Sustaining Quality, Performance and Cost-effectiveness in a Public Hospital System

Hong Kong Hospital Authority

Dr P Y Leung, Chief Executive
Ms Nancy Tse, Director (Finance)
Dr Deacons Yeung, Chief Manager (Financial Planning)
Part I: Introduction of Hong Kong’s Healthcare System

Part II: Sustaining Quality Care Through Effective Resource Allocation

Part III: The Journey of Casemix Development in HA
Introduction of Hong Kong’s Healthcare System

Dr P Y Leung
Chief Executive
Hospital Authority, Hong Kong
Hong Kong Special Administrative Region (HKSAR), China

- Land area: ~ 1,100 sq. km
- Population: ~ 7 million
- Birth rate: ~ 12.5% (per 1000 population)
- Financial centre in Asia
- Per capita GDP ~ US$32,000
Mortality & Life Expectancy in Hong Kong

**Mortality Rates**

- **Infant Mortality Rate (IMR):** 1.6 per 1,000 live births (2010*)
- **Maternity Mortality Rate (MMR):** 1.53 per 100,000 (2006)

**Life Expectancy at Birth by Sex**

- **Male:** 79.3 yrs (2008)
- **Female:** 85.5 yrs (2008)

* Provisional
Comparing Life Expectancy in Hong Kong To Other Developed Countries

<table>
<thead>
<tr>
<th>Countries</th>
<th>Male Life Expectancy</th>
<th>Female Life Expectancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>79.3</td>
<td>86.1</td>
</tr>
<tr>
<td>Hong Kong SAR</td>
<td>79.3</td>
<td>85.5</td>
</tr>
<tr>
<td>Australia</td>
<td>79.2</td>
<td>83.7</td>
</tr>
<tr>
<td>Sweden</td>
<td>79.1</td>
<td>83.2</td>
</tr>
<tr>
<td>New Zealand</td>
<td>78.4</td>
<td>82.4</td>
</tr>
<tr>
<td>France</td>
<td>77.6</td>
<td>84.3</td>
</tr>
</tbody>
</table>

Source: Health related statistics from Food & Health Bureau (2008)
Hong Kong’s Health Policy Hierarchy

HKSAR Food and Health Bureau

Department of Health (government department)

- Responsible for public and port health

Hospital Authority (statutory body)

- Directly manage public hospitals and institutions

DH also oversees the private sector
“No one should be denied adequate healthcare through lack of means by ensuring that the public healthcare system can continue to serve those who cannot afford private healthcare services”

HK’s public healthcare services are heavily subsidized

fixed subsidy at 84% to 98% *

* As at 2008/09
Hong Kong’s Healthcare Expenditure and Around the World

Health Service Expenditure as Percentage of GDP

Source:
1) Census and Statistics Dept
2) OECD Health Data 2010 June

5.3% = 2.4% + 2.9%
GDP Public Private
Hong Kong’s Public Expenditure on Health

Source: The 2011 -12 Budget

- Economic: 3.4%
- Community and External Affairs: 3.5%
- Housing: 0.1%
- Environment and Food: 4.3%
- Infrastructure: 6.6%
- Security: 11.7%
- Social Welfare: 17.4%
- Education: 22.5%
- Health: 16.5%
- Support: 14%
Hong Kong’s Dual Healthcare System: Core Public System Complemented by Private Sector

Highly subsidized by government

Public

Self-financed by patients

Private

10% inpatients (~4,000 private beds)

90% inpatients (~27,000 public beds)

2.9% GDP

30% outpatients

30% outpatients

2.4% GDP

Source:
1) GDP: 2009
2) Inpatient (secondary & tertiary care):
   “Public-private share by inpatient treated in 2009” from HA and Dept of Health
3) Outpatient (primary care):
Hong Kong’s 3-Tier Healthcare System

Primary Care (distribution of consultations)
- Public: 57%
- Private: 29%
- Chinese Medicine Practitioners: 15%
- Others: 1%

Secondary and Tertiary Care
- Public: 90%
- Private: 10%

Long Term Care
- 100%

Source:
2) Public/private share by in-patient bed day in 2009 (HA & Dept of Health)
Establishment of Hong Kong Hospital Authority (HA)

- Established in 1990 under the Hospital Authority Ordinance
- A statutory body tasked to manage all public hospitals and institutions
  - Government owned + Charity + religious organizations
- Accountable to Secretary (Minister) of Health
- Majority of funding from Government
Roles of HA

**Managing and developing the public hospital system**

**Establishing public hospitals**

**Recommended to Government**
Fees policies for use of public hospital services

**Advising Government**
Public’s need for hospital services and resources required to meet these needs

**Promoting, assisting and taking part in education/training of HA staff and research relating to hospital services**
Hospital Clusters of Hospital Authority

