

Development of a regional ICU database for  
longitudinal ICU performance monitoring:

## Summary and Way forward

HA Convention

15 May 2013

# The presentation

- Contain two parts:
  - Summary of what we have achieved
  - Experience sharing from management perspective, consider the lessons to be learnt (Briggs, 2001)

# Our Challenges

- ICU is the most **expensive**, technologically advanced and resource-intensive area of medical care.
- The service is so **scarce** and it is usually only offered to those whose condition is potentially reversible and who have a good chance of surviving with intensive care support.
- Since the critically ill are so close to dying, the **outcome** of this intervention is **difficult to predict**.

# Methodology

- Case mix : heterogeneity in the ICU patients' severity of illnesses
- Differences across institutional settings
- Risk-adjusted model to tackle the confounders
- APACHE (Acute Physiology and Chronic Health Evaluation) was chosen as the standard tool and validated benchmark index for ICU outcome prediction and performance assessment

# Milestones

- 2007: with the support from the **Head Office IT** and **Statistics Departments**, an *APACHE data entry interface* with extensive built-in logic and data check was built in the HA Clinical Management System (CMS)
- 2008: APACHE IV (the latest version of APACHE) *score calculators* to do the back end score calculation
- 2008: User-friendly prognostic *score reporting function* was added in the Clinical Data Audit and Research System (CDARS)
- 2009: *Designated ICU data collection team* was set up to alleviate the ICU frontline clinical staff's workload in data collection and data entry

# CMS APACHE Form

Screen Dump - Windows Internet Explorer

Layout

Adm./Dis. Dx Physiology Blood gas

ICU admission date/time:  /  /  :  :  **ICU ADT auto** Parent specialty:  Age:  y

ICU admission type:

Readmission during this hospitalization?

Unplanned readmission within 72 hours?

ICU discharge date/time:  /  /  :  :  **HDU ADT auto**

ICU outcome:

Worst GCS in first 24 hrs:

GCS scoring: GCS should be free from the effects of neuro-active drugs, and in a sedated/paralyzed pt, should be based on pre-drug assessment closest to the time of ICU admission.

Best Eye Opening:

Best Verbal Response:

Verbal Intubated:

Best Motor Response:

Unable to assess GCS before medication

**Unable to access GCS before medication will assume patient to have a normal GCS score**

ICU ADMISSION SOURCE:  A&E  OT/Recovery  General ward  Other ICU in same hospital  Other CCU in same hospital  Other HDU in same hospital  Other hospital ICU  Other hospital CCU  Other hospital HDU  Other hospital general ward

CHRONIC HEALTH:  None  Yes **definition**

CVS: NYHA Class IV  Chronic respiratory insufficiency with or w/o pulm. hypertension  Renal: Receiving chronic dialysis  Hepatic failure  Cirrhosis with documented portal hypertension +/- GI bleeding  AIDS  Lymphoma  Metastatic cancer  Leukaemia / Myeloma  Immunosuppressive therapy

Note: APACHE is a registered trademark of Cerner Corporation, Kansas City, Missouri, USA

Screen Dump - Windows Internet Explorer

Layout

Adm./Dis. Dx Physiology Blood gas

	high	low		high	low	ICU activity:	Starting date	D/C date
Core temp °C	<input type="text"/>	<input type="text"/>	Na <sup>+</sup> mmol/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
Heart rate /min	<input type="text"/>	<input type="text"/>	K <sup>+</sup> mmol/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
Resp rate /min	<input type="text"/>	<input type="text"/>	Urea mmol/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
On ventilator? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Yes <input type="radio"/> No			Creat umol/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
Mean BP mmHg	<input type="text"/>	<input type="text"/>	Alb g/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
Sys/Dia mmHg	<input type="text"/> / <input type="text"/>	<input type="text"/> / <input type="text"/>	Bil umol/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
Urine ml/24 hrs	<input type="text"/>		WCC 10 <sup>9</sup> /L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
If < 24 Hrs, specify collection duration: <input type="text"/> hrs			Hb g/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
			Hct	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
			Plt 10 <sup>9</sup> /L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>
			Glu mmol/L	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>	<input type="text"/> / <input type="text"/> / <input type="text"/> : <input type="text"/> : <input type="text"/>

