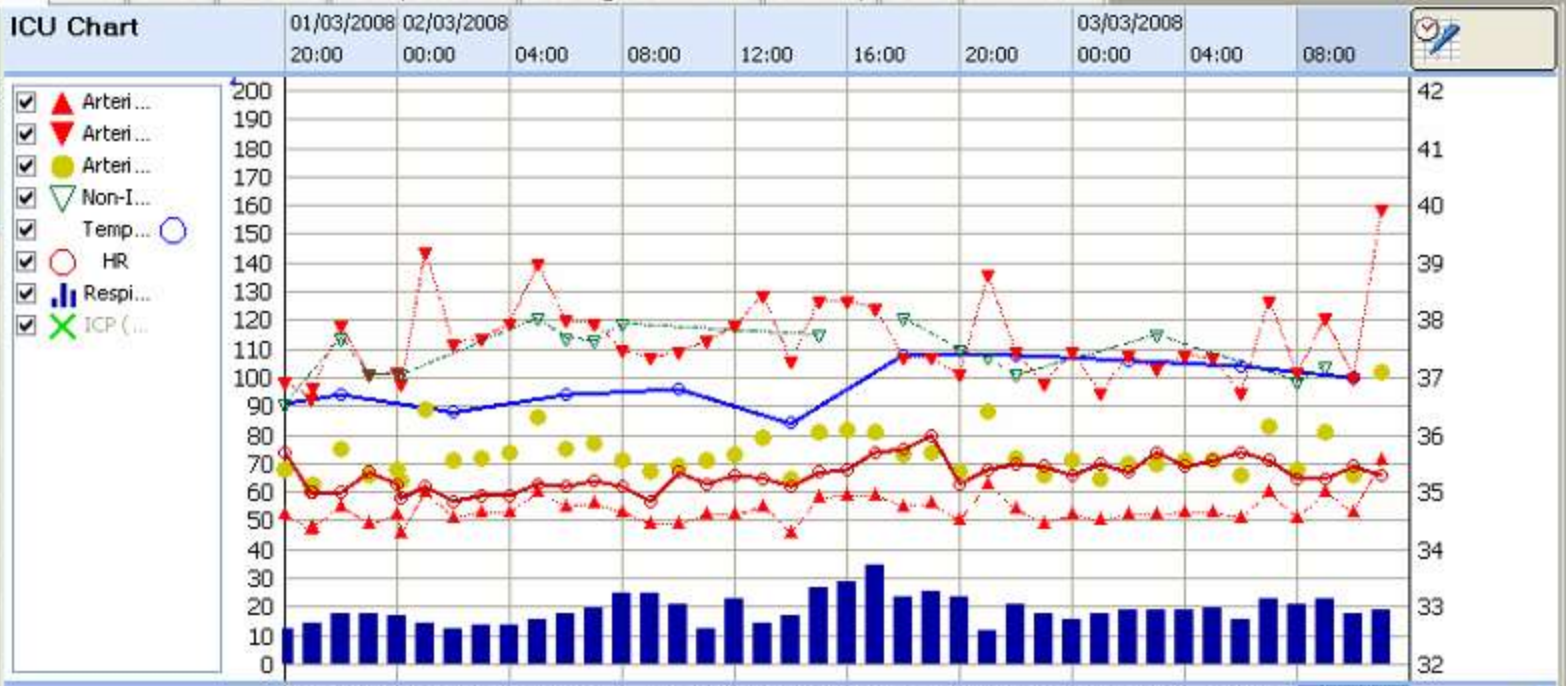
D10-06 - [redacted] - ICU_D

Admission Documents | Flowsheets | Notes | Orders | Lab Data | Forms/Checklists | Discharge Documents | Summary | Other | Work Folder

- Circulation Chart
- ICU Chart
- ICU Chart-Daily Assessment
- Medications Overview
- Ventilator Flowsheet