New Territories West
Kowloon West
Kowloon Central
Kowloon East
Hong Kong West
Hong Kong East
• 41 public hospitals & institutions
• 27000 beds
• 48 Specialist Outpatient Clinics
• 74 General Outpatient Clinics
• 60000 staff; 6000 being doctors
IT Network of Hospital Authority

Patient Records Accessible Anywhere Within HA IT System

IHF Conference (Dubai Nov 2011)
Challenges to Hong Kong’s Public Healthcare System
Growing & Ageing Population

Note: + The Figures are based on the mid-1980 population estimates under the “extended de facto” approach (excluding Vietnamese Migrants).
@ The figures are compiled based on the mid-2010 population estimate under the “resident population” approach.
# The figures are compiled based on the 2009-based population projection.
Source: Census and statistics Department
Challenges to Hong Kong’s Public Healthcare System

Higher Risk of Hospitalization for Elderly

Non-Elderly (< 65)  vs  Elderly (65+)

<table>
<thead>
<tr>
<th></th>
<th>Relative risk of hospitalization</th>
<th>Ever Hospitalized in General Specialty in 2010*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Elderly (&lt; 65)</td>
<td>1</td>
<td>0.6 in 10</td>
</tr>
<tr>
<td>Elderly (65+)</td>
<td>4.2</td>
<td>2.6 in 10</td>
</tr>
</tbody>
</table>

* General Specialty refers to Care Category: Acute General or Convalescence/Rehabilitation
Age 0 are excluded in the calculation of hospital services utilisation.
### Challenges to Hong Kong’s Public Healthcare System

#### Intensifying Use of HA Services (esp. Elderly)

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2009</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong Total Population</td>
<td>6,783k</td>
<td>7,004k</td>
<td>↑3.3%</td>
</tr>
<tr>
<td>HA Patient Headcount*</td>
<td>2,173k</td>
<td>2,334k</td>
<td>↑7.4%</td>
</tr>
<tr>
<td><strong>Elderly (/&gt;age 65)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hong Kong Elderly Population</td>
<td>819k</td>
<td>893k</td>
<td>↑9.0%</td>
</tr>
<tr>
<td>HA Elderly Patient*</td>
<td>485k</td>
<td>541k</td>
<td>↑11.5%</td>
</tr>
</tbody>
</table>

Around **35%** of HA’s inpatient headcount are elderly, but they occupied almost **50%** of HA’s total bed days *(2010)*

*“Patient Headcount” includes IP, A&E & SOP only.*
Challenges to Hong Kong’s Public Healthcare System

Escalating Disease Burden & Treatment Complexity

Prevalence Rate ¹ of Top 5 Rising Diseases

1) Prevalence rate is a measurement of all individuals affected by the disease at a given point in time.

Annualized growth

04/05 05/06 09/10 10/11

Malignant Neoplasms (cancer group)
Ischaemic Heart Diseases
Chronic Renal Failure
Lower respiratory infection
Schizophrenia

Pathology
Radiology
Operations (Ultramajor & Major)

Annualized growth

верхний рисунок
In light of advances in medical science and higher community expectation, challenges to Hong Kong’s Public Healthcare System are becoming more pressing. Enhancing service quality and safety are key areas of focus. 

Examples of such challenges include:

- **Wrong patient treated for prostate cancer**

  Hospital admits biopsy blunder

- **Wire left in patient’s body after surgery**

  Wire left in patient’s body after surgery

- **Errors spark patient-safety fears**

  The blunders indicate that medical staff have not made patients’ safety the top priority. No doubt urgent action is needed.

- **Baby mix-up inquiry points to 3 staff**

  Baby mix-up inquiry points to 3 staff

- **Hospital admits mixing up blood samples**

  Three-month-old boy suffers burns to more than 12 per cent of his skin

- **Infant scalded in hospital bath**

  Three-month-old boy suffers burns to more than 12 per cent of his skin
Challenges to Hong Kong’s Public Healthcare System

Overstretched Workforce

- Mounting workload as a result of manpower shortages

Doctors say they are worn out by demands

Manpower

Inpatient Episodes

Despite continuous growth in activities, number of HA doctors & nurses has only increased marginally
**HA’s Strategic Directions to Address Challenges**