**Get laboratory result**

from:  /  /  :  :  to:  /  /  :  :

D/C Date: Enter discontinuation date or ICU discharge date, whichever was earlier

# CDARS APACHE Standard Reports

CDARS -- CHEUNG, LEO login at 15:18, 14/05/2013 - Windows Internet Explorer

Clinical Data Analysis and Reporting System

Report History Request Submission User Definition System Maintenance

## Standard Report

Please specify reporting criteria for the chosen standard report

### APACHE IV Report

**Step 1 : Specify the Reporting Period by:**

Reporting Period Type	<input type="radio"/> Quarterly	<input type="radio"/> Half-yearly	<input checked="" type="radio"/> Yearly
Selected Reporting Period	From: 2012	To: 2012	

**Step 2 : Specify Study Hospital:**

Hospital * <input checked="" type="radio"/> All Hospitals <input type="radio"/> by Cluster	<input checked="" type="checkbox"/> All Acute Hospitals
	<input checked="" type="checkbox"/> AHN
	<input checked="" type="checkbox"/> CMC
	<input checked="" type="checkbox"/> KWH
	<input checked="" type="checkbox"/> NDH
	<input checked="" type="checkbox"/> PMH
	<input checked="" type="checkbox"/> PWH
	<input checked="" type="checkbox"/> PYN
	<input checked="" type="checkbox"/> QEH
	<input checked="" type="checkbox"/> QMH
	<input checked="" type="checkbox"/> RH
	<input checked="" type="checkbox"/> TKO
	<input checked="" type="checkbox"/> TMH
	<input checked="" type="checkbox"/> UCH
<input checked="" type="checkbox"/> YCH	

**Step 3 : Specify Report Layout:**

Report Layout	Table C4a - Summary Report (APACHE IV risk-adjusted analysis for non-CABG patients)
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**Step 4 : Specify ICU Type:**

ICU Type	<input checked="" type="radio"/> ICU <input type="radio"/> ICU+HDU <small>ICU+HDU means direct admission or transfer-in from other specialty to ICU or HDU subspecialty; including within subspecialty transfer between ICU and HDU</small>
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**Step 5 : Specify Admission Type:**

Admission Type	<input type="radio"/> First Admission <input checked="" type="radio"/> All Admissions
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[Back](#) [Reset](#) [Submit](#)

# Milestones (2):

- 2011: Local benchmarking by using 2007 to 2011 data
  - The performance fluctuation spotted was fed back to the individual ICU and hospital management for the respective exploration and service improvement.
- 2012: Benchmark HA ICU data with about 200 ICUs in the UK (collaboration with the Intensive Care National Audit and Research Centre, ICNARC) with recalibrated APACHE model