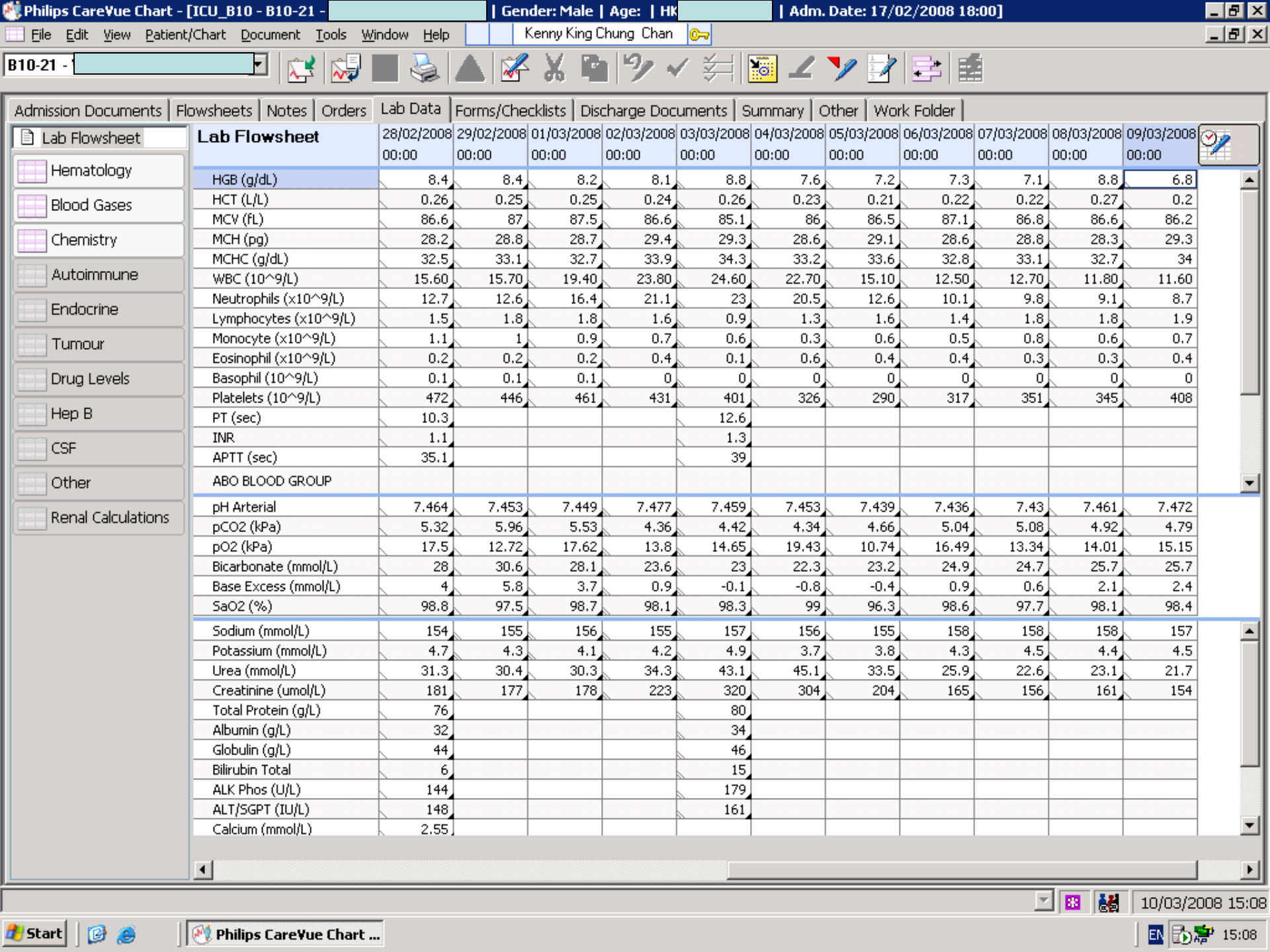
- Vitals 1
- Vitals 2
- Vital Signs
- Respiratory
- Neuro Assessment
- Drugs/Infusion Titration
- Medication
- I/O
- Lines
- Nursing Care
- H'Stix
- Labs
- Daily Goal
- Procedure
- Cardiac Pacing
- Microbiology
- Miscellaneous

