PowerHealth

AN INTRODUCTION TO PATIENT LEVEL COSTING AND DATA ANALYTICS

Reykjavík

PRESENTED TO

PCSI CONFERENCE
SEPTEMBER 27, 2022

BY

CHARLES COCKBURN, COSTING ANALYST, POWERSANTÉ
MARC HYNDMAN, DATA ANALYTICS MANAGER, POWERSANTÉ
CHRISTIAN PEPIN, COSTING MANAGER, POWERSANTÉ

ABOUT THE PRESENTERS

Christian Pepin

- Manager, Costing analysts
- With PHS for 5 years, mainly dedicated to Québec province Costing project
- Manager in the public health network (many programs)
- Performance tools, projects, improvement processes

Marc Hyndman

- Manager, Data Analytics
- With PHS since 1977
- Over 25 years' experience in analysis and improvement of clinical, financial and organisational performance in healthcare, working with consulting firms, health care organisations and as independent consultant

Charles Cockburn

- Charles is a Senior Costing Analyst
- With PHS for over 4 years
- Case Costing in Province of Quebec, Saskatchewan
- Data Submission Frameworks, Performance BI tools

Presenters of this workshop are employees of PowerSanté, the Canadian office of Australian company PowerHealth Solutions (PHS).

In 2020, PHS entered a Joint Venture with Telstra Health Pty Ltd., subsidiary Telstra Corporation Ltd.

ABOUT YOU

From ?

- How many people from Iceland ?
- Europe, America, Asia, Africa ?
- Finance people ?
- Quality/performance people ?
- IT people ?
- Health managers ?
- Clinicians ?
- Healthcare authority officials ?

PLC knowledge

From a scale of 1 to 5 where:

- 1 is : I do not know anything about Patient level costing
- to
- 5 : I am an expert in that field

- How many 5-4-3-2-1 ?

Data analytics knowledge

From a scale of 1 to 5 where:

- 1 is : I do not know anything about Data analytics
- to
- 5 : I am an expert in that field

- How many 5-4-3-2-1 ?

WORKSHOP OBJECTIVES

Part 1 – Patient Level Costing

- Understand what Patient Level Costing is and how its data can be used to better manage healthcare facilities
- Understand the concept of the GL Cost Allocation process, including
  - The concept of Overhead and Patient Care Cost Centres
  - The use of Cost Allocations statistics such as Floor Area, Number of Meals Served, etc
  - The need to refine the GL for Patient Costing purposes
- Understand the types of data feeds used in Patient Level Costing
- Understand the concept of Relative Value Units (RVUs) / weights and their application to Patient Costing
- Understand the concepts of loading, processing and reconciling patient level and general ledger data.

Part 2 – Data Analytics

- Understand the methods for analysing Patient Level Costing results to improve financial performance
- Understand the methods for analysing the variability and quality of clinical practices from the Patient Level Costing results
- Understand the methods for using the Patient Level Costing results to document best practices and to support value-based management of care and services

WORKSHOP AGENDA AND APPROACH

Agenda

- Patient Level Costing — 75 min
  - Presentation — 35 min
  - Case study throughout presentation — 30 min
  - Conclusion — 10 min
- Break — 10 min
- Data Analytics — 75 min
  - Presentation — 30 min
  - Case study - Small Group Exchanges — 20 min
  - Presentation (con't) — 25 min
  - Conclusion — 5 min
- Overall Wrap-up and Questions — 15 min

Approach : Interactive and participatory

- Presentations with open questions to audience
- Case studies and work in small groups (up to 10 people per group)
- Questions during presentations welcomed

STARTING QUESTION

People who said sooner “I am a 2, 3, 4 or 5 !”:

In your own words, how would you describe Patient Level Costing to a person who did not work in healthcare?

What are the key words associated with the concept?

JARGON BUSTER

JARGON BUSTER

Term	Meaning
Bottom Up Costing	Refer to Patient Level Costing.
BI	Business Intelligence
Casemix	A broad term referring to the tools and information systems used to assist in activities such as planning, benchmarking, managing and funding healthcare services.
Casemix Classification System	A system used to identify the different types of patients treated. Will generally have 3 overriding principles; Manageable Number of Groups, Clinically Meaningful and Resource Homogenous. The DRG system is the most widely used.
Clinical Costing	Clinical Costing is the process of calculating the costs associated with delivering care to individual patients. Includes both Patient Level costing and Cost Modelling.
Clinical Costing Standards	Standards developed to provide best practice guidance on deriving cost data. They reflect the methodologies and processes used to derive patient level costs. Generally will be developed nationally, eg Australian Hospital Patient Costing Standards, Version 4.1, August 2021. And Quebec's Cost allocation methodological sheets, Version 2021-2022
Conditional Service Weight	A Relative Intensity Weight used where it is known that a particular patient received a service, although the number of services is not known, e.g., using ACHI codes to identify patients who have received Physiotherapy services
Cost bucket	Standard groupings of expenses used for reported patient level costs (ex., groupings of clinical departments or cost categories)
Cost driver	A cost driver is the direct cause of a cost and its effect is on the total cost incurred

JARGON BUSTER

Term	Meaning
Cost Modelling	Application of mathematical principles to the calculation of resource use and costs in healthcare. Often referred to as 'Top-Down' costing.
Cost Output	Rollup of like account codes to a higher level, eg Nursing Salaries, Medical Salaries, Drugs, Medical Supplies, etc, that is visible in Patient Level Costing.
Cost Weight / Relative Intensity Weight	Usually relates to the use of a DRG Classification System. It is the measure of the relative cost of a DRG compared to all other DRGs. Generally, the average cost across all DRGs is chosen as the reference value, and given a weight of 1.
Direct Cost	A cost that was originally in a Patient Care Cost Centre, eg Nursing Salaries, Med/Surg Supplies, Drugs, etc.
DRG	Diagnosis Related Groups. A casemix classification used internationally, e.g. AR-DRG, G-DRG, NordDRG, DkDRG, APR-DRG, CMG+, HRG.
FTE/WTE	The ratio of the total number of paid hours during a period (part time, full time, contracted) by the number of working hours in that period. The ratio units are Full Time Equivalent (FTE) or Whole Time Equivalent (WTE) units of employees working full-time. In other words, 1 FTE is equivalent to one employee working full-time. In a normal 40 hour week, two employees who work 20 hours each per week would be classified as 1 FTE together or 0.5 FTE individually
Fully Absorbed GL	The end result of the GL Cost Allocation process when all Overhead costs have been removed and allocated to Patient Care cost centres.
GL Cost Allocation Statistic	A statistic that is used to allocate costs from an Overhead cost centre down to the Patient Care cost centres, eg Floor Area, FTE, GL Expenditure, Headcount, etc.
Indirect Cost	A cost that has been assigned to a Patient Care cost centre as a result of running the GL Cost Allocation process, e.g., it is an 'Overhead' cost.

JARGON BUSTER

Term	Meaning
KPI	Key Performance Indicator
MDC	Major Diagnostic Category. Generally relates to a DRG classification system whereby like DRGs are rolled up to a single organ system or aetiology associated with a particular medical specialty, eg Orthopaedics, Respiratory, etc.
Outlier	An outlier is an observation that lies an abnormal distance from other values in a random sample from a population
Overhead Cost Centre	A cost centre that does not provide direct patient care, eg Finance, Payroll, HR, Cleaning and Building & Engineering Services, etc.
Patient Care Cost Centre	A cost centre that provides direct patient care, eg Wards, Medical Departments, Diagnostic Services, Allied Health, etc.
Patient Level Costing	The process of calculating the costs associated with delivering care to individual patients by recording and costing the services that they receive. Often referred to as 'Bottom-up' costing.
Patient Costing Allocation Statistic	A statistic that is used to allocate the Fully Absorbed GL expenditure, for a given Patient Care Area, down to patient services it provides, eg Duration, Actual Cost, Quantity, RVU value, etc.
PREM	Patient-reported experience measure
PROM	Patient-reported outcome measure

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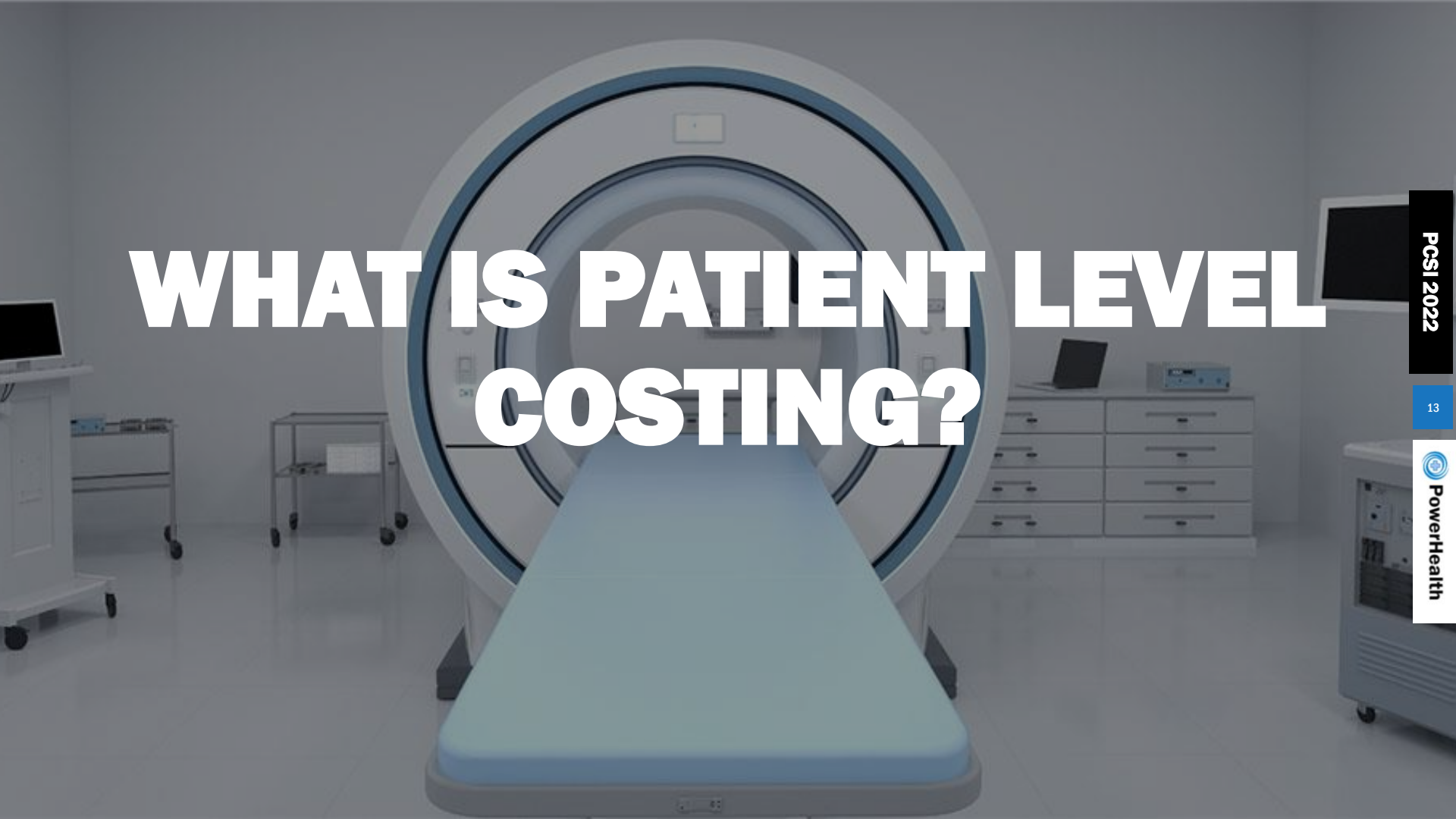
Term	Meaning
RVU	Relative Value Unit. Establishes a standard measure of treatment intensity based upon; the complexity of the procedure; the resources consumed; and the time spent delivering the service.
Service Code	An indicator of the intervention or service provided to a patient, eg CSR, FBP, MRI, etc. In Patient Costing terminology a Service Code may also include additional elements to aide in the mapping of the service to the appropriate Patient Care Area or include information to facilitate the costing of a service. For example the Service Code of 'MRI' may be prefixed by 'Imaging-' , whilst a Ward Transfer record may incorporate the prefix 'Ward Hours-' followed by the Ward Code, followed by the DRG, eg Ward Hours-DIAL-L61Z.
Service Weight	The relative resource use for a given DRG compared to other DRGs for a particular *service*, eg Imaging, Pathology, Nursing, Theatre, Implants, Allied Health, etc. Calculated in two ways; Conditional (it is known that a patient received a service) and Unconditional (it is not known whether a patient received a service)
Severity level	Indicates the presence of important interactive factors, comorbidities or complications (degree of physiological decompensation), which influence the intensity of services required for the care provided to the user. Each DRG is associated with a severity level ranging from 1 (low) to 4 (very high)
Top Down Costing	Refer to Cost Modelling
Unconditional Service Weight	A weight used when it is not known whether a patient received a service or not.
Value-based healthcare (VBHC)	Value-based health care's central tenant is that value for patients must be the overarching principle in the organisation and management of health care delivery systems. Value is defined as the outcomes that matter to patients and the costs to achieve those outcomes. To achieve value for patients, health care delivery needed to be organized around the medical conditions patients have, accurately measure the outcomes that matter to patients, and measure the cost to achieve them. Payment should reflect value and not volume.

JARGON BUSTER

Term	Meaning
WIP	Work In Progress. Activity that relates to Encounters that have not yet been discharged, or were discharged after the Costing period, or commenced before the start of the Costing period
WTE	Whole Time Equivalent (refer to FTE).

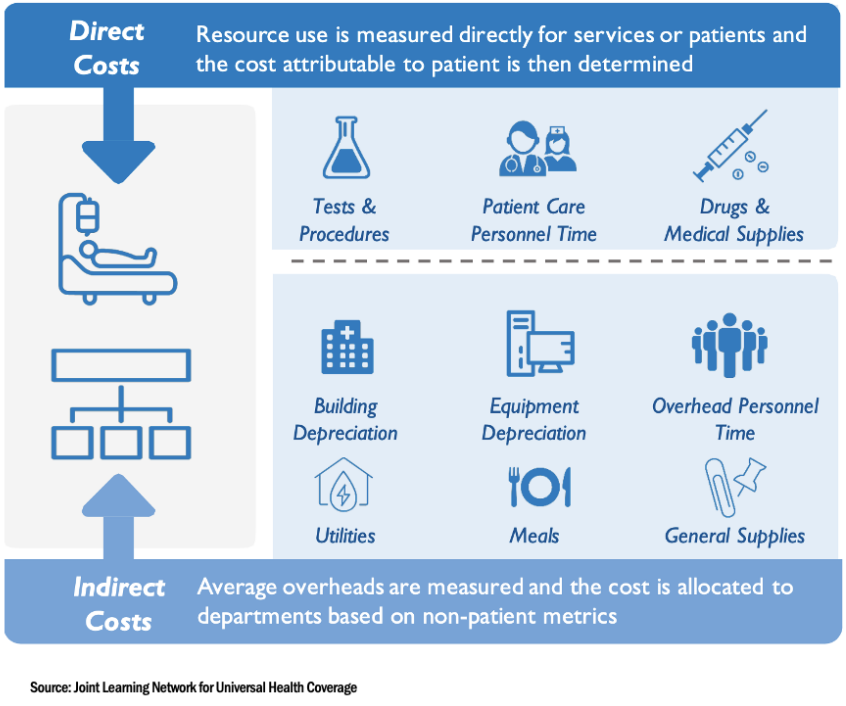


WHAT IS PATIENT LEVEL COSTING?

PowerHealth

WHAT IS PATIENT LEVEL COSTING (PLC)

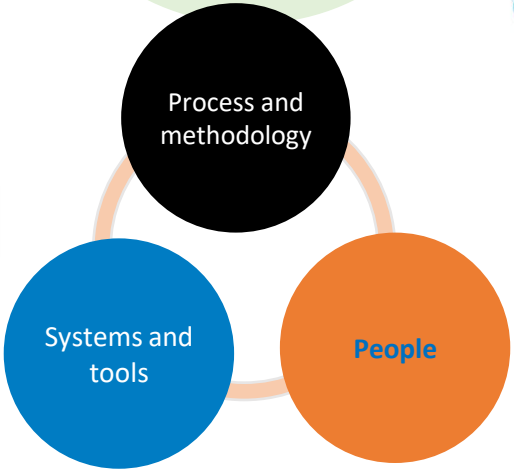
WHAT IS PATIENT LEVEL COSTING?



Source: Joint Learning Network for Universal Health Coverage

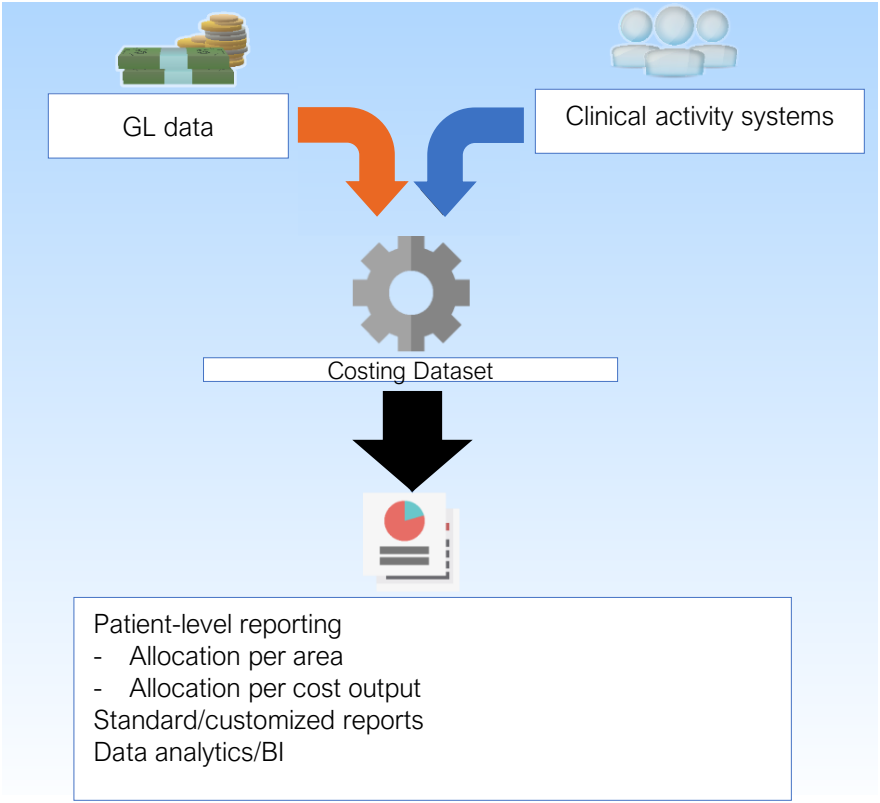
It is about matching the activity to the costs incurred in producing that activity.

PLC is about:



It is a *journey* that develops over time

COSTING PROCESS OVERVIEW



AS DATA IS A FUNDAMENTAL KEY: QUESTION – WHAT IS WORK PERFORMED?

What kind of work performed in a Hospital is typically captured electronically at the Patient Level?

What kind of work performed in a Hospital is *not* typically captured electronically at the Patient Level?

MAIN PATIENT LEVEL COSTING APPROACHES

Patient level costing is about matching the activity to the expenses incurred in producing that activity.

Bottom-up Costing

- Patient Level costs are built up by costing the individual services that each Patient receives
- Each Drug, Imaging Exam or Laboratory Test that a patient receives is costed
- The cost for each Patient is made up from the Number of Services received multiplied by the Cost of each Service

Where specific Patient Level utilisation data is not available, *Cost Modelling*, *Average Costing* or *Top-down Costing* can be used

Cost Modelling *(Top-down)*

- A resource utilisation indicator, such as a Resource Intensity Weight (RIW), is applied to all patients in a given DRG.
- the RIW for a given Patient (based on their DRG), is multiplied by the Number of Units received to give a Weighted Quantity
  - e.g., Days or Hours
- The Weighted Quantity for all patients is summed and that amount is divided into the GL $ amount to be allocated, to give a Cost / Weighted Quantity
- This amount is then allocated to all patients based on their Weighted Quantity

MAIN PATIENT LEVEL COSTING APPROACHES

Patient level costing is about matching the activity to the expenses incurred in producing that activity.

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Where specific Patient Level utilisation data is not

Cost Modelling *(Top-down)*

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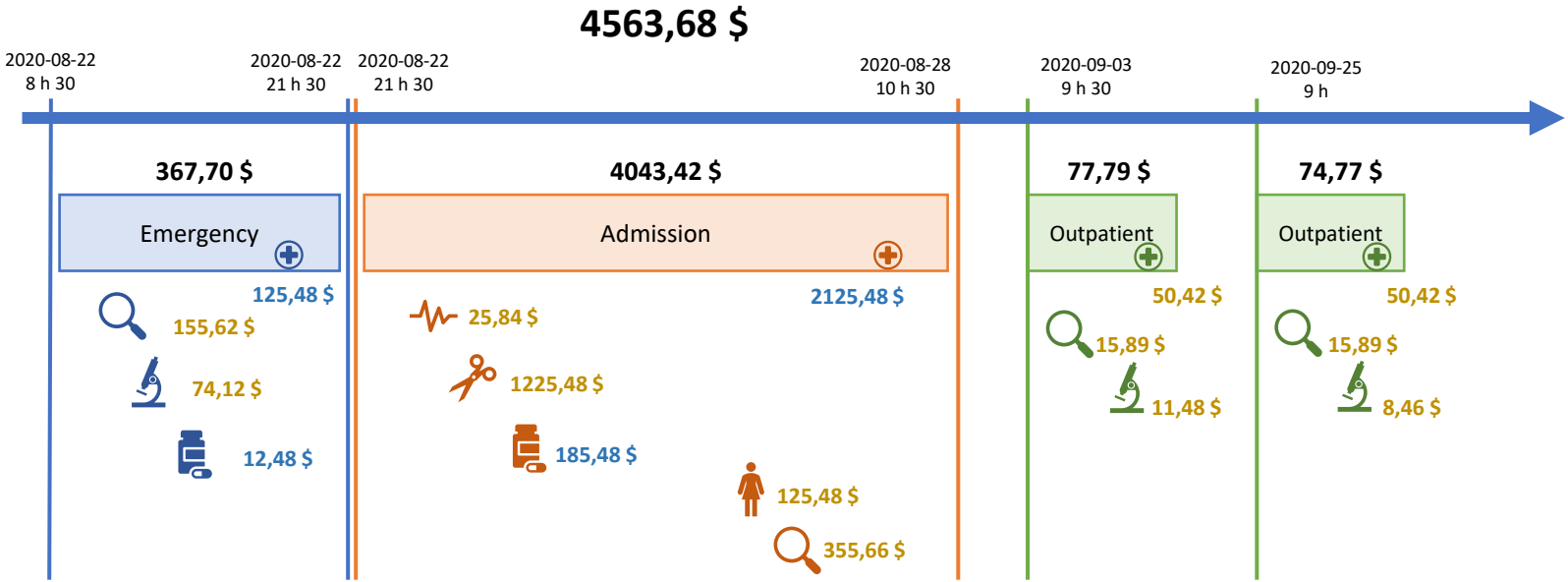
- The Weighted Quantity for all patients is summed and that amount is divided into the GL $ amount to be allocated, to give a Cost / Weighted Quantity
- This amount is then allocated to all patients based on their

The significant benefit of Bottom-up Costing is that each Patient's cost is based on what services they actually received, whereas Top-down Costing, assigns the same cost to each patient in a given DRG, regardless of how many services they actually received

TRAJECTORY OF CARE - [redacted]

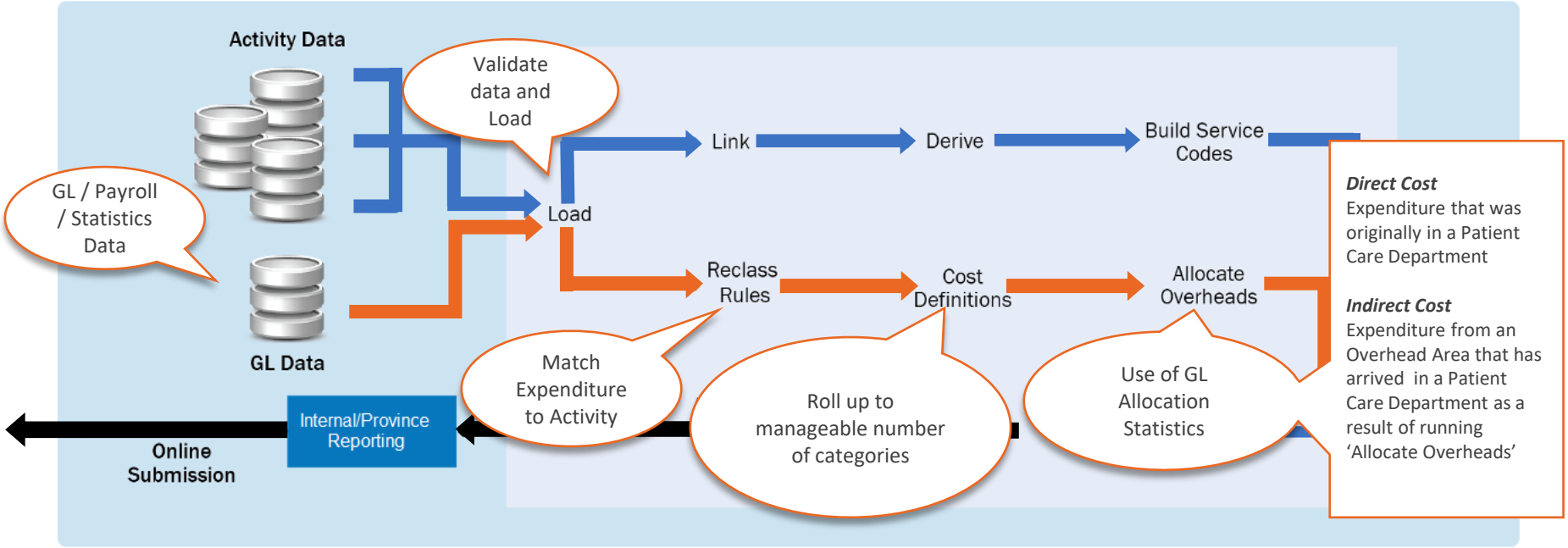


Costing is usually a mix of bottom-up and top-down approaches

Imagery · Laboratory · Pharmacy · Other diag. · Allied health · Theater · Nursing and attendants