*Driving Quality, Performance & Cost-effectiveness*

<table>
<thead>
<tr>
<th>Strategic Intent (What we want to achieve)</th>
<th>Strategic Directions (Where we are going)</th>
</tr>
</thead>
</table>
| Better able to manage growing demand      | • Increase capacity  
                                          • Keep people healthy  
                                          • Divert demand |
| Better service quality and safer services | • Do no harm  
                                          • Promote patient-centred care  
                                          • Continuous service improvement |
| Nurture a skilled and high performing workforce | • Engage staff  
                                           • Enhance workforce capacity |
Sustaining Quality Care Through Effective Resource Allocation

Introduction of Pay-for-Performance Internal Resource Allocation Model at HA

Ms Nancy Tse
Director (Finance)
Hospital Authority, Hong Kong
• Hong Kong’s financing system for healthcare – An Overview

• Evolution of HA’s internal resources allocation system

• Introducing “Pay For Performance” at HA

• Overcoming challenges – Our P4P implementation journey

• HA’s performance since P4P
• Hong Kong’s financing system for healthcare – An Overview

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Hong Kong’s Healthcare Financing System

- Monetary Flows
  - Taxes
  - Premiums

- Service Flows
  - Global Budgets
  - Fee for Service
  - User Charges
  - Health Services

- Government
  - Budgets
  - Healthcare Services

- Private Insurance
  - GPs / Specialists
  - Hospitals
  - Private / Public

- Taxpayers / Employers
  - Patients

- User Charges
  - Health Services
Funding for Hospital Authority

HA’s expenditure budget in 2011-12 is over US$5 Billion

Source of Funding

- ~92% Government subvention
- ~6% Fee income
- ~2% Other income
HA, as a Responsible Public Healthcare Provider in Hong Kong, Shall...

... use hospital beds, staff, equipment and other resources efficiently to provide hospital services of the highest possible standard within the resources obtainable ...

Hospital Authority Ordinance
Cap 113, Section (4)
Providing equitable and accessible quality public healthcare services to the entire Hong Kong population so that “no one would be denied adequate healthcare through lack of means”

Reference:
Healthcare Reform Second Stage Consultation Document “My Health My Choice”
Food & Health Bureau, Hong Kong SAR
Yet, Government Funding to HA Depends on Economic Performance

Asia economic crisis

SARS Epidermic

$29.4B (01/02)
$27.3B (05/06)
$31.1B (08/09)
HA: From Funding to Service Output (2011/12)

**Funding**
- Govt subvention (92%)
- Fee income
- Other income

**Input**
- Manpower: >60,000 staff
- Other recurrent expenditure: e.g. drugs, medical supplies, maintenance etc
- Recurrent expenditure: ~ US$5 Billion

**Size of Operation**
- 41 public hospitals and institutions (~ 27,000 beds)
- 48 Specialist Out-Patient Clinics
- 74 General Out-patient Clinics

**Annual Service Output (N1)**
- Inpatient and day patient discharges: 1.4M
- Accident and emergency visits: 2.3M
- Specialist out-patient attendances: 8.7M
- General out-patient attendances: 5.2M

*N1: Based on 2011-12 Controlling Officer’s Report (COR) - Head 140*
• Hong Kong’s financing system for healthcare – An Overview
• Evolution of HA’s internal resources allocation system
• Introducing “Pay For Performance” at HA
• Overcoming challenges – Our P4P implementation journey
• HA’s performance since P4P
Historical / Facility-based Model

before re-organization of hospitals into geographical clusters

- Allocations to hospitals based on preceding years’ baseline budget plus
- New funding for opening new beds/facilities

Example:

- Hospital 1
- Hospital 2
- Hospital 3

- Not conducive in reducing avoidable hospitalization to improve efficiency (e.g. replacing inpatient treatment by ambulatory and day services)
- Reinforced any historical unfairness in funding allocation
Aged-Adjusted Population-based Model
to pay cluster for the population it serves

- Budget allocation to clusters based on their respective share of age-adjusted population

Example:

- Cluster A
- Cluster B
- Cluster C
Limitations with Population-based Model

(1) Mobility of “Cluster Population”

- No geographical boundaries between clusters
  - e.g. patients living in one cluster may seek medical service from other clusters closer to their workplace
- Patients cannot be denied treatment in another cluster
- Cross-border flows from Mainland China

Example:

Cluster A  | Cluster B  | Cluster C
---|---|---
Actual Patients Treated
Allocated Resources based on population

Adequate reflection of resource needs for cross-cluster / border patient flows?
Limitations with Population-based Model

(2) Variation in Casemix and Treatment Complexity

- Case complexity varies across hospitals / clusters
- Hospitals with more complicated cases ⇒ heavier workload; more resource required

Example:

Population Profile

Cluster A

Cluster B

Allocated Resources based on population

Same population size & profile but different complexity

Consideration of resource implications for treating more complex cases?
Other Shortfalls with Population-based Model