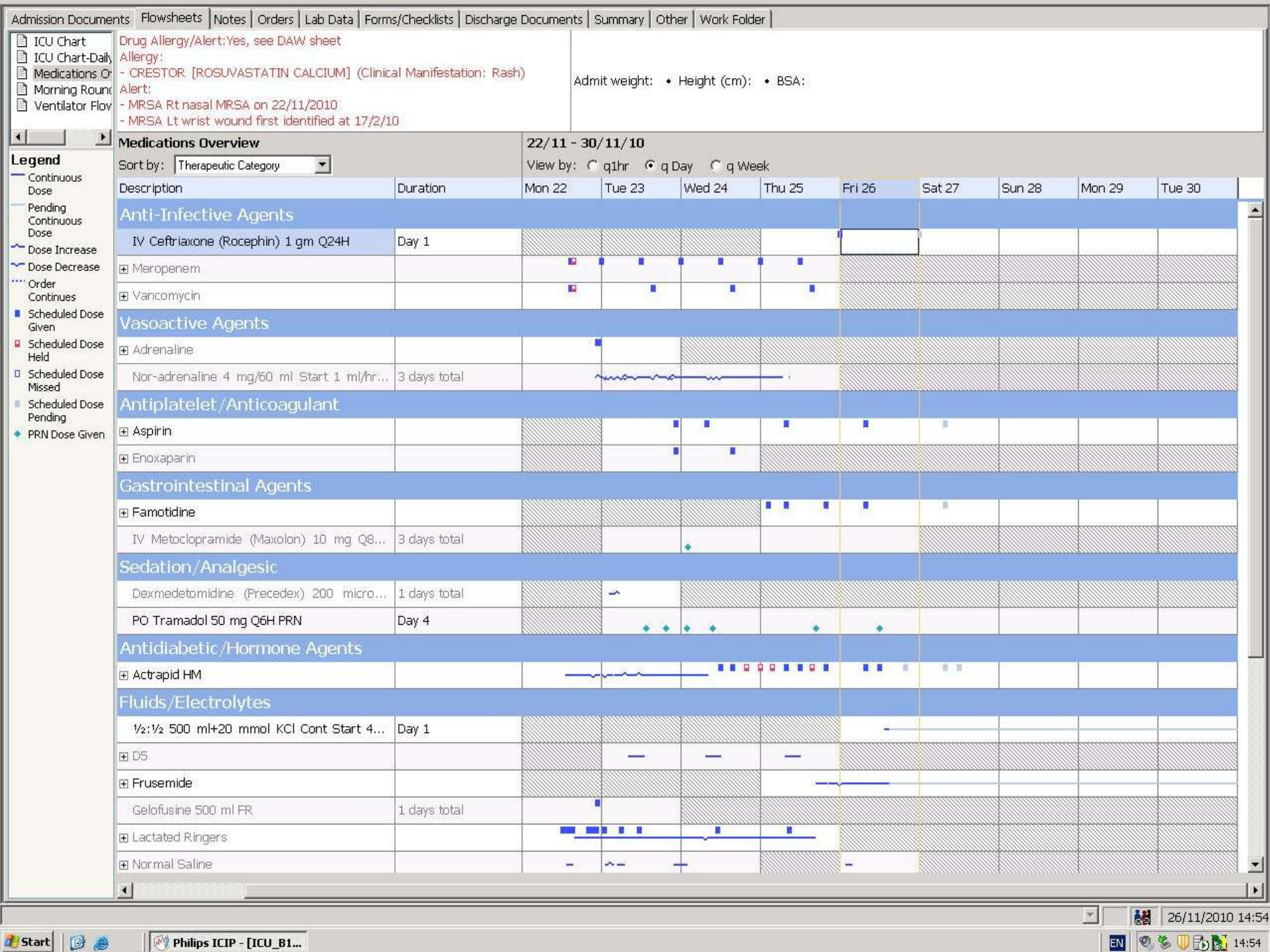
ICU Chart

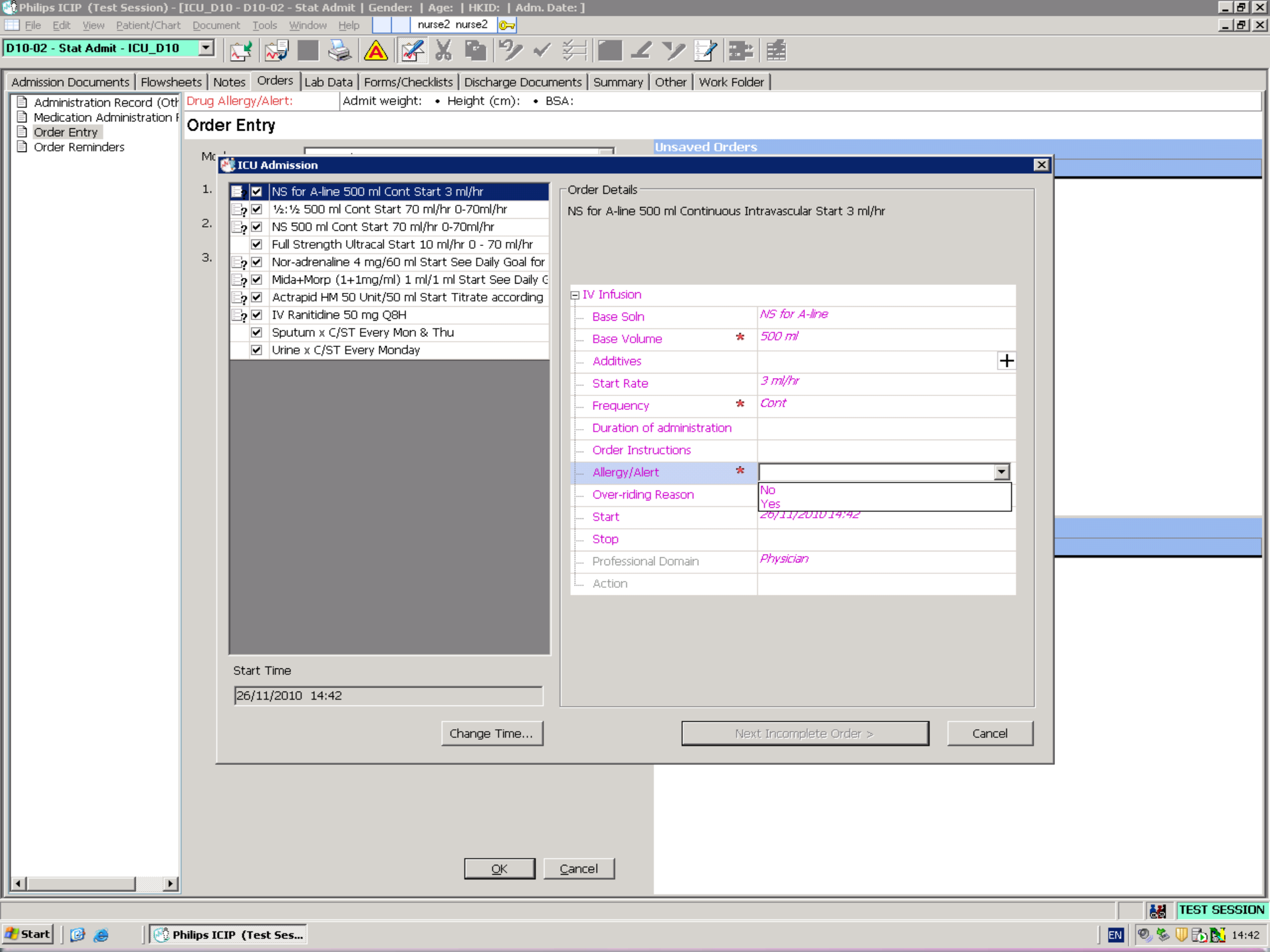


	01/03/2008 20:00	02/03/2008 00:00	04:00	08:00	12:00	16:00	20:00	03/03/2008 00:00	04:00	08:00
Total In	437 (1625)	442 (2067)	558 (558)	439 (997)	316 (1313)	196 (1509)	196 (1705)	196 (1901)	196 (196)	195 (391)
Total Out	560 (2021)	240 (2261)	170 (170)	275 (445)	210 (655)	388 (1043)	260 (1303)	375 (1678)	220 (220)	135 (355)
UO	360	190	170	175	210	228	170	175	170	135
⊞ Non-Invasive BP	101/54	101/35	113/48	119/52	115/49	121/63	101/44	115/70		104/44
⊞ O2 Delivery	ETT; 30%			ETT; 30%	ETT; 30%		ETT; 30%			ETT; 25%
⊞ Glasgow Coma Scale	E2VTM6			E3VTM6	E3VTM6		E3VTM6		E3VTM6	E3VTM6
CPP (mmHg)										
WBC (10^9/L)			24.80						23.00	
Creatinine (umol/L)	127	123	117						99	
pH Arterial	7.409		7.431						7.434	
pCO2 (kPa)	4.97		4.67						5.43	
Base Excess (mmol/L)	-1.2		-0.9						2.3	