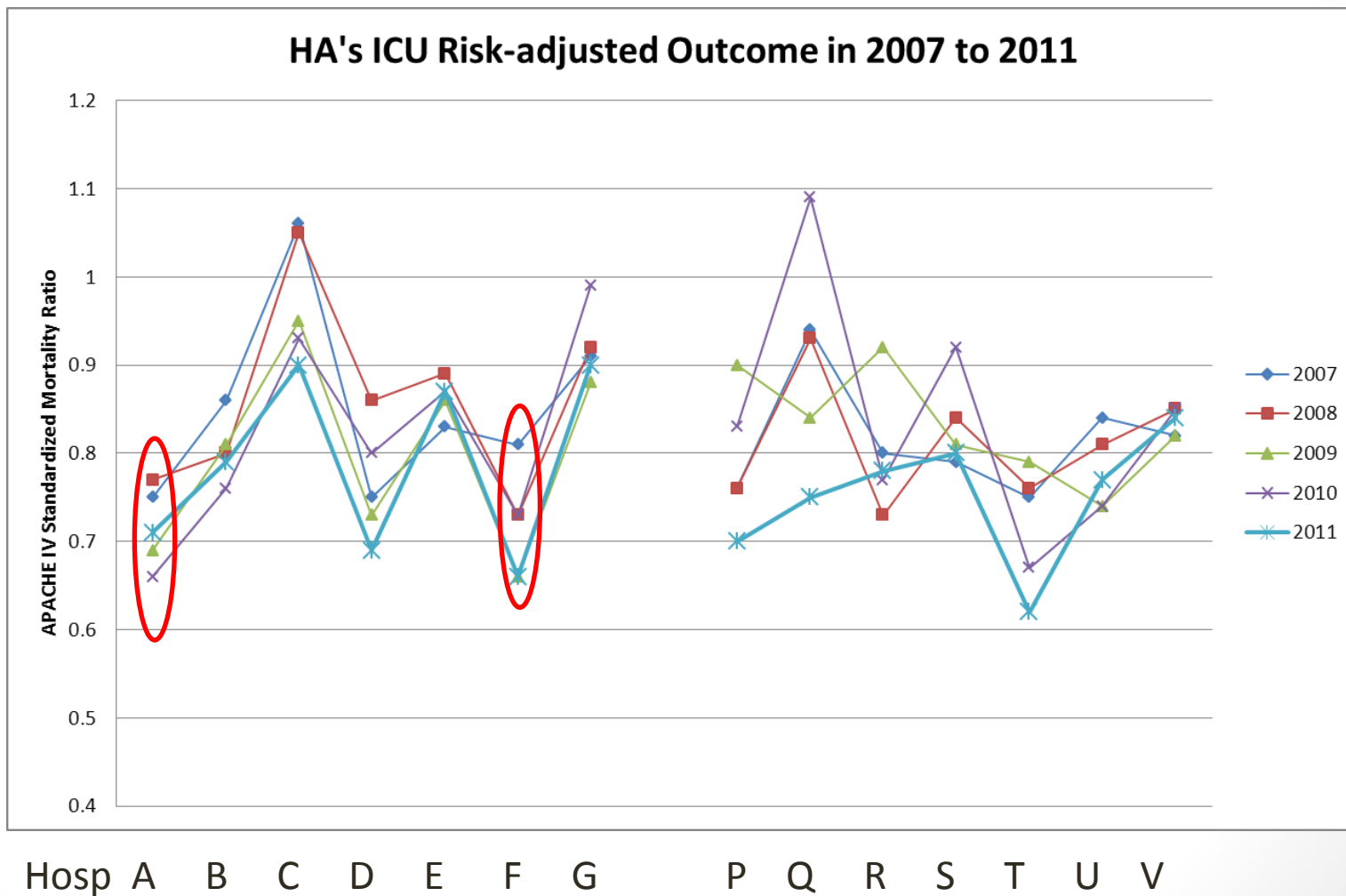
# Benchmarking

- Is best suited to high-performance companies that are attuned to the need to adapt to best practice
- To address exceptional events or performance

# Example

HA's ICU Risk-adjusted Outcome in 2007 to 2011

Lower is better



# Example (cont'd)

- Good practice observed in a unit with consistent good performance:
  1. All team members work and cooperate together with **high morale**
  2. Adopted the hospital approach of **Crew Resource Management** to improve patient safety
  3. Promoting **learning culture** within the department
  4. Successful implementation of ICU Clinical Information System (**CIS**). Medication incidence has decreased dramatically since implementation.

