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Persatuan Hospital Swasta Malaysia
Association of Private Hospitals of Malaysia

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International Healthcare Conference and Exhibition
2009

Lean Management in Operating Theatres

by Yvonne Chong

THE HEALTHCARE ADVISOR

What is lean ?

Lean is the term given to a system originally developed by Toyota over 50 years

- Adopted by various commercial and some public sector organisations. It is about doing more with less.
- Lean aims to create precise customer value by delivering quality goods and services with
  - less resources, time, human effort, space and capital.
- Lean achieves this objective by focusing on what creates value for the customer and
  - eliminating activities that do not create value.

Continuous Improvement at Toyota

"Many good companies try to practice kaizen and use various TPS tools. But what is important is having all the elements together in a system. It must be practiced everyday in a very consistent manner – not in spurts – in a concrete way on the shop floor"

Fujio Cho, President, Toyota Motor Corporation

The 5 Key Lean Principles

The 5 Key Principles that will create an hospital-wide impetus for improvement are as follows:

- **Value** - Specify value from the standpoint of the customer
- **Value stream** - Identify all the steps in the value stream, and eliminate any step that does not create value
- **Flow** - Make the remaining value-creating steps occur in a tight and integrated sequence so the product or service will flow smoothly toward the customer.
- **Pull** - As flow is introduced, let customers pull value from the next upstream activity.
- **Pursue perfection** - As these steps lead to greater transparency, enabling further elimination of waste, pursue perfection through continuous improvement.

(Reference: Lean Thinking, James Womack and Daniel Jones, 1996)

Lean in Healthcare – is it relevant?

"Lean thinking is not a manufacturing tactic or a cost-reduction programme, but a management strategy that is applicable to all organisations because it has to do with improving processes.

All organisations – including healthcare organisations – are composed of a series of processes or sets of actions intended to create value for those who use or depend on them (customers/patients)".

(IHI – "Going Lean in Healthcare – 2005)

Critical Issues Facing Healthcare

- Increasing Market Share – Increasing patient volumes
- Maximizing Net Revenues
- Reducing Costs
- Improving Patient Safety and the Overall Quality of Care
- ……the list goes on…..

Creating Elegant Solution with Lean Tools

Understanding Value

Redesigning Care

Learning to See

Delivering Benefit

Build A No Blame Culture

PARADIGM
(Value vs waste)

→

PEOPLE BEHAVIOURS
(Surface & solve problems)

→

CULTURE

Learn to See Waste

WASTE

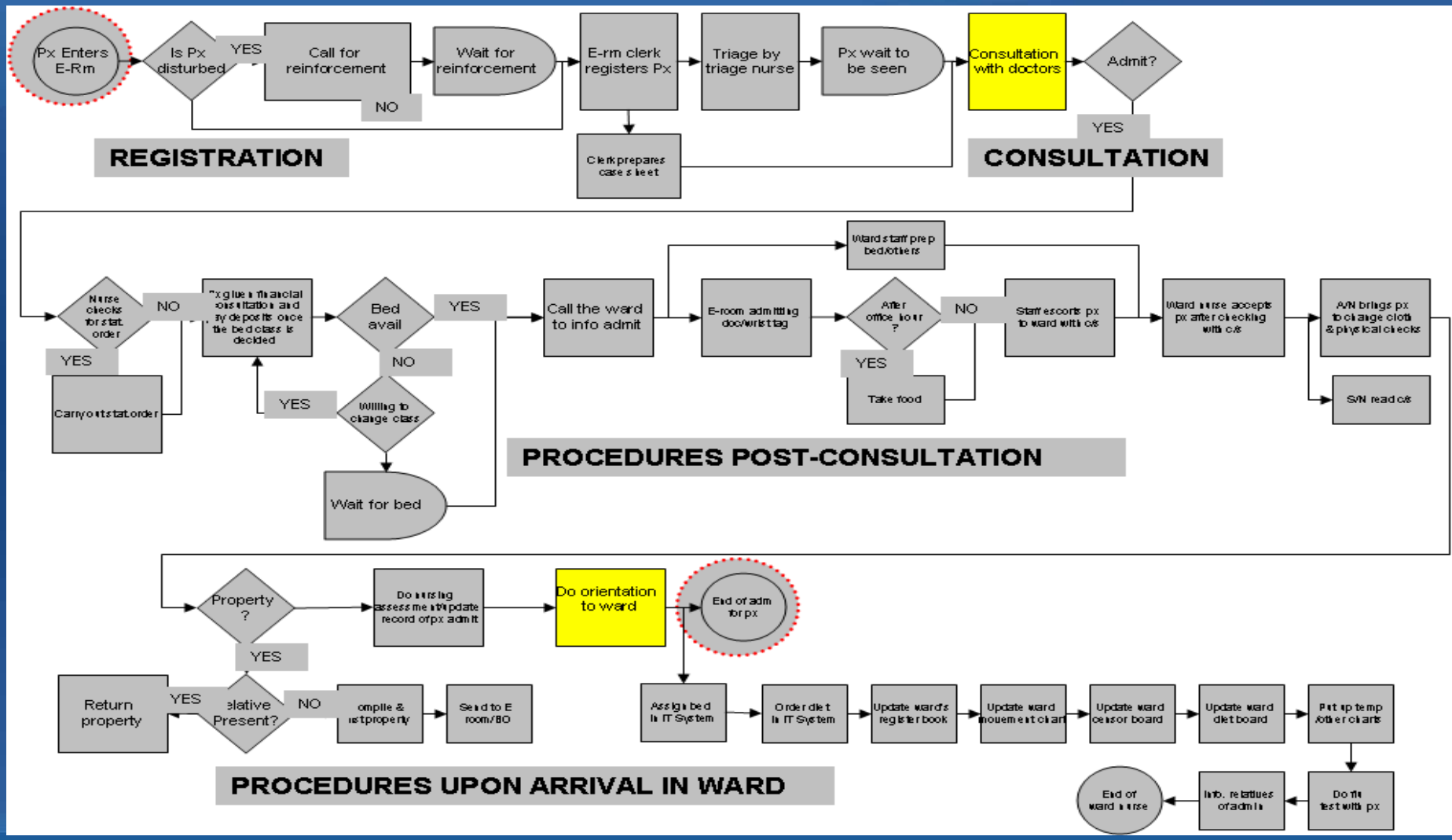
- **D**efects rework:
- **O**verproduction:
- **W**aiting:
- **N**ot using staff talents:
- **T**ransportation:
- **I**nventory:
- **M**otion:
- **E**xcessive processing:

Learn to See Value from Patients perspective

Diagnosis → **Treatment & Advice**

Good clinical outcomes
Cost-effective
Respect & Dignity
Convenience

Learn to See Value vs Waste



Sharing on Singapore Tertiary Hospital approach

- The approach is not in improving productivity.
- Its about aligning work that is done up, down, through and across the organization so that the patient flows across the processes in the hospital from end to end with minimal interruptions and with a supply of skill, expertise, materials and information that exactly meets the ever increasing demand for healthcare in Singapore.