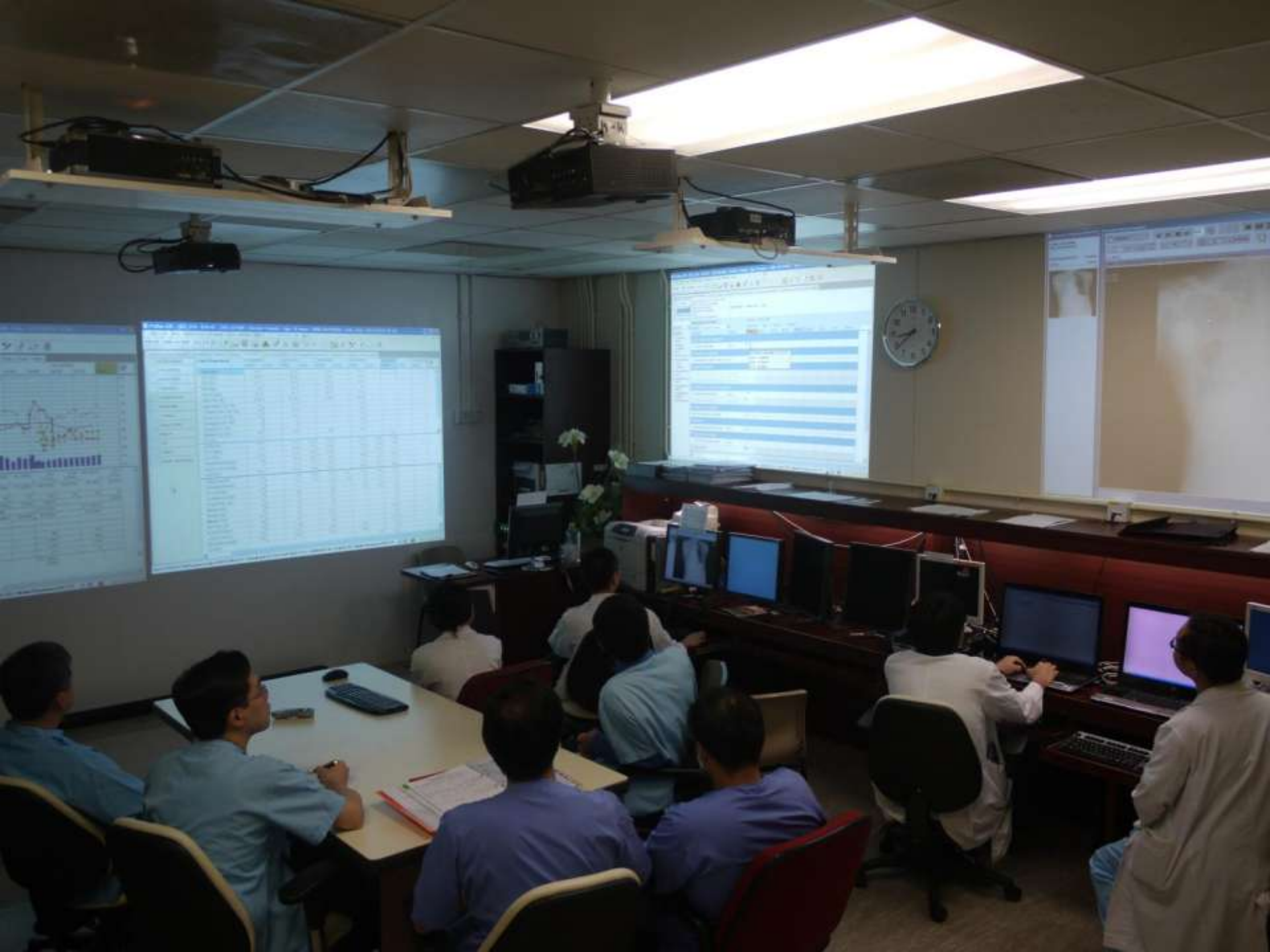
03/03/2008 12:46


Philips CareVue Chart - [ICU_B10 - B10-21 - | Gender: Male | Age: | HK | Adm. Date: 17/02/2008 18:00]
File Edit View Patient/Chart Document Tools Window Help
Kenny King Chung Chan
B10-21 -
Admission Documents
Flowsheets
Notes
Orders
Lab Data
Forms/Checklists
Discharge Documents
Summary
Other
Work Folder
Lab Flowsheet
Hematology
Blood Gases
Chemistry
Autoimmune
Endocrine
Tumour
Drug Levels
Hep B
CSF
Other
Renal Calculations
Lab Flowsheet
28/02/2008 00:00
29/02/2008 00:00
01/03/2008 00:00
02/03/2008 00:00
03/03/2008 00:00
04/03/2008 00:00
05/03/2008 00:00
06/03/2008 00:00
07/03/2008 00:00
08/03/2008 00:00
09/03/2008 00:00
HGB (g/dL) 8.4 8.4 8.2 8.1 8.8 7.6 7.2 7.3 7.1 8.8 6.8
HCT (L/L) 0.26 0.25 0.25 0.24 0.26 0.23 0.21 0.22 0.22 0.27 0.2
MCV (fL) 86.6 87 87.5 86.6 85.1 86 86.5 87.1 86.8 86.6 86.2
MCH (pg) 28.2 28.8 28.7 29.4 29.3 28.6 29.1 28.6 28.8 28.3 29.3
MCHC (g/dL) 32.5 33.1 32.7 33.9 34.3 33.2 33.6 32.8 33.1 32.7 34
WBC (10^9/L) 15.60 15.70 19.40 23.80 24.60 22.70 15.10 12.50 12.70 11.80 11.60
Neutrophils (x10^9/L) 12.7 12.6 16.4 21.1 23 20.5 12.6 10.1 9.8 9.1 8.7
Lymphocytes (x10^9/L) 1.5 1.8 1.8 1.6 0.9 1.3 1.6 1.4 1.8 1.8 1.9