- Lack of a common unit for throughput measurement and performance monitoring, i.e., unable to drive resources to target areas of need
- Inadequate incentive or reward to drive quality and efficiency
- Inconsistent with international trend, e.g., activity-based or outcome-based system
Thus, HA Needed to Modernize its Resource Allocation System to:

- Promote efficiency and productivity improvement
- Better reflect HA’s effective use of public money → accountability to the Government (transparency)
- Address shortfalls in its population-based model
- Ensure long term financial sustainability
Guiding Principles in Developing a New Resource Allocation System

- Transparent allocation of funds based on patients treated
- Pay hospitals extra for treating more patients
- Target extra resources to community’s highest priority needs
- Offer incentive to benchmark & introduce service innovations to improve patient care
- Benchmark with private sector e.g. public-private partnership
Taking References From Overseas Models

• United Kingdom: “Payment By Results”

  A tariff-based hospital payment system that encourages the provision of effective care in the most appropriate setting, support patients’ choices and rewards hospitals fairly for the number and complexity of patients treated.

  Introducing payment by results, Health National Report, Audit Commission 2004, UK

• United States of America: “Pay-4-Performance”

  “The use of incentives to encourage and reinforce the delivery of evidence-based practices and health care system transformation that promote better outcomes as efficiently as possible.”

  Christopher B. Forrest, Victor G. Villagra and James E. Pope
  John Hopkins Bloomberg School of Public Health / American Healthways Inc
  Nov 2006
Developed a new Internal Resources Allocation System for HA – “Pay for Performance”

Developed a new Internal Resources Allocation System for HA – “Pay for Performance”

HA Recurrent Budget

Before 2003/04
Historical / facilities based

2003/04 – 2008/09
Age-adjusted population based

2009/10 – now
Pay-for-Performance (P4P)
• Hong Kong’s financing system for healthcare – An Overview

• Evolution of HA’s internal resources allocation system

• Introducing “Pay For Performance” at HA

• Overcoming challenges – Our P4P implementation journey

• HA’s performance since P4P
Performance (P4P) = G + Q + STW

- Aims to promote **productivity & quality improvement** thru a fair & transparent mechanism

Facilitates strategic purchasing
“Same service, same price” (using costing as the basis)

Promotes productivity & quality
HA’s P4P Model
Using a Casemix Model for Acute Inpatient Services

- **Target growth funding**
  - Service growth in areas of greatest needs
  - Improve patient safety & quality
  - Service enhancement thru staff development and technology advancement

- **Encourage productivity & efficiency improvement**
  - Shift from **INPUT** to **OUTPUT** performance-based resources allocation
  - Service re-classification / technical efficiency

**“Same Service Same Price”**
Casemix (DRG) as ‘product’ list for purchasing acute inpatient services

**Casemix Costing as a tool for acute inpatient services**
The Casemix Model for HA’s Acute IP Services
For Strategic Purchasing & Efficiency Measurement

Building blocks to HA’s Casemix model:
- A patient classification system (IR-DRG Grouper)
- Clinical Documentation
- Cost Weights
• Hong Kong’s financing system for healthcare – An Overview
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• HA’s performance since P4P
Challenges in Implementing a Casemix System at HA within a 2-Year Timeframe

High level commitment and support

Clinician acceptance and buy-in

Technical readiness
- Good quality clinical & costing data
- Casemix expertise, skills and knowledge
- Robust information system
Overcoming the Challenges....

- **Leadership**
- **Communications**
  - Road shows targeted at various staff levels

- **Clinician engagement**
  - Clinical casemix groups
  - Project governance structure
  - Discussion forums to iron out issues
Other Factors Contributing to HA’s Technical Feasibility in Jump-starting Casemix

• HA’s well-developed clinical IT system
  - Practice of capturing clinical data already in place – Clinical Management System (CMS)
  - Centralized process for developing and installing health information technology

• HA’s established process of corporate-based costing
  - Cost of service by specialties
HA’s Clinical Systems
Track patient’s record throughout care delivery journey

Outcomes
- Coding of discharge diagnosis & procedures
- Drug prescription
- Discharge summary
- Referrals or replies to other clinicians
- Follow-up appointment booking
- Medical reports

Investigations, Diagnosis, Treatment, Procedures
- Radiological exam
- Laboratory tests
- Progress notes
- Family Medicine
- Community care
- In-patient medical
- Outpatient medical
- Order Entry
- Drug - Drug check
- Allergy list
- Nursing Summary
- Psychiatric Summary

Problems
- History taking
- Physical examination

Patient Admitted
- Laboratory orders
- Radiology orders
- Radiology Imaging results
- Operating Theatre Theatre Management / booking

AEIS
- Patient Admission
- Patient Discharge

CMS
- Patient Care
- Psv/Obs
- Organ Transplant

Electronic Patient Record
- Prescription
- Dispensed

Appointment Booking
- Mortuary Info.