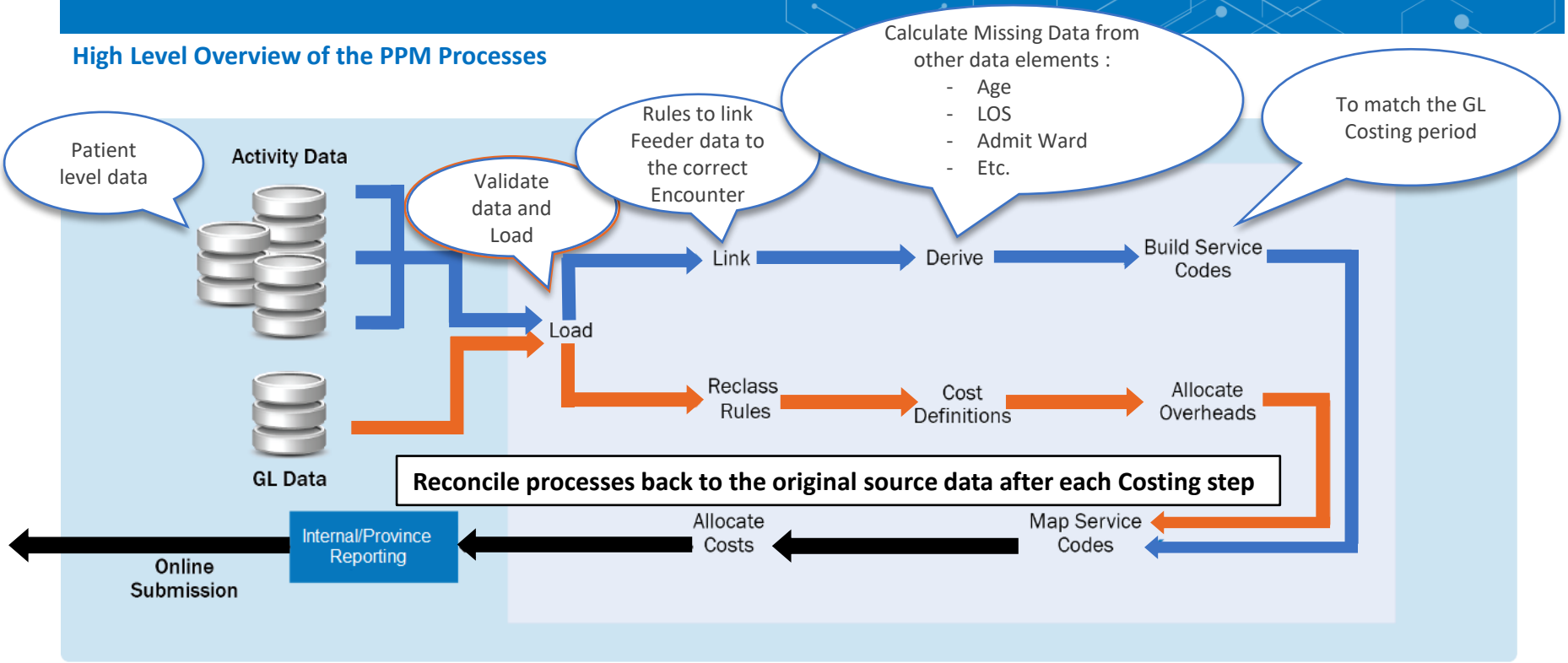
PATIENT LEVEL COSTING SYSTEM

High Level Overview of the PPM Processes



PATIENT LEVEL COSTING SYSTEM

High Level Overview of the PPM Processes



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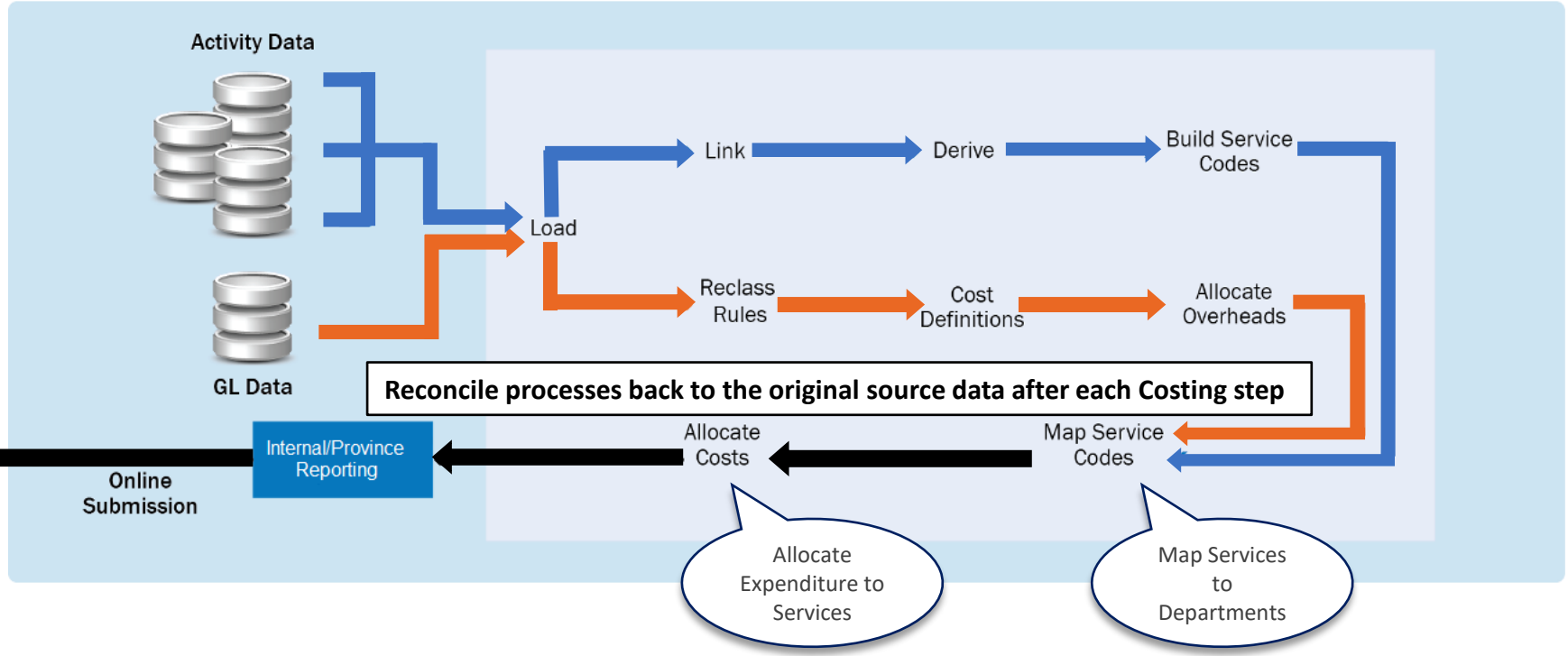
High Level Overview of the PPM Processes

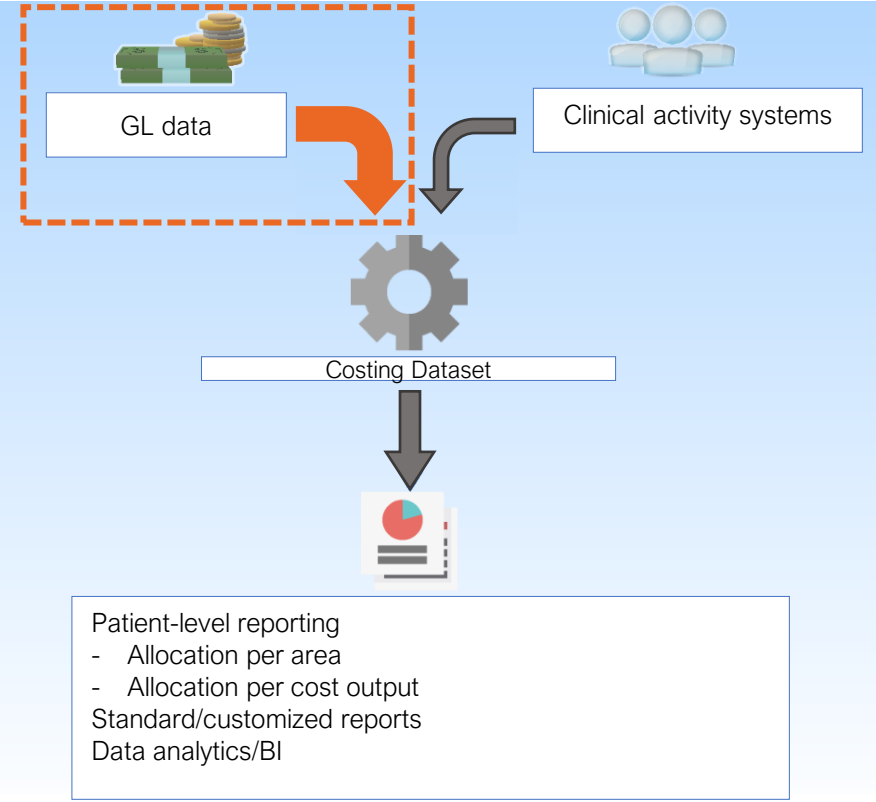


GL
MAJOR PROCESSES

MAJOR GL SET-UP PROCESSES

From a detailed General Ledger used for accounting purpose

To a General Ledger for costing purpose



MAJOR GL SET-UP PROCESSES

Regular GL Account level is too detailed:

- Regular Nursing salaries
- Overtime Nursing salaries
- Premiums-Nursing
- Holidays-Nursing
- Annual leaves-Nursing
- Sick leaves-Nursing
- Govern. Programs-Nursing
- …

Hundreds of Accounts
Useful for accounting, budgeting, periodic follow-up

Roll-up to Cost Category:

- Nursing salaries

30 to 50 Cost Categories
In an accessible language for clinicians

MAJOR GL SET-UP PROCESSES

Regular GL Cost Centre may be too detailed:

- Surgical ward 5B
- Intensive Care Unit
- General Radiology
- Pathology Laboratory
- Finances – accounts payable
- Finances – budgeting advisors
- Human Resources – hiring
- Human Resources – sick leaves
- …

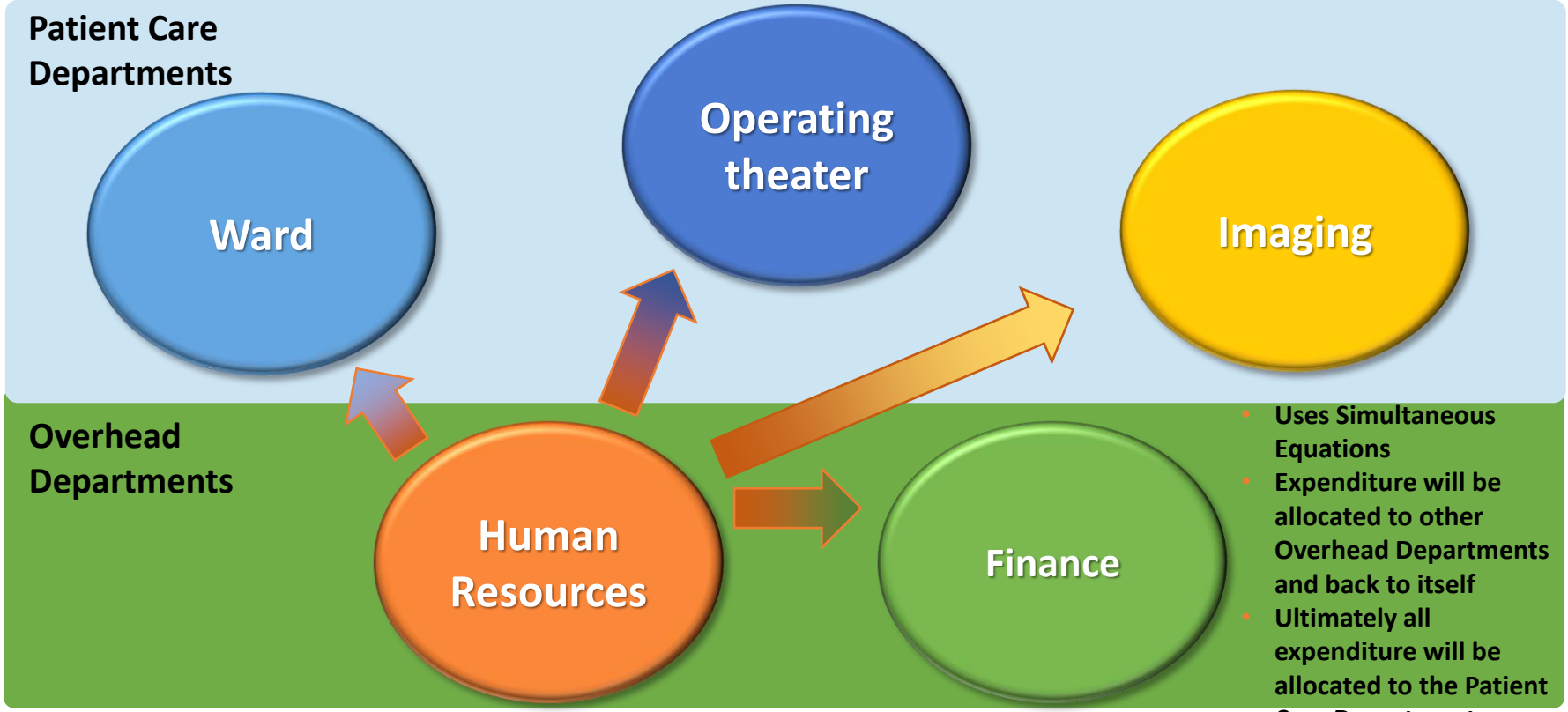
Hundreds of CostCentre depending of the size of the organisation

Roll-up to Departments:

- Surgical ward 5B
- Intensive Care Unit
- General Radiology
- Pathology Laboratory
- Finances
- Human Resources

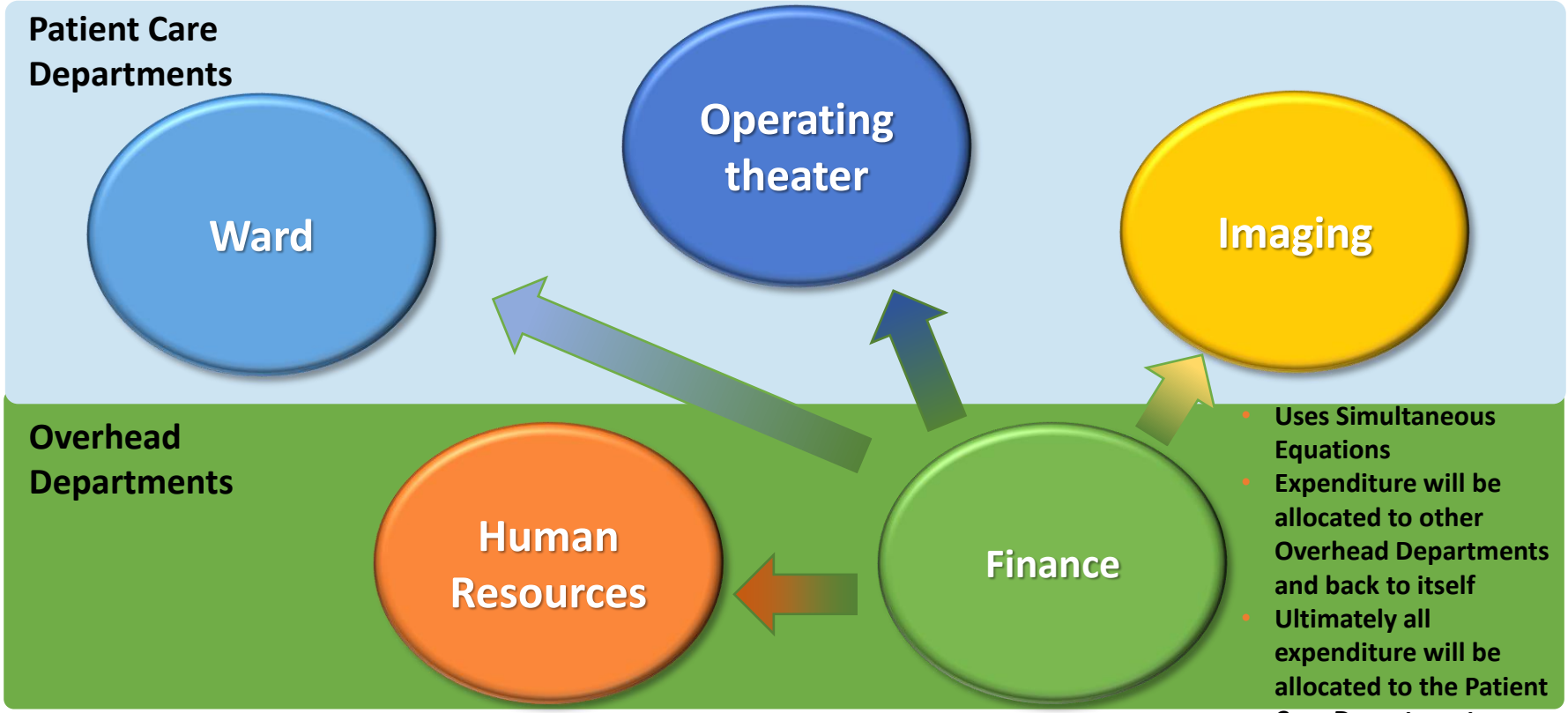
- Usually one to one relation between clinical Cost Centre and Department (or roll-up as needed)
- Roll-up for overhead Departments

ALLOCATING OVERHEAD EXPENDITURE - PROCESS



- Uses Simultaneous Equations
- Expenditure will be allocated to other Overhead Departments and back to itself
- Ultimately all expenditure will be allocated to the Patient Care Departments

ALLOCATING OVERHEAD EXPENDITURE - PROCESS



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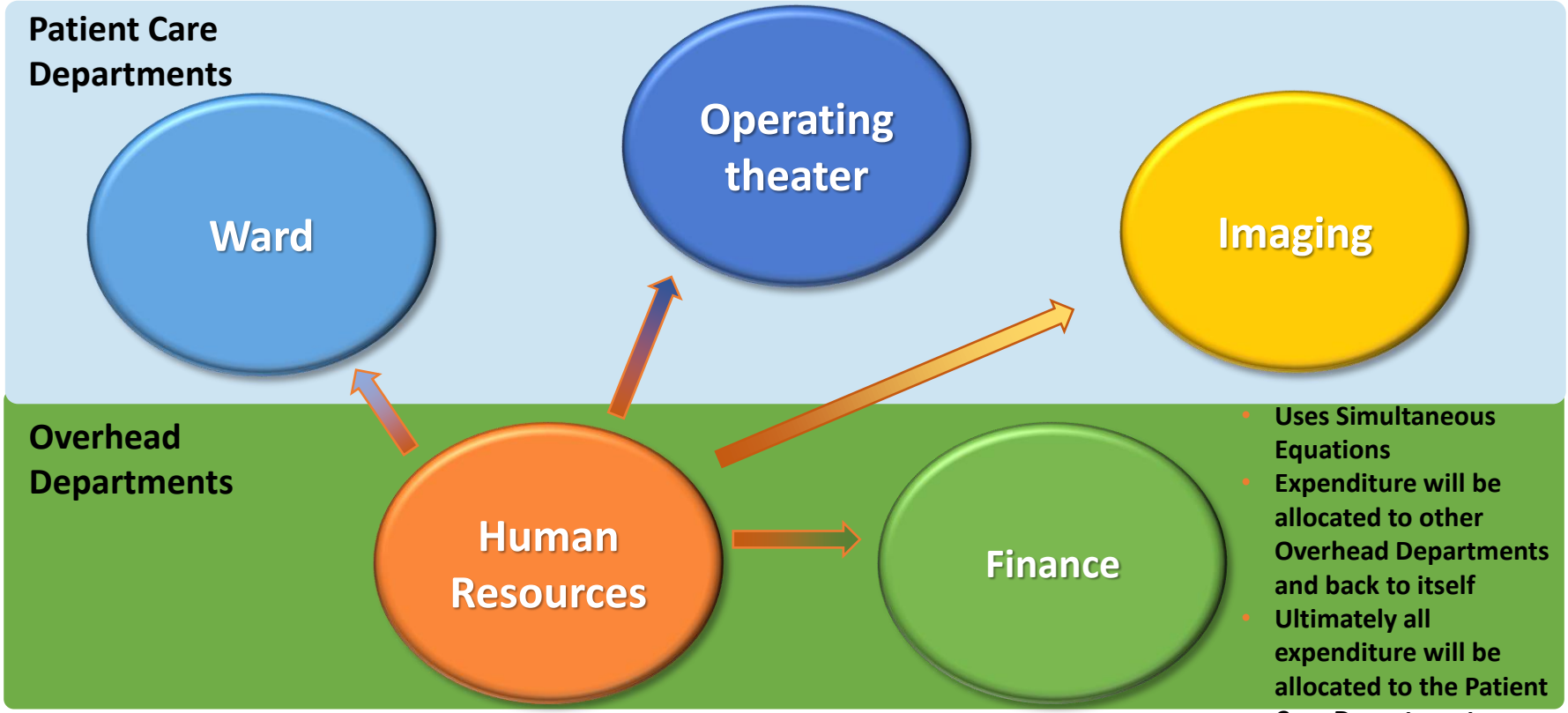

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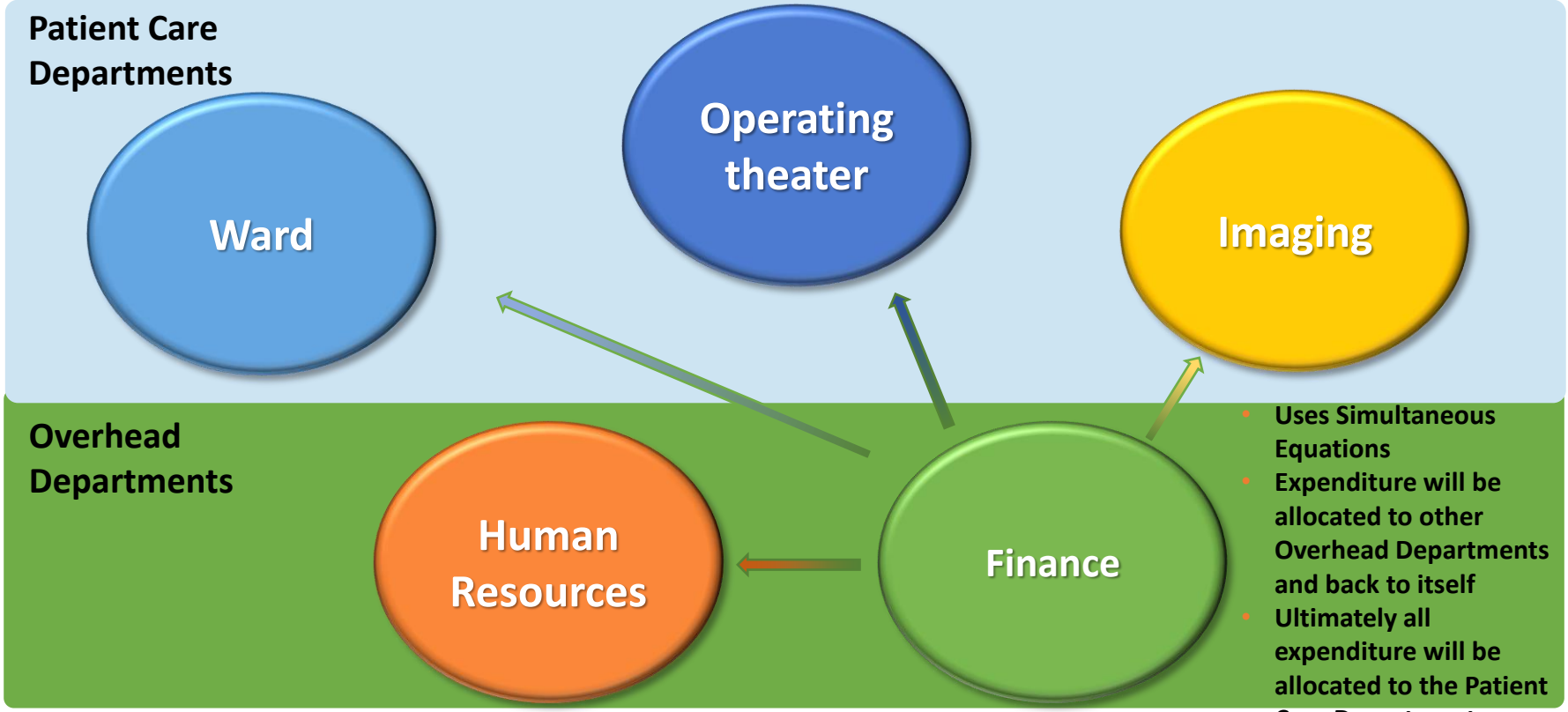

CASE STUDY – GENERAL LEDGER

Allocate Overhead expenses to Patient Care Departments

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Overhead Allocation

GL Before Overhead Allocation

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GL after Overhead Allocation – Fully Absorbed, expenses only

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P			
Imaging-General Radiology	SUPP-Clinical Supplies	P			
Imaging-General Radiology	SAL-Professional	P			
Imaging-General Radiology	SUPP-Office Supplies	P			
Nursing-ICU	SAL-Nursing	P			
Nursing-ICU	SUPP-Clinical Supplies	P			
Nursing-ICU	SAL-Professional	P			
Nursing-ICU	SAL-Technician	P			
Nursing-ICU	SUPP-Office Supplies	P			
Nursing-Ward 5B	SAL-Nursing	P			
Nursing-Ward 5B	SUPP-Clinical Supplies	P			
Nursing-Ward 5B	SAL-Professional	P			
Nursing-Ward 5B	SAL-Technician	P			
Nursing-Ward 5B	SUPP-Office Supplies	P			
OT-Operating Theatre	SAL-Nursing	P			
OT-Operating Theatre	SAL-Professional	P			
OT-Operating Theatre	SAL-Technician	P			
OT-Operating Theatre	SUPP-Office Supplies	P			
OT-Implants	SUPP-Implants	P			

Overhead Allocation

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Imaging-General Radiology	SUPP-Office Supplies	P	-		
Nursing-ICU	SAL-Nursing	P	3500		
Nursing-ICU	SUPP-Clinical Supplies	P	950		
Nursing-ICU	SAL-Professional	P	-		
Nursing-ICU	SAL-Technician	P	-		
Nursing-ICU	SUPP-Office Supplies	P	-		
Nursing-Ward 5B	SAL-Nursing	P	8500		
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000		
Nursing-Ward 5B	SAL-Professional	P	-		
Nursing-Ward 5B	SAL-Technician	P	-		
Nursing-Ward 5B	SUPP-Office Supplies	P	-		
OT-Operating Theatre	SAL-Nursing	P	1500		
OT-Operating Theatre	SAL-Professional	P	-		
OT-Operating Theatre	SAL-Technician	P	-		
OT-Operating Theatre	SUPP-Office Supplies	P	-		
OT-Implants	SUPP-Implants	P	500		

Overhead Allocation by Worked Hours

Allocation Statistic

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Worked Hours	Worked Hours		
Nursing-ICU	UNI-Worked Hours	Worked Hours		
Nursing-Ward B	UNI-Worked Hours	Worked Hours		
OT-Operating Theatre	UNI-Worked Hours	Worked Hours		
OT-Implants	UNI-Worked Hours	Worked Hours		

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Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380		
Imaging-General Radiology	SUPP-Clinical Supplies	P	50		
Imaging-General Radiology	SAL-Professional	P	-		
Imaging-General Radiology	SUPP-Office Supplies	P	-		
Nursing-ICU	SAL-Nursing	P	3500		
Nursing-ICU	SUPP-Clinical Supplies	P	950		
Nursing-ICU	SAL-Professional	P	-		
Nursing-ICU	SAL-Technician	P	-		
Nursing-ICU	SUPP-Office Supplies	P	-		
Nursing-Ward 5B	SAL-Nursing	P	8500		
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000		
Nursing-Ward 5B	SAL-Professional	P	-		
Nursing-Ward 5B	SAL-Technician	P	-		
Nursing-Ward 5B	SUPP-Office Supplies	P	-		
OT-Operating Theatre	SAL-Nursing	P	1500		
OT-Operating Theatre	SAL-Professional	P	-		
OT-Operating Theatre	SAL-Technician	P	-		
OT-Operating Theatre	SUPP-Office Supplies	P	-		
OT-Implants	SUPP-Implants	P	500		

Overhead Allocation by Worked Hours

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Allocation Statistic

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Worked Hours	Worked Hours	3	3/100 = 0,03
Nursing-ICU	UNI-Worked Hours	Worked Hours	26	26/100 = 0,26
Nursing-Ward B	UNI-Worked Hours	Worked Hours	66	66/100 = 0,66
OT-Operating Theatre	UNI-Worked Hours	Worked Hours	5	5/100 = 0,05
OT-Implants	UNI-Worked Hours	Worked Hours	0	0/100 = 0

Total: 100

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380		
Imaging-General Radiology	SUPP-Clinical Supplies	P	50		
Imaging-General Radiology	SAL-Professional	P	-		
Imaging-General Radiology	SUPP-Office Supplies	P	-		
Nursing-ICU	SAL-Nursing	P	3500		
Nursing-ICU	SUPP-Clinical Supplies	P	950		
Nursing-ICU	SAL-Professional	P	-		
Nursing-ICU	SAL-Technician	P	-		
Nursing-ICU	SUPP-Office Supplies	P	-		
Nursing-Ward 5B	SAL-Nursing	P	8500		
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000		
Nursing-Ward 5B	SAL-Professional	P	-		
Nursing-Ward 5B	SAL-Technician	P	-		
Nursing-Ward 5B	SUPP-Office Supplies	P	-		
OT-Operating Theatre	SAL-Nursing	P	1500		
OT-Operating Theatre	SAL-Professional	P	-		
OT-Operating Theatre	SAL-Technician	P	-		
OT-Operating Theatre	SUPP-Office Supplies	P	-		
OT-Implants	SUPP-Implants	P	500		

Overhead Allocation by Worked Hours

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Worked Hours	Worked Hours	3	3/100 = 0,03
Nursing-ICU	UNI-Worked Hours	Worked Hours	26	26/100 = 0,26
Nursing-Ward B	UNI-Worked Hours	Worked Hours	66	66/100 = 0,66
OT-Operating Theatre	UNI-Worked Hours	Worked Hours	5	5/100 = 0,05
OT-Implants	UNI-Worked Hours	Worked Hours	0	0/100 = 0