Monocyte (x10^9/L) 1.1 1 0.9 0.7 0.6 0.3 0.6 0.5 0.8 0.6 0.7
Eosinophil (x10^9/L) 0.2 0.2 0.2 0.4 0.1 0.6 0.4 0.4 0.3 0.3 0.4
Basophil (10^9/L) 0.1 0.1 0.1 0 0 0 0 0 0 0 0
Platelets (10^9/L) 472 446 461 431 401 326 290 317 351 345 408
PT (sec) 10.3 12.6
INR 1.1 1.3
APTT (sec) 35.1 39
ABO BLOOD GROUP
pH Arterial 7.464 7.453 7.449 7.477 7.459 7.453 7.439 7.436 7.43 7.461 7.472
pCO2 (kPa) 5.32 5.96 5.53 4.36 4.42 4.34 4.66 5.04 5.08 4.92 4.79
pO2 (kPa) 17.5 12.72 17.62 13.8 14.65 19.43 10.74 16.49 13.34 14.01 15.15
Bicarbonate (mmol/L) 28 30.6 28.1 23.6 23 22.3 23.2 24.9 24.7 25.7 25.7
Base Excess (mmol/L) 4 5.8 3.7 0.9 -0.1 -0.8 -0.4 0.9 0.6 2.1 2.4
SaO2 (%) 98.8 97.5 98.7 98.1 98.3 99 96.3 98.6 97.7 98.1 98.4
Sodium (mmol/L) 154 155 156 155 157 156 155 158 158 158 157
Potassium (mmol/L) 4.7 4.3 4.1 4.2 4.9 3.7 3.8 4.3 4.5 4.4 4.5
Urea (mmol/L) 31.3 30.4 30.3 34.3 43.1 45.1 33.5 25.9 22.6 23.1 21.7
Creatinine (umol/L) 181 177 178 223 320 304 204 165 156 161 154
Total Protein (g/L) 76 80
Albumin (g/L) 32 34
Globulin (g/L) 44 46
Bilirubin Total 6 15
ALK Phos (U/L) 144 179
ALT/SGPT (IU/L) 148 161
Calcium (mmol/L) 2.55
10/03/2008 15:08
Start
Philips CareVue Chart ...
15:08