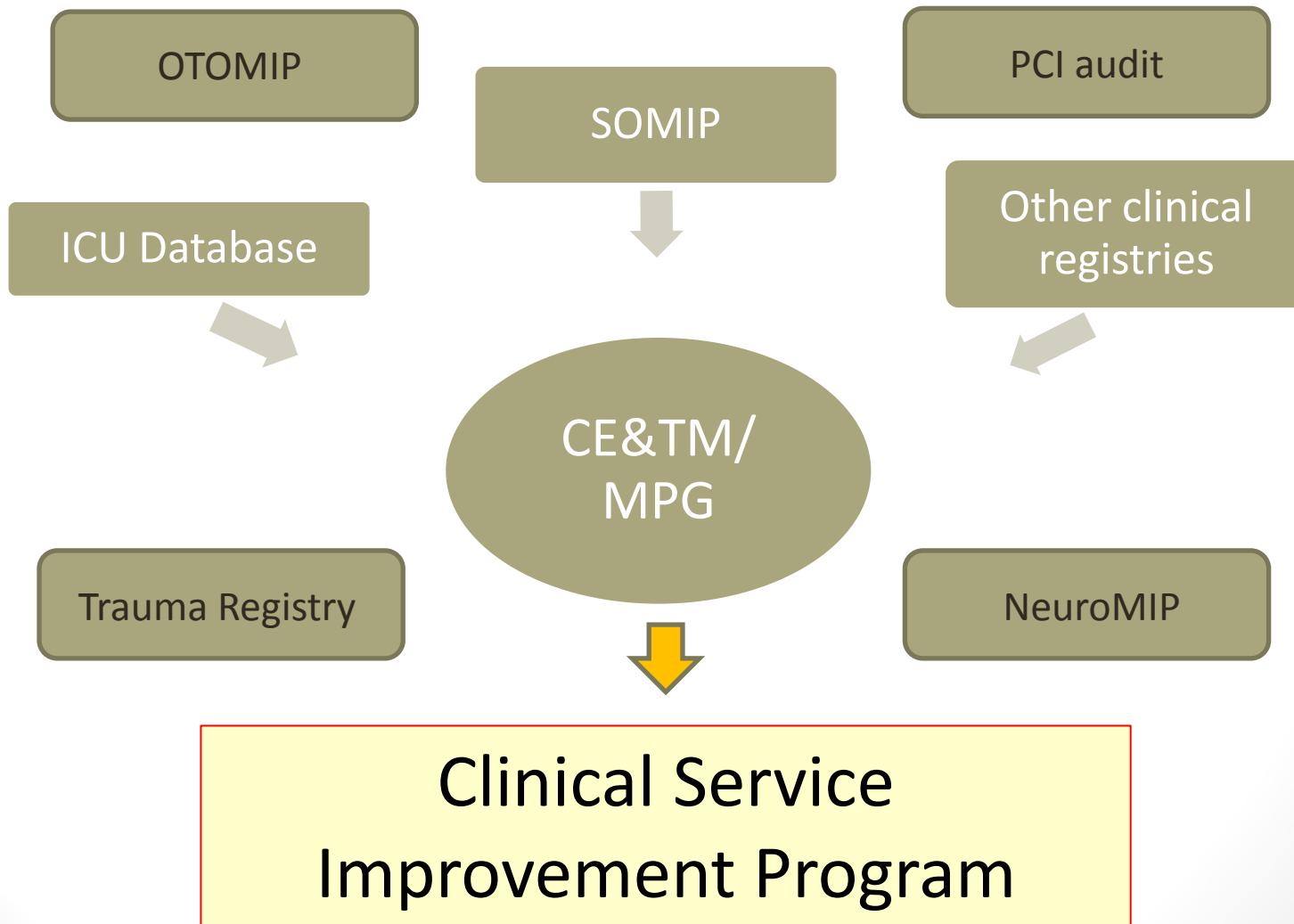
# Our sharing...

- Everything talking about resources:
  - IT system development (time and money)
  - Data collection (technology and manpower)
  - Data analysis (expertise, other contextual information)
  - Data reporting (sensitive to the political context of the public reporting process)
  - *How can these be sustainable? By what way?*
- Useful for Service planning
  - Can it tell good pattern of service delivery?
  - *E.g. How many ICU should we have?*
  - *E.g. How many beds should an individual ICU has?*

# Reviewing Organisational Performance

- Griffith & Alexander (2002):
  - Clear strategic guidance, leadership and planning are essential, particularly when alternative targets compete for limited resources
  - This is especially critical for uniting existing and new improvement activities into a systematic, organisational-wide approach.

# Way forward



# Acknowledgments

- COC (ICU)
- HO Statistics & Workforce Planning
- HO Health Informatics and IT