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380	52,50	
Imaging-General Radiology	SUPP-Clinical Supplies	P	50	-	
Imaging-General Radiology	SAL-Professional	P	-	60,00	
Imaging-General Radiology	SUPP-Office Supplies	P	-	5,40	
Nursing-ICU	SAL-Nursing	P	3500	-	
Nursing-ICU	SUPP-Clinical Supplies	P	950	-	
Nursing-ICU	SAL-Professional	P	-	520,00	
Nursing-ICU	SAL-Technician	P	-	455,00	
Nursing-ICU	SUPP-Office Supplies	P	-	46,80	
Nursing-Ward 5B	SAL-Nursing	P	8500	-	
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000	-	
Nursing-Ward 5B	SAL-Professional	P	-	1320,00	
Nursing-Ward 5B	SAL-Technician	P	-	1155,00	
Nursing-Ward 5B	SUPP-Office Supplies	P	-	118,80	
OT-Operating Theatre	SAL-Nursing	P	1500	-	
OT-Operating Theatre	SAL-Professional	P	-	100,00	
OT-Operating Theatre	SAL-Technician	P	-	87,50	
OT-Operating Theatre	SUPP-Office Supplies	P	-	9,00	
OT-Implants	SUPP-Implants	P	500	-	

Overhead Allocation by Worked Hours

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Worked Hours	Worked Hours	3	3/100 = 0,03
Nursing-ICU	UNI-Worked Hours	Worked Hours	26	26/100 = 0,26
Nursing-Ward B	UNI-Worked Hours	Worked Hours	66	66/100 = 0,66
OT-Operating Theatre	UNI-Worked Hours	Worked Hours	5	5/100 = 0,05
OT-Implants	UNI-Worked Hours	Worked Hours	0	0/100 = 0

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380	52,50	432,50
Imaging-General Radiology	SUPP-Clinical Supplies	P	50	-	50,00
Imaging-General Radiology	SAL-Professional	P	-	60,00	60,00
Imaging-General Radiology	SUPP-Office Supplies	P	-	5,40	5,40
Nursing-ICU	SAL-Nursing	P	3500	-	3500,00
Nursing-ICU	SUPP-Clinical Supplies	P	950	-	950,00
Nursing-ICU	SAL-Professional	P	-	520,00	520,00
Nursing-ICU	SAL-Technician	P	-	455,00	455,00
Nursing-ICU	SUPP-Office Supplies	P	-	46,80	46,80
Nursing-Ward 5B	SAL-Nursing	P	8500	-	8500,00
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000	-	3000,00
Nursing-Ward 5B	SAL-Professional	P	-	1320,00	1320,00
Nursing-Ward 5B	SAL-Technician	P	-	1155,00	1155,00
Nursing-Ward 5B	SUPP-Office Supplies	P	-	118,80	118,80
OT-Operating Theatre	SAL-Nursing	P	1500	-	1500,00
OT-Operating Theatre	SAL-Professional	P	-	100,00	100,00
OT-Operating Theatre	SAL-Technician	P	-	87,50	87,50
OT-Operating Theatre	SUPP-Office Supplies	P	-	9,00	9,00
OT-Implants	SUPP-Implants	P	500	-	500,00

Overhead Allocation by Worked Hours

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Worked Hours	Worked Hours	3	3/100 = 0,03
Nursing-ICU	UNI-Worked Hours	Worked Hours	26	26/100 = 0,26
Nursing-Ward B	UNI-Worked Hours	Worked Hours	66	66/100 = 0,66
OT-Operating Theatre	UNI-Worked Hours	Worked Hours	5	5/100 = 0,05
OT-Implants	UNI-Worked Hours	Worked Hours	0	0/100 = 0

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380	52,50	432,50
Imaging-General Radiology	SUPP-Clinical Supplies	P	50	-	50,00
Imaging-General Radiology	SAL-Professional	P	-	60,00	60,00
Imaging-General Radiology	SUPP-Office Supplies	P	-	5,40	5,40
Nursing-ICU	SAL-Nursing	P	3500	-	3500,00
Nursing-ICU	SUPP-Clinical Supplies	P	950	-	950,00
Nursing-ICU	SAL-Professional	P	-	520,00	520,00
Nursing-ICU	SAL-Technician	P	-	455,00	455,00
Nursing-ICU	SUPP-Office Supplies	P	-	46,80	46,80
Nursing-Ward 5B	SAL-Nursing	P	8500	-	8500,00
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000	-	3000,00
Nursing-Ward 5B	SAL-Professional	P	-	1320,00	1320,00
Nursing-Ward 5B	SAL-Technician	P	-	1155,00	1155,00
Nursing-Ward 5B	SUPP-Office Supplies	P	-	118,80	118,80
OT-Operating Theatre	SAL-Nursing	P	1500	-	1500,00
OT-Operating Theatre	SAL-Professional	P	-	100,00	100,00
OT-Operating Theatre	SAL-Technician	P	-	87,50	87,50
OT-Operating Theatre	SUPP-Office Supplies	P	-	9,00	9,00
OT-Implants	SUPP-Implants	P	500	-	500,00

Department	Direct Amount	Indirect Amount	Total Amount	Indirect/Direct Ratio
Imaging-General Radiology	430	118	548	0,27
Nursing-ICU	4450	1022	5472	0,23
Nursing-Ward 5B	11500	2594	14094	0,23
OT-Implants	500	-	500	-
OT-Operating Theatre	1500	197	1697	0,13

Overhead Allocation by Worked Hours

by Total Hours

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Worked Hours	Worked Hours	3	3/100 = 0,03
Nursing-ICU	UNI-Worked Hours	Worked Hours	26	26/100 = 0,26
Nursing-Ward B	UNI-Worked Hours	Worked Hours	66	66/100 = 0,66
OT-Operating Theatre	UNI-Worked Hours	Worked Hours	5	5/100 = 0,05
OT-Implants	UNI-Worked Hours	Worked Hours	0	0/100 = 0

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380	52,50	432,50
Imaging-General Radiology	SUPP-Clinical Supplies	P	50	-	50,00
Imaging-General Radiology	SAL-Professional	P	-	60,00	60,00
Imaging-General Radiology	SUPP-Office Supplies	P	-	5,40	5,40
Nursing-ICU	SAL-Nursing	P	3500	-	3500,00
Nursing-ICU	SUPP-Clinical Supplies	P	950	-	950,00
Nursing-ICU	SAL-Professional	P	-	520,00	520,00
Nursing-ICU	SAL-Technician	P	-	455,00	455,00
Nursing-ICU	SUPP-Office Supplies	P	-	46,80	46,80
Nursing-Ward 5B	SAL-Nursing	P	8500	-	8500,00
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000	-	3000,00
Nursing-Ward 5B	SAL-Professional	P	-	1320,00	1320,00
Nursing-Ward 5B	SAL-Technician	P	-	1155,00	1155,00
Nursing-Ward 5B	SUPP-Office Supplies	P	-	118,80	118,80
OT-Operating Theatre	SAL-Nursing	P	1500	-	1500,00
OT-Operating Theatre	SAL-Professional	P	-	100,00	100,00
OT-Operating Theatre	SAL-Technician	P	-	87,50	87,50
OT-Operating Theatre	SUPP-Office Supplies	P	-	9,00	9,00
OT-Implants	SUPP-Implants	P	500	-	500,00

Overhead Allocation by Worked Hours

by Total Hours

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Statistic	Amount	Weight
Imaging-General Radiology	UNI-Total Hours	Total Hours	6	6/240 = 0,031
Nursing-ICU	UNI-Total Hours	Total Hours	48	48/240= 0,344
Nursing-Ward B	UNI-Total Hours	Total Hours	120	120/240= 0,563
OT-Operating Theatre	UNI-Total Hours	Total Hours	66	66/240=0,063
OT-Implants	UNI-Total Hours	Total Hours	0	0/240=0

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380		
Imaging-General Radiology	SUPP-Clinical Supplies	P	50		
Imaging-General Radiology	SAL-Professional	P	-		
Imaging-General Radiology	SUPP-Office Supplies	P	-		
Nursing-ICU	SAL-Nursing	P	3500		
Nursing-ICU	SUPP-Clinical Supplies	P	950		
Nursing-ICU	SAL-Professional	P	-		
Nursing-ICU	SAL-Technician	P	-		
Nursing-ICU	SUPP-Office Supplies	P	-		
Nursing-Ward 5B	SAL-Nursing	P	8500		
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000		
Nursing-Ward 5B	SAL-Professional	P	-		
Nursing-Ward 5B	SAL-Technician	P	-		
Nursing-Ward 5B	SUPP-Office Supplies	P	-		
OT-Operating Theatre	SAL-Nursing	P	1500		
OT-Operating Theatre	SAL-Professional	P	-		
OT-Operating Theatre	SAL-Technician	P	-		
OT-Operating Theatre	SUPP-Office Supplies	P	-		
OT-Implants	SUPP-Implants	P	500		

Overhead Allocation by Worked Hours

by Total Hours

Department	CostCategory	Statistic	Amount	Weight	
Imaging-General Radiology	UNI-Total Hours	Total Hours	6	6/240 = 0,031	
Nursing-ICU	UNI-Total Hours	Total Hours	48	48/240= 0,344	
Nursing-Ward B	UNI-Total Hours	Total Hours	120	120/240= 0,563	
OT-Operating Theatre	UNI-Total Hours	Total Hours	66	66/240=0,063	
OT-Implants	UNI-Total Hours	Total Hours	0	0/240=0	

Department	CostCategory	Dept type	Amount
General Radiology	SAL-Technician	P	380
General Radiology	SUPP-Clinical Supplies	P	50
General Radiology	UNI-Total Hours	P	4
General Radiology	UNI-Worked Hours	P	3
Nursing-ICU	SAL-Nursing	P	3 500
Nursing-ICU	SUPP-Clinical Supplies	P	950
Nursing-ICU	UNI-Total Hours	P	44
Nursing-ICU	UNI-Worked Hours	P	26
Nursing-Ward 5B	SAL-Nursing	P	8 500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	4 000
Nursing-Ward 5B	UNI-Total Hours	P	72
Nursing-Ward 5B	UNI-Worked Hours	P	66
OT-Operating Theatre	SAL-Nursing	P	1 500
OT-Operating Theatre	UNI-Total Hours	P	8
OT-Operating Theatre	UNI-Worked Hours	P	5
OT-Implants	SUPP-Implants	P	500
Admin-Human Resources	SAL-Professional	O	1 900
Admin-Human Resources	SAL-Technician	O	1 750
Admin-Human Resources	SUPP-Office Supplies	O	180
Admin-Human Resources	UNI-Total Hours	O	18
Admin-Human Resources	UNI-Worked Hours	O	13

Department	CostCategory	Dept type	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	SAL-Technician	P	380	55	435
Imaging-General Radiology	SUPP-Clinical Supplies	P	50	-	50
Imaging-General Radiology	SAL-Professional	P	-	63	63
Imaging-General Radiology	SUPP-Office Supplies	P	-	6	6
Nursing-ICU	SAL-Nursing	P	3500	-	3500
Nursing-ICU	SUPP-Clinical Supplies	P	950	-	950
Nursing-ICU	SAL-Professional	P	-	688	688
Nursing-ICU	SAL-Technician	P	-	602	602
Nursing-ICU	SUPP-Office Supplies	P	-	62	62
Nursing-Ward 5B	SAL-Nursing	P	8500	-	8500
Nursing-Ward 5B	SUPP-Clinical Supplies	P	3000	-	3000
Nursing-Ward 5B	SAL-Professional	P	-	1125	1125
Nursing-Ward 5B	SAL-Technician	P	-	984	984
Nursing-Ward 5B	SUPP-Office Supplies	P	-	101	101
OT-Operating Theatre	SAL-Nursing	P	1500	-	1500
OT-Operating Theatre	SAL-Professional	P	-	125	125
OT-Operating Theatre	SAL-Technician	P	-	109	109
OT-Operating Theatre	SUPP-Office Supplies	P	-	11	11
OT-Implants	SUPP-Implants	P	500	-	500

Department	Direct Amount	Indirect Amount	Total Amount	Indirect/Direct Ratio
Imaging-General Radiology	430	123	553	0,29
Nursing-ICU	4450	1351	5801	0,30
Nursing-Ward 5B	11500	2211	13711	0,192
OT-Implants	500	-	500	-
OT-Operating Theatre	1500	246	1746	0,16

Overhead Allocation by Worked Hours

Department	Direct Amount	Indirect Amount	Total Amount	Indirect/Direct Ratio
Imaging-General Radiology	430	118	548	0,27
Nursing-ICU	4450	1022	5472	0,23
Nursing-Ward 5B	11500	2594	14094	0,23
OT-Implants	500	-	500	-
OT-Operating Theatre	1500	197	1697	0,13

by Total Hours

Department	Direct Amount	Indirect Amount	Total Amount	Indirect/Direct Ratio
Imaging-General Radiology	430	123	553	0,29
Nursing-ICU	4450	1351	5801	0,30
Nursing-Ward 5B	11500	2211	13711	0,192
OT-Implants	500	-	500	-
OT-Operating Theatre	1500	246	1746	0,16

Allocation with Worked Hours vs Total hours

Department	Worked Hours Indirect/Direct Ratio	Total Hours Indirect/Direct Ratio
Imaging-General Radiology	0,27	0,29
Nursing-ICU	0,23	0,30
Nursing-Ward 5B	0,23	0,192
OT-Implants	-	-
OT-Operating Theatre	0,13	0,16

Fully Absorbed General Ledger			
Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	430	118	548
Nursing-ICU	4450	1022	5472
Nursing-Ward B	11500	2594	14094
OT-Implants	500	-	500
OT-Operating Theatre	1500	197	1697

Well done! We now have a Fully Absorbed GL, ready for costing purposes.

Next step, we'll have to leave the Financials aside and focus on Clinical Activity Data.

QUESTION

QUESTION:

Give an example of an Overhead Allocation Statistic typically used to allocate:

- Nursing Administration expenditure
- Utilities-Electricity
- Finances
- Patient Catering (if no Patient Level Catering data)

Bed days , Total expense, Worked Hours, Total Hours, Area in Square Meters, etc.

QUESTION

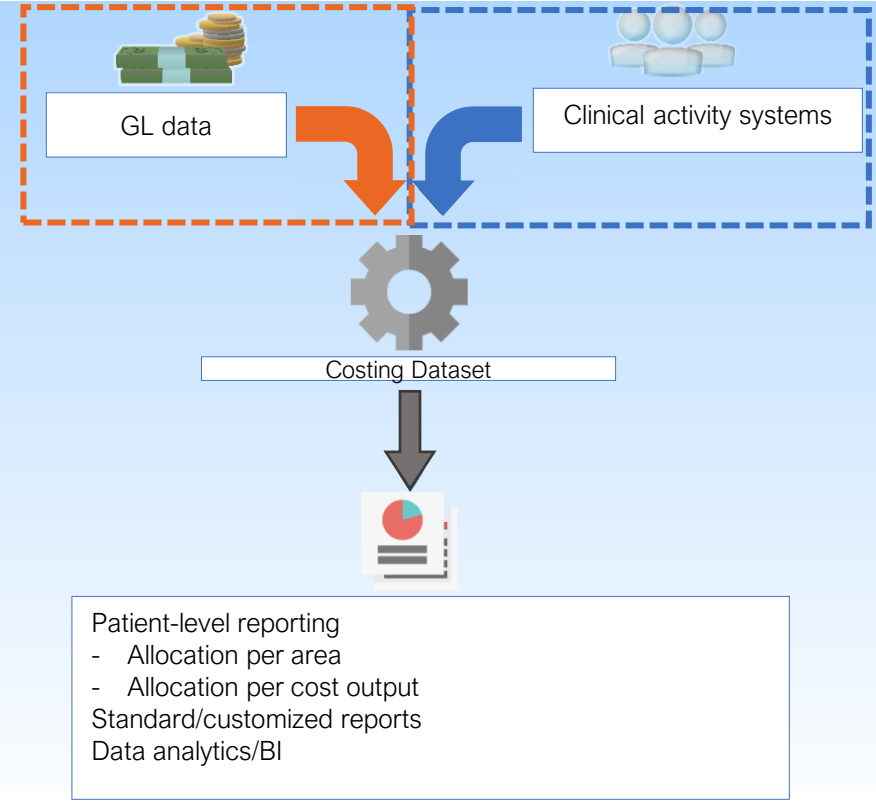
QUESTION:

Give an example of an Overhead Allocation Statistic typically used to allocate:

- Nursing Administration expenditure – Nursing Worked Hours
- Utilities-Electricity – Worked Hours, Area in Square Meters
- Finances – Total expense, Worked Hours, Total Hours
- Patient Catering (if no Patient Level Catering data) – Number of Bed days per cost centre, Number of meals served

LOADING PATIENT LEVEL DATA

LOADING PATIENT LEVEL DATA

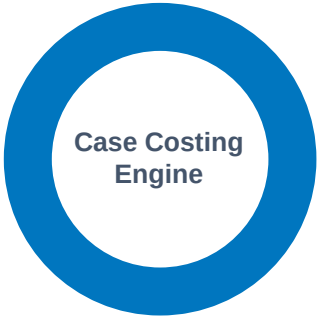


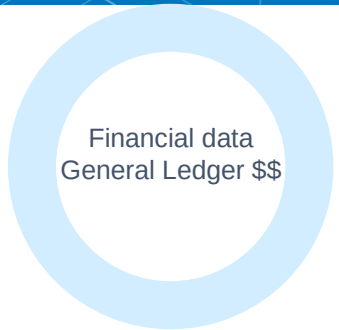
LOADING PATIENT LEVEL DATA - HOSPITAL ENCOUNTERS

Hospital

- Patient file
- Admission
- Emergency
- Operating room
- Diagnosis/procedures
- Ambulatory
- Imaging
- Lab
- Pharmacy
- Accident
- Other

Load of Hospital's encounters





LOADING PATIENT LEVEL DATA - HOSPITAL SERVICES

Hospital

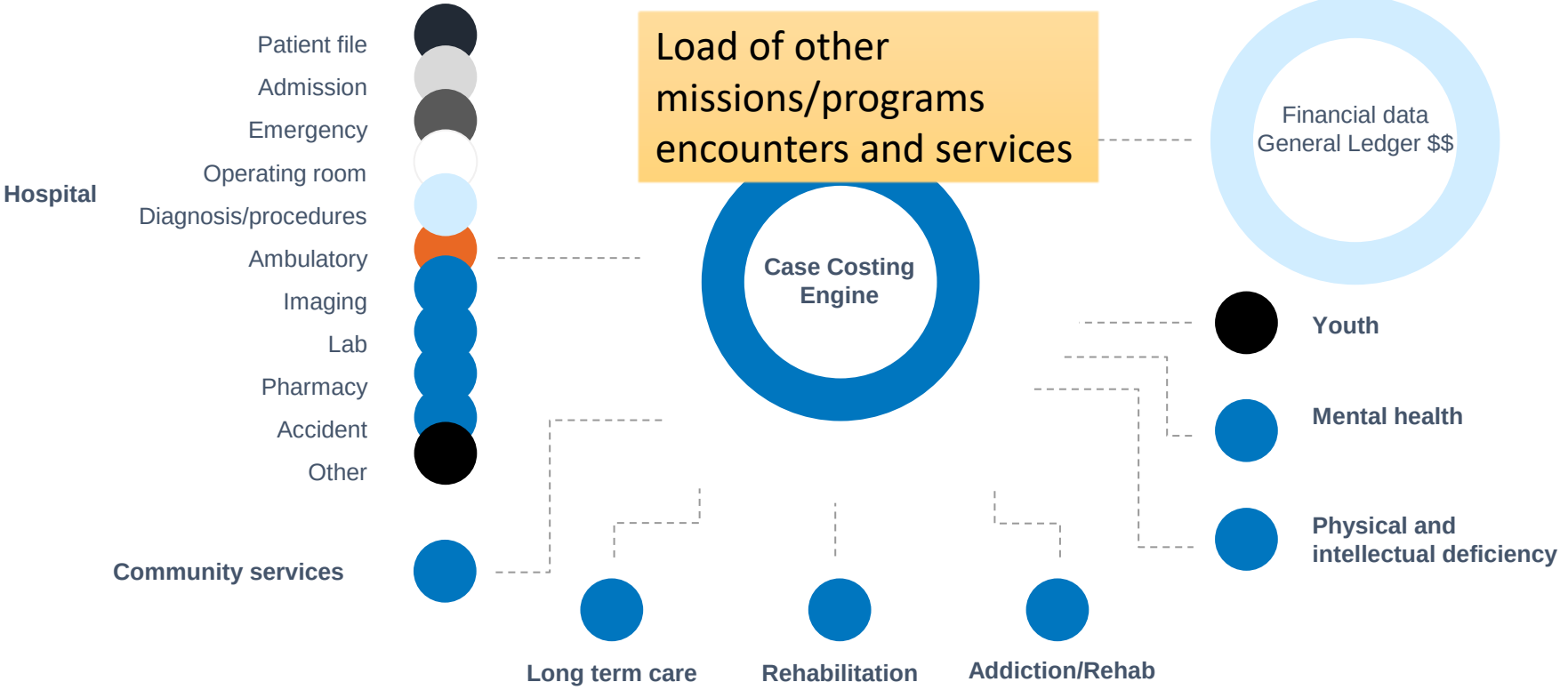
- Patient file
- Admission
- Emergency
- Operating room
- Diagnosis/procedures
- Ambulatory
- Imaging
- Lab
- Pharmacy
- Accident
- Other

Load of Hospital's services

Case Costing Engine

Financial data
General Ledger $$

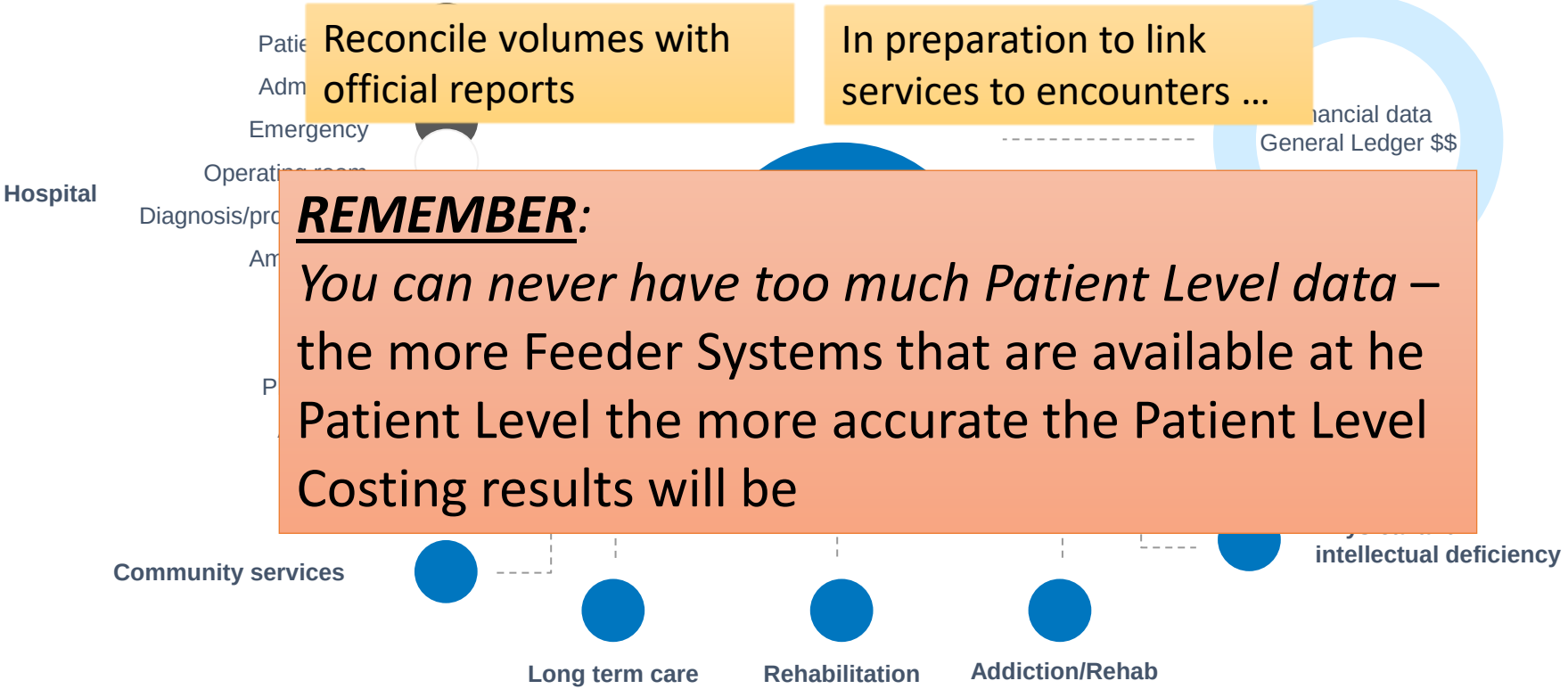
LOADING PATIENT LEVEL DATA - OTHER MISSIONS ENCOUNTERS AND SERVICES



LOADING PATIENT LEVEL DATA - HOSPITAL ENCOUNTERS AND SERVICES

Reconcile volumes with official reports

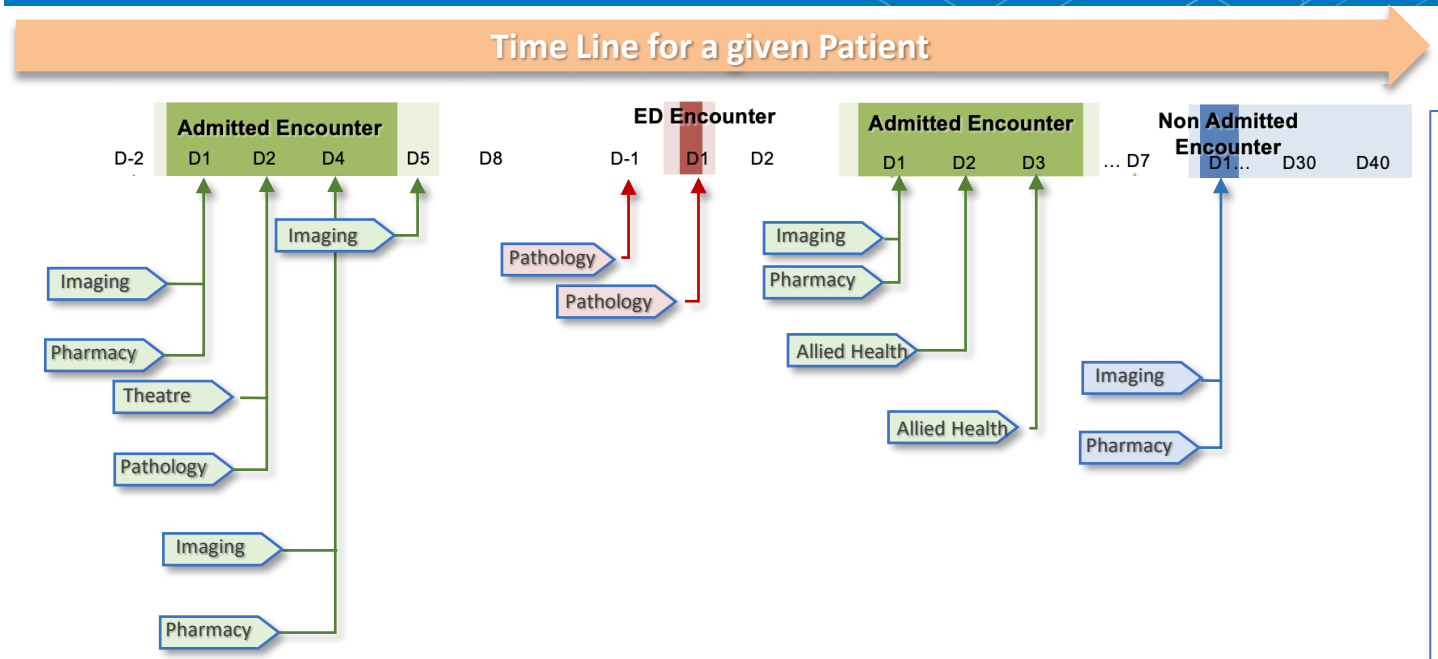
In preparation to link services to encounters …



***REMEMBER**:*

You can never have too much Patient Level data – the more Feeder Systems that are available at he Patient Level the more accurate the Patient Level Costing results will be

LINKING SERVICE DATA TO THE CORRECT ENCOUNTER



- Linking Rules are hierarchical and stop at the first match
- Rules should reflect Clinical practise at the organisation
- If no matching Encounter is found, a stand-alone Encounter can be created (Occasion of Service)