Lean approach to building a hospital of choice

Lean Way Objective:
Safely provide the best clinical & service outcomes with least waste and good staff morale

Just In Time
Get high throughput by continuous flow

Possible Tools:
- Cells
- Quick Setup
- Workload Levelling
- Match Supply to Demand
- Get rid of waste, bring cycle time to takt time
- Pull systems

Thinking People who Constantly Problem Solve Together

Built In Quality

Possible Tools:
- Error Proofing
- Visible controls to identify errors
- Systems for us to respond to and solve staff needs

Foundation of Operational Stability
See for Yourself, Value Stream Planning, Staff Standardising Their Work, Visual Management (5S), Total Preventive Maintenance

Another Hospitals Lean Healthcare Model

Leadership Development

Skills and Capabilities

Support functions: IT, Finance, Estates, Facilities

HR Processes

The Essence of Lean Is

Can we put in place:

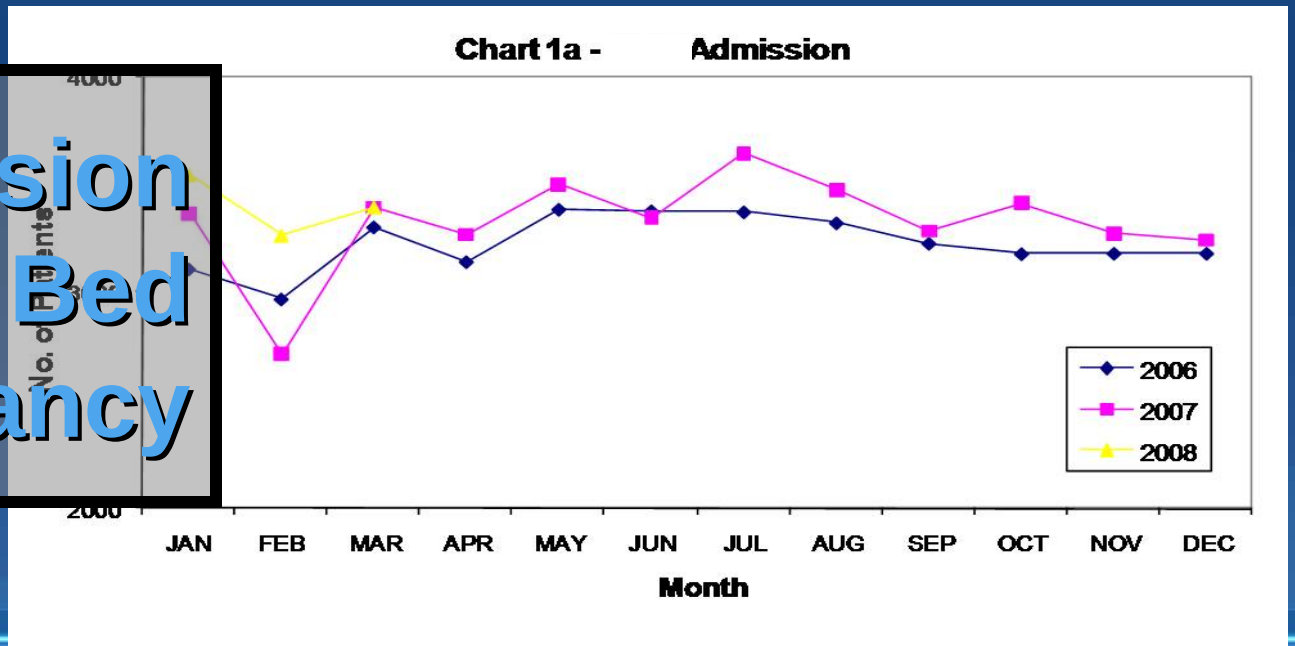
A long-term operating strategy that enables our organization to keep learning how to create the most value from our patient's perspective while consuming the fewest resources*.

*Essence of Toyota Way / Lean Thinking

Case Study

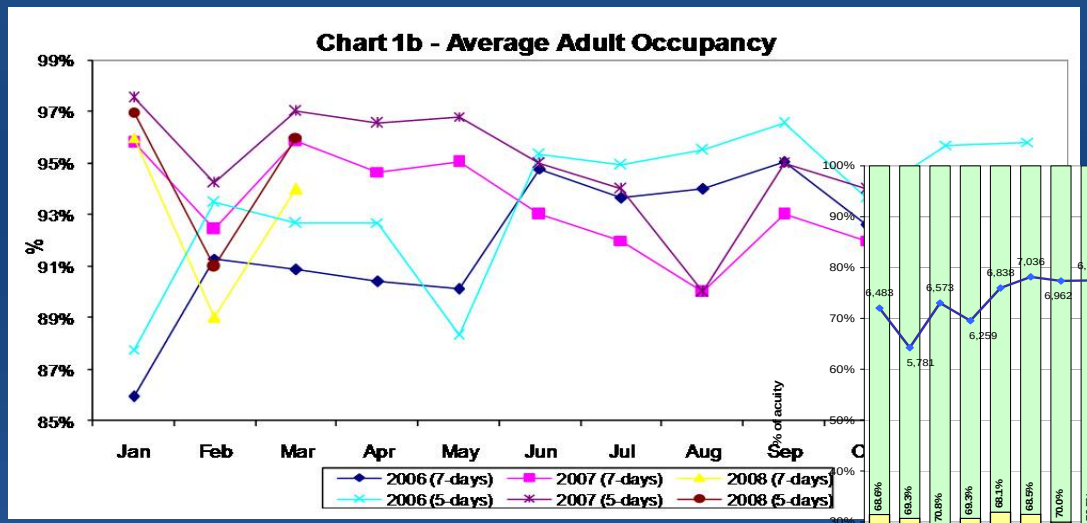
- Admission has been increasing year on year.
- With Emergency load at about 60%of total admission. Leaving 40% of capacity for Elective load.

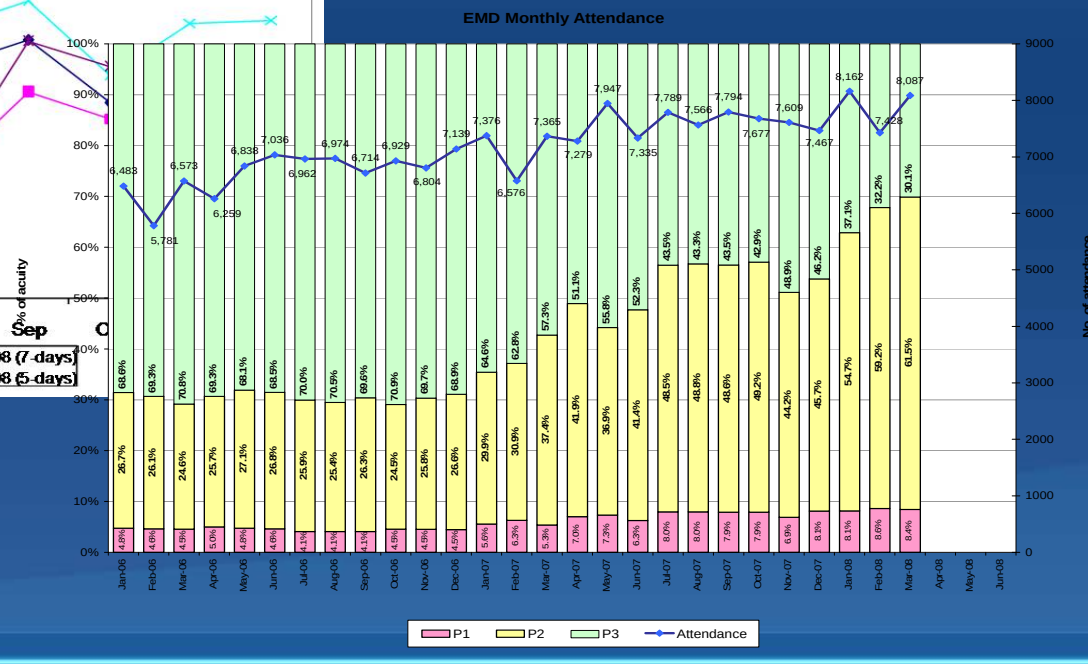
Admission and Bed Occupancy



Admission and Bed Occupancy

- Adults Bed Occupancy Rate is currently in the 90s.
- Average Bed Occupancy Rate hovered around 95%
- Various initiatives ie. control is successful in helping to reduced BOR slightly. **Ideal is at 85%**