Pharmacy Dispensing
- Patient registration
- Ward & bed Assignment
- Record Loan

Med Record Tracing System

Hong Kong Patient Master Index – Patient Administration
HA’s Clinical Systems Comprehensive Capture of Patient Records
• Hong Kong’s financing system for healthcare – An Overview

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Value for Money:
Rising throughput while unit costs remained largely steady

* Annualized growth
Enhanced Efficiency: 
Improvement in Overall Productivity

- Shorter length of stay, treat more patients with same facilities
  ⇒ bedday saving ~ 1,500+ beds

Days

Acute Inpatient Average Length of Stay*

- 2008/09: 3.68 days
- 2009/10: 3.43 days
- 2010/11: 3.34 days

* Based on HA DRG data
Improving Service Accessibility
Treatment of Life Threatening Illness & Diagnostic Services

**Cancer**
Clinical Oncology Services (1)

- **Inpatient headcount**: 10% growth from 08/09 to 10/11
- **Outpatient attendance**: 5% growth from 08/09 to 10/11

**Renal Failure**
Haemodialysis Services (2)

- **Patients headcount**: 3% growth from 08/09 to 10/11

**Computerized Tomography**

- **No. of Examinations**: 7% annualized growth from 08/09 to 10/11

**Magnetic Resonance Imaging**

- **No. of Examinations**: 7% annualized growth from 08/09 to 10/11

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(1) Executive Information System, Hospital Authority
(2) Hong Kong Renal Registry, Hospital Authority
Piloted a Quality Incentive Programme

Implemented 11 Quality Performance Indicators

• To incentivize good performance in quality, to reinforce good practice, focus on barriers to further improve quality, and align priority in the clusters

• Ensure a balanced focus on quantity and quality under casemix-based funding

• Provide incentive to reduce unacceptable waiting time
Dilemma Facing by HA

Promote productivity using Casemix

Pay more for treating more patients

To drive increase in throughput delivery

BUT....

Medical manpower shortages

Fixed global budget from Government

Coding emphasis under Casemix System

To further improve clinical documentation

⇒ add pressure on frontline clinicians
HA Needs to Strike a Balance:
Clinical Quality vs Productivity

... under a public funding environment
In Summary

HA’s P4P is designed under an integrative approach to support corporate objectives:

- Extra funding for hospitals to treat additional patients at strategically priority areas
- High cost clusters required to bring down production cost
- Clinicians acceptance and ownership is critical
- One price for all hospitals based on number of incremental weighted episodes
- Balance between activity growth and quality

Model is still evolving, refinement will continue
Future Development Direction of HA’s Internal Resource Allocation System

- **Continue to develop and refine** an appropriate casemix system for Hong Kong that dovetails with local practices.
- **Further strengthen** robustness of HA’s costing system.
- **Consider to explore** a casemix system for non-acute inpatient and ambulatory services.
Most Importantly.....

Build the right incentives for hospitals to perform
Thank you!
The journey of Casemix Development in HA

Dr Deacons Yeung
Chief Manager (Financial Planning)
Hospital Authority, Hong Kong
“...if you can’t measure, you can’t manage it..”

Edwards Deming
Peter Drucker
And many other leaders
“we need a common language to communicate and engage with stakeholders”
Anonymous
And many other hidden voices
Easily understood, lesser codes, facilitate learning,

Casemix makes sense
HA Casemix model built on ……

Leadership

Clinicians

IT system

Managers
Casemix Project Governance

Project Steering Committee
Chair: CE

- Clinical Committee
  Chair: Sr Clinicians
- Executive Group
  Chair: D(F)
- QP Working Group
  Chair: D(Q&S)
- Development Committee
  Chair: Cluster CE

Casemix Office
The Journey started...

Modernise

Patient Classification

2008 → 2011

CMS → Casemix in acute inpatient service
Choosing a Patient Classification System

Consultancy Report for a new Clinical Costing System for HA

**Adoption** and **Adaptation** for Hong Kong

- IR-DRG (International Refined Diagnosis Related Group)
  - compatible with existing coding practice (i.e. ICD9CM classification) in HA’s clinical information system (CMS)
  - i.e. minimal extra coding / paperwork for doctors
Casemix developed at patient care path

Data Conversion and Coding behind the scene

Patient Admitted → Patient Receives Treatment → Patient Discharged & Doctor Completes Discharge Summary

IR-DRG

Age/gender
Admission date
Discharge date
Discharge destination
Procedure codes: Px1, Px2, Px3..
Diagnosis codes: Principal Dx, Dx1, Dx2, Dx3..