Look for an ***Admitted*** Encounter **+/- 1 day from the Date of Service**

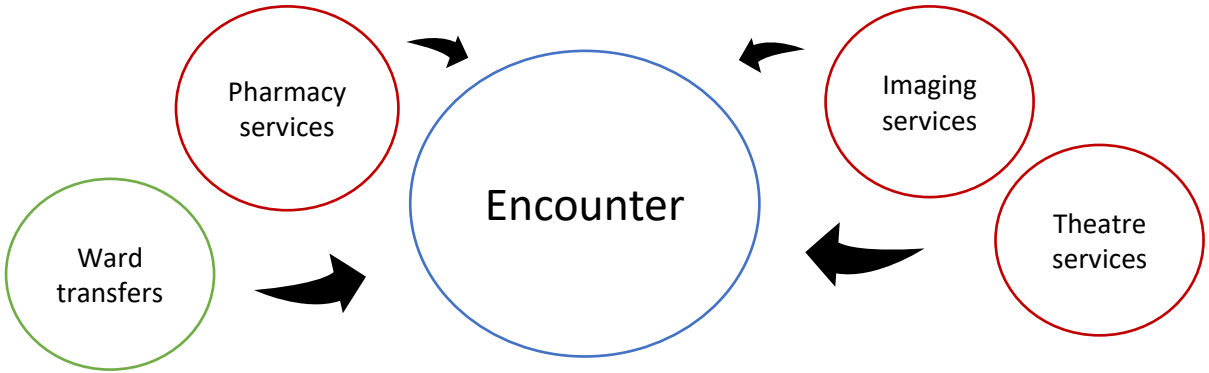
Look for an ***Emergency*** Encounter **+ 2 day s or -1 day from the Date of Service**

Look for an ***Non Admitted*** Encounter **+/- 30 days from the Date of Service**

CASE STUDY – ACTIVITY DATA

Data load and linking

Admitted encounters from the ADT system					
Patient	Encounter Number	Start	End	LOS	DRG
Patient Boulard	A-7654	2021-06-02 13:22	2021-06-07 19:22	5,25	301
Patient Cockburn	A-1234	2021-08-07 12:56	2021-08-12 18:56	5,25	301
Patient Hyndman	A-3456	2021-08-04 08:15	2021-08-09 14:15	5,25	140
Patient Pepin	A-8765	2021-07-23 15:26	2021-07-28 21:26	5,25	140



Case 1
Basic Patient Information

Admitted encounters from the ADT system

Patient	Encounter Number	Start	End	LOS	DRG
Patient Boulard	A-7654	2021-06-02 13:22	2021-06-07 19:22	5,25	301
Patient Cockburn	A-1234	2021-08-07 12:56	2021-08-12 18:56	5,25	301
Patient Hyndman	A-3456	2021-08-04 08:15	2021-08-09 14:15	5,25	140
Patient Pepin	A-8765	2021-07-23 15:26	2021-07-28 21:26	5,25	140

Transfers information from the ADT system

Patient	Encounter Number	DateTime	Activity	Ward	Bed	Delta
Patient Boulard	A-7654	2021-06-02 13:22	Admission	5B	5B-4	
Patient Boulard	A-7654	2021-06-07 19:22	Discharge			5.25
Patient Cockburn	A-1234	2021-08-07 12:56	Admission	5B	5B-1	
Patient Cockburn	A-1234	2021-08-09 12:56	Bed transfer	5B	5B-3	2
Patient Cockburn	A-1234	2021-08-12 18:56	Discharge			3.25
Patient Hyndman	A-3456	2021-08-04 08:15	Admission	5B	5B-1	
Patient Hyndman	A-3456	2021-08-05 08:15	Ward transfer	ICU	ICU-2	1
Patient Hyndman	A-3456	2021-08-07 14:15	Ward transfer	5B	5B-4	2.25
Patient Hyndman	A-3456	2021-08-09 14:15	Discharge			2
Patient Pepin	A-8765	2021-07-23 15:26	Admission	5B	5B-2	
Patient Pepin	A-8765	2021-07-28 21:26	Discharge			5.25

Operating theater information

Patient	Surgery Number	Service	Surgery Date	In-room DateTime	Out-room DateTime	Duration
Patient Boulard	001	Hip replacement	2021-06-02	2021-06-02 14:30	2021-06-02 16:00	90
Patient Cockburn	022	Hip replacement	2021-08-07	2021-08-07 13:30	2021-08-07 14:30	60

Patient	Exam Number	Service	Room	DateTime	Technical units
Patient Boulard	001	Hip Xray	Surg. Room	2021-06-02 15:45	15
Patient Cockburn	002	Hip Xray	Surg. Room	2021-08-07 14:15	15
Patient Hyndman	003	Lung Xray	Imag-1	2021-08-04 08:45	8
Patient Hyndman	004	Lung Xray	Mobile unit	2021-08-07 12:15	8
Patient Pepin	005	Lung Xray	Imag-1	2021-07-23 15:40	8
Patient Pepin	006	Sinus Xray	Imag-1	2021-07-23 15:50	10

Basic level Cost Drivers

Case 2
Detailed Patient Information

Admitted encounters from the ADT system

Patient	Encounter Number	Start	End	LOS	DRG	DRG Nursing weight
Patient Boulard	A-7654	2021-06-02 13:22	2021-06-07 19:22	5,25	301	0,9083
Patient Cockburn	A-1234	2021-08-07 12:56	2021-08-12 18:56	5,25	301	0,9083
Patient Hyndman	A-3456	2021-08-04 08:15	2021-08-09 14:15	5,25	140	0,8592
Patient Pepin	A-8765	2021-07-23 15:26	2021-07-28 21:26	5,25	140	0,8592

Transfers information from the ADT system

Patient	Encounter Number	DateTime	Activity	Ward	Bed	Delta
Patient Boulard	A-7654	2021-06-02 13:22	Admission	5B	5B-4	
Patient Boulard	A-7654	2021-06-07 19:22	Discharge			5.25
Patient Cockburn	A-1234	2021-08-07 12:56	Admission	5B	5B-1	
Patient Cockburn	A-1234	2021-08-09 12:56	Bed transfer	5B	5B-3	2
Patient Cockburn	A-1234	2021-08-12 18:56	Discharge			3.25
Patient Hyndman	A-3456	2021-08-04 08:15	Admission	5B	5B-1	
Patient Hyndman	A-3456	2021-08-05 08:15	Ward transfer	ICU	ICU-2	1
Patient Hyndman	A-3456	2021-08-07 14:15	Ward transfer	5B	5B-4	2.25
Patient Hyndman	A-3456	2021-08-09 14:15	Discharge			2
Patient Pepin	A-8765	2021-07-23 15:26	Admission	5B	5B-2	
Patient Pepin	A-8765	2021-07-28 21:26	Discharge			5.25

Operating theater information

Patient	Surgery Number	Service	Surgery Date	In-room DateTime	Out-room DateTime	Duration	Actual Charge	Nurses In-Room
Patient Boulard	001	Hip replacement	2021-06-02	2021-06-02 14:30	2021-06-02 16:00	90		1
Patient Cockburn	022	Hip replacement	2021-08-07	2021-08-07 13:30	2021-08-07 14:30	60		2
Patient Boulard	001	Basic Implant	2021-06-02				150	
Patient Cockburn	022	De luxe Implant	2021-08-07				350	

Patient	Exam Number	Service	Room	DateTime	Technical units	Duration	HR factor
Patient Boulard	001	Hip Xray	Surg. Room	2021-06-02 15:45	15	20	1
Patient Cockburn	002	Hip Xray	Surg. Room	2021-08-07 14:15	15	25	1
Patient Hyndman	003	Lung Xray	Imag-1	2021-08-04 08:45	8	10	1
Patient Hyndman	004	Lung Xray	Mobile unit	2021-08-07 12:15	8	15	2
Patient Pepin	005	Lung Xray	Imag-1	2021-07-23 15:40	8	10	1,25
Patient Pepin	006	Sinus Xray	Imag-1	2021-07-23 15:50	10	10	1,25

Detailed Cost Drivers

Admitted encounters from the ADT system

Patient	Encounter Number	Start	End	LOS	DRG	DRG Nursing weight
Patient Boulard	A-7654	2021-06-02 13:22	2021-06-07 19:22	5,25	301	**0,9083**
Patient Cockburn	A-1234	2021-08-07 12:56	2021-08-12 18:56	5,25	301	**0,9083**
Patient Hyndman	A-3456	2021-08-04 08:15	2021-08-09 14:15	5,25	140	**0,8592**
Patient Pepin	A-8765	2021-07-23 15:26	2021-07-28 21:26	5,25	140	**0,8592**

Link all Services to their Encounters

Transfers information from the ADT system

Patient	Encounter Number	DateTime	Activity	Ward	Bed	Delta
Patient Boulard	A-7654	2021-06-02 13:22	Admission	5B	5B-4	
Patient Boulard	A-7654	2021-06-07 19:22	Discharge			5.25
Patient Cockburn	A-1234	2021-08-07 12:56	Admission	5B	5B-1	
Patient Cockburn	A-1234	2021-08-09 12:56	Bed transfer	5B	5B-3	2
Patient Cockburn	A-1234	2021-08-12 18:56	Discharge			3.25
Patient Hyndman	A-3456	2021-08-04 08:15	Admission	5B	5B-1	
Patient Hyndman	A-3456	2021-08-05 08:15	Ward	ICU	ICU-2	1
Patient Hyndman	A-3456	2021-0 14:15				
Patient Hyndman	A-3456	2021-0 14:15				
Patient Pepin	A-8765	2021-0 15:26				
Patient Pepin	A-8765	2021-0 21:26				

Operating theater information

Patient	Surgery Number	Service	Surgery Date	In-room DateTime	Out-room DateTime	Duration	Actual Charge	Nurses In-Room
Patient Boulard	001	Hip replacement	2021-06-02	2021-06-02 14:30	2021-06-02 16:00	90		**1**
Patient Cockburn	022	Hip replacement	2021-08-07	2021-08-07 13:30	2021-08-07 14:30	60		**2**
Patient Boulard	001	Basic Implant	2021-06-02				**150**	
Patient Cockburn	022	De luxe Implant	2021-08-07				**350**	

Patient	Exam Number	Service	Room	DateTime	Technical units	Duration	HR factor
Patient Boulard	001	Hip Xray	Surg. Room	2021-06-02 15:45	15	**20**	**1**
						25	**1**
						10	**1**
						15	**2**
						10	**1,25**
						10	**1,25**

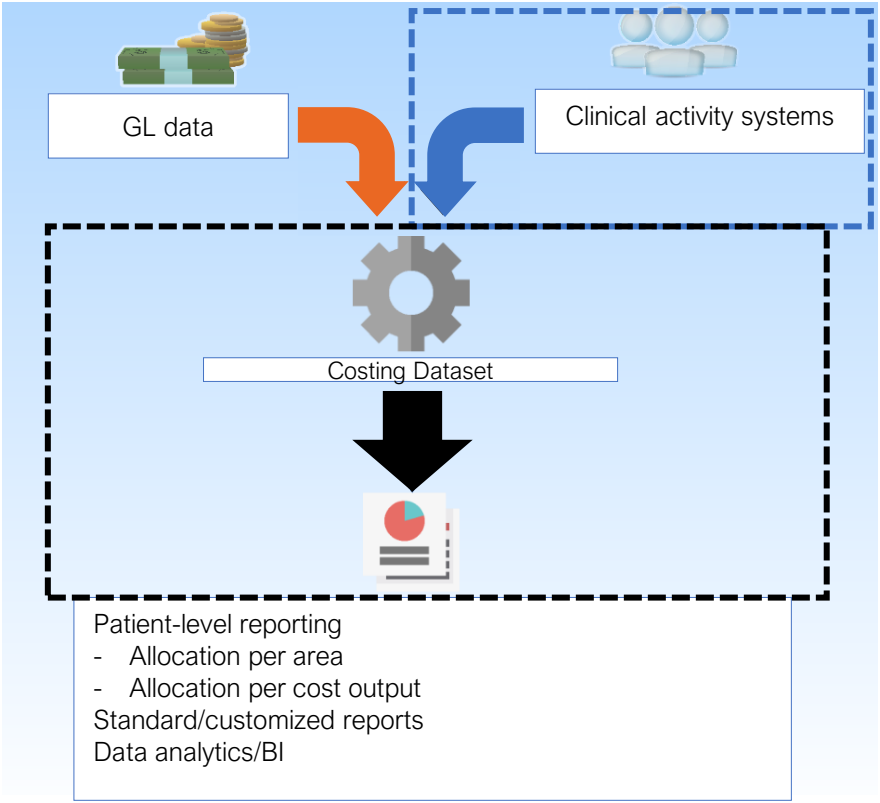
Now that the **Services are all linked to Encounters** and that **Cost Drivers are known and available**

It's time to marry the **Activity Data** to our **Fully Absorbed GL**

SETTING UP THE PATIENT LEVEL COSTING PROCESSES

SETTING UP THE PATIENT LEVEL COSTING PROCESSES

It is all about mapping the clinical activities to the expenses in the Department where the activities occurred.



And then, apply an allocation method with an available cost driver or use a top-down approach where data is not available

DIFFERENT WAYS OF COSTING A SURGERY - 1

Patient	Surgery Date				Surgery Start			Surgery End				
Patient A	2022-08-09				09:45			10:45				

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

10 M$

60 minutes

Allocation of total expenses of the Department based on surgery duration

DIFFERENT WAYS OF COSTING A SURGERY - 2

Patient	Surgery Date				Surgery Start		Detailed implants (high cost consum.)	Surgery End			Recovery room Start	Recovery room End
Patient A	2022-08-09				09:45		Hip $1250	10:45			11:02	12:15

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

Surg 5 M$

Recov 0,5 M$

Split the nursing salaries (surgery and recovery teams)

60 minutes

73 minutes

Allocate with surgery duration

Allocate with recovery duration

DIFFERENT WAYS OF COSTING A SURGERY - 2

Patient	Surgery Date				Surgery Start		Detailed implants (high cost consum.)	Surgery End			Recovery room Start	Recovery room End
Patient A	2022-08-09				09:45		Hip $1250	10:45			11:02	12:15

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

2 M$

Allocate based on actual charge

DIFFERENT WAYS OF COSTING A SURGERY - 3

Patient	Surgery Date	In-Room Time	Anaest. Start	Anaesthetics and other Drugs	Surgery Start	Staff	Detailed implants (high cost consum.)	Surgery End	Anaest. End	Out-Room Time	Recovery room Start	Recovery room End
Patient A	2022-08-09	09:30	09:40	General anaest Drug A $50 Drug B $14	09:45	1 RN 1 SH	Hip $1250	10:45	10:50	11:00	11:02	12:15

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

Surgery Duration weighted by staff in the room

Recovery Duration

DIFFERENT WAYS OF COSTING A SURGERY - 3

Patient	Surgery Date	In-Room Time	Anaest. Start	Anaesthetics and other Drugs	Surgery Start	Staff	Detailed implants (high cost consum.)	Surgery End	Anaest. End	Out-Room Time	Recovery room Start	Recovery room End
Patient A	2022-08-09	09:30	09:40	General anaest Drug A $50 Drug B $14	09:45	1 RN 1 SH	Hip $1250	10:45	10:50	11:00	11:02	12:15

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

Anaesthesia Duration

Actual Charge

Number of surgeries

Actual Charge

DIFFERENT WAYS OF COSTING A SURGERY - 3

Patient	Surgery Date	In-Room Time	Anaest. Start	Anaesthetics and other Drugs	Surgery Start	Staff	Detailed implants (high cost consum.)	Surgery End	Anaest. End	Out-Room Time	Recovery room Start	Recovery room End
Patient A	2022-08-09	09:30	09:40	General anaest Drug A $50 Drug B $14	09:45	1 RN 1 SH	Hip $1250	10:45	10:50	11:00	11:02	12:15

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

Anaesthesia Duration

Recovery Duration

Actua

room

rgeries

Actual Cha

Understand the impact of the data availability on the cost allocation process.

DIFFERENT WAYS OF COSTING A SURGERY - 4

NO DATA FROM THEATER

CostCategory
Nursing salaries
Resp. therapist salaries
Clerical salaries
Implants
Anaesthetics
Drugs
Surg. supplies

10 M$

Allocation based on DRG using RIW Surgical weight

RIW (Resource intensity weights) is a relative value measuring total patient resource use compared with average typical acute inpatients. (source: CIHI)

DIFFERENT WAYS OF COSTING A SURGERY - 4

NO DATA FROM THEATER

DRG_CODE	RIW	RIW_Inpatient Nursing	RIW_Outpatient Nursing	RIW_OperatingRoom &Recovery Nursing	RIW_OtherProfessional Services	RIW_ClinicalLab	RIW_MedicalImaging
234	0.48127	0.09737	0.01399	0.20125	0.00353	0.01999	0.00418
327	1.566	0.17584	0.02002	0.95333	0.03122	0.01503	0.04501
592	1.30122	0.85185	0.00803	0.00449	0.04302	0.03471	0.02307
747	1.18072	0.31018	0.02154	0.37977	0.04662	0.01067	0.05985
385	1.7613	0.26238	0.01828	0.84507	0.03753	0.12524	0.00419
704	5.4097	3.01528	0.21894	0.05857	0.31041	0.03986	0.027
618	7.20373	2.95698	0.094	1.10743	0.34	0.54992	0.2317

Drugs

Surg. supplies

QUESTION – COSTING METHODOLOGY

QUESTION:

Ideally, how would you allocate (Cost Driver) the Fully Absorbed GL for the following Departments down to the Services that each produces:

- Outpatient Clinics
- Physiotherapy
- Imaging
- Dispensed Drugs
- Endoscopy

inpatients. (source: CIHI)

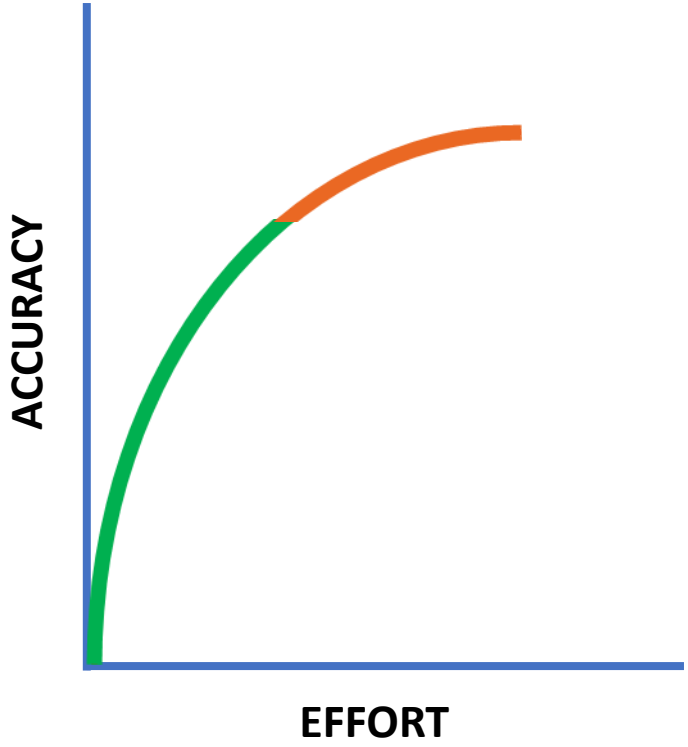
QUESTION – COSTING METHODOLOGY

QUESTION:

Ideally, how would you allocate (Cost Driver) the Fully Absorbed GL for the following Departments down to the Services that each produces:

- Outpatient Clinics – Number of visits, time spent in clinic room
- Physiotherapy – Number of Treatment, length of treatment
- Imaging – Workload/technical units, Procedure time, HR factor
- Dispensed Drugs – Actual charge per patient,
- Endoscopy – Number of Procedures, Time in room, HR factor

PATIENT COSTING METHODOLOGY CHOSEN TRADE-OFF IS ACCURACY VS EFFORT



Certain level of effort for good starting accuracy
(comfortable level that allows the start of cost analysis activities, clinical questioning and improvement processes).

Higher effort required to increase accuracy.

CASE STUDY – COST ALLOCATION

Mapping of Services to Departments and Allocation of Patient Care expenses to Patients

Allocate GL onto Patient Services = Case Costing Process

Fully Absorbed General Ledger

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	430	118	548
Nursing-ICU	4450	1022	5472
Nursing-Ward B	11500	2594	14094
OT-Implants	500	-	500
OT-Operating Theatre	1500	197	1697

Activity Data

Patient	DRG	Time in 5B	Time in ICU
Patient Boulard	301	5,25	0
Patient Cockburn	301	5,25	0
Patient Hyndman	140	3	2,25
Patient Pepin	140	5,25	0

Fully Absorbed General Ledger

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	430	118	548
Nursing-ICU	[illegible]	1022	5472
Nursing-Ward B	11500	2594	[illegible]
OT-Implants	500	-	500
OT-Operating Theatre	1500	197	1697

Nursing activity

Using Basic methodology

Using Detailed methodology

Methodology using Length of Stay

				Nursing-Ward 5B					Nursing-ICU				
Patient	DRG	Time in 5B	Time in ICU	Ward B Total Bed-days	Proportion of total	Direct Cost	Indirect Cost	Total Cost	ICU Total Bed-days	Proportion of total	Direct Cost	Indirect Cost	Total Cost
Patient Boulard	301	5,25	0										
Patient Cockburn	301	5,25	0										
Patient Hyndman	140	3	2,25										
Patient Pepin	140	5,25	0										
	Total:	**18,75**	**2,25**										

It's easy to say that a stay in ICU boasts the cost of an encounter
However, for all 3 patients that spent 5.25 days on ward 5B, seeing that they are of different DRG, would they receive the same level of care?

Why? What would be the best way to address the level of nursing care received in the costing process?

One way is to use the Nursing RIW to weight each patient according to their DRG

Fully Absorbed General Ledger

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	430	118	548
Nursing-ICU	4450	1022	5472
Nursing-Ward B	11500	2594	14094
OT-Implants	500	-	500
OT-Operating Theatre	1500	197	1697

Nursing activity

Using Basic methodology

Using Detailed methodology

Methodology using Length of Stay

				Nursing-Ward 5B				Nursing-ICU				
Patient	DRG	Time in 5B	Time in ICU	Ward B Total Bed-days	Proportion of total	Direct Cost	Indirect Cost	Total Cost	ICU Total Bed-days	Proportion of total	Direct Cost	Indirect Cost	Total Cost
Patient Boulard	301	5,25	0	18,75	5,25 / 18,75 = 0,28	3220	726	3946	2,25	0 / 2,25 = 0	0	0	0
Patient Cockburn	301	5,25	0	18,75	5,25 / 18,75 = 0,28	3220	726	3946	2,25	0 / 2,25 = 0	0	0	0
Patient Hyndman	140	3	2,25	18,75	3 / 18,75 = 0,16	1840	415	2255	2,25	2,25 / 2,25 = 1	4450	1022	5472
Patient Pepin	140	5,25	0	18,75	5,25 / 18,75 = 0,28	3220	726	3946	2,25	0 / 2,25 = 0	0	0	0
	Total:	**18,75**	**2,25**										

Methodology using Length of Stay and DRG Nursing Weight

					Nursing-Ward 5B				
Patient	DRG	DRG Nursing weight	Time in 5B	Weighted Time in 5B	Ward B Total Weighted Bed-Hours	Proportion of total	Direct Cost	Indirect Cost	Total Cost
Patient Boulard	301	0,9083	5.25	4.7686	16.62555	4.768575 / 16.62555 = 0.2868	3,298	744	4,042
Patient Cockburn	301	0,9083	5.25	4.7686	16.62555	4.768575 / 16.62555 = 0.2868	3,298	744	4,042
Patient Hyndman	140	0,8592	3	2.5776	16.62555	2.5776 / 16.62555 = 0.155	1,783	402	2,185
Patient Pepin	140	0,8592	5.25	4.5108	16.62555	4.5108 / 16.62555 = 0.2713	3,120	704	3,824
			18,75	16.62555		Total	11,500	2,594	14,094

Using Basic methodology

Using Detailed methodology

Patient	Time in 5B	Time in ICU	DRG	DRG Nursing weight	Total Cost With Method 1 (5B + ICU)	Total Cost With Method 2 (5B + ICU)	Gap	Gap (%)
Patient Boulard	5,25	0	301	0,9083	3946	4042	96	2,4%
Patient Cockburn	5,25	0	301	0,9083	3946	4042	96	2,4%
Patient Hyndman	3	2,25	140	0,8592	2255 + 5472 = 7727	2185 + 5472 = 7657	-70	-0,9%
Patient Pepin	5,25	0	140	0,8592	3946	3824	-122	-3,1%
				Total:	19566	19566	0	

Using Basic methodology

Patient Boulard

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946

Patient Cockburn

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946

Patient Hyndman

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	4450	1022	5472
Nursing-Ward B	1840	415	2255
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Patient Pepin

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946

Using Detailed methodology

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	0	0	0
Nursing-Ward B	3298	744	4042

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	0	0	0
Nursing-Ward B	3298	744	4042

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	4450	1022	5472
Nursing-Ward B	1783	402	2185

Department	Direct Amount	Indirect Amount	Total Amount
Nursing-ICU	0	0	0
Nursing-Ward B	3120	704	3824

Using Basic methodology

Patient Boulard

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	101	28	128
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946
OT-Operating Theatre	900	118	1018
OT-Implants	250	0	250

Patient Cockburn

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	101	28	128
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946
OT-Operating Theatre	600	79	679
OT-Implants	250	0	250

Patient Hyndman

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	108	30	138
Nursing-ICU	4450	1022	5472
Nursing-Ward B	1840	415	2255
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Patient Pepin

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	121	33	154
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Using Detailed methodology

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	78	21	100
Nursing-ICU	0	0	0
Nursing-Ward B	3298	744	4042
OT-Operating Theatre	643	84	727
OT-Implants	150	0	150

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	98	27	124
Nursing-ICU	0	0	0
Nursing-Ward B	3298	744	4042
OT-Operating Theatre	857	113	970
OT-Implants	350	0	350

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	156	43	200
Nursing-ICU	4450	1022	5472
Nursing-Ward B	1783	402	2185
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	98	26	124
Nursing-ICU	0	0	0
Nursing-Ward B	3120	704	3824
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Using Basic methodology

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	101	28	128
Nursing-ICU	0	0	0

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	101	28	128
Nursing-ICU	0	0	0

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	108	30	138
Nursing-ICU	4450	1022	5472

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	121	33	154
Nursing-ICU	0	0	0
Nursing-Ward B	3220	726	3946
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Using Detailed methodology

Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	78	21	100
Nursing-ICU	0	0	0

Department	Direct Amount	Indirect Amount	Total Amount
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Imaging-General Radiology	156	43	200
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Department	Direct Amount	Indirect Amount	Total Amount
Imaging-General Radiology	98	26	124
Nursing-ICU	0	0	0
Nursing-Ward B	3120	704	3824
OT-Operating Theatre	0	0	0
OT-Implants	0	0	0

Patient	Direct Amount	Indirect Amount	Total Amount
Patient Boulard	4471	872	5342
Patient Cockburn	4171	833	5003
Patient Hyndman	6398	1467	7865
Patient Pepin	3341	759	4100

Patient	Direct Amount	Indirect Amount	Total Amount
Patient Boulard	4169	849	5019
Patient Cockburn	4603	884	5486
Patient Hyndman	6389	1467	7857
Patient Pepin	3218	730	3948

Using Basic methodology

Using Detailed methodology

Once the GL is fully allocated to Patient Level Data, the Costing Process is over.

However, Costing is only the beginning.
It is of little relevance if the Costing Results are not used.