Hospital Challenge

- The challenge is to be able to handle emergency patients while minimizing the impact on the EL that we can put through the system.
- The objective is to reduce the variability in total admission by balancing the EL and EMD load.
- EMD admission load is a natural variable whereas EL admission load is an artificial variability that is created by way of the system set up.
- Our objective is to:

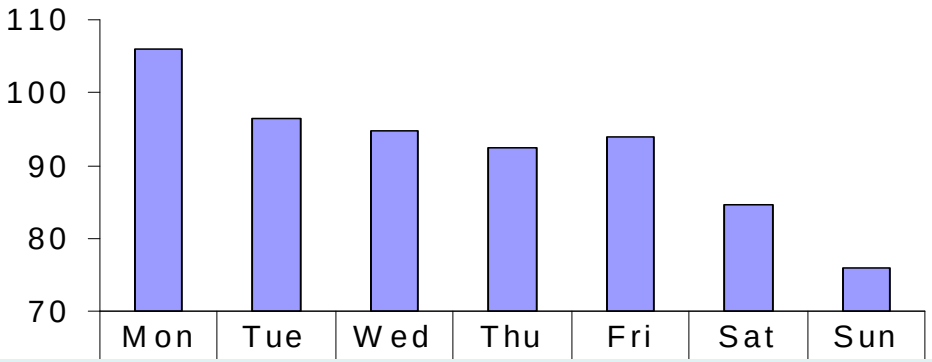
(i) shift the EL pattern such that EL admission pattern counter balance the EMD admission pattern

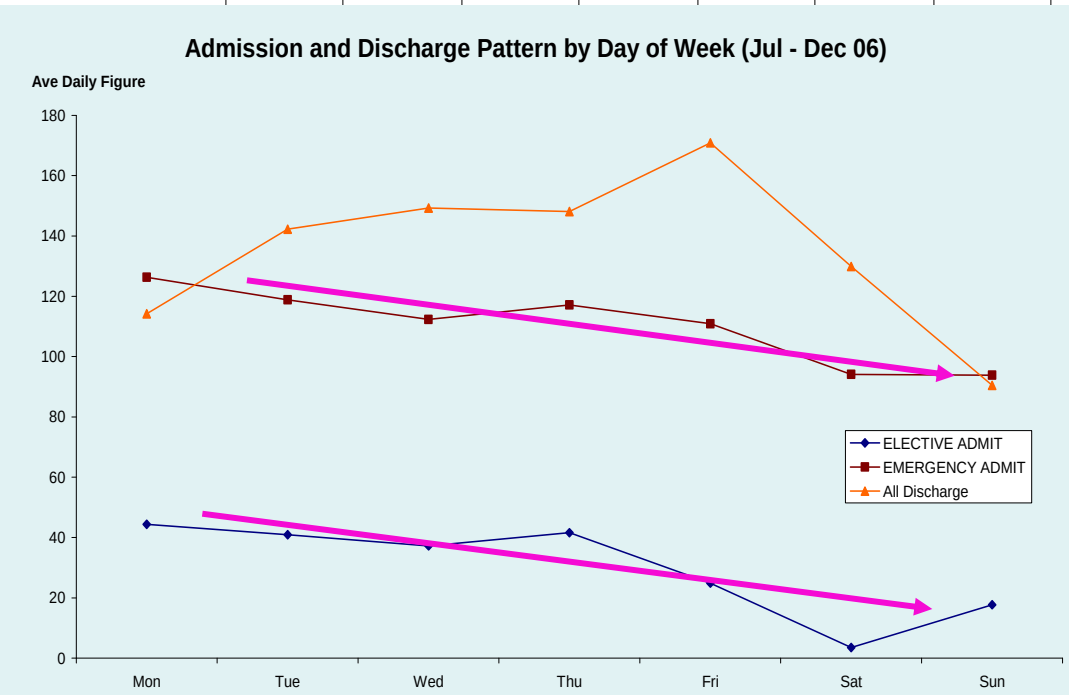
(ii) without compromising OT utilization.

What is it that NUH want to achieve

- Smooth variation in total admissions by load balancing on adult* electives
- For Surgical Electives using MOT
  - Same total number of electives done per week
  - Same surgical hours
  - Swap day to perform Day Surgery, Same Day Admits, In Patient to cut admissions on Mon and admit more on Friday/Sunday
  - Minimize peak of admission at any one day at discipline level

Optimising admission / OT load by workload balancing through OR study





- Across the week, there are huge variations in elective (EL) and emergency (EMD) admissions, with EL admission having a larger variability.
- The degree of variability is inverse function of their degree of control we have on EL and EMD admission.
- Both EL and EMD admission tapered down towards the end of the week. The workload is not leveled.
- This results in tight beds situation in midweek and relatively lower bed occupancy over the weekend.

Top 6 Surgical Electives

Current

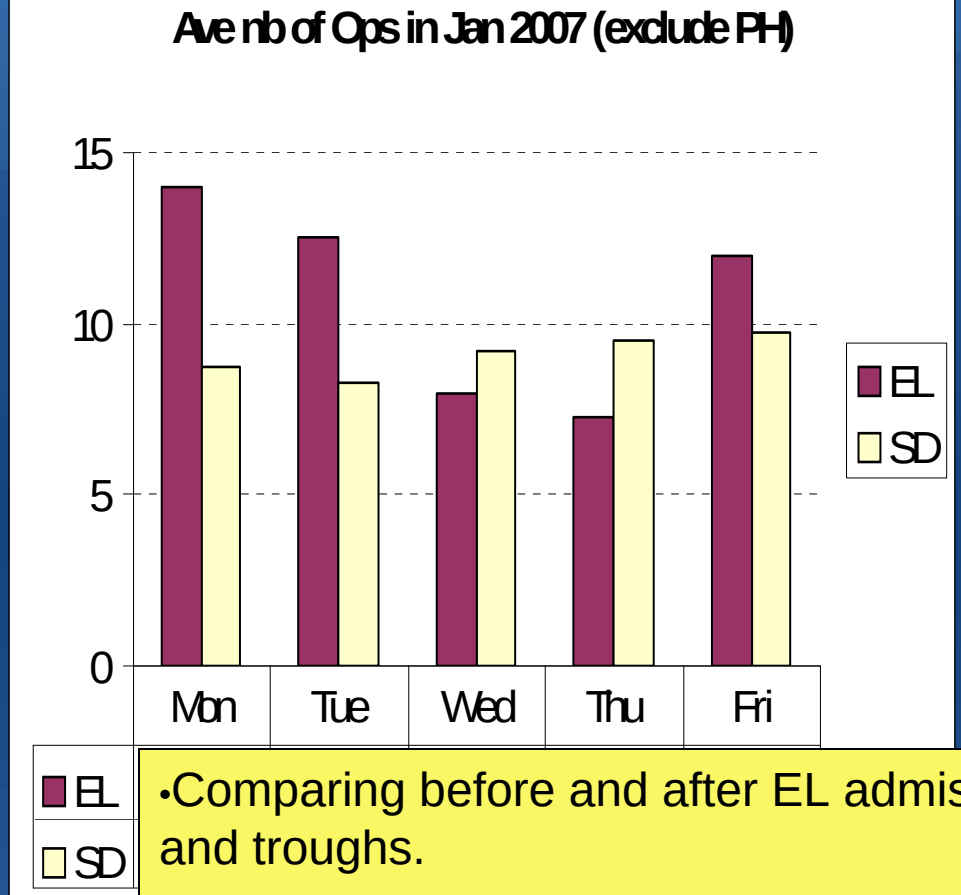
	Day Surgery					Same Day Adm.					Elective inpa				
	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri
Otolaryngology&Head&Neck Surg	3	2	2	3	2	1	1	1	1	1	0	1	0	0	0
General Surgery	0	2	0	0	1	0	4	0	4	1	0	3	0	2	0
Urology	0	0	1	0	0	2	0	2	0	3	2	0	2	0	1
CardiacThoracic&Vascular Surg	0	0	0	0	0	0	0	0	0	0	3	4	3	1	2
Colorectal Surgery	2	0	2	0	3	1	0	1	0	1	1	0	1	0	1
Hand&Reconstructive Microsurg	1	2	1	3	1	0	1	0	1	1	0	0	0	0	1