Admission Documents
Flowsheets
Notes
Orders
Lab Data
Forms/Checklists
Discharge Documents
Summary
Other
Work Folder
ICU Chart
ICU Chart-Daily
Medications O
Morning Rounc
Ventilator Flov
Drug Allergy/Alert:Yes, see DAW sheet
Allergy:
- CRESTOR [ROSUVASTATIN CALCIUM] (Clinical Manifestation: Rash)
Alert:
- MRSA Rt nasal MRSA on 22/11/2010
- MRSA Lt wrist wound first identified at 17/2/10
Admit weight: • Height (cm): • BSA:
Medications Overview
22/11 - 30/11/10
Sort by: Therapeutic Category
View by: q1hr q Day q Week
Legend
Continuous Dose
Pending Continuous Dose
Dose Increase
Dose Decrease
Order Continues
Scheduled Dose Given
Scheduled Dose Held
Scheduled Dose Missed
Scheduled Dose Pending
PRN Dose Given
Description
Duration
Mon 22
Tue 23
Wed 24
Thu 25
Fri 26
Sat 27
Sun 28
Mon 29
Tue 30
Anti-Infective Agents
IV Ceftriaxone (Rocephin) 1 gm Q24H
Day 1
Meropenem
Vancomycin
Vasoactive Agents
Adrenaline
Nor-adrenaline 4 mg/60 ml Start 1 ml/hr...
3 days total
Antiplatelet/Anticoagulant
Aspirin
Enoxaparin
Gastrointestinal Agents
Famotidine
IV Metoclopramide (Maxolon) 10 mg Q8...
3 days total
Sedation/Analgesic
Dexmedetomidine (Precedex) 200 micro...
1 days total
PO Tramadol 50 mg Q6H PRN
Day 4
Antidiabetic/Hormone Agents
Actrapid HM
Fluids/Electrolytes
½:½ 500 ml+20 mmol KCl Cont Start 4...
Day 1
D5
Frusemide
Gelofusine 500 ml FR
1 days total
Lactated Ringers
Normal Saline
26/11/2010 14:54
Start
Philips ICIP - [ICU_B1...
EN
14:54


Philips ICIP (Test Session) - [ICU_D10 - D10-02 - Stat Admit | Gender: | Age: | HKID: | Adm. Date:]
File Edit View Patient/Chart Document Tools Window Help
nurse2 nurse2
D10-02 - Stat Admit - ICU_D10
Admission Documents Flowsheets Notes Orders Lab Data Forms/Checklists Discharge Documents Summary Other Work Folder
Administration Record (Oth
Medication Administration F
Order Entry
Order Reminders
Drug Allergy/Alert:
Admit weight: • Height (cm): • BSA:
Order Entry
Unsaved Orders
ICU Admission
1.
2.
3.
NS for A-line 500 ml Cont Start 3 ml/hr
½:½ 500 ml Cont Start 70 ml/hr 0-70ml/hr
NS 500 ml Cont Start 70 ml/hr 0-70ml/hr
Full Strength Ultracal Start 10 ml/hr 0 - 70 ml/hr
Nor-adrenaline 4 mg/60 ml Start See Daily Goal for
Mida+Morp (1+1mg/ml) 1 ml/1 ml Start See Daily G
Actrapid HM 50 Unit/50 ml Start Titrate according
IV Ranitidine 50 mg Q8H
Sputum x C/ST Every Mon & Thu
Urine x C/ST Every Monday
Start Time
26/11/2010 14:42
Change Time...
Order Details
NS for A-line 500 ml Continuous Intravascular Start 3 ml/hr
IV Infusion
Base Soln
NS for A-line
Base Volume *
500 ml
Additives
Start Rate
3 ml/hr
Frequency *
Cont
Duration of administration
Order Instructions
Allergy/Alert *
No
Yes
Over-riding Reason
Start
26/11/2010 14:42
Stop
Professional Domain
Physician
Action
Next Incomplete Order >
Cancel
OK
Cancel
TEST SESSION
Start
Philips ICIP (Test Ses...
EN
14:42


Hospital Authority
Clinical Management System



Bread and Butters

- Reducing effort
  - User account management
  - Interlocking of patients – CCOW
  - Automatic / Better data entry device

Summary

- Implementation is an art
- Framework and experience sharing is important
- Let’s open more “oysters” together