★ **Activity-based Funding**

★ **Data Analytics**

Patient	Direct Amount	Indirect Amount	Total Amount
Patient Boulard	4471	872	5342
Patient Cockburn	4171	833	5003
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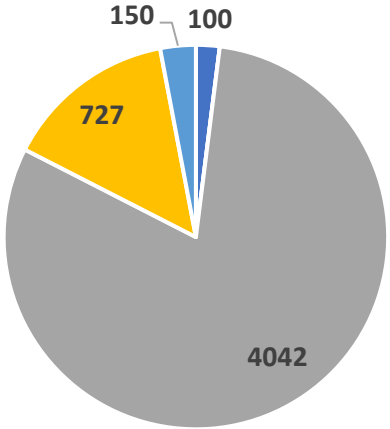
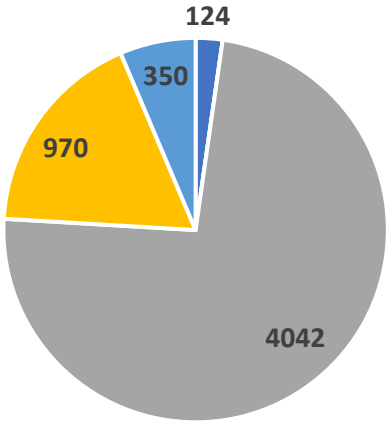
COST COMPARISON – DIG INTO THE CLINICAL TRAJECTORY

Patient Boulard - total: 5019



Patient Cockburn - total: 5486

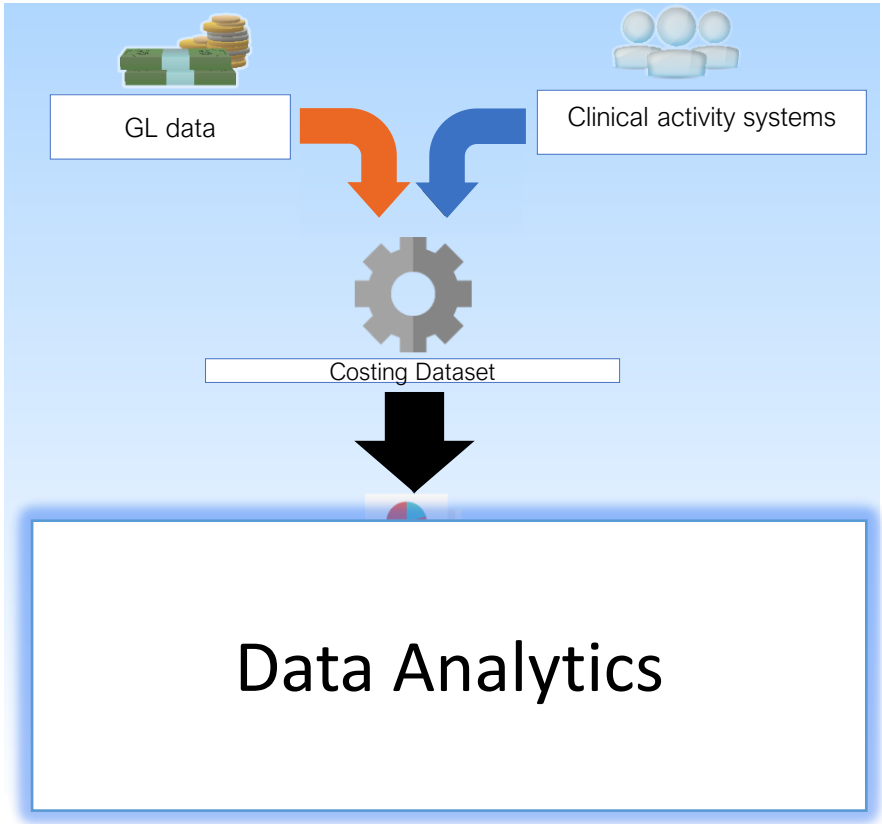


Same DRG
Same type of surgery (hip replace.)
Same LOS
Standard Allocation methods

Digging into the PLC data, you may discover a **younger** and **still active** patient Cockburn who need a **specific** and **more expensive** implant with a **special surgery technique** explaining the cost differences

- Imaging-General Radiology
- Nursing-ICU
- Nursing-Ward B
- OT-Operating Theatre
- OT-Implants

COSTING PROCESS OVERVIEW



Break

PATIENT LEVEL COSTING – GOOD PRACTICE

Starting the journey and setting goals

- Never wait until all systems are available before getting PLC started
- Start with what you have and quickly get results out for comment
- Recognise that PLC is an embryonic and never-ending process
- Initially cost on a biannual / quarterly basis, moving to monthly over 12-24 months
- Establish effective communication channels within the organisation
- Vision of the journey going beyond the strictly financial aspects by incorporating qualitative issues such as outcome measures into the PLC data, e.g. Patient Incidents

Governance and direction

- Central body responsible for developing, guiding and enhancing PLC
- Centralize processing at an Area, Network or Group level to ensure an adequate pool of expert staff
- DO something with the data, PLC data by itself is of little value
- Ensure that the project has support at the highest levels of the organisation
- Clinical engagement is a must
- Set in place effective governance structures to manage the project
- Incorporate PLC results into organisational wide reporting so that it is widely available for comment and feedback
- Develop a PLC scoring system to evaluate the quality of results from each Hospital/Department, e.g., NHS UK Materiality and Quality Score

PATIENT LEVEL COSTING – GOOD PRACTICE

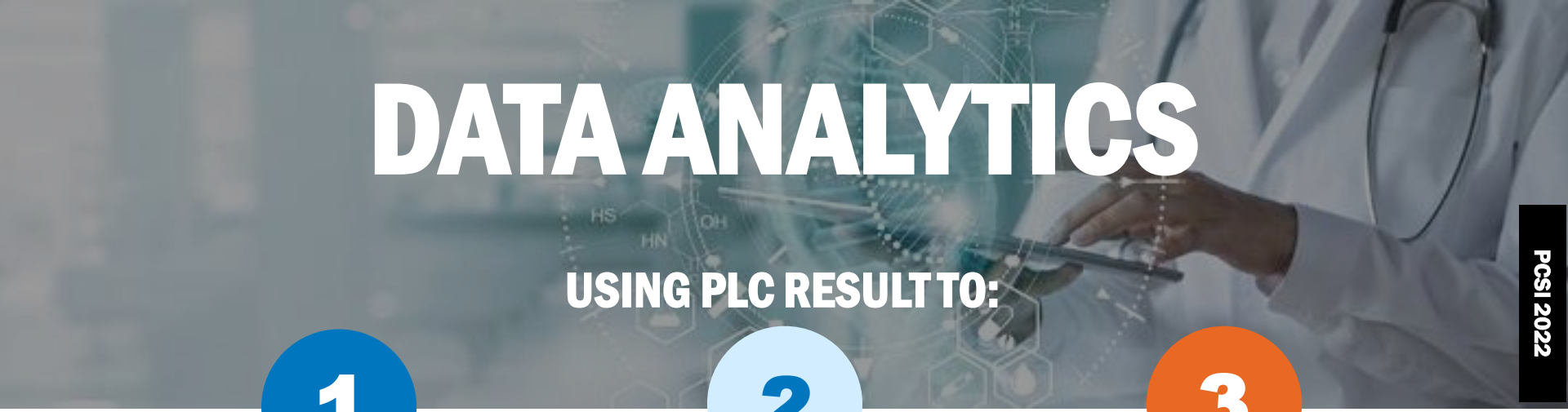
IT Architecture and Data

- Adequate resourcing for collection, processing and analysis of data
- Ensure whole of health systems are available for ‘minimum dataset’ feeders
- Automate all data extractions for external reporting
- Develop in-built extract routines for all standard feeder systems
- Develop automatic data integrity mechanisms to validate the data

Setting and following Standards

- Establish multi-disciplinary groups to advise on PLC methodologies
- Develop a standard Patient Costing methodology to be used across all sites
- Develop Data Dictionaries to resolve definitional issues
- If external Service Weights are used, ensure that they reflect clinical practice in the organisation in which they are used
- Develop RVUs for all standard Feeder systems, where actual utilisation data is not available

15 MIN BREAK



DATA ANALYTICS

USING PLC RESULT TO:

1. Analyse and improve financial performance
2. Analyse the variability and quality of clinical practices
3. Document best practices and support value-based management of care and services

ANALIZING PLC RESULTS

Improve financial performance

How would you describe Data Analytics applied to Healthcare?

- "Process of examining raw datasets to find trends, draw conclusions and identify the potential for improvement, using current and historical data to gain insights, macro and micro, to support financial and clinical decision-making at both the patient and business level"
  https://online.shrs.pitt.edu/blog/data-analytics-in-health-care/
- More than a one-time linear process of building dashboards where you

  Connect to data sources → perform data ETL/ELT → Create a single source of truth → develop and share dashboards

ANALYSING PLC RESULTS

Improve financial performance

How would you describe Data Analytics applied to Healthcare?

- More an iterative on-linear type of process, with different, yet inter-related, types of data analytics
- The Gartner Analytic Ascendancy Model refers to 5 types :
  - **Descriptive:** visualizing the data to understand what happened so far
  - **Diagnostic:** answering the question : why it happened ?
  - **Predictive:** predicting a result in the future, based on analysis of past data.
  - **Prescriptive:** providing decision suggestions to achieve a desired outcome in the future.
  - **Cognitive:** mimicking human thinking through advanced techniques, AI, Machine Learning (ML), Deep Learning (DL)

ANALYZING PLC RESULTS

To improve financial performance

ANALYSING PLC RESULTS

Improve financial performance

How would you define the notion of financial performance applied to healthcare service providers ?

- Two perspectives : Revenue-Cost VS cost efficiency.
- We will draw heavily on our experience in QC, where no ABF yet. Will focus on :
  - Cost efficiency perspective
  - Inpatient acute care encounters
- In the efficiency perspective, Analysing performance is always about comparing A with B (organisations, facilities, specialties, consultants, etc.)

ANALYSING PLC RESULTS

Improve financial performance

What is specific to financial performance appraisal based on the use of patient level costing results ?

- Based on an “integrated” patient perspective as opposed to production perspective where performance is appraised “in silo”

PowerHealth

ANALYSING PLC RESULTS

Improve financial performance

		Departments					
		Ward	**Theater**	**Drugs**	**Imaging**	**Laboratory**	**Physiotherapy**
	Patient A DRG	Surgical ward X 1,5 days 1123$	Ombilical hernia cure 0,75 hr 546$	In OR, 125$ In Ward, 67$		1 pre-op test, 13$	
Casemix	Patient B DRG	Day surg. ward 4,75 hr 674$	Open reduction 1 hr 702$	In OR, 125$ In Ward, 27$	XRay, 37$	1 pre-op test, 13$	1 treatment 168$
	Patient C DRG	Medical ward Y 4,3 days 2234$		In Ward, 432$	Chest XRay, 34$	4 tests, 79$	3 treatments, 435$
	...						

ANALYSING PLC RESULTS

Improve financial performance

		Departments					
		Ward	Theater	Drugs	Imaging	Laboratory	Physiotherapy
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	Patient C DRG	Medical ward Y 4,3 days 2234$		In Ward, 432$	Chest XRay, 34$	4 tests, 79$	3 treatments, 435$
	...						

- From a department manager's point of view, this approach to performance analysis and improvement includes unit cost comparisons, process improvement, Lean approaches, etc.

ANALYSING PLC RESULTS

Improve financial performance

		Departments					
		Ward	Theater	Drugs	Imaging	Laboratory	Physiotherapy
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	Patient C DRG	Medical ward Y 4,3 days 2234$		In Ward, 432$	Chest XRay, 34$	4 tests, 79$	3 treatments, 435$
	...						

- This patient “journey” or “care pathway” or patient “encounter” perspective allows to analyse the nature, intensity, continuity, relevance, sequence of care activities globally and on a day-by-day basis

- By considering patient care pathways, PLC allows to evaluate the performance combining both a financial and clinical perspective, opening the door to a more complete and integrated approach.

ANALYSING PLC RESULTS

Improve financial performance

		Departments					
		Ward	Theater	Drugs	Imaging	Laboratory	Physiotherapy
Casemix	Patient A DRG	Surgical ward X 1,5 days 1123$	Ombilical hernia cure 0,75 hr 546$	In OR, 125$ In Ward, 67$		1 pre-op test, 13$	
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	Patient C DRG	Medical ward Y 4,3 days 2234$		In Ward, 432$	Chest XRay, 34$	4 tests, 79$	3 treatments, 435$
	...						

- Provided the data from information systems allow it, pathways can cover multiple care environments, such as :
  - In and outpatient acute and rehab care in institutional settings, and/or
  - Community-based care

ANALYSING PLC RESULTS

Improve financial performance

What are key potential sources of biases when analysing the financial performance of a healthcare provider ?

- Not all biases may be accounted for in the analytical approach, sometimes they need to be accounted for in the interpretation of results
- **Key potential biases ?**
  - Provider comparability
  - Casemix biases : are we comparing “apples with apples” ?
  - Costing methodologies
  - Quality of clinical data from provider source systems
  - Outliers
- None of these biases are valid reasons not to begin Analysing the data !

Provider comparability?

- ✓ Community versus university hospital
- ✓ HC provider size (Ex: Nb of facilities, patients, beds and stretchers)
- ✓ Size and dispersion of catchment area
- ✓ Specific regional, supra-regional or national mandates (ex. Traumatology)
- ✓ Specialties covered. Ex : Mental health, Obstetric
- ✓ Geographic location : urban, semi-urban, rural
- ✓ Degree of HC integration at local, regional, national levels, through horizontally and vertically integrated HC organisations or HC networks

Casemix biases?

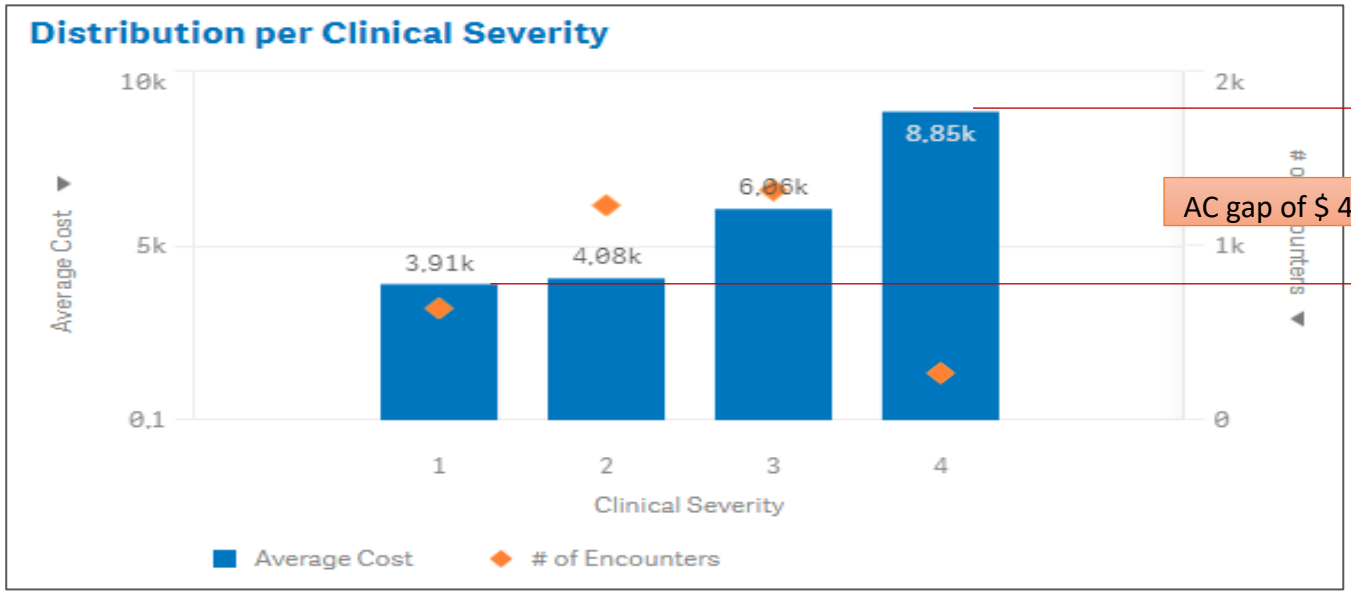
- Comparisons should account for different distribution of patients or encounters
  - By MCC and DRG
  - By severity level (or average severity)
  - According to age groups
  - According to proportion of urgent versus elective admissions
  - According to proportion of typical versus atypical encounters
  - According to care setting, ex. :
    - hospitalisation versus SDS or versus hospital at home
    - Intensive rehab as inpatient versus as external or at home
  - According to patient residence location
  - According to frequency of primary procedures and diagnostics for a given DRG

ANALYSING PLC RESULTS

Improve financial performance

Ex. 1 : Casemix impact on costs

The average cost per DRG is influenced by distribution of encounters according to clinical severity



Ex. 2 : Casemix impact on costs

Also, by the frequency of the various primary procedures associated with a DRG

DRG Unilateral hip replacement

Primary proc.	Nb of enc.	Average enc. cost
1VA53LLPN	181	$6,794
1VA53LAPN	56	$6,848
1VA53LLPNA	11	$6,584
1VA53LAPNA	3	$7,807
1VA53LLPNN	1	$10,064

ANALYSING PLC RESULTS

Improve financial performance

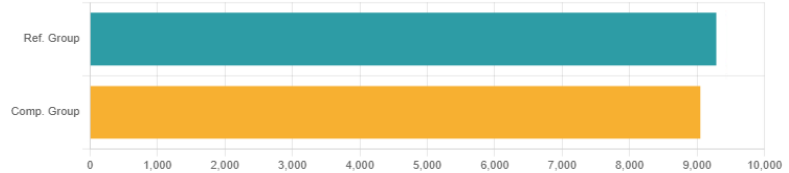
Ex. 3 : Casemix impact on costs

Also, by the proportion of typical versus atypical encounters

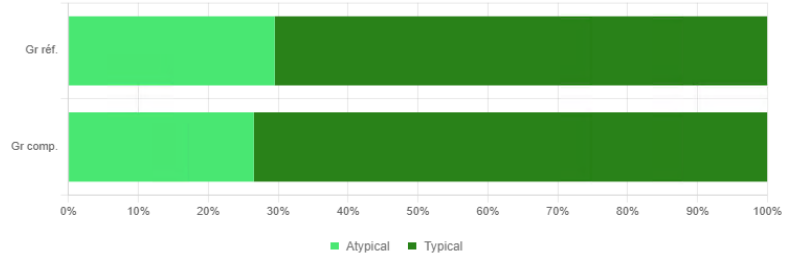
GAPS

	Ref. Group	Comp. Group	Gaps
Total Cost	$87,636,083	$202,098,384	-$114,462,301
Direct Cost	$71,042,788	$167,331,106	-$96,288,318
Indirect Cost	$16,593,295	$34,767,278	-$18,173,983
Average Cost	$9,285	$9,0	$237
Number of Encounters	9,438	22,334	-12,896
Number of Patients	7,361	17,686	-10,325
ALOS (days)	8.3	7.1	1.2
Bed Equivalents (Days / 365)	201.51	409.18	-207.68

AVERAGE COST



DISTRIBUTION BY ATYPICAL / TYPICAL



ANALYSING PLC RESULTS

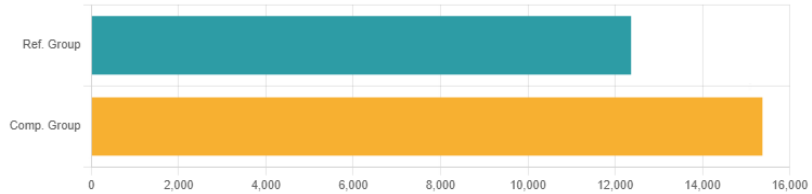
Improve financial performance

Ex. 3 : Casemix impact on costs

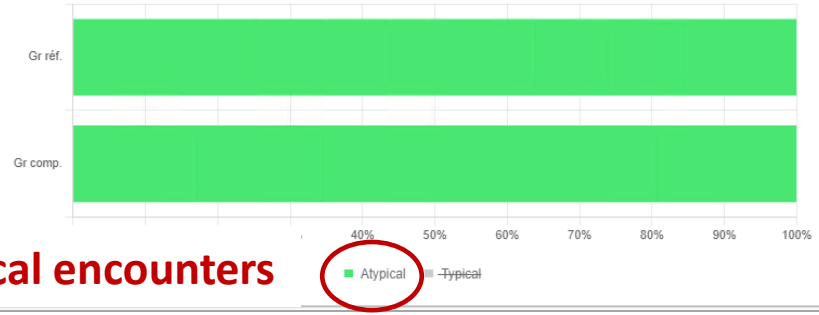
GAPS

	Ref. Group	Comp. Group	Gaps
Total Cost	$34,451,372	$91,082,286	-$56,630,913
Direct Cost	$27,682,334	$75,656,342	-$47,97
Indirect Cost	$6,769,038	$15,425,944	-$8,6
Average Cost	$12,366	$15,375	-$3,009
Number of Encounters	2,786	5,924	-3,138
Number of Patients	2,495	5,112	-2,617
ALOS (days)	14	13.4	0.6
Bed Equivalents (Days / 365)	96.16	196.99	-100.84

AVERAGE COST



DISTRIBUTION BY ATYPICAL / TYPICAL



After filtering on atypical encounters

ANALYSING PLC RESULTS

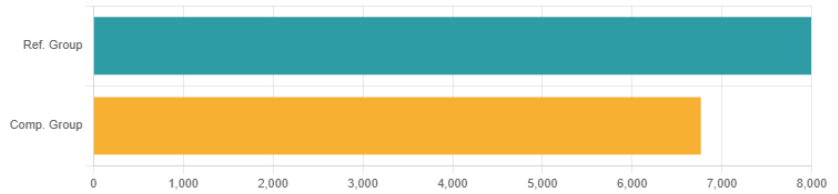
Improve financial performance

Ex. 3 : Casemix impact on costs

GAPS

	Ref. Group	Comp. Group	Gaps
Total Cost	$53,184,711	$111,016,099	-$57,831,388
Direct Cost	$43,360,454	$91,674,764	-$4[illegible],310
Indirect Cost	$9,824,257	$19,341,334	-$[illegible]077
Average Cost	$7,995	$6,765	$1,230
Number of Encounters	6,652	16,410	-9,758
Number of Patients	5,405	13,737	-8,332
ALOS (days)	6	4.9	1.1
Bed Equivalents (Days / 365)	105.35	212.19	-106.84

AVERAGE COST

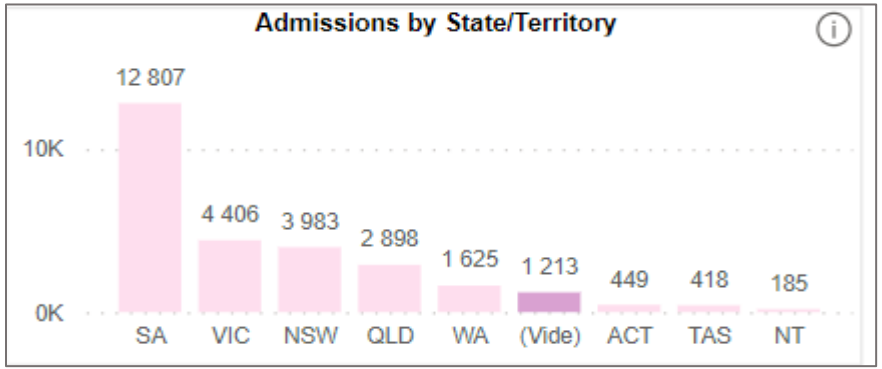


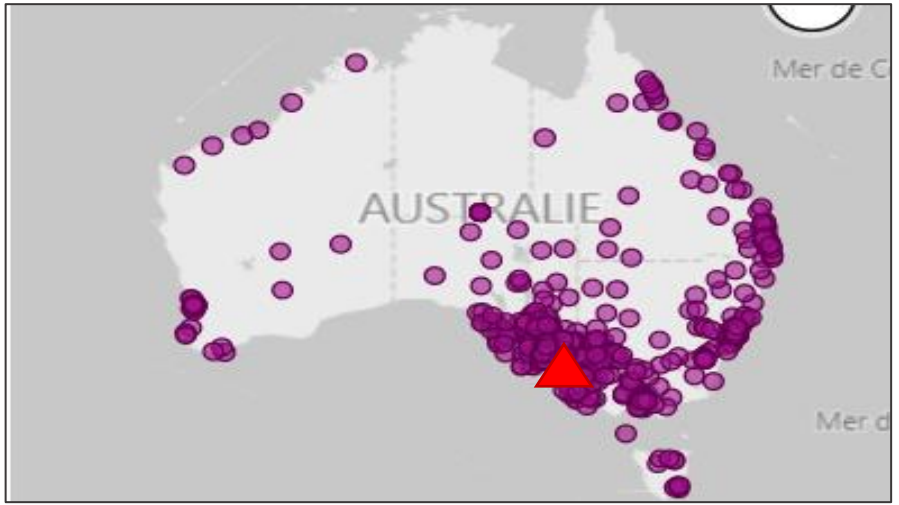
DISTRIBUTION BY ATYPICAL / TYPICAL

After filtering on typical encounters

Ex. 4 : Casemix impact on costs

Also, by the HC provider's catchment area and proportion of patients living far away. Why ?





Costing methodology and data quality biases

Costing methodology biases

- Already discussed in 1st portion of this workshop
- 2 Key aspects to consider :
  - Variability in cost allocation methods
  - Non allocated expenses (ex. due to non availability or low reliability of PL activity data)

Quality of source data for provider information systems

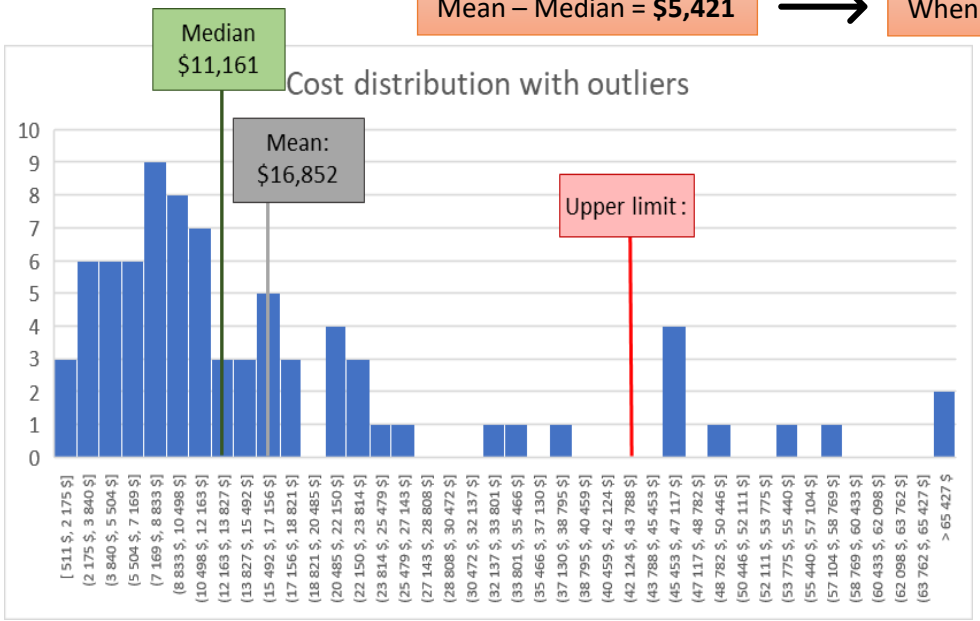
- Variability in PC activity data or coding practices
- Ex. : hospital erroneously coding most of their knee joint replacement procedures as “Dual” rather than “Tri” component with synthetic material – a different, much cheaper procedure, with tremendous impact on their comparative financial performance

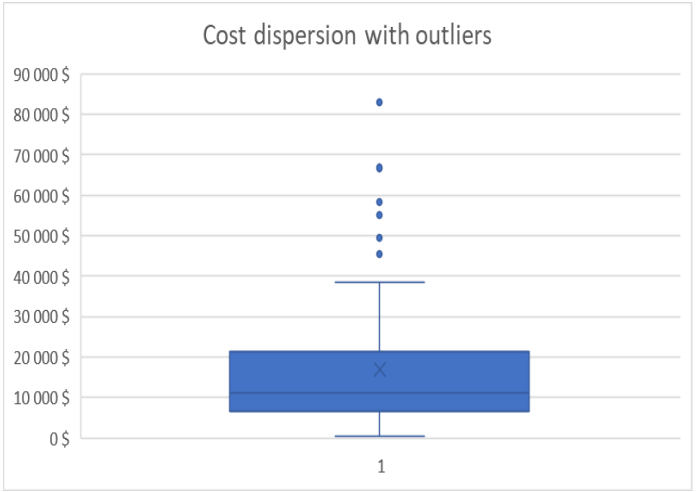
ANALYSING PLC RESULTS

Improve financial performance

Outliers

Mean – Median = **$5,421** → When **Including** the Outliers



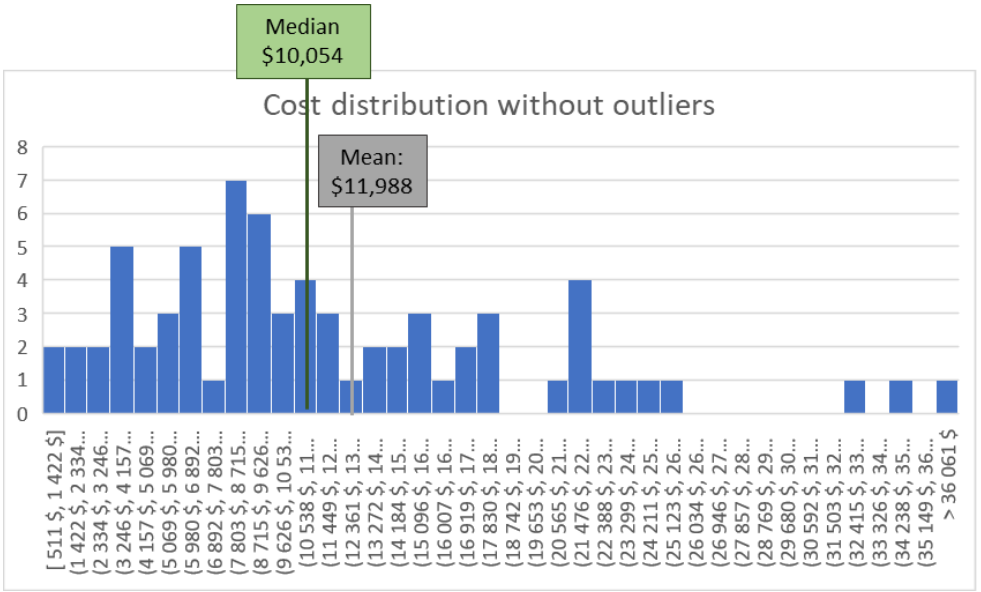


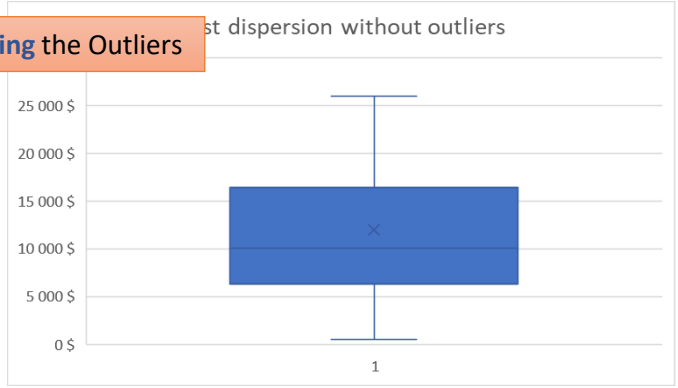
ANALYSING PLC RESULTS

Improve financial performance

Outliers

Mean – Median = **$1,934** → When **Excluding** the Outliers





With outliers	
Minimum	$511
Q1	$6 722
Median	**$11 161**
Q3	$21 210
Maximum	$82 912
Mean	**$16 852**
Range	**$82 401**

without outliers	
Minimum	$511
Q1	$6 324
Median	**$10 054**
Q3	$16 389
Maximum	$38 361
Mean	**$11 988**
Range	**$37 850**

ANALYSING PLC RESULTS

Improve financial performance

Improving financial performance is very much about addressing the “right” performance levers

ANALYSING PLC RESULTS

Improve financial performance

What are broad categories of performance drivers in the context of a healthcare organisation ?