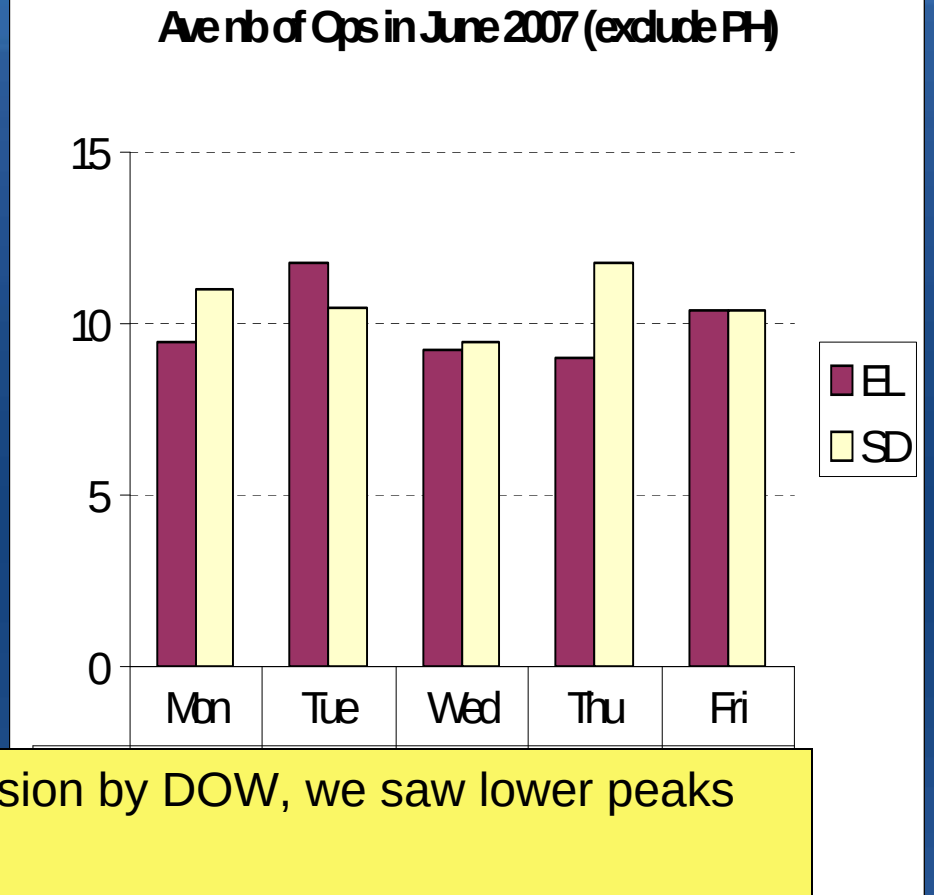
Proposed Guidelines

	DS Operations					SDA Operations					IP Operations				
Disciplines	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri	Mon	Tue	Wed	Thu	Fri
Otolaryngology&Head&Neck Su	1	2	3	4	2	0	1	2	2	2	2	0	0	0	0
General Surgery	0	3	0	0	0	0	3	0	3	2	0	3	0	3	0
Urology	0	0	2	0	0	0	0	2	0	4	4	0	1	0	0
CardiacThoracic&Vascular Surg	0	0	0	0	0	0	0	0	0	0	3	3	2	3	3
Colorectal Surgery	0	0	7	0	0	0	0	0	0	2	2	0	0	0	0
Hand&Reconstructive Microsurg	0	1	1	4	2	0	1	1	1	1	1	1	0	0	0

Examples of surgical elective planning

Comparing before and after EL admission by DOW





- Comparing before and after EL admission by DOW, we saw lower peaks and troughs.
- The variance of elective admissions had decreased by 20%, i.e. with fewer admissions from Mondays and Tuesdays and more admissions from Thursdays and Fridays.

Workload Leveling

- Basic Leveling of volume is key in establishing process stability and continuous flow.
- Leveling is necessary to provide a “standard core” to which all resources are aligned.
  - Material Replenishment : Dictates rate of material replenishment.
  - People : Basis for determining takt time, which is required for standardized work. Determines required number of people.
  - Equipment : Aligns required equipment to the people and work based on the level scheduled.

If variability in workload cannot be leveled : Match supply to demand.

Perioperative Operational Challenges

Patient Safety Risks

- Response to emergency cases
- Risk of wrong patient, wrong site, wrong procedure
- Incomplete PAT and pre-op procedures
- Missing Patient Allergy info

Surgery Cancellation

- Duplicate bookings
- Equipment not available
- OR not available
- Incomplete PAT
- Incomplete pre-op procedure
- ICU/HD not available

Surgery Overrun

- Planning not accurate
- Inaccurate estimation of surgery duration
- Delayed start
- Waiting for services
  Ex: Blood, X-Ray etc

Operational Inefficiency

- Inefficient resource utilization - OR, Equipment
- Inefficient tracking
- Waiting Times (Peri Op)
  - For patient
  - For surgeon/Anaesthetist
  - For equipment, blood

