



臺中榮民總醫院
Taichung Veterans General Hospital

Use of Big Data to Improve Management of Operating Rooms by e-Streamlining

Tsung-Hung Chang, MD

2019/09/20



Operating Room



A CLEAR OPPORTUNITY FOR QUALITY IMPROVEMENT



Because of the **growing complexity and demands** of operations, every healthcare organization needs access to good data for improving efficiency and controlling cost.

Operating Room



The surgical OR is clearly a **high-risk and high-consequence environment**

The surgical OR is characterized by a high degree of complexity with respect to both **human-technology** interfaces and **human-human** interfaces.

Difficulty and Issue in OR



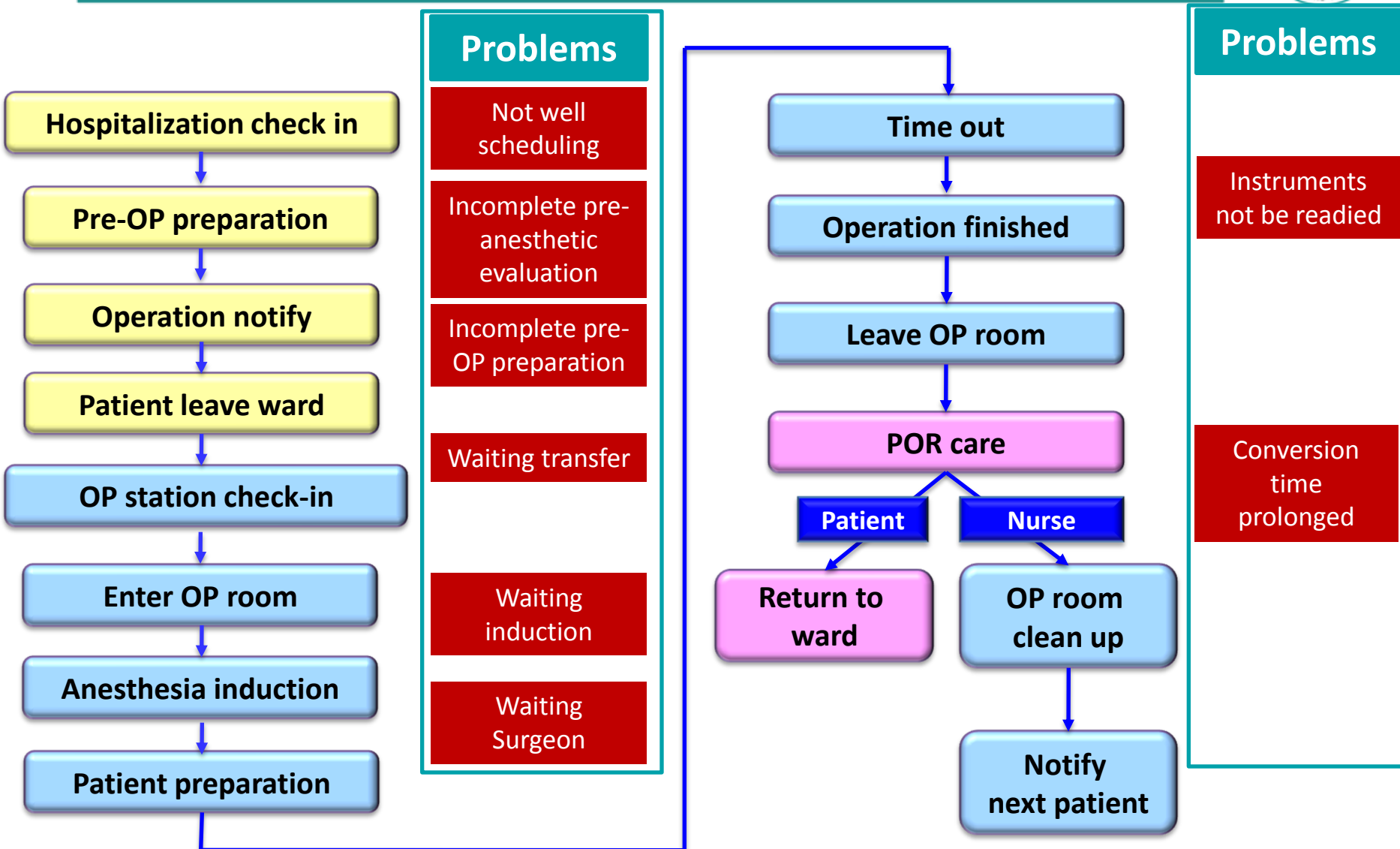
1. Increasing of surgical volume in the past years
2. Increasing of workload of surgical team members
3. Increasing of surgical technique complexity
4. Introducing and implement of new equipment
Different Video-Assisted System and scope connection, New anesthesiology devices...etc.
5. Lacking a daily and computer-aid surgical workflow dashboard
OR system relied on a manual data-preparation process from multiple disparate systems – which was inefficient from a timing perspective and carried the risk of potential mistakes

Challenge of Operating Room Management



High quality, short load time, low cost

Operating Room Workflow Framework



Management Method of Operating Workflow



Problem	Customer necessary	Lean method
Not well scheduling	Confirm operation schedule the day before	Computerized Dashboard
Incomplete pre-anesthetic evaluation	Completed the day before operation	Computerized Dashboard
Incomplete pre-OP preparation	Completed the day before operation	Balance
Instruments not be readied	Confirm operation equipments are fully prepared	Pull
Waiting transfer	Avoid transferring delay	Flow
Waiting Anesthesiologist	The time of waiting for Anesthesiologist shortened	Flow
Waiting Surgeon	The time of waiting for surgeons shortened	Flow
Conversion time prolonged	Well prepared	Balance Flow

The Goal of Improvement



Time Monitoring Indicator



➡ Nominal definition

➡ Monitor the time of waiting and reduce time wasting

■ **Waiting for Anesthesiologist –**

the interval from patient entered OP room till anesthesiologist entered

■ **Waiting for surgeon –**

the interval from fully anesthesia till surgeon entered

■ **Unoccupied time –**

the interval from patient send out of OP room till next patient entered