- Structural
- Patient-related

} Hard to modify and act upon

- organisational / processual
- Clinical

} Main sources of performance levers

PLC results opens the door to the analysis of both financial and clinical performance and to an understanding of the underlying clinical practices driving costs

ANALYSING PLC RESULTS

Improve financial performance

Proposed roadmap

V1 – Starting point : Temporal Analysis

①

- Ranking of DRGs according to annual variation of total cost
- Selection 10 to 20 DRGs

1. Temporal Analysis

2. Deep-dive comparative analysis

- Adjusting comparing group and parameters according to targeted DRG
- Performance analysis at cost buckets level

- Average utilisation data at Department level in terms of quantity of service/care activities per encounter

3. Comparative utilisation analysis

4. Comparative Unit cost analysis

- Comparison of costs per unit of measurement at Department level
- Cost drivers analysis

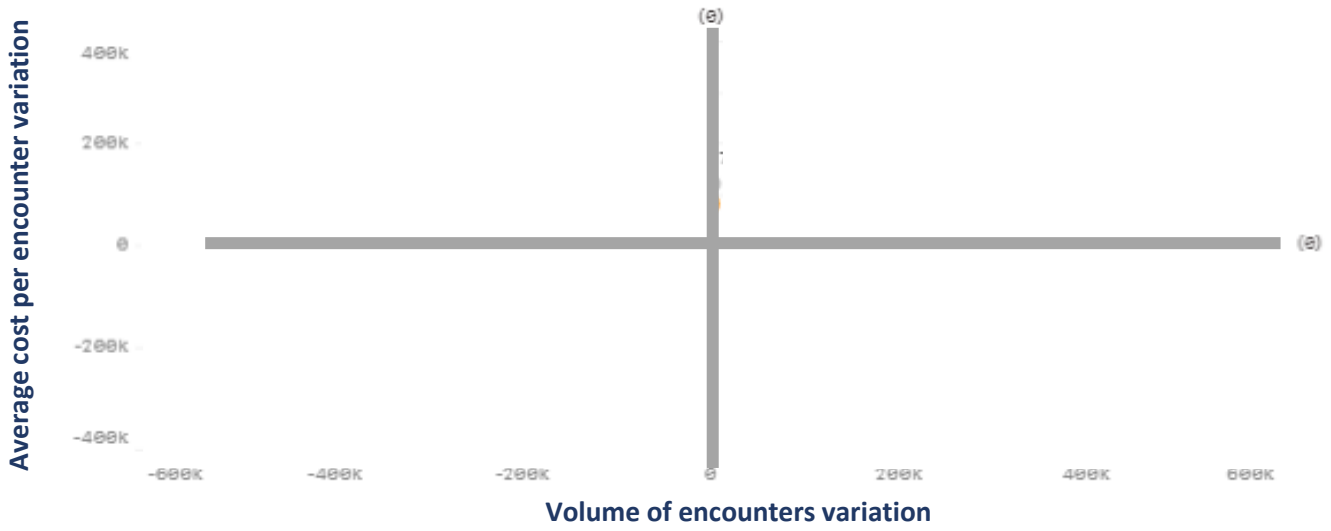
ANALYSING PLC RESULTS

Improve financial performance

Analysing annual total cost variation per DRG as starting point for targeted benchmarking analysis

Average cost Δ

Representation of DRGs in 4 quadrant



Volume Δ

ANALYSING PLC RESULTS

Improve financial performance

Proposed roadmap

V2 – Starting point : High level benchmarking

① **Alternative starting point**

Ranking of DRGs according to performance gap
Selection 10 to 20 DRGs

1. High-level benchmarking

2. Deep-dive comparative analysis

- Adjusting comparing group and parameters according by DRG
- Cost/Performance analysis at cost buckets level

- Average utilisation data at Department level in terms of quantity of service/care activities per encounter

3. Comparative utilisation analysis

4. Comparative Unit cost analysis

- Comparison of costs per unit of measurement at Department level
- Cost drivers analysis

ANALYSING PLC RESULTS

Improve financial performance

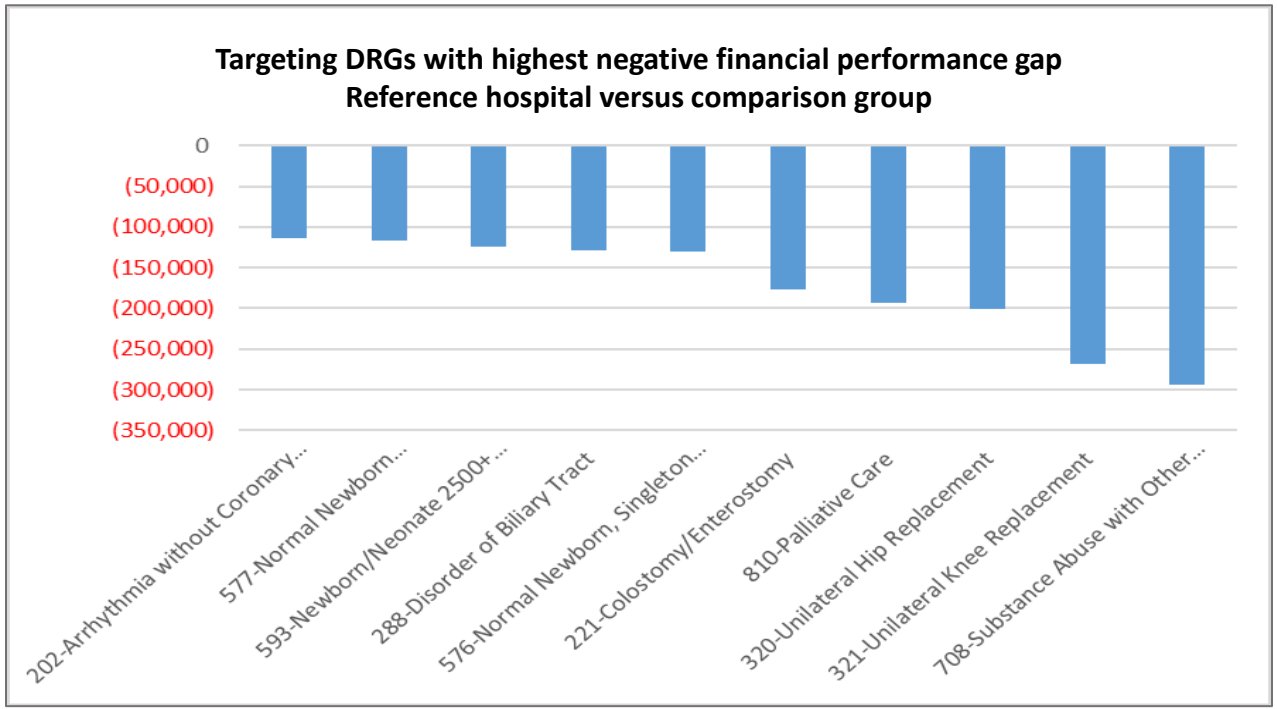
Ranking of all DRGs in decreasing order of performance gap with comparative group

CMG	# Enc. Ref. Org.	# Enc. Comp. Gr.	Tot Cost Ref. Org.	Ave. Cost Ref. org.	Av. Cost Comp. Gr.	Perform. Gap
558-Primary Caesarean Section, with induction	40	48	$416,501	$10,413	$16,331	$236,732
130-Respiratory Failure	12	92	$383,263	$31,939	$49,630	$212,298
733-Major Thoraco-abdominal/Vascular Intervention with Trauma/Complication of	6	49	$262,167	$43,694	$77,571	$203,260
562-Vaginal Birth with Anaesthetic and Non-Major Obstetric/Gynecologic Interven	102	370	$514,462	$5,044	$6,825	$181,659
502-Hysterectomy with Non Malignant Diagnosis	71	40	$702,745	$9,898	$12,382	$176,386
559-Primary Caesarean Section, no induction	50	55	$324,525	$6,491	$9,743	$162,617
133-Infectious/Parasitic Disease of Respiratory System	16	493	$296,629	$18,539	$27,417	$142,046
560-Caesarean Section with uterine scar, no induction	75	95	$389,736	$5,196	$6,832	$122,701
26-Ischemic Event of Central Nervous System	43	107	$434,936	$10,115	$12,877	$118,774
142-Other Lung Disease	8	99	$66,871	$8,359	$21,455	$104,770
Other CMGs	3,232	20,900	$22,973,342			($891,695)
202-Arrhythmia without Coronary Angiogram	94	176	$407,653	$4,337	$3,127	($113,713)
577-Normal Newborn Multiple/Caesarean Delivery	95	87	$156,371	$1,646	$424	($116,069)
593-Newborn/Neonate 2500+ grams, Short Gestation	18	41	$208,740	$11,597	$4,669	($124,694)
288-Disorder of Biliary Tract	38	148	$232,915	$6,129	$2,752	($128,347)
576-Normal Newborn, Singleton Vaginal Delivery	199	759	$172,602	$867	$216	($129,537)
221-Colostomy/Enterostomy	22	113	$1,057,736	$48,079	$40,073	($176,122)
810-Palliative Care	49	662	$345,693	$7,055	$3,119	($192,859)
320-Unilateral Hip Replacement	50	312	$578,456	$11,569	$7,558	($200,569)
321-Unilateral Knee Replacement	82	361	$901,559	$10,995	$7,720	($268,534)
708-Substance Abuse with Other State	81	313	$480,449	$5,931	$2,302	($293,963)
	4,383	**25,320**	**$31,307,349**	**$6,778**	**$8,732**	**($974,859)**

ANALYSING PLC RESULTS

Improve financial performance

Ranking of all DRGs in decreasing order of performance gap with comparative group



Calculation of « financial performance gap » :

$$\text{Nb of encounters}_{\text{Ref Hosp.}} \times (\text{AC}_{\text{Comp Gr.}} - \text{AC}_{\text{Ref Hosp.}})$$

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ANALYSING PLC RESULTS

Improve financial performance

Proposed roadmap

- Ranking of DRGs according to annual variation of total cost
- Then rank according to annual variation of cost per encounter

1. Temporal Analysis

2. Deep-dive comparative analysis

- Adjusting comparing group and parameters according to targeted DRG
- Performance analysis at cost buckets level

2

- Average utilisation data at Department level in terms of quantity of service/care activities per encounter

3. Comparative utilisation analysis

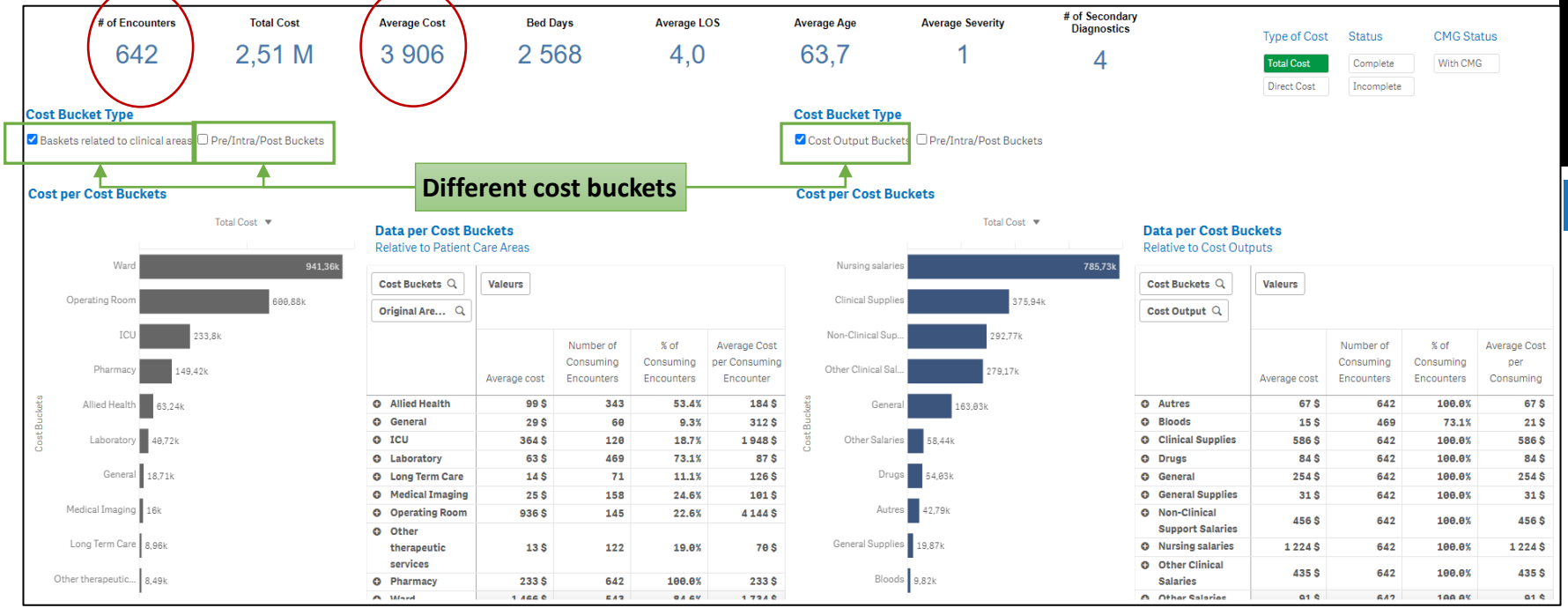
4. Comparative Unit cost analysis

- Comparison of costs per unit of measurement at Department level
- Cost drivers analysis

ANALYSING PLC RESULTS

Improve financial performance

Financial performance analysis at cost bucket level



ANALYSING PLC RESULTS

Improve financial performance

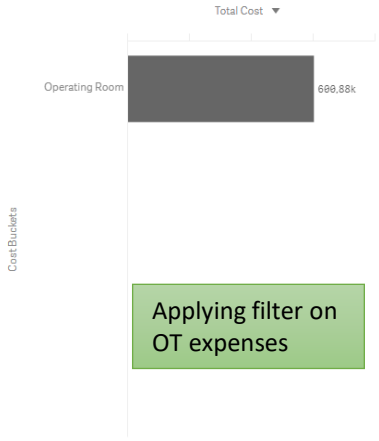
Financial performance analysis at cost bucket level

# of Encounters	Total Cost	Average Cost	Bed Days	Average LOS	Average Age	Average Severity
145	1,26 M	8 660	347	2,4	58,9	1

Cost Bucket Type

☑ Baskets related to clinical areas ☐ Pre/Intra/Post Buckets

Cost per Cost Buckets



Applying filter on OT expenses

Data per Cost Buckets

Relative to Patient Care Areas

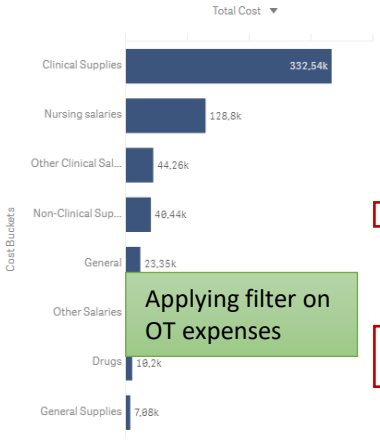
Cost Buckets | Valeurs | Original Are...

	Average cost	Number of Consuming Encounters	% of Consuming Encounters	Average Cost per Consuming Encounter
Allied Health	99 $	343	53.4%	184 $
General	29 $	60	9.3%	312 $
ICU	364 $	120	18.7%	1 948 $
Laboratory	63 $	469	73.1%	87 $
Long Term Care	14 $	71	11.1%	126 $
Medical Imaging	25 $	158	24.6%	101 $
Operating Room	936 $	145	22.6%	4 144 $
Other therapeutic services	13 $	122	19.0%	70 $
Pharmacy	233 $	642	100.0%	233 $
Ward	1 466 $	643	84.6%	1 734 $

Cost Bucket Type

☑ Cost Output Buckets ☐ Pre/Intra/Post Buckets

Cost per Cost Buckets



Applying filter on OT expenses

Data per Cost Buckets

Relative to Cost Outputs

Cost Buckets | Valeurs | Cost Output

	Average cost	Number of Consuming Encounters	% of Consuming Encounters	Average Cost per Consuming
Clinical Supplies	2 293 $	145	100.0%	2 293 $
Drugs	70 $	144	99.3%	71 $
General	161 $	145	100.0%	161 $
General Supplies	49 $	145	100.0%	49 $
Non-Clinical Support Salaries	279 $	145	100.0%	279 $
Nursing salaries	888 $	145	100.0%	888 $
Other Clinical Salaries	305 $	145	100.0%	305 $
Other Salaries	98 $	145	100.0%	98 $

ANALYSING PLC RESULTS

Improve financial performance

Financial performance analysis at cost bucket level

# of Encounters	Total Cost	Average Cost	Bed Days	Average LOS	Average Age	Average Severity
145	1,26 M	8 660	347	2,4	58,9	1

Drilling down OT expenses by department

Drilling down on OT cost bucket

	Total
⊕ AH	63 239 $
⊕ CARDIAC	3 675 $
⊕ CRITCARE	233 796 $
⊕ IMAGE	16 005 $
⊕ LABO	40 721 $
⊕ LTC	8 961 $
⊖ OR	600 883 $
⊕ OR-ANAESTHETIC DRUGS	10 330 $
⊕ OR-ANAESTHETICS	77 278 $
⊕ OR-DAY SURGERY UNIT	8 996 $
⊕ OR-MAXILLO-FACIAL SURGERY	41 304 $
⊕ OR-OPERATING THEATRES	166 970 $
⊕ OR-ORTHOPAEDIC HIP CONSUMABLES	240 572 $
⊕ OR-ORTHOPAEDIC SURGERY	45 208 $
⊕ OR-RECOVERY	10 224 $
⊕ PATTRANS	18 710 $
⊕ PHARM	149 423 $
⊕ SPS	4 812 $
⊕ WARDD	2 764 $
⊕ WARDM	807 281 $
⊕ WARDU	131 317 $

Drilling OT clinical supplies expenses by cost categories

Drilling down on OR clinical supplies

Cost Buckets | Cost Output | Valeurs

	Average cost	Number of Consuming Encounters	% of Consuming Encounters	Average Cost per Consuming
⊖ Clinical Supplies	2 293 $	145	100.0%	2 293 $
Catheters Exp	10 $	145	100.0%	10 $
Imaging Exp	0 $	139	95.9%	0 $
Implant Exp	1 998 $	145	100.0%	1 998 $
Instrument Exp	66 $	145	100.0%	66 $
Laboratory Exp	0 $	145	100.0%	0 $
Med / Surg Exp	216 $	145	100.0%	216 $
Medical Gas Exp	2 $	145	100.0%	2 $
Suture Exp	1 $	145	100.0%	1 $
⊕ Drugs	70 $	144	99.3%	71 $
⊕ General	161 $	145	100.0%	161 $
⊕ General Supplies	49 $	145	100.0%	49 $

ANALYSING PLC RESULTS

Improve financial performance

Comparative perspective

AREA GROUPING

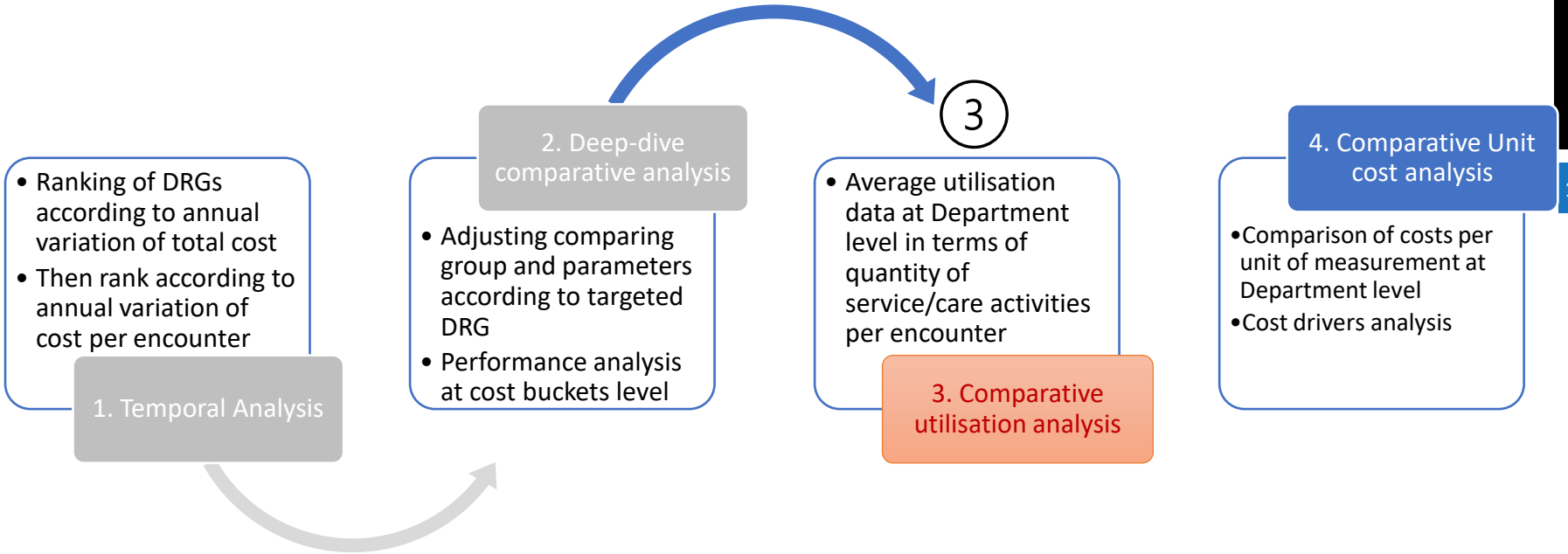
	Total Cost	Average Cost	Number of Encounters	ALOS (days)	Pharmacy	Clinical Laboratories	Day Surgery	Medical Imaging	Allied Health	Ambulatory Care - Day and Night	Inpatient Nursing	Operating Room
Gr réf.	$87,636,083	$9,285	9,438	8.3	0	$15	0	$209	$562			$2,030
Gr comp.	$202,098,384	$9,049	22,334	7.1	$463	$183	$78	$251	$491	$10	$6,220	$1,353

OT AC/enc. gap

ANALYSING PLC RESULTS

Improve financial performance

Proposed roadmap



ANALYSING PLC RESULTS

Improve financial performance

Analysing utilisation data

Nursing

	Average Length of Stay in eq-days	Cost per Bed-Hour in Ward	Average Number Of Bed-Equivalent	Number of Consuming Encounters
WARDM	9,3	15,9	79,0	3 095
CRITCARE	2,7	53,8	4,1	565
WARDU	2,3	25,1	0,6	96
WARDD	0,1	26,9	0,1	140

Diagnostic and Therapeutic Services

	Average Number of Procedures per Encounter	Average Workload/Pro...	Average Workload Units per Encounter	Number of Consuming Encounters	Cost per Workload Unit
CARDIAC	1,7	0,0	0,0	669	-
IMAGE	2,5	21,9	54,1	1 660	2,6
LABO	130,6	0,0	0,0	3 114	-

Operating Room

	Secondary Procedure Frequency	Average Procedure Time	Average Number of Surgeries per Encounter	Average OR salary expenses per hour of Procedure	Number of Consuming Encounters
Totaux	**0**	**2,51**	**1,00**	**0**	**163**
Operating Room	0	2,51	1,00	0	163

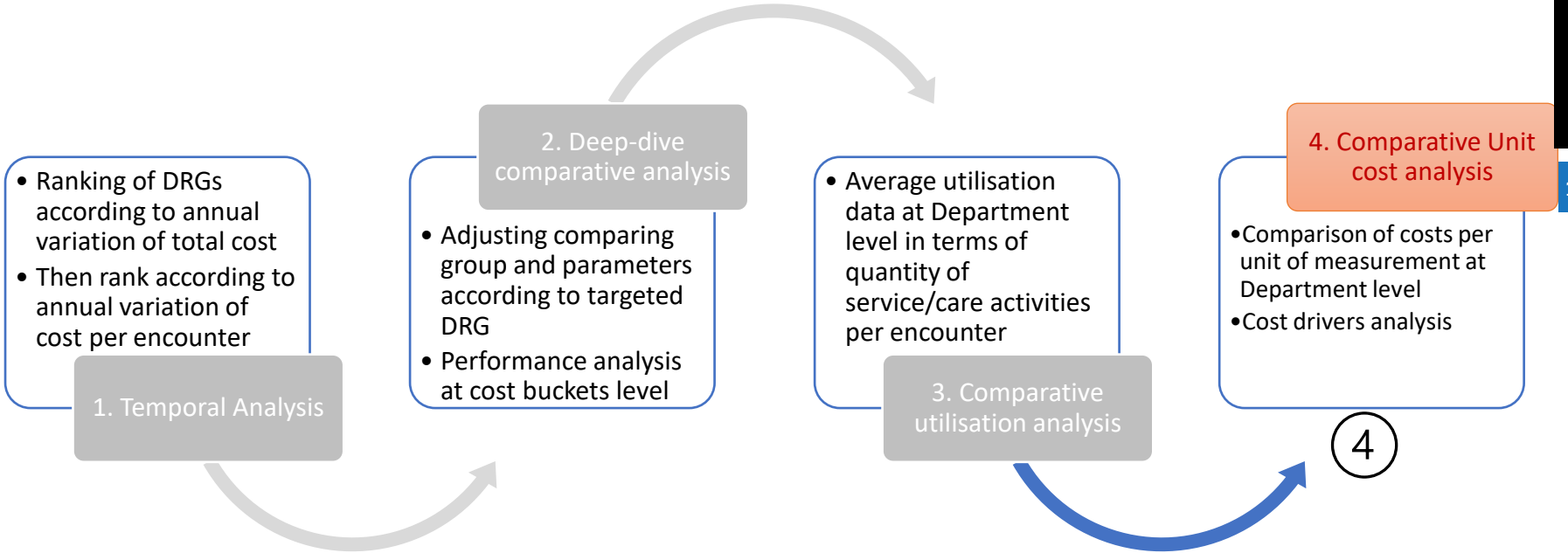
Comparative utilisation data is essential to ascertain if observed average cost per Department are due to gaps in :

- Service utilisation, or
- Department unit costs

ANALYSING PLC RESULTS

Improve financial performance

Proposed roadmap



ANALYSING PLC RESULTS

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Department unit costs

Nursing

	Average Length of Stay in eq-days	Cost per Bed-Hour in Ward	Average Number Of Bed-Equivalent	Number of Consuming Encounters
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Operating Room

	Secondary Procedure Frequency	Average Procedure Time	Average Number of Surgeries per Encounter	Average OR salary expenses per hour of Procedure	Number of Consuming Encounters
Totaux	**0**	**2,51**	**1,00**	**0**	**163**
Operating Room	0	2,51	1,00	0	163

ANALYSING PLC RESULTS

Improve financial performance

Q : What type of factors may account for differences in service utilisation ?