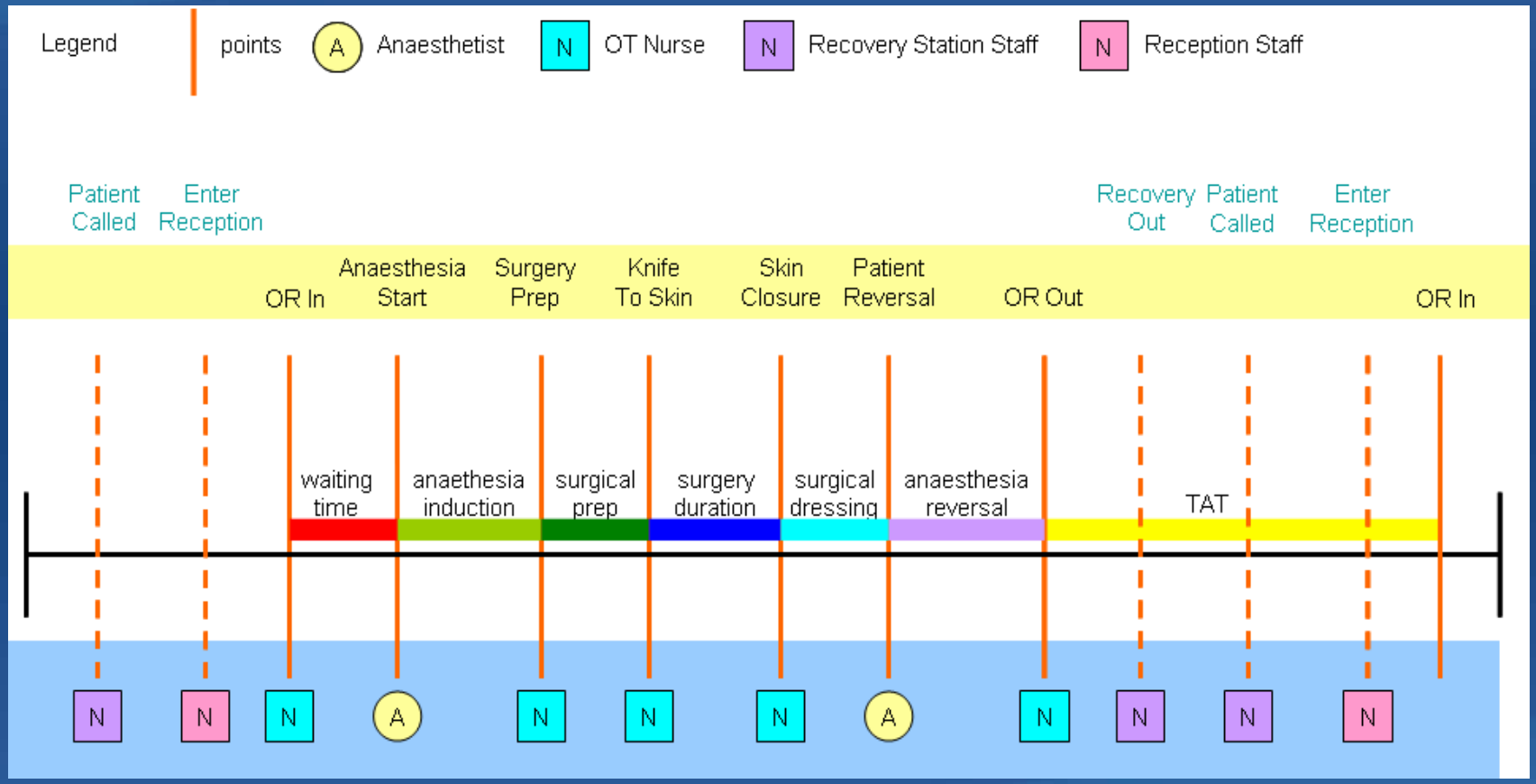
Co-ordination Problem

- Information not in sync
- Lack of visibility
- Numerous phone calls
- Irritating public paging
- Time consuming

Lack of Visibility

- Disparate IT systems
- Multiple communication devices
- Multiple stakeholders
- Inaccurate data
- No advanced data analysis