Data Warehouse → Coding of Diagnosis/ procedure via CMS → HACVT
1. Enter the Keyword for the diagnosis

Note: Two Diagnoses Descriptions with the same ICD-9-CM codes

2. Choose Diagnosis from list

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>101</td>
<td>Vincent's angina</td>
</tr>
<tr>
<td>411.0</td>
<td>Post MI angina</td>
</tr>
<tr>
<td>413.0</td>
<td>Angina decubitus</td>
</tr>
<tr>
<td>413.1</td>
<td>Prinzmetal angina</td>
</tr>
<tr>
<td>413.1</td>
<td>Variant Angina</td>
</tr>
<tr>
<td>528.3</td>
<td>Ludwig's Angina</td>
</tr>
<tr>
<td>648.63</td>
<td>Angina pectoris, antepartum care</td>
</tr>
<tr>
<td>648.64</td>
<td>Angina pectoris, postpartum care</td>
</tr>
</tbody>
</table>

[Image of a computer screen showing a list of medical diagnoses with a keyword search interface.]
ICD-9 codes → IR-DRGs not a straight path

Doctor reports diagnoses and/or procedures via CMS

Diagnoses and procedures translates into ICD-9 codes

HACVT

IR-DRG

HACVT / IR-DRG Mapping Table

DRG Classification System

IHF Conference (Dubai Nov 2011)
The Journey continued…

CMS → Casemix in acute inpatient service

System in place to maintain data quality and review Casemix to keep up with latest development
**Casemix Data Quality: Audit in place**

- Un-groupable cases reduced to < 1%

<table>
<thead>
<tr>
<th>Year</th>
<th>Ungroupable Cases</th>
<th>Percentage for all cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-09</td>
<td>23,953</td>
<td>2.0%</td>
</tr>
<tr>
<td>2009-10</td>
<td>709</td>
<td>0.06%</td>
</tr>
<tr>
<td>2010-11</td>
<td>897</td>
<td>0.07%</td>
</tr>
</tbody>
</table>

Casemix started

Audit started
Why review the Casemix?

Modernization of Medical Care

Global

ICD 10 + future versions

Casemix Review

Innovation of treatment

Local
Continuous DRG Classification Review

2009 - Preliminary Review
Focus: Grouping of DRG Families

2011 - 1st Comprehensive Review
Focus: Grouping of CC levels

2nd Comprehensive Review
Focus: Grouping of DRG Families
The Journey continued...

- Modernise
- Enhance
- Patient Classification
- Resource Information

Specialty costing
→ patient level costing

IHF Conference (Dubai Nov 2011)
Development of Relative (Cost) Weights For Disease Episodes

• **Top Down**
  start with general ledger and allocate costs to DRGs by modeling using best available data

• **Bottom up**
  allocate costs to patients and then aggregate patients into DRGs

Leveraging on International Experience:

1. **Most countries start with top down but quickly move towards a more bottom up approach**

2. .....Department of Health strongly supports the use of Patient Level Information and Costing System (PLICS) within the NHS.

*NHS Costing Document Gateway Reference 9006/11400 3 Mar 2009*
HA’s Approach to Development of Cost Weights

- Use information that HA (clinicians and managers) is familiar with
  - specialty cost and length of stay
- Set-up consultative structures to engage hospital management and clinical leaders
- Quality review by clinical leaders
- Commitment to make refinement and way forward
Specialty Costing at HA: Costing Methodology

**Hospital Cost by Specialty**
- **Direct Cost** +
- **Clinical & Non-clinical Support Cost** +
- **Hospital Overhead**

**Hospital Activity**
- Patient day/Treated
- Patient Headcount,
- Attendance/Visit

### Cost buckets
- Direct Specialty (incl. Med, OPH, Surg, O&T, ICU…)
- Anaesthetic
- Cardiac Cath L
- Operating Theatre (incl. surgeons’ PE)
- Pharmacy
- Pathology
- Radiology
- Allied Health
- Medical Devices

### Cost Allocation Parameters

<table>
<thead>
<tr>
<th>Cost Weight</th>
<th>Modeled Cost per DRG (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>900</td>
</tr>
<tr>
<td>1.2</td>
<td>2,160</td>
</tr>
<tr>
<td>2.0</td>
<td>3,600</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
</tr>
<tr>
<td>…</td>
<td>…</td>
</tr>
</tbody>
</table>

**Average Cost per DRG**
- 1,800 = 1 WE*

***WE=Weighted Episode**
What is the currency in Casemix?

Patient Episode
1 patient with bone marrow transplantation

Weighted Episode (WE)
~15 WEs

~1 WE

1 patient with burns
The Journey continued...