- Patient casemix
- Clinical practices
  - Ex. : conservative practices possibly leading to over-prescription

Q : What type of factors may account for differences in department unit costs ?

- Staffing ratios and composition
- Cost of labor differences (ex. due to staff seniority or labor shortages)
- Rate of absenteeism due to sickness or accidents
- Resources productivity
- Nature & quality of consumables
- Negotiated prices
- Economies of scale
- Biases relating to quality/comparability of activity data

Case studies

ANALYSING PLC RESULTS

Improve financial performance

Should the Ref. Hospital manage to reduce its average cost of $9,811 to that of the comparison group of $5,368, it could save up to **$222K** annually

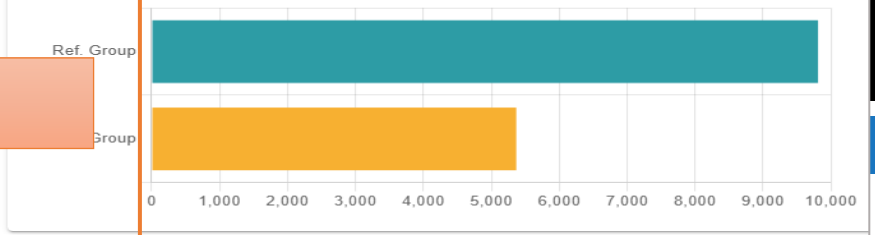
Case 1 : DRG Laparoscopic Cholecystectomy – high level analysis

GAPS

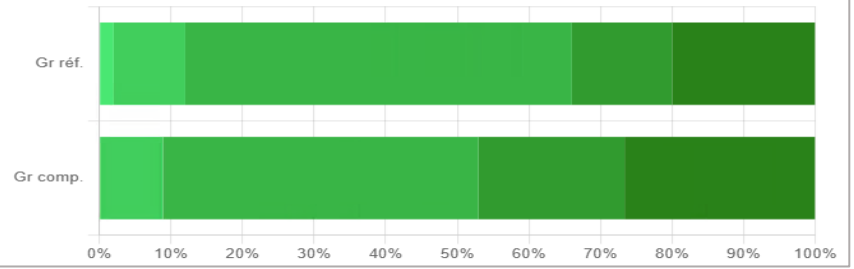
	Ref. Group	Comp. Group	Gaps
Total Cost	$490,55		
Direct Cost	$406,90		
Indirect Cost	$83,646	$240,569	-$156,923
Average Cost	$9,811	$5,368	$4,443
Number of Encounters	50	304	-254
Number of Patients	50	304	-254
ALOS (days)	2.8	2.7	0.2
Bed Equivalents (Days / 365)	0.38	2.18	-1.8

Ref hospital smaller than most of hospitals from Comparison Group

AVERAGE COST



DISTRIBUTION BY AGE GROUP



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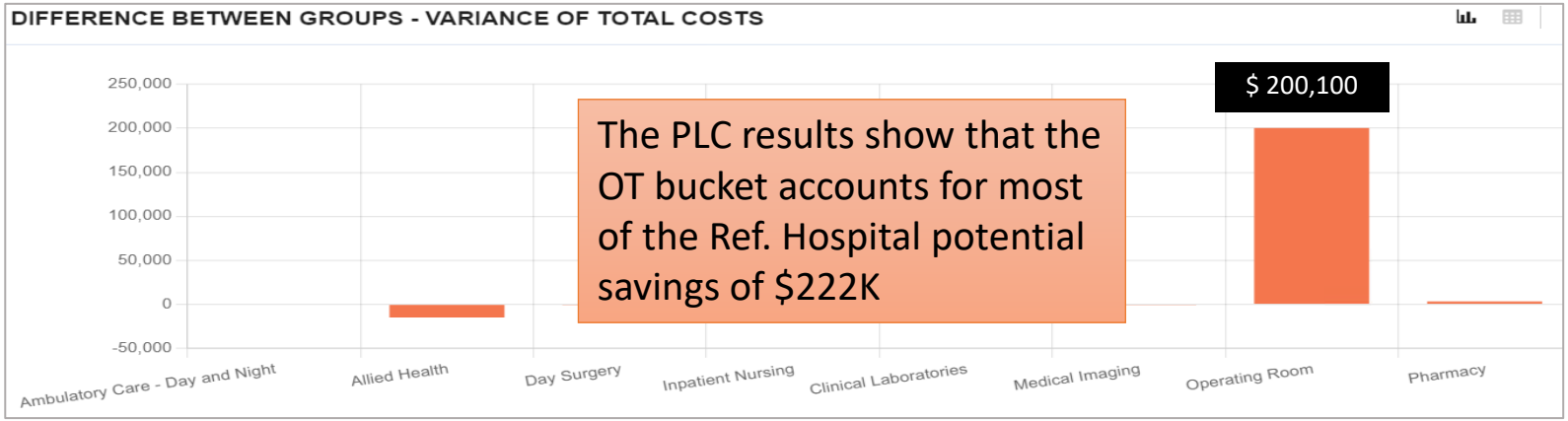
High-level | Drill down 1 | Drill down 2 | Performance drivers

ANALYSING PLC RESULTS

Improve financial performance

Case 1 : DRG Laparoscopic Cholecystectomy – Comparative drill-down analysis by cost buckets



The PLC results show that the OT bucket accounts for most of the Ref. Hospital potential savings of $222K

AREA GROUPING

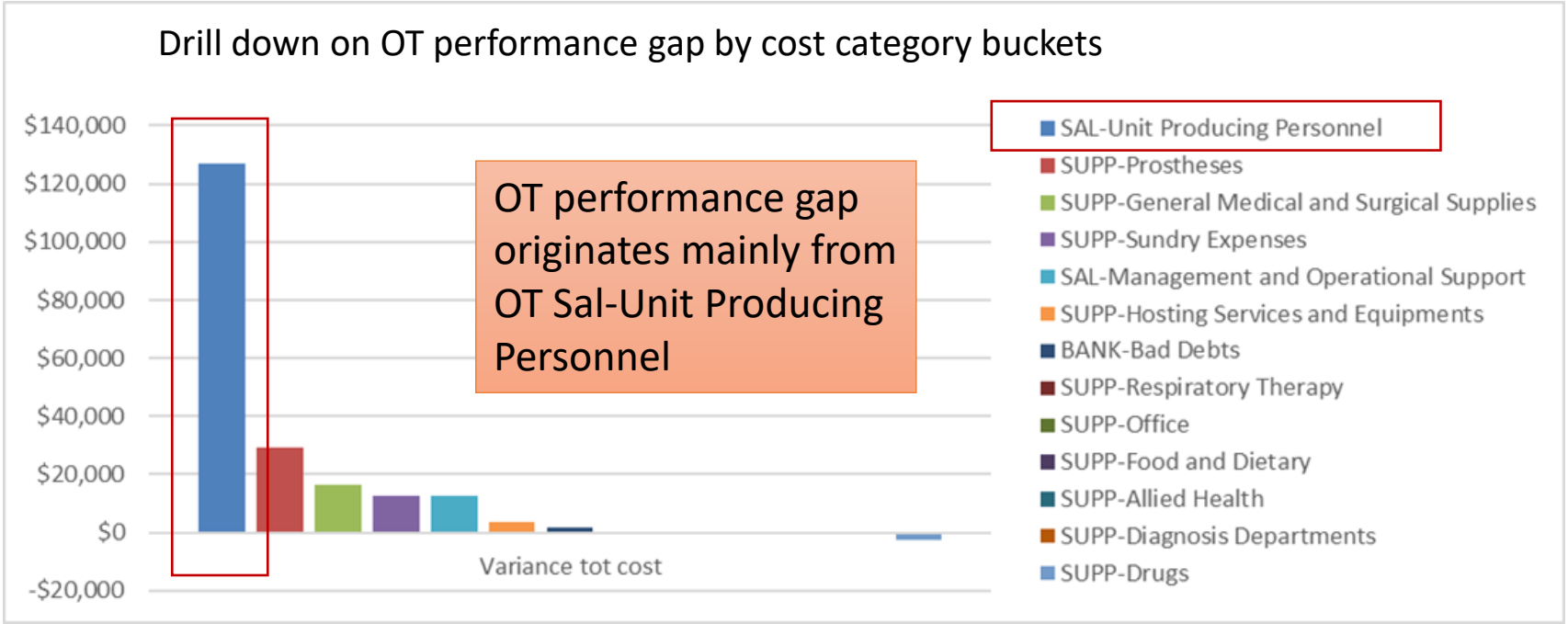
	Total Cost	Average Cost	Number of Encounters	ALOS (days)	Allied Health	Ambulatory Care - Day and Night	Medical Imaging	Day Surgery	Pharmacy	Clinical Laboratories	Inpatient Nursing	Operating Room
Gr réf.	$490,555	$9,811	50	2.8	$53	0	$67	0	$149	$185	$1,162	$8,196
Gr comp.	$1,631,824	$5,368	304	2.7	$349	$10	$74	$5	$80	$65	$591	$4,194

High-level | Drill down 1 | Drill down 2 | Performance drivers

ANALYSING PLC RESULTS

Improve financial performance

Case 1 : DRG Laparoscopic Cholecystectomy - Comparative drill-down analysis on OT bucket



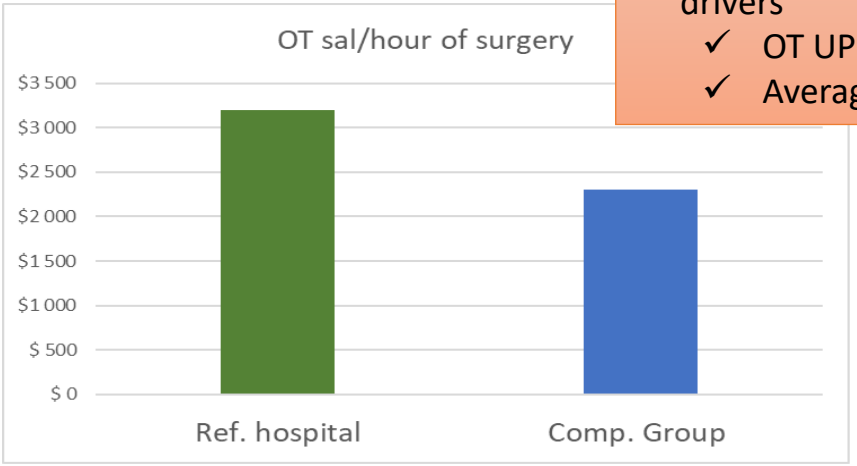
High-level | Drill down 1 | Drill down 2 | Performance drivers

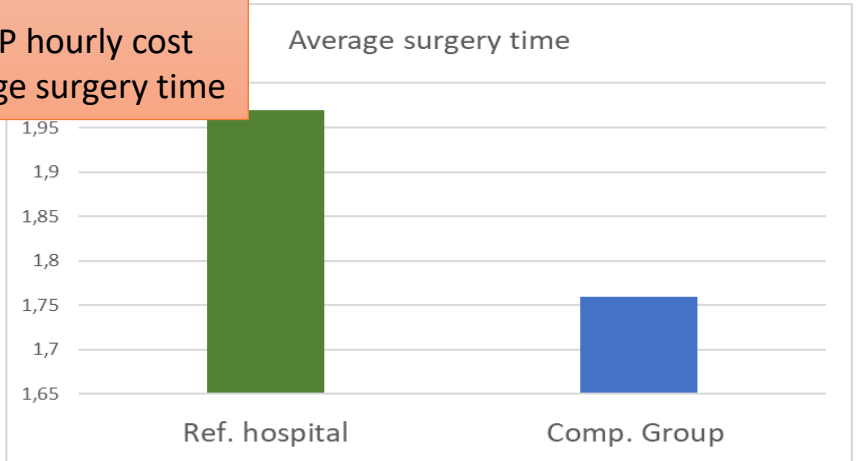
ANALYSING PLC RESULTS

Improve financial performance

Case 1 : DRG Laparoscopic Cholecystectomy – Analysis of performance gap for OT UPP salaries

- Two key performance drivers
  - ✓ OT UPP hourly cost
  - ✓ Average surgery time





- The **larger hospitals** of the comparison group are making a more efficient use of their OT
- The longer average surgery time for the Ref. hospital could be related to lower volumes by surgeons

SMALL GROUP SESSION
EXERCICE 1

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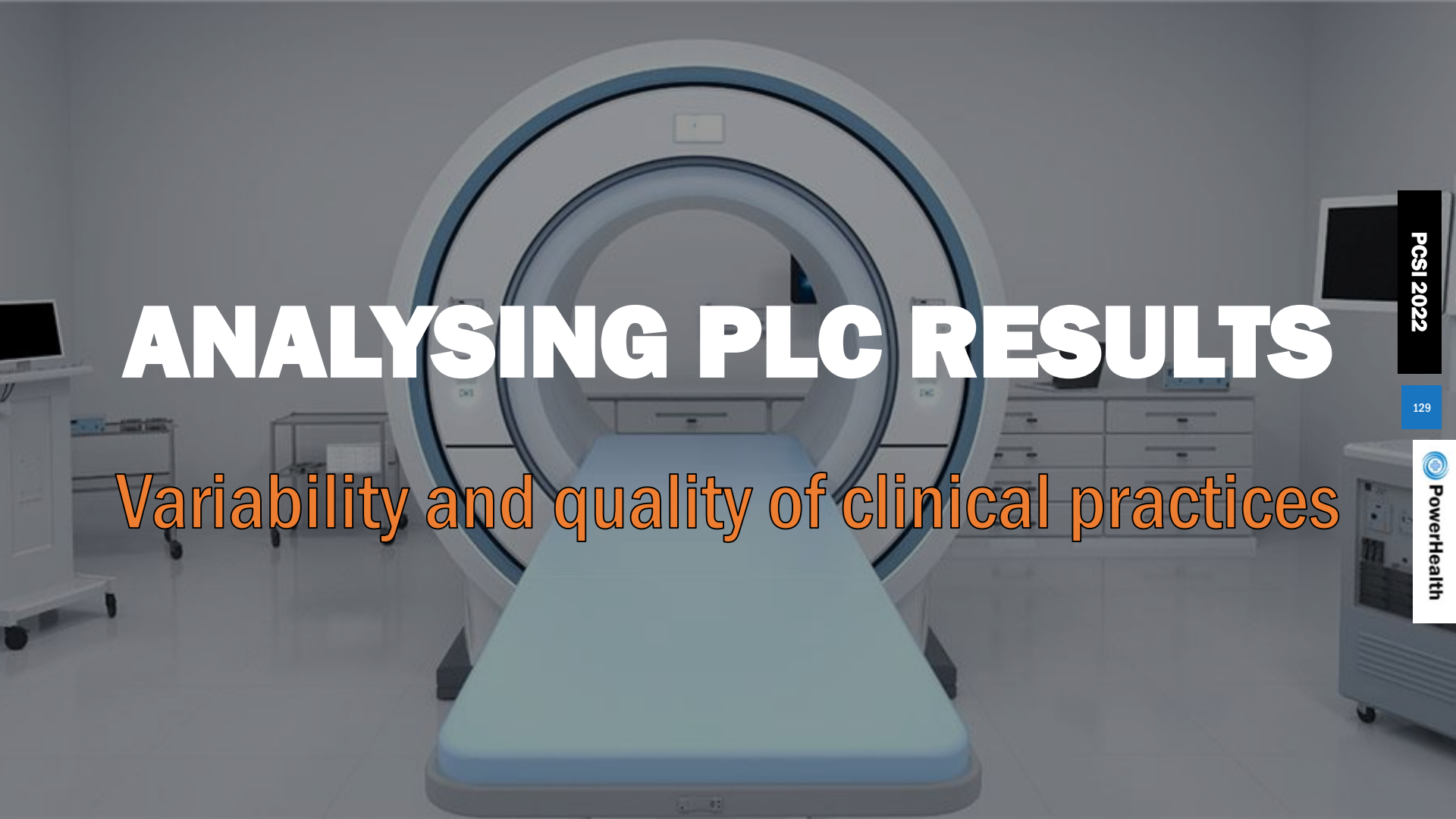
WORK SESSION IN SMALL GROUPS

Context

- Your Ministry of health has produced a performance report concluding that your hospital's orthopaedics department is underperforming financially-wise
- The Ministry's conclusion is based on a single performance KPI produced for each of the 21 DRGs of MDC 08
- The KPI is calculated by multiplying the average cost difference between your hospital and the entire state by your volumes

Assignment

- As an analyst for the Performance and Quality Division of your hospital, your are asked validate the Ministry's conclusion regarding the performance of your orthopaedics department, given the Ministry's performance appraisal approach
- How would you go about this ? What checks would you perform ? What kind of nuances would you seek to bring to the Ministry's conclusion.



ANALYSING PLC RESULTS

Variability and quality of clinical practices

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ANALYSING PLC RESULTS

Variability and quality of clinical practices

From a financial to a clinical perspective...

- The approach described so far is useful to circumscribe the sources of unfavorable performance gaps, but it remains an accounting type of analysis.
- Does not always go as far as explaining the underlying factors – clinical or other - driving costs above those of comparable hospitals
- To a large extent, these factors are rooted in the clinical practices of physicians and other professionals responsible for the organisation, coordination and delivery of care

Why analyse the variability and quality of clinical practices ?

Variability

- A great variability of clinical practices has been observed in HC organisations
- Care variability is associated with both poorer efficiency and poorer quality of healthcare[1]
- Care variability results from practice differences among health care clinicians and includes overuse and underuse, both of which can have negative consequences for patients"[2]

1. https://www.wolterskluwer.com/en/expert-insights/reduce-variability-of-care-factors-benefits-and-methods,
2. Sagi Shashar, Moriah Ellen, Shlomi Codish, Ehud Davidson and Victor Novack, The Annals of Family Medicine, January 2021, 19 (1) 30-37

Why analyse the variability and quality of clinical practices ?

Quality

- There is a now much evidence that **better quality of care can save money**[3]
  - According to Eliminating Waste in US Health Care *"Poor execution or lack of widespread adoption of known best care processes was costing **between 102 and 154 billions in wasteful spending** in 2011"*
- Among the sources poor quality and waste :
  - Poor execution
  - Non-conformity to best care processes and practices
  - Failures of care coordination (fragmented care)

3. Berwick Donald, Hackbarth Andrew, **Eliminating Waste in US Health Care**, JAMA 2012, 307 (14): 1513-1516
Jha AK, Orav EJ, Dobson A, Book RA, Epstein AM. Measuring efficiency: the association of hospital costs and quality of care. Health Aff (Millwood), 2009;28(3):897-906.

ANALYSING PLC RESULTS

Variability and quality of clinical practices

How can we measure the variability and quality of clinical practices using PLC results?

What we have been doing in Quebec over the last few years…

1. In collaboration of clinicians, we have identified and integrated PL quality of care measures in PLC results, which may or may not be condition or treatment specific. Examples :
   - ✓ NSQIP (National Surgical Quality Improvement Program) post-operation complications (NSQIP), allowing benchmarking with hospitals across the world
   - ✓ Delays - consultation, treatment, results
   - ✓ Rate of adverse events (infections, complications, accidents, mortality)
   - ✓ Readmissions and returns to ER
   - ✓ Etc.

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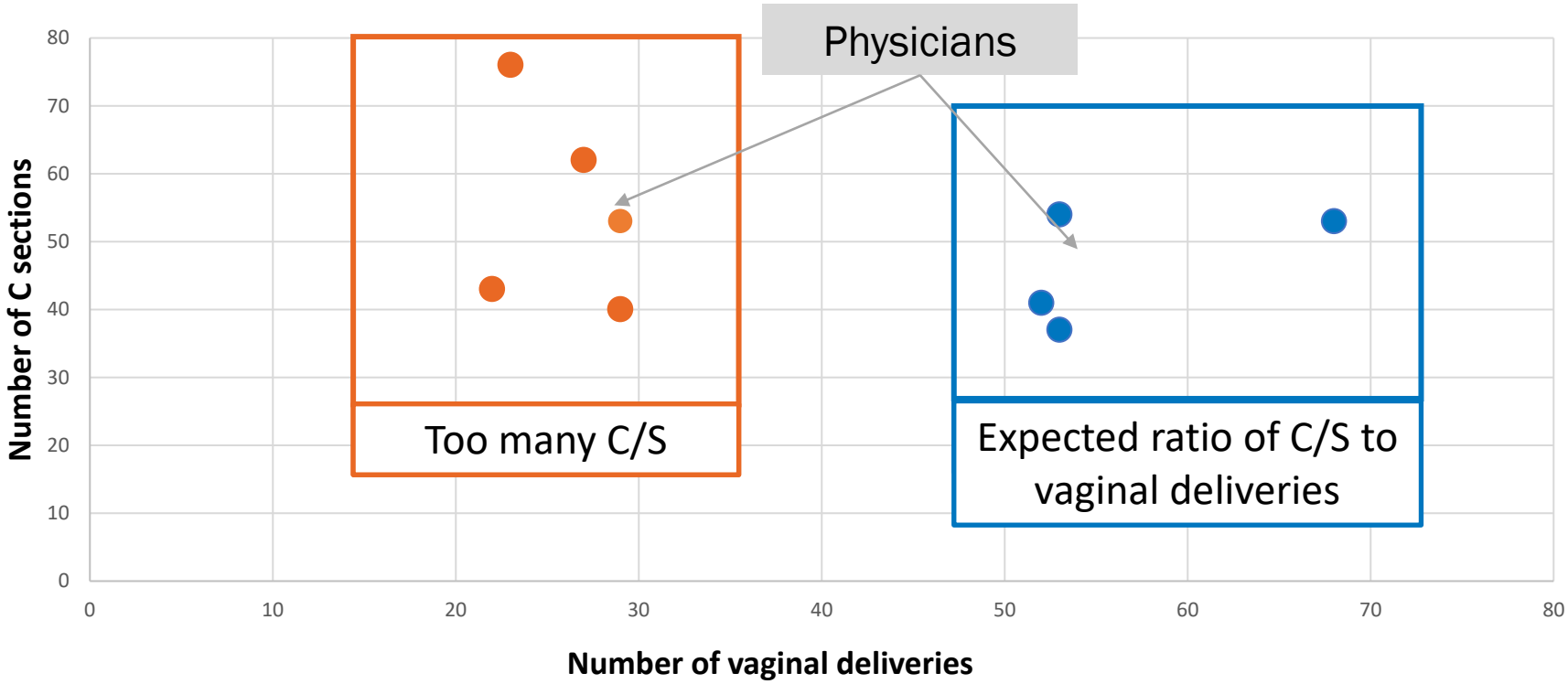
2. Comparative intra-organisation analysis - between facilities, specialties and consultants. We have done so looking, for example, at
   - Variability and spread of average costs, ALOS and quality KPI results
   - Variability of procedure techniques for specific conditions or DRGs
   - Occurrence of adverse events - complications, infections, accidents, mortality, readmissions
3. Analysis of complete patient care journeys, including an inpatient acute care phase along with a pre and a post hospitalisation phase, looking at
   - The variability and frequency of patient care pathways for a given trajectory (ex. Hip surgery)
   - The variability of costs, quality and outcomes between these different pathways

Case studies

ANALYSING PLC RESULTS

Variability and quality of clinical practices

Case 2 : Variability of delivery practices: C-section (DRG 540) and vaginal deliveries (DRG 560)

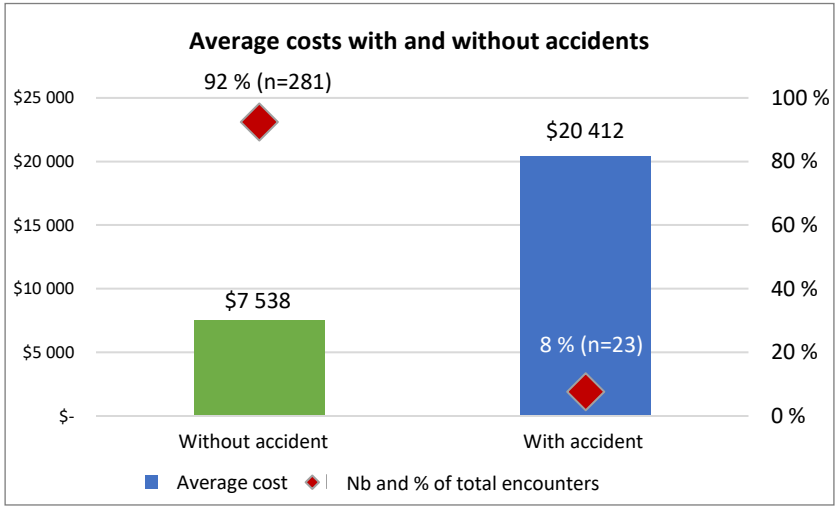


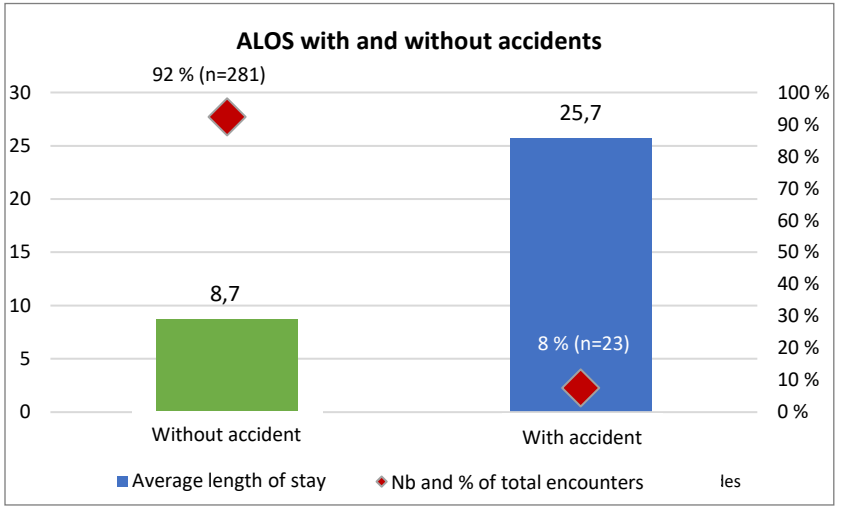
ANALYSING PLC RESULTS

Variability and quality of clinical practices

Case 4: Comparison of average cost and LOS of encounter with and without accidents

CMG 140 - Chronic obstructive pulmonary disease (MPOC)





Average cost 2.7 times higher in presence of accidents

ALOS 2.9 times longer in presence of accidents

Results to be interpreted with caution, given the existence of confounding variables impacting on costs and LOS other than accidents and the low volumes

ANALYSE PLC RESULTS

Document best practices and support value-based management of care (VBMC)

ANALYSING PLC RESULTS

Document best practices and support VBMC

A word on clinical involvement…

Why ? Critical for…

- Preserving a respectful and continued dialog between clinicians and managers
- Improving the quality of patient-level activity data and costing results
- Interpreting the clinical practices and performance drivers behind financial performance results
- Proposing further investigations and realistic improvement solutions based on clinical practices and outcomes evidence

How ? Involves…

- Using PLC financial et clinical results as common ground and language for clinico-administrative dialogue and collaboration
- Acknowledging clinical values, such as quality of care, access, best practices
- Relying on experienced physicians for clinical context of PLC results
- Ensuring a safe and non judgemental environment for Analysing and comparing PLC results
- Support clinicians with data analysis

ANALYSING PLC RESULTS
DOCUMENT BEST PRACTICES AND SUPPORT VBMC

How can PLC results be used to document best practices ?