Automated OR Workflow & Patient Tracking

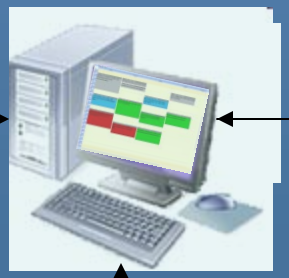


Decentralized Real-time OT Planning

CLINIC 1 | CLINIC 2 | CLINIC 3 | CLINIC N

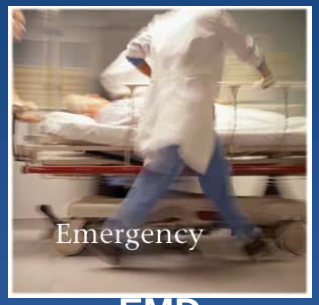
Decentralized Planning

- Surgery Booking
- Surgery Re-scheduling
- Surgery Cancellation



Optimization IT System

- Log Pending Cases



EMD

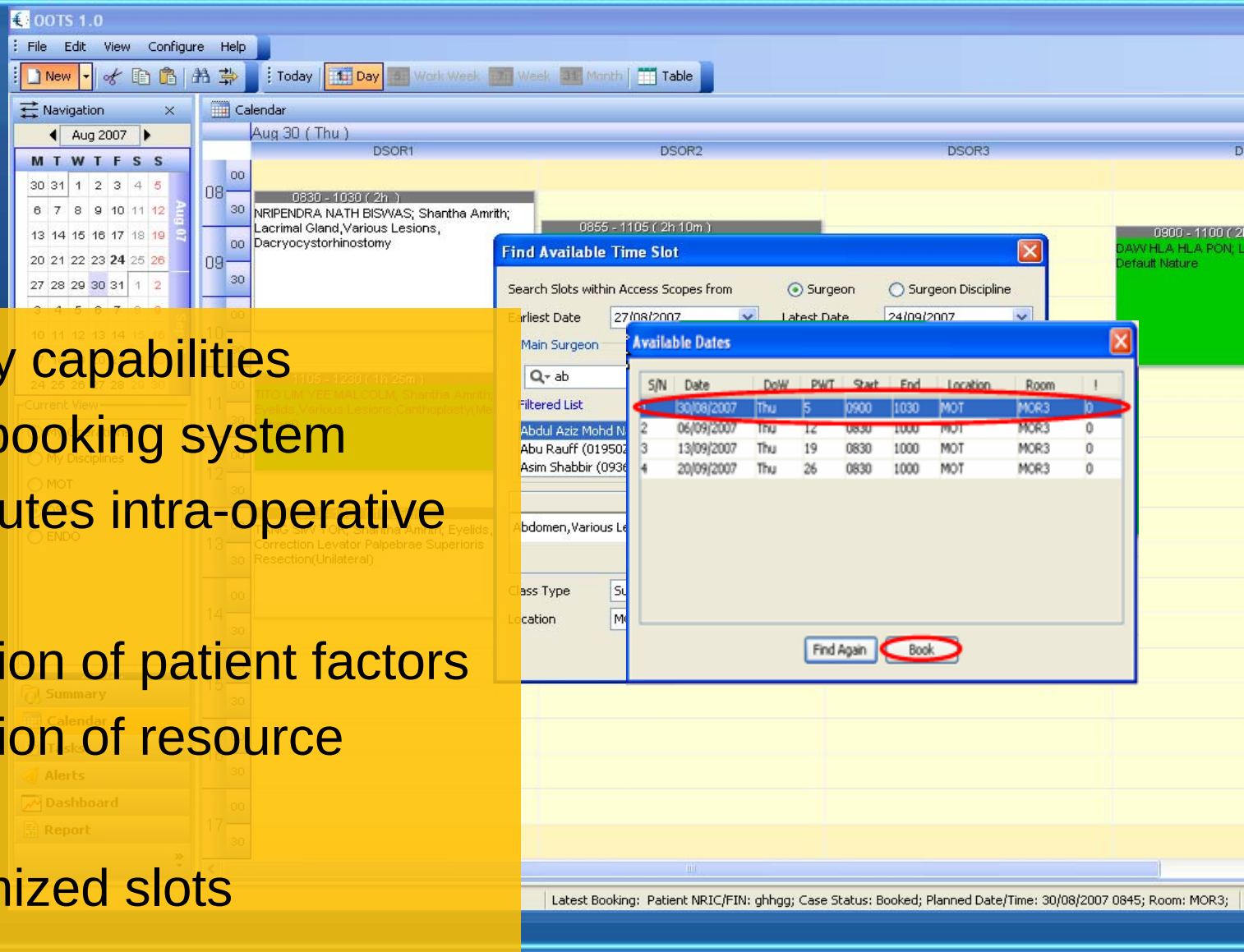
OT Clerk

Day Before Surgery
Control flows to OT Clerk

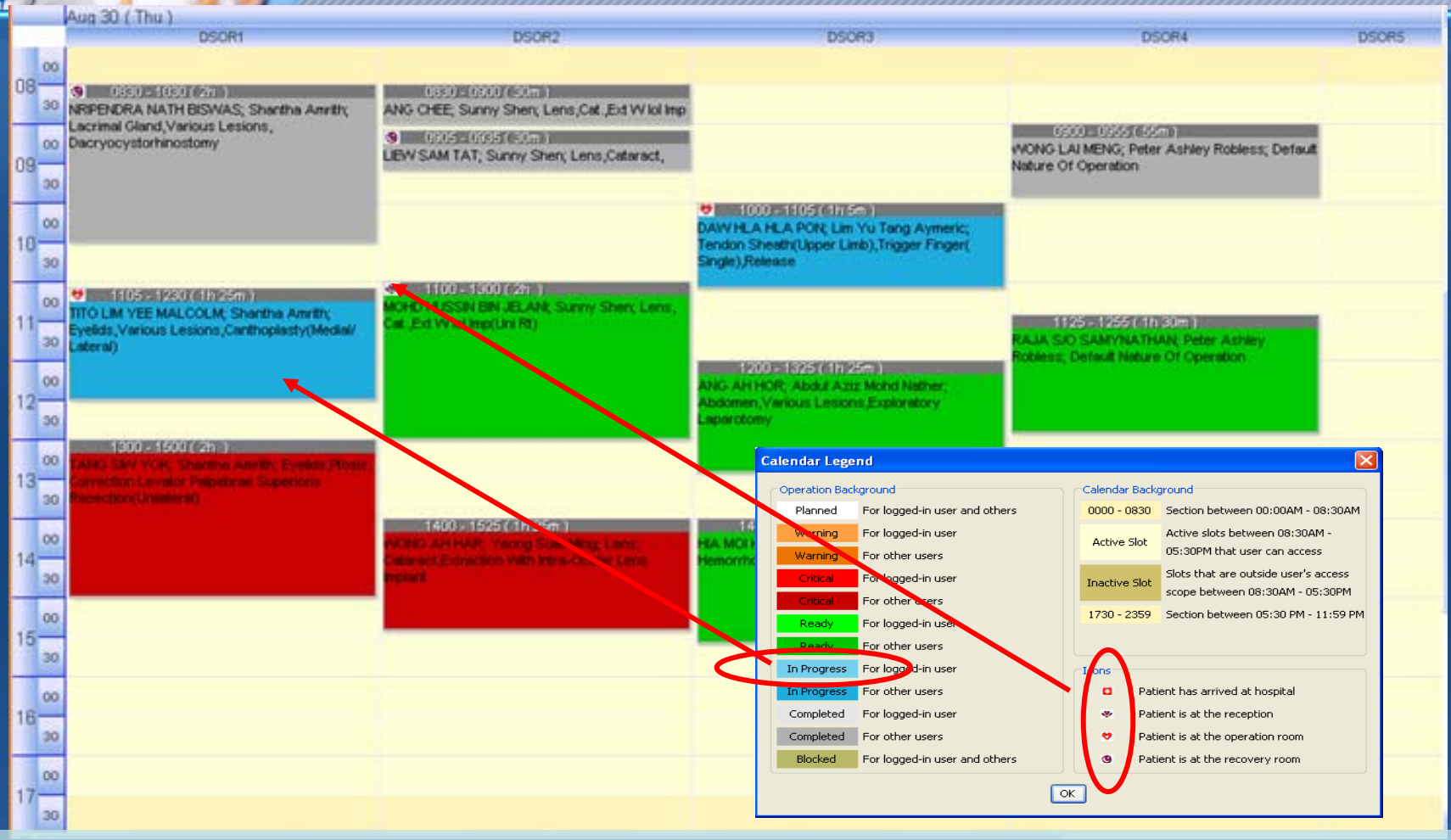
- Surgery Sequencing
- Case Tracking
- Emergency Booking

Solution : OOTM Surgery Planning

- Multi-facility capabilities
- Real-time booking system
- Auto-computes intra-operative duration
- Consideration of patient factors
- Consideration of resource availability
- Finds optimized slots



Providing Visibility – Dash board



- **Issue identification**
- **Alerts**

OOTM OR Dashboard

STAFF

Scrub Nurse	Adlisa Bte Abdullah	
Circulating Nurse	Aileen Pasalo Damo	
AU Nurse	Ahmad Nabil bin Noor (65)6278-4591	SMS
Primary Anaesthetist	Ang Bee Leng Sophia (65)6278-4671	SMS
Secondary Anaesthetist	Anuntapon Chutatape (65)9034-6688	SMS
Performing Surgeon	Amartya Mukhopadyay (65)9038-5567	SMS
Secondary Surgeon	Abdul Aziz Mohd Nather (65)9011-4591	SMS
OT Technician	Chew Siew Lay Rosalind (65)9039-4599	SMS

SERVICE REQUEST

Equipment | Drug | Blood | X-Ray | Image Intensifier | Next Patient

Request	Item	Time	Status

PATIENT INFORMATION

MOR01

Patient	Jonathan	Male	16 Yrs.	0 Kg.	GA
Case Description	removal of implant right hip				

CRITICAL INFORMATION

Allergy: NO INFO

Planned Procedures

Nature Of Operation	Code
Bone(Lower Limb),Plates & Screws/Nails,Removal	SB129B

Pre-Op | Timeout (Pre-Induction) | Timeout (Pre-Incision) | Post-Op

Category	Item	Select
Pre-Op	Blood group and cross-match done	☑
Surgical Requisites	Implants check completed	☑
Surgical Requisites	Surgical sets check completed	☑
Surgical Requisites	Scans/X-Rays completed	☑
Equipment	Brain Lab	☑
Equipment	Amsco Table	☑

POST OPERATION

None

PROGRESS LOG

OR In | Anaesthesia Induction | Surgical Preparation | Knife to Skin | Skin Closure | Patient Reversal | OR Out | Cleaning/ Setup

Error Proofing – Build in Patient Safety and Quality

•Real-time tracking of surgery progress and acts as console to communicate with wards and recovery

Wednesday, March 11, 2009 13:11

09:00-10:55 (1 FOO HELIN; Kesavan Esuvaranathan;
11:10-12:30 (1 CHELIN @ CHEOLIN; Kesavan
Lee Eng Hin; Bone
Kesavan Esuvaranathan;
Osteotomy
Liu Ka Po Gabriel; Spine,Deformities/Corrective

00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00

Error Proofing – Build in Patient Safety and Quality

- " Between 44,000 and 98,000 people die each year nationwide as a result of avoidable errors in hospitals….Safety does not reside in a person, device or department, but emerges from the interactions of components of a system."

- Errors can include problems in practice, products, procedures and systems. The usual responses to such errors focus on preventing recurrence by punishing or retraining individuals. These responses tend to be ineffective because they ignore the system and instead focus on one particular set of circumstances that are unlikely to reoccur.

To Err is Human : Building a Safer Health System, Institute of Medicine (IOM)

Error Proofing

Key is to put in process for avoiding simple human errors.

Two Levels of Error Proofing :

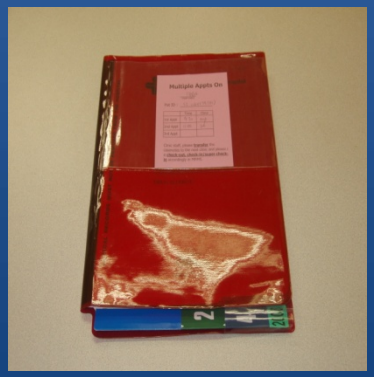
- Level 1: Put in place a system whereby errors cannot be made.