- Modernise
- Enhance

2008 to 2011:

- Specialty costing
  → patient level costing

- Casemix to support Govt Subvention and P4P for improving efficiency while sustaining quality
Casemix helped Govt to understand resource pressure
Baseline redistribution to drive efficiency improvement

No redistribution

Baseline

Acute Inpatient
Non-acute Inpatient
Ambulatory Services Community

New Money

Growth
Quality
Service, Technology, Workforce

P4P Program to address specific service gaps

P4P Model since 2009/10
Using Casemix Model to Drive Efficiency

(a) Develop cluster budget for acute inpatient

<table>
<thead>
<tr>
<th>MDC</th>
<th>DRG</th>
<th>No. of Episodes (10/11)</th>
<th>HA Cost Weight</th>
<th>No. of Weighted Episodes</th>
<th>Casemix-Adjusted Budget Per DRG</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>054121</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>$xx Mn</td>
</tr>
<tr>
<td></td>
<td>054122</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>$xx Mn</td>
</tr>
<tr>
<td></td>
<td>054123</td>
<td>XXX</td>
<td>XXX</td>
<td>XXX</td>
<td>$xx Mn</td>
</tr>
</tbody>
</table>

Cluster D Total Casemix Adjusted Budget for IP Acute Service: $223Mn
### Using Casemix Model to Drive Efficiency

#### (b) Casemix efficiency adjustment for baseline budget

<table>
<thead>
<tr>
<th>Clusters</th>
<th>10/11 actual</th>
<th>Casemix-adjusted</th>
<th>Difference (Mn)</th>
<th>Casemix efficiency redistribution (10% of difference)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>192</td>
<td>203</td>
<td>11</td>
<td>1.1</td>
</tr>
<tr>
<td>B</td>
<td>250</td>
<td>225</td>
<td>(25)</td>
<td>(2.5)</td>
</tr>
<tr>
<td>C</td>
<td>252</td>
<td>247</td>
<td>(5)</td>
<td>(0.5)</td>
</tr>
<tr>
<td>D</td>
<td>211</td>
<td>223</td>
<td>12</td>
<td>1.2</td>
</tr>
<tr>
<td>E</td>
<td>201</td>
<td>204</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>F</td>
<td>443</td>
<td>454</td>
<td>11</td>
<td>1.1</td>
</tr>
<tr>
<td>G</td>
<td>306</td>
<td>299</td>
<td>(7)</td>
<td>(0.7)</td>
</tr>
<tr>
<td>Total</td>
<td>1,854</td>
<td>1,854</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

0.1% – 0.5% of cluster’s budget
Baseline redistribution to drive efficiency improvement

P4P Model since 2009/10

Baseline

Acute Inpatient

New Money

Growth

Quality

Service, Technology, Workforce

P4P Program to address specific service gaps

Awarded 1st Prize in Casemix Innovation Award

26th PCSI-Conference Munich

CaseMix: What do we get for our money?

September 15-18, 2010
Enhanced Efficiency: Improvement in Overall Productivity

- Shorter length of stay, treat more patients with same facilities
- \( \Rightarrow \) bedday saving \( \sim 1,500+ \) beds

Days

<table>
<thead>
<tr>
<th>Years</th>
<th>Acute Inpatient Average Length of Stay*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008/09</td>
<td>3.68</td>
</tr>
<tr>
<td>2009/10</td>
<td>3.43</td>
</tr>
<tr>
<td>2010/11</td>
<td>3.34</td>
</tr>
</tbody>
</table>

* Based on HA DRG data
* Exclude Dialysis and Chemotherapy DRGs and cap cases with LOS > 180 days to 180 days
* Data Period: 0910 Vs 1011

**Relative Stay Index (RSI)**

<table>
<thead>
<tr>
<th></th>
<th>RSI (0910)</th>
<th>RSI (1011)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.88</td>
<td>0.87</td>
</tr>
<tr>
<td>B</td>
<td>1.06</td>
<td>1.05</td>
</tr>
<tr>
<td>C</td>
<td>1.02</td>
<td>1.04</td>
</tr>
<tr>
<td>D</td>
<td>0.90</td>
<td>0.92</td>
</tr>
<tr>
<td>E</td>
<td>1.05</td>
<td>1.05</td>
</tr>
<tr>
<td>F</td>
<td>1.05</td>
<td>1.06</td>
</tr>
<tr>
<td>G</td>
<td>0.95</td>
<td>0.94</td>
</tr>
</tbody>
</table>
### Improving Efficiency while sustaining Quality