1. By identifying clinical/medical champions, based on results pertaining to :
   - ✓ Their financial performance in terms of average cost per encounter
   - ✓ Their clinical performance in terms key quality and/or outcome indicators

   Then, analysing and documenting specific aspects of their practices which make them champions

2. By comparing different specific aspects of clinical practices based on two comparable cohorts of patients and documenting their impacts on costs, quality and outcomes

ANALYSING PLC RESULTS
DOCUMENT BEST PRACTICES AND SUPPORT VBMC

How else can PLC results be used to monitor and improve clinical practices ?

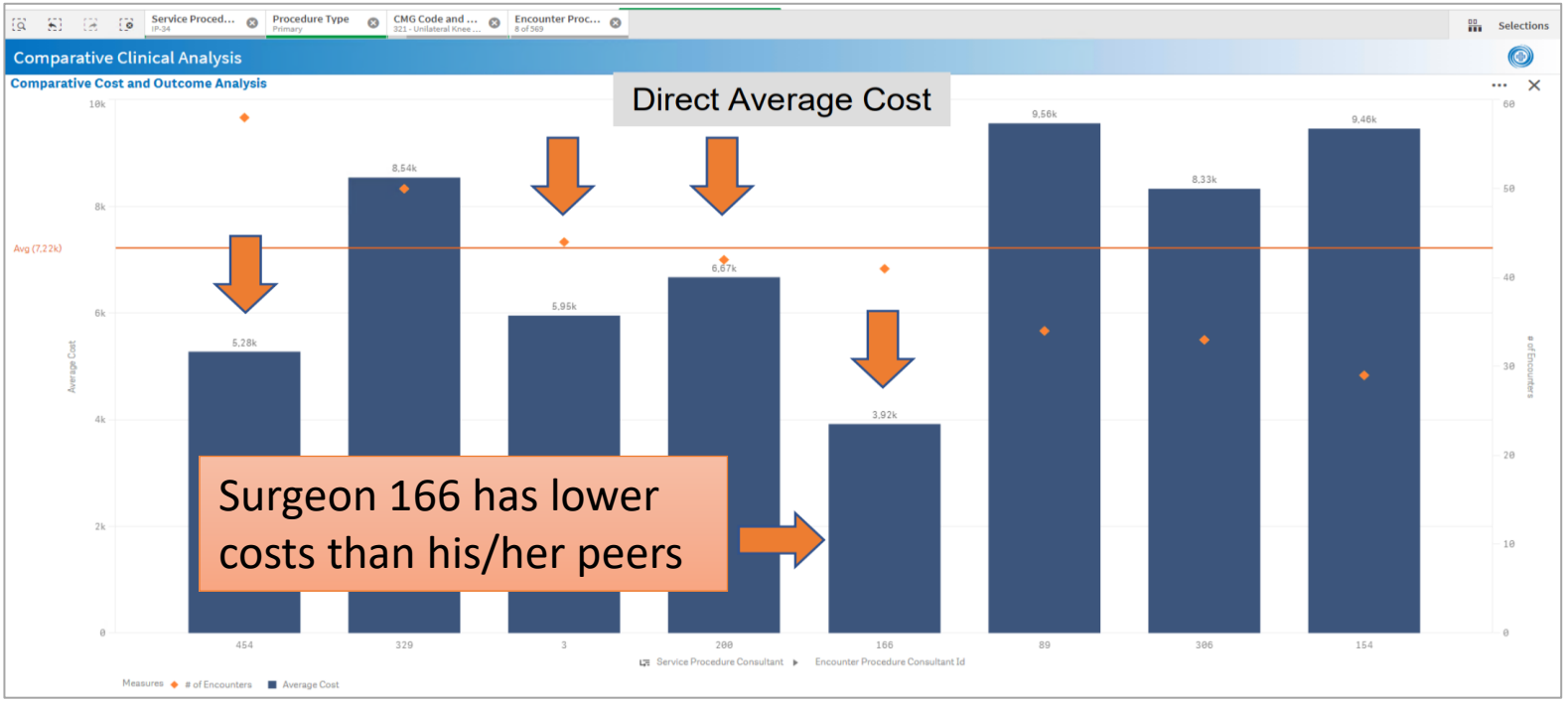
- By allowing to document the relevance of clinical practices based on high-quality evidence
  - ✓ Ex. : **Choosing Wisely** recommendations (by specialty), such as “Don’t perform annual stress cardiac imaging or advanced non-invasive imaging as part of routine follow-up in asymptomatic patients”.
    https://www.choosingwisely.org/clinician-lists/american-society-nuclear-cardiology-stress-cardiac-imaging-coronary-angiography-without-cardiac-symptoms/
- By measuring the level of compliance with nationally or locally defined model trajectories and trajectory-related quality standards
  - Ex. : Early readaptation following surgery, post-discharge delay before follow-up home care, etc.

Case Studies

ANALYSING PLC RESULTS

DOCUMENT BEST PRACTICES AND SUPPORT VBMC

Case 1 : Clinical Analysis - Knee Replacement DRG



ANALYSING PLC RESULTS

DOCUMENT BEST PRACTICES AND SUPPORT VBMC

Case 1 : Clinical Analysis - Knee Replacement DRG

ANALYSING PLC RESULTS

DOCUMENT BEST PRACTICES AND SUPPORT VBMC

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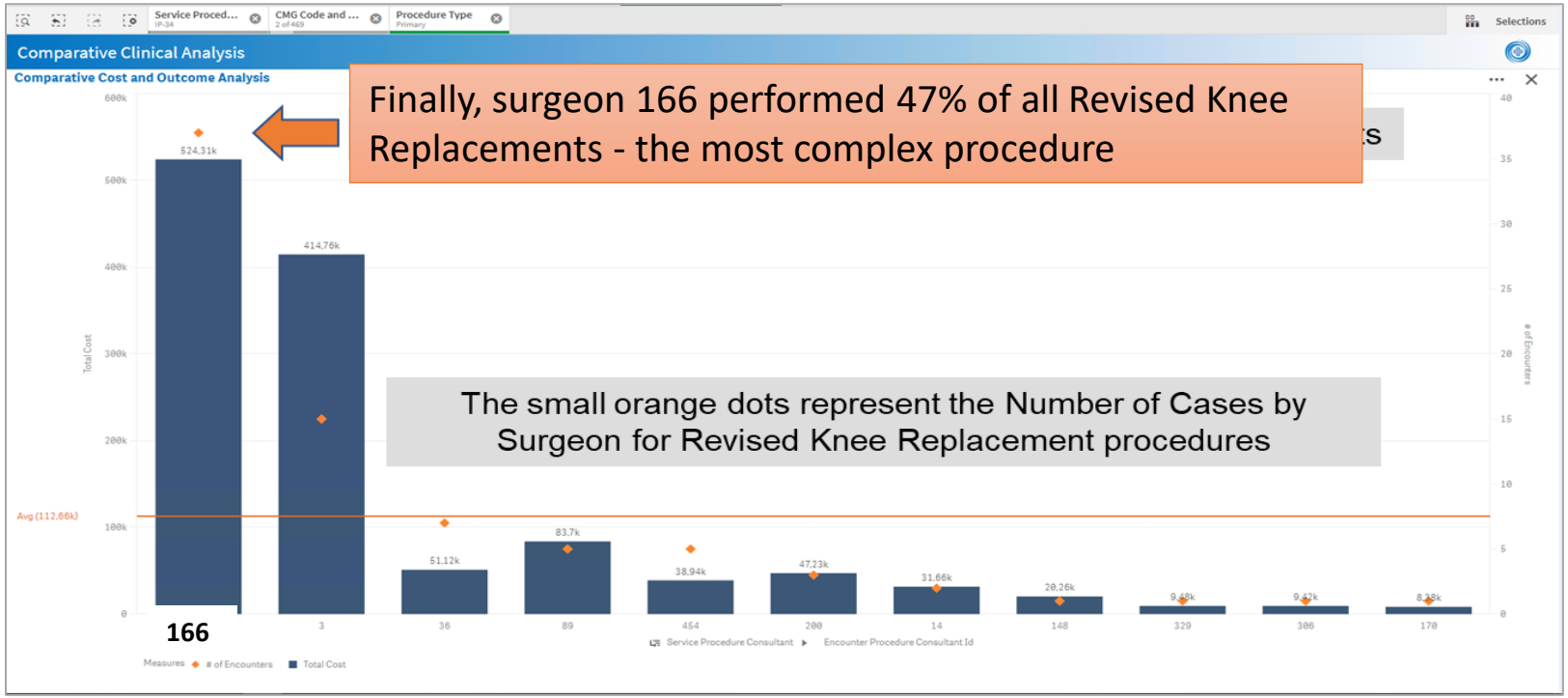

ANALYSING PLC RESULTS
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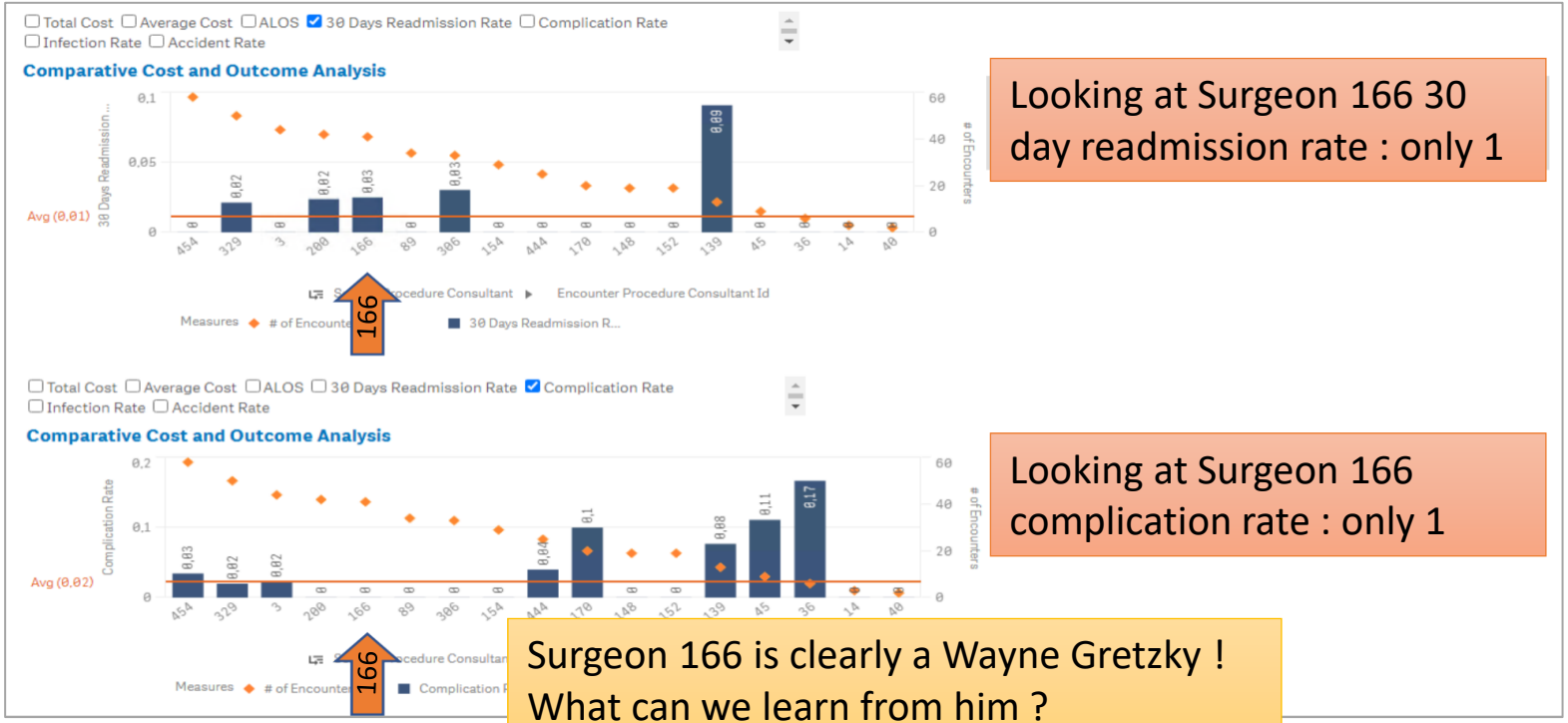


Looking at Surgeon 166 30 day readmission rate : only 1

Looking at Surgeon 166 complication rate : only 1

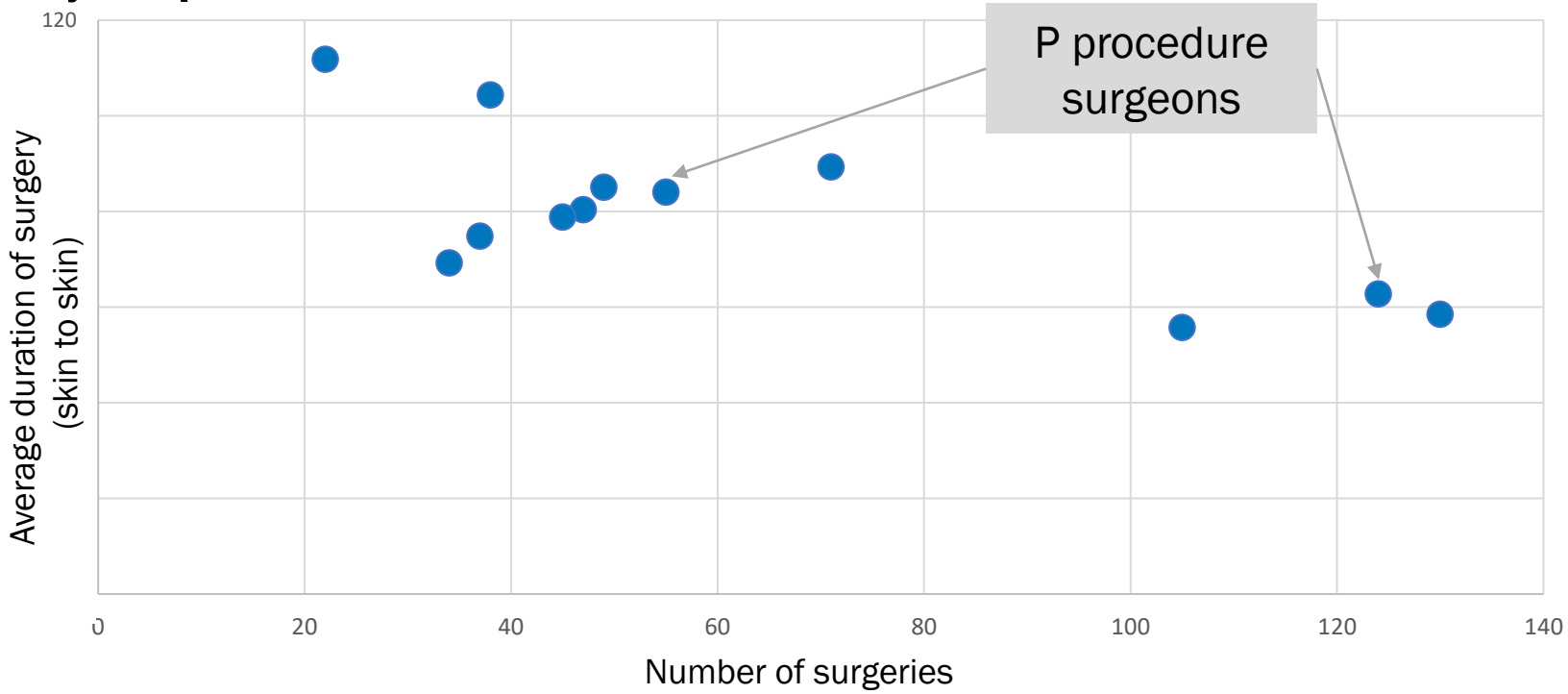
Surgeon 166 is clearly a Wayne Gretzky ! What can we learn from him ?

ANALYSING PLC RESULTS

DOCUMENT BEST PRACTICES AND SUPPORT VBMC

Case 2 : Variability of surgery time versus volume by surgeon (surgeons with ≥ 20 surgeries yearly)

Knee joint replacement



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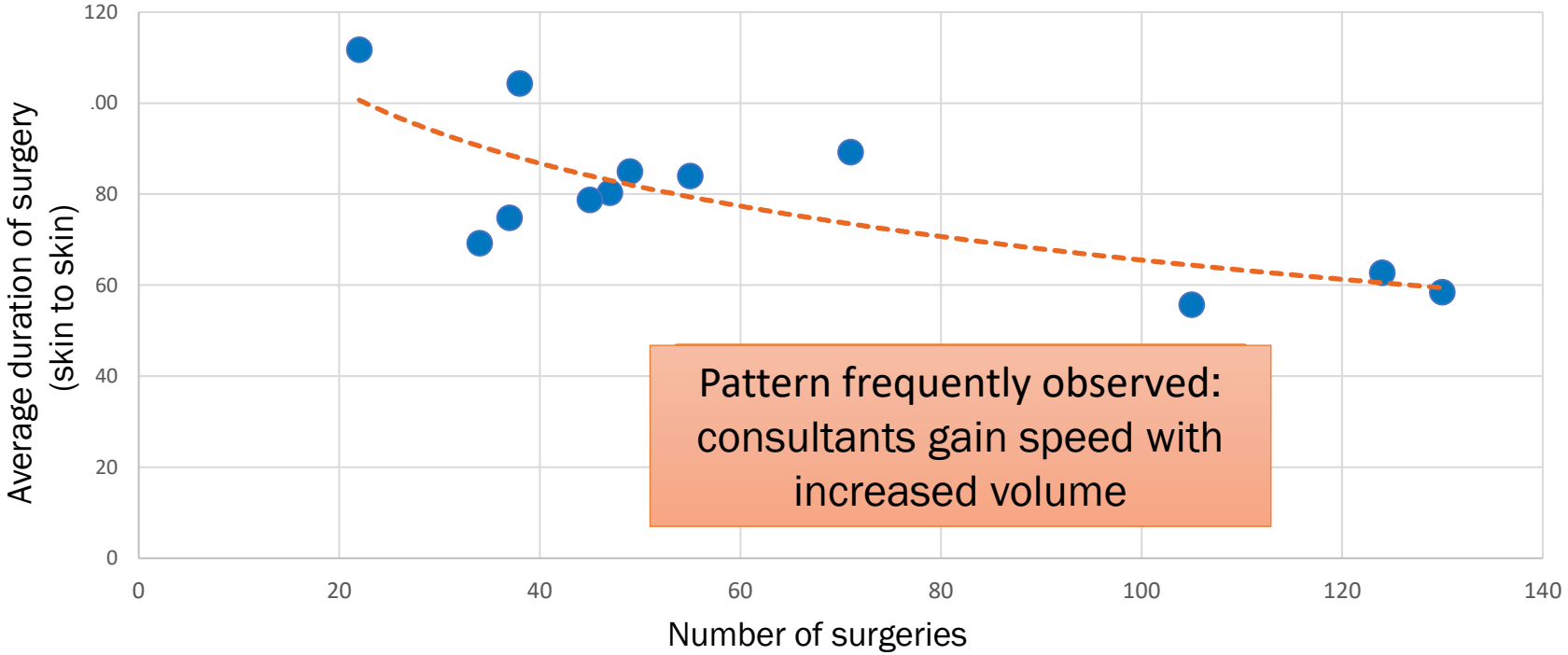


What does “Value of care” mean in the context of VBMC ?

- Patient value is defined as patient-relevant outcomes, divided by the costs per patient across the full cycle of care in order to achieve these outcomes (Michael Porter, https://www.vintura.com/value-based-healthcare/michael-porter/)

$$\text{Patient value} = \frac{\text{patient-relevant outcomes}}{\text{costs per patient to achieve these outcomes}}$$

ANALYSING PLC RESULTS
DOCUMENT BEST PRACTICES AND SUPPORT VBMC

What is VBMC ?

- Value Based Healthcare Management, or VBHC, is about…
  - Adopting clinical practices congruent with desired clinical outcomes
  - Comparing how much money is spent on healthcare programs or services over a patient's journey to the desired clinical outcomes.
- VBHC necessarily rests on the integration of PLC results with measures of desired outcomes, such as
  - Patient Reported Outcome and Experience Measures (PROMS/PREMS)
  - Otherwise, if no PROMS or PREMS available :
    - Clinical reported outcomes measures, or, as proxies
    - Quality KPIs

ANALYSING PLC RESULTS
DOCUMENT BEST PRACTICES AND SUPPORT VBMC

Situation in Quebec

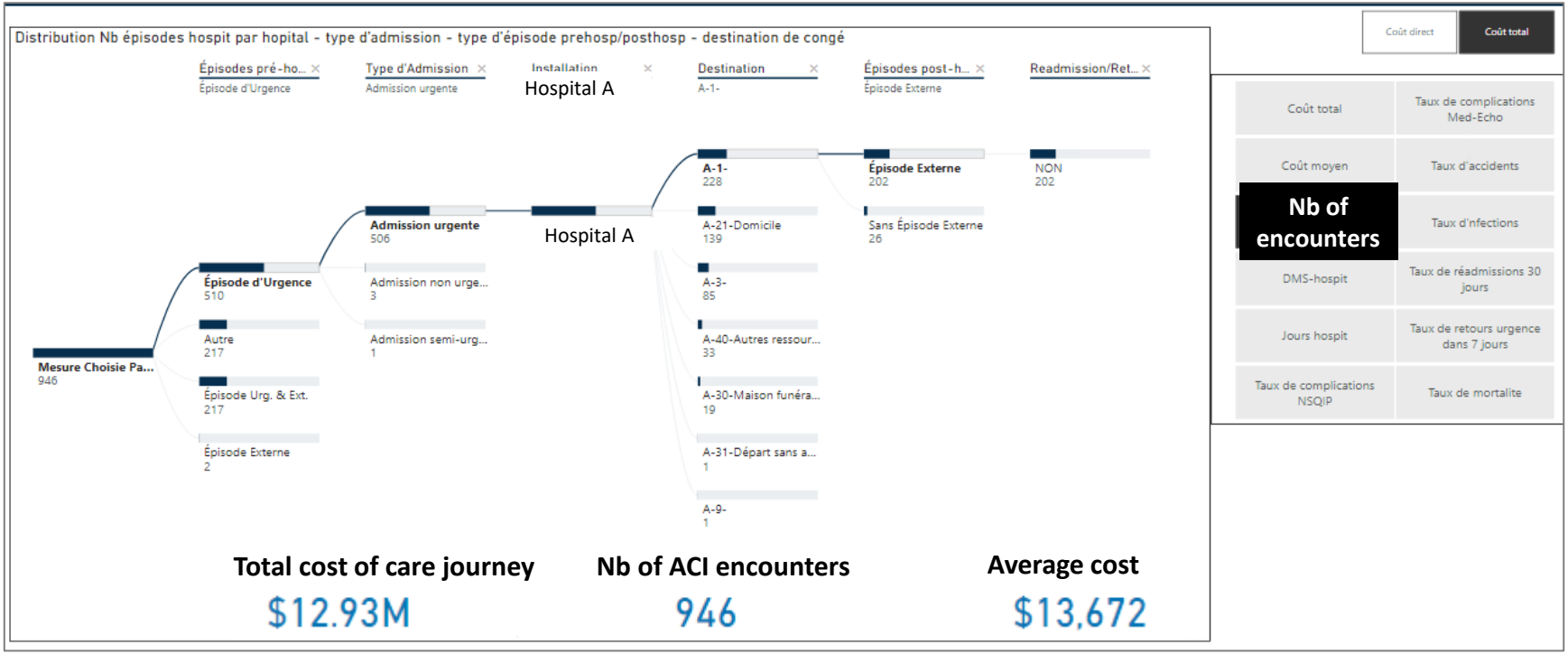
- Still at early stages of VBHC
  - Just deployed PLC provincial-wide
  - However, few HC provider organisations collecting PROMS and PREMS, which needs to be : a) condition and population specific; b) reliable and comparable - based on standard sets of measures and tools (c.f. ICHOM)
- We have an ongoing pilot project with an Innovative HC organisation consisting of developing a BI platform aimed at supporting the transition towards VBMC as described by Porter. Involves:
  - Reconstitution full care cycle trajectories, linking different types of encounters
  - Comparison of costs and outcomes of all patient care pathways (initially using quality KPIs as proxies)
  - Managing and optimizing trajectories based on value

Case study

ANALYSING PLC RESULTS

DOCUMENT BEST PRACTICES AND SUPPORT VBMC

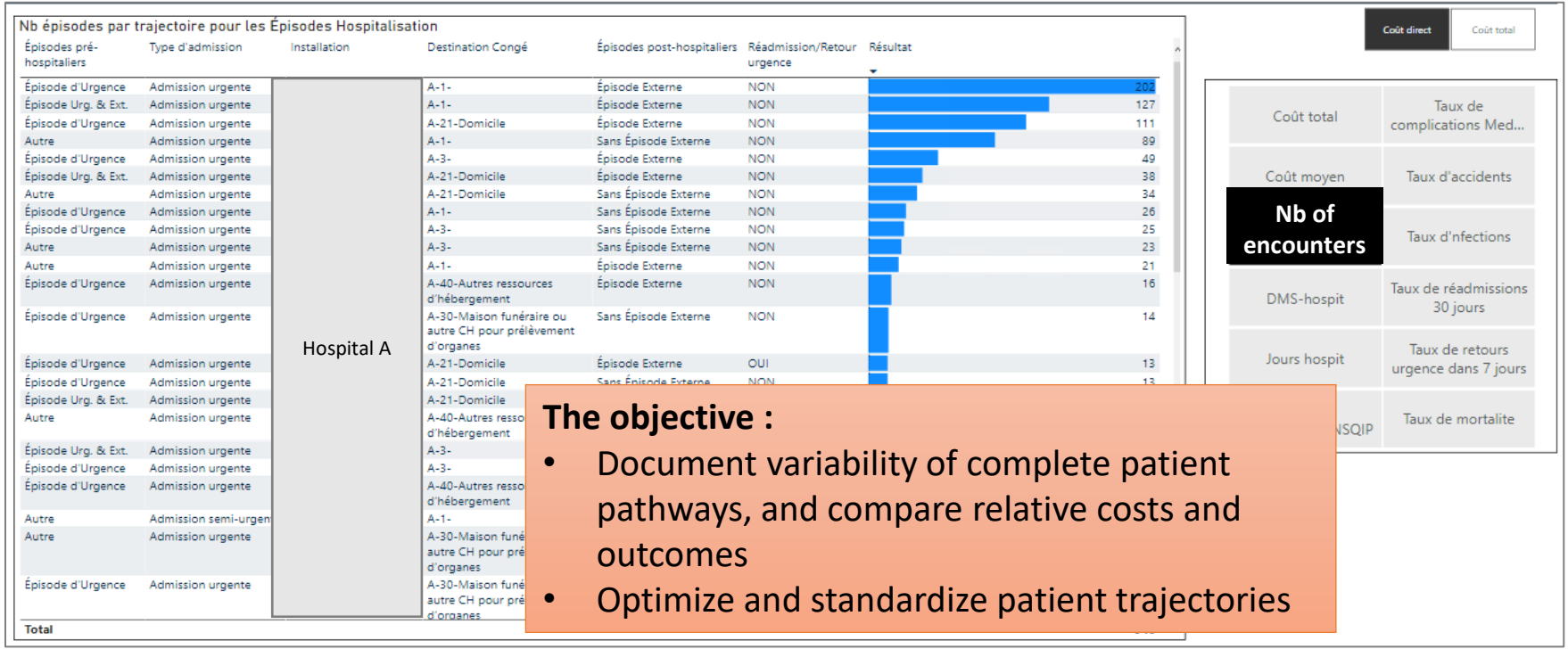
Case 1: Variability of complete patient trajectories, DRG 308 Hip Fracture



ANALYSING PLC RESULTS

DOCUMENT BEST PRACTICES AND SUPPORT VBMC

Case 1 : variability of complete patient trajectories, DRG 308 Hip Fracture



The objective :

- Document variability of complete patient pathways, and compare relative costs and outcomes
- Optimize and standardize patient trajectories

CONCLUSION

PowerHealth

CONCLUSION ON DATA ANALYTICS USING PLC RESULTS

- PLC results opens the door to an integrated financial and clinical approach, based on patient care trajectories
- Start with descriptive and diagnostic types of analysis before getting into more complex analytics
- Data analytics using PLC results requires a combination of expertise
  - This is why data analysis is best done collaboratively

CONCLUSION ON DATA ANALYTICS USING PLC RESULTS

- In particular, clinical input is critical, to understand the clinical drivers behind costs and financial performance, but also :
  - To improve data quality
  - Refine analytical approaches
  - Interpret results
  - Ensure relevance, applicability, acceptability/buy-in and perennity of proposed improvement strategies and targets

DISCUSSION

What do you see as the main challenges associated with data analytics using PLC results ?