Eg. Diluted KCl, NRIC check digit in SAP

- Level 2: Use Visual Controls

Visible Controls to Identify Errors
(Lower level of error proofing)

- Create system to bring immediate attention to an error or trigger action to prevent errors



Elevate to higher level if necessary

Escalate

Prevention (Short Term)

Contain

Evaluate + Act

Control (Protect the Customer)

Prevention (Long Term)

Recognition (Andon Cord)

OOTM Perioperative Dashboard

OT View

Major Operating Theatre

Saturday, February 14, 2009 01:26 PM

Room	Patient	Status	Discipline	Surgeon	Start Time	End Time	Nature Of Operation	OTT	Special Requisite	Next Patient
MOR01	NILK 060Z		EYE	Wong Bik Yun Inez	11:43	13:38	Eye,Squint,Operation(One/Both Eyes-Transpositio			
MOR02	EMMA 132Z		EYE	Chee Ka Lin Caroline	08:00	09:40	Lens,Cataract,Extraction With Intra-Ocular Lens		Isolation	
MOR03	THAN 988I		CTVS	Tan Tiong Tee Christie	09:00	13:30	Heart,Coronary Disease,Coronary Artery Bypass		IV	NONE
MOR04	ANG 570Z		Surgery	Koh Chi Siong Dean	07:00	10:45	Anus,Fissure,Excision/Lateral Sphincterotomy		LMA	
MOR05										
MOR06	YEO 444H		EYE	Wang Jenn Chyuan	07:00	10:47	Cornea,Various Lesions,Transplantation(Superficial/		LMA	

Nature Of Operation

Waiting Time | Anaesthesia Induction | Surgery Preparation | Surgery | Surgical Dressing | Patient Reversal | Cleaning/ Setup | Reception | Hospital | Recovery Room | Inside OR

Real-time and configurable dashboards to keep everyone in sync

Key Benefits

Enhanced Patient Safety

- care

Eliminate:
Wrong patient
Wrong site/side
Wrong procedure

Increase Revenue

- es effectively

Pack More Cases:
10% Increase

Reduce Cost

- Automated workflow notification (SMS)

Reduce OR Occupancy:
Estd: 5-10% cost reduction

Better Visibility

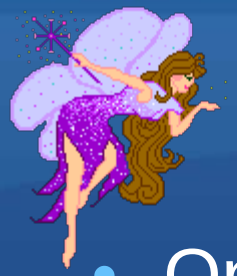
- Accountability

Better Decision Making

Business Intelligence (BI)

- Provides “evidence” to demonstrate to the healthcare provider & their clients that the care is delivered efficiently
- Engages the clients by providing value-added information in a timely & reliable manner

Uses of Business Intelligence (BI)



- Optimizing emergency room (A&E) staffing
- Estimating bill size & ALOS
- Measuring the profitability of clinical programs

Sample BI Framework for Healthcare Analytics

Healthcare Analytics

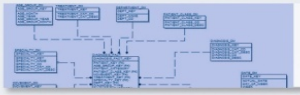

Operational Performance


Clinical Performance


Financial Performance


Chronic Diseases Analysis


Regulatory Compliance


Healthcare Schematics (By Subject Area)


Specific Subject Area Data Marts

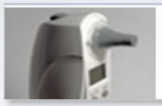

Subject Area Identification & Extraction Engine


Healthcare Data Warehouse


Healthcare Warehouse Builder Framework


Patient Information


Lab Information


Clinical Information


Diagnosis Information


Pharmacy Information


Finance Information

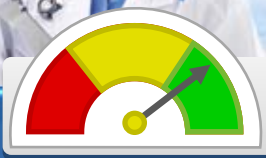
Various of Components of BSC putting together in a Simple Dashboard

ID : Yvonne Chong

Logout

Score Reports Analysis

Overall Score | Overall History | Financial | People | Quality | Service | Growth

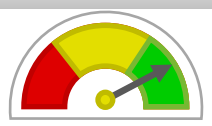


Overall Score

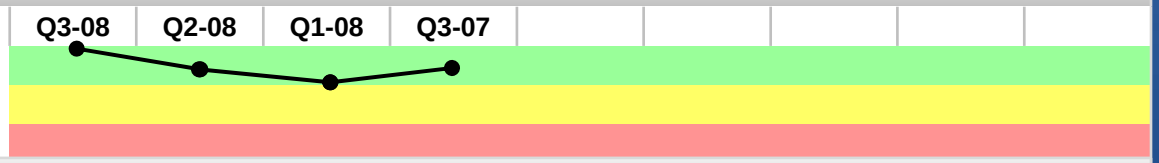
3.01 Trend

Entity: All Go

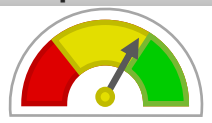
Financial



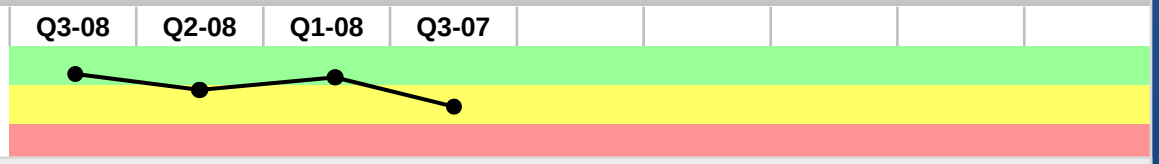
3.44 Trend



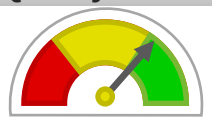
People



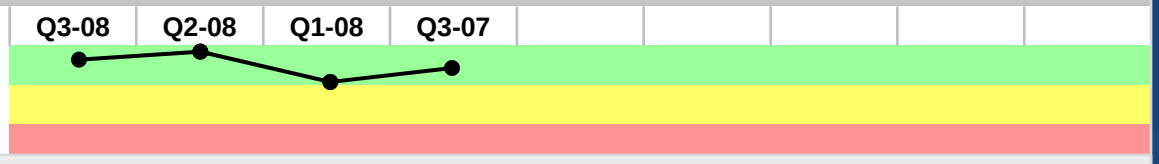
2.90 Trend



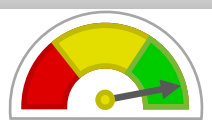
Quality



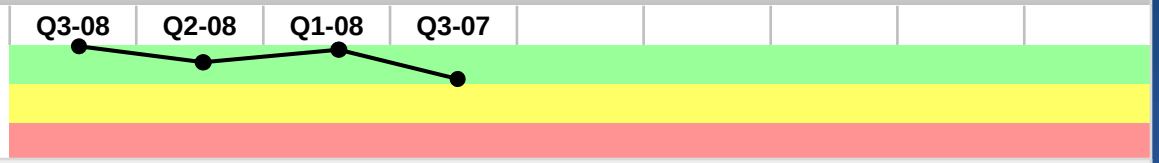
3.04 Trend



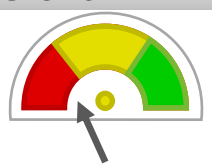
Service



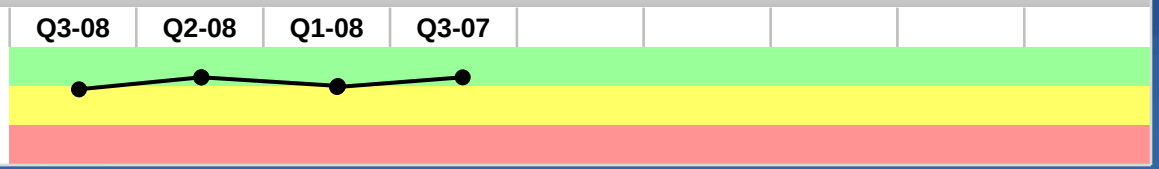
3.81 Trend



Growth



2.23 Trend



ID : Yvonne Chong

Logout

Score Reports Analysis

Overall Score | Overall History | Financial | People | Quality | Service | Growth