#### Baseline

<table>
<thead>
<tr>
<th>Strategic Priority Areas</th>
<th>Quality Performance Indicators</th>
<th>Performance Target</th>
</tr>
</thead>
</table>
| Access                   | Waiting time SOPD - routine category  
1. Medicine  
2. Surgery  
3. Psychiatry  
4. Orthopaedics  
Cancer treatment waiting time  
5. Breast cancer  
6. Colorectal cancer | new case booking for routine cases  
75th percentile at 52 weeks | |
| Safety                   | 7. MRSA bacteraemia for acute episodes  
8. Casemix-adjusted unplanned readmission rate | 90% of patients < 55 days from diagnosis to first definitive treatment  
< 0.1258 MRSA bacteraemia in acute beds per 1,000 acute patient days | |
| Specific disease management / integrated care | 9. Fracture hip surgery (pre-op LOS)  
10. DM – HbA1c control in each cluster (combine SOPC and GOPC)  
11. Hypertension - BP control for GOPC patients | 70% of fracture hip surgery with pre-op LOS < 2 days  
35% of DM patients treated in COPD and SOPD with HbA1c of <7%  
65% with BP < 140/90 mmHg | |

#### New Money

- Growth
- Quality
- Service, Technology, Workforce
2010 Performance
QPI 11 Hypertension - BP control for GOPC patients < 140/90mmHg
2010 Performance
QPI 9 Fracture hip surgery with pre-op LOS ≤ 2 days
The Journey continues...

IT DataMart: 1st step to facilitate use of casemix information in performance management
Casemix Datamart Architecture

Source
- Data Warehouse
- Costing
- Others

Casemix Data Mart
- DW Clinical Data
- LOS
- Other Clinical Data
- Costing Data
- DRG Grouped Data
- Cost Weight Data
- Casemix Reporting Data
- Other Manual Data

Management Information
- Data Extraction
  + Analysis for HAHO
  + Data Analysis for Clusters
Productivity (Doctor Staff)

No. of Patients per $10,000 doctor staff cost

IP WEs per $10,000 doctor staff cost
Productivity (Nursing Staff)

No. of Patients per $10,000 nursing staff cost

IP WEs per $10,000 nursing staff cost
Resource used in a disease (selected DRG)

Which way is better?

A culture of sharing of best practice with cost awareness can be facilitated by casemix information.
Workload trend in wards in terms of WE

↑ ↑ ↑ turnover of nurses
The Journey continues...

R&D with clinicians’ engagement to sustain both quality and efficient care
Edwards Deming’s process management theory says that the best way to reduce costs is to improve quality.
Marriage with Clinical Outcome

One embryo idea…

Q as a measure of outcome in one patient episode

\[
Q \times \text{WE} = \text{QWE}
\]

<table>
<thead>
<tr>
<th>Q</th>
<th>WE</th>
<th>QWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>0.8</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>1.2</td>
<td>2.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

Good return

- Clinicians’ engagement is vital
- long term investment
“Can’t you just show me how to use these (casemix) data to do a better job in caring for my patients?”
Traditional Approach - Issues

- Slow to detect and respond (say 3 months later)
\( n^{\text{th}} \) patient

\[
\text{net life saved} = \text{actual outcome} - \text{expected casemix adjusted outcome}
\]

For example, if the projected mortality of \( n^{\text{th}} \) patient is 0.35 and he is eventually discharged home alive (1.00),

the net life saved is \( 1.00 - 0.35 = 0.65 \)
Casemix adjusted outcome monitored within control limits

Control limits based upon Markov Chain Monte Carlo Simulation
(10,000 iterations of 10,000 sequential events)

- Expect 1 false positive signal every 1,200 cases
  (1 every 2 or 3 years for most hospitals)

- Detect a doubling of the odds ratio
Performance can be reviewed in runs of bad
The Journey continues…

**Modernise**
- Patient Classification

**Enhance**
- Resource Information

**Facilitate**
- Operation Management

**Evaluate**
- Clinical Outcome

2008 → 2011

**CMS → Casemix in acute inpatient service**

- System in place to maintain data quality and review Casemix to keep up with latest development

**Extend casemix to non-acute service?**

**Specialty costing**
- → patient level costing

**Casemix to support Govt Subvention and P4P for improving efficiency while sustaining quality**

**IT DataMart: 1st step to facilitate use of casemix information in performance management**

**R&D with clinicians’ engagement to sustain both quality and efficient care**
“Casemix information is the tool we have used to facilitate…….”
The team behind all these