Balanced Scorecard

3.01 Trend

Period: Q3 2008

Entity: All

Go

Financial

2.33

KPI	Weightage	Actual	Status	Trend	Details
Meet and Exceed Our Financial Goals	12.5%	3.00			
Exceed Intl. Benchmarks for Ops Eff	12.5%	2.11			
Increase Bargaining Power	12.5%	1.20			
Optimize Use of Facilities	12.5%	3.00			
Improve Profitability by Bundling	12.5%	3.00			
Minimise Financial Risk	12.5%	3.00			
Improve Marketability of Programs	25%	2.40			

Quality

2.61

KPI	Weightage	Actual	Status	Trend	Details
Heart & Vascular		3.00			
Oncology		2.65			
Transplant & Cellular Therapy		1.98			
Women & Children		3.11			
Musculoskeletal		3.05			
Neurosciences		3.06			
Surgery		2.89			
Chronic Diseases		3.00			
Labs TAT for STAT tests		3.01			
Imaging – Film Repeat rate		2.40			

People

1.83

KPI		Weightage	Actual	Status	Trend	Details
1	Attract, Develop, Retain Engaged Employees	12.5%	3.00			
2	Create Competitive Compensation & Benefit Plans	12.5%	2.11			
3	Develop Competent Staff	12.5%	1.20			
4	Promote Safety Culture	12.5%	3.00			
5	Create Leadership & Succession Plans	12.5%	3.00			
6	Build hospital Pride &	12.5%	3.00			

Services

2.83

KPI	Weightage	Actual	Status	Trend	Details
Attain the highest levels of service	12.5%	3.00			
"Towards Excellence"	12.5%	2.11			
Patient Focused Environments	12.5%	1.20			
Toyota Way	12.5%	3.00			

F01 - Meet and Exceed our Financial Goals

- **F01 - Meet and Exceed Our Financial Goals**
- F02 - Exceed International Benchmarks and standards
- F03 – Improve Bargaining Power
- F04 - Optimize Use of Facilities and RM
- F05 - Improve Profitability by consolidation
- F06 – Decrease Financial Risk
- F07 - Improve Marketability of Services

Result – Net Earnings

	Value			Details
Actual	29,701,828.00			
Target	30,202,660.00			
Forecast	29,763,000.00			

Net Earnings - Entities

	Actual	Target	Gap	%
ASEAN OPS	**19,701,828.00**	**19,700,000.00**	**1,828.00**	0.01%
General	374,877.00	300,000	74,877.00	2.27%
Med	475,394.00	500,000	-24,606.00	-0.98%
EGC	474,987.00	500,000	-25,013.00	-1.67%
Heart & Vascular	423,495.00	900,000	23,495.00	2.61%
Oncology	740,300.00	750,000	-9,700.00	-1.29%
Transplant & Cellular Therapy	374,877.00	350,000	24,877.00	0.74%
Women & Children	475,394.00	100,000	475,394.00	23.77%
Musculoskeletal	474,987.00	500,000	-25,013.00	-1.67%
Neurosciences	423,495.00	900,000	23,495.00	2.61%
Surgery	740,300.00	750,000	-9,700.00	-1.29%
Chronic Diseases	374,877.00	350,000	24,877.00	0.74%
Related Clinics	475,394.00	000,000	475,394.00	23.77%
Lab Services	474,987.00	500,000	-25,013.00	-1.67%
Imaging Services	423,495.00	400,000	23,495.00	2.61%
Other Services	240,300.00	750,000	-9,700.00	-1.29%

Score Reports Analysis

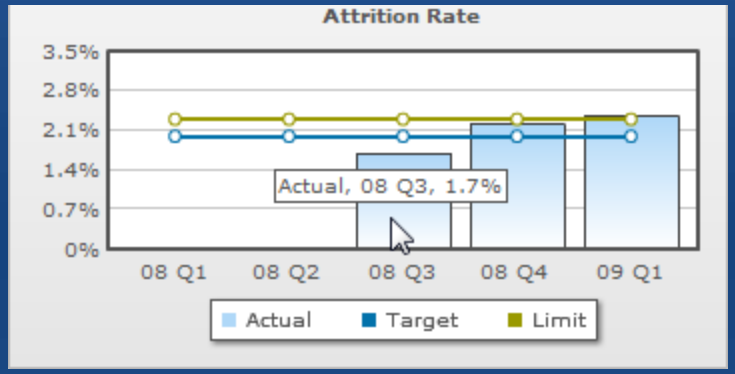
ID : Yvonne Chong

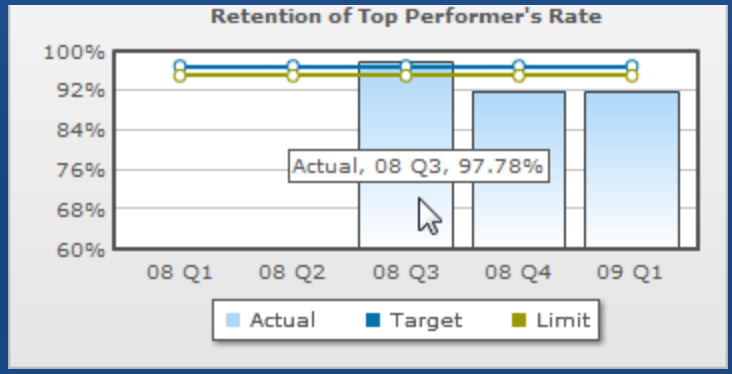
Overall Score | Overall History | Financial | People | Quality | Service | Growth | Logout

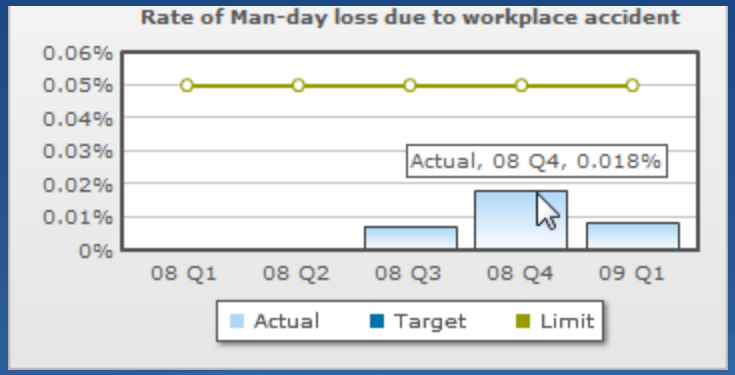
Latest QTR Results | Quarterly Trend | Latest Mth Results | Monthly Trend | YTD Results | Ad Hoc Reporting | Reports List

- Report List
  - **General Reports**
  - P01
  - **P02**
  - P03
  - P04
    - P04 Enhance safety culture

People 3.01 Trend Period Entity Go







Score Reports Analysis

ID : Yvonne Chong Logout

Overall Score | Overall History | Financial | People | Quality | Service | Growth

Latest QTR Results | Quarterly Trend | Latest Mth Results | Monthly Trend | YTD Results | Ad Hoc Reporting | Reports List

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  - **P02**
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    - P04 Enhance safety culture

People 3.01 Trend Period Entity Hospiital Go

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Summary of Work Injury Compensation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	YTD 2008	2007	2006
Number of cases	2	4	1	7	10	2	5	1	5	7		44	0	0
Number of employees involved	2	4	1	7	10	2	5	1	5	7		44	0	0
Number of mandays loss	3	12	1	21	19	2	7	1	12.5	51.5		130		
Avg Number of man-days loss per month												13		
% of man-days loss vs total man-day per month	0.004%	0.015%	0.001%	0.026%	0.023%	0.002%	0.009%	0.001%	0.014%	0.000%		0.009%	0.000%	0.000%

Contact Details

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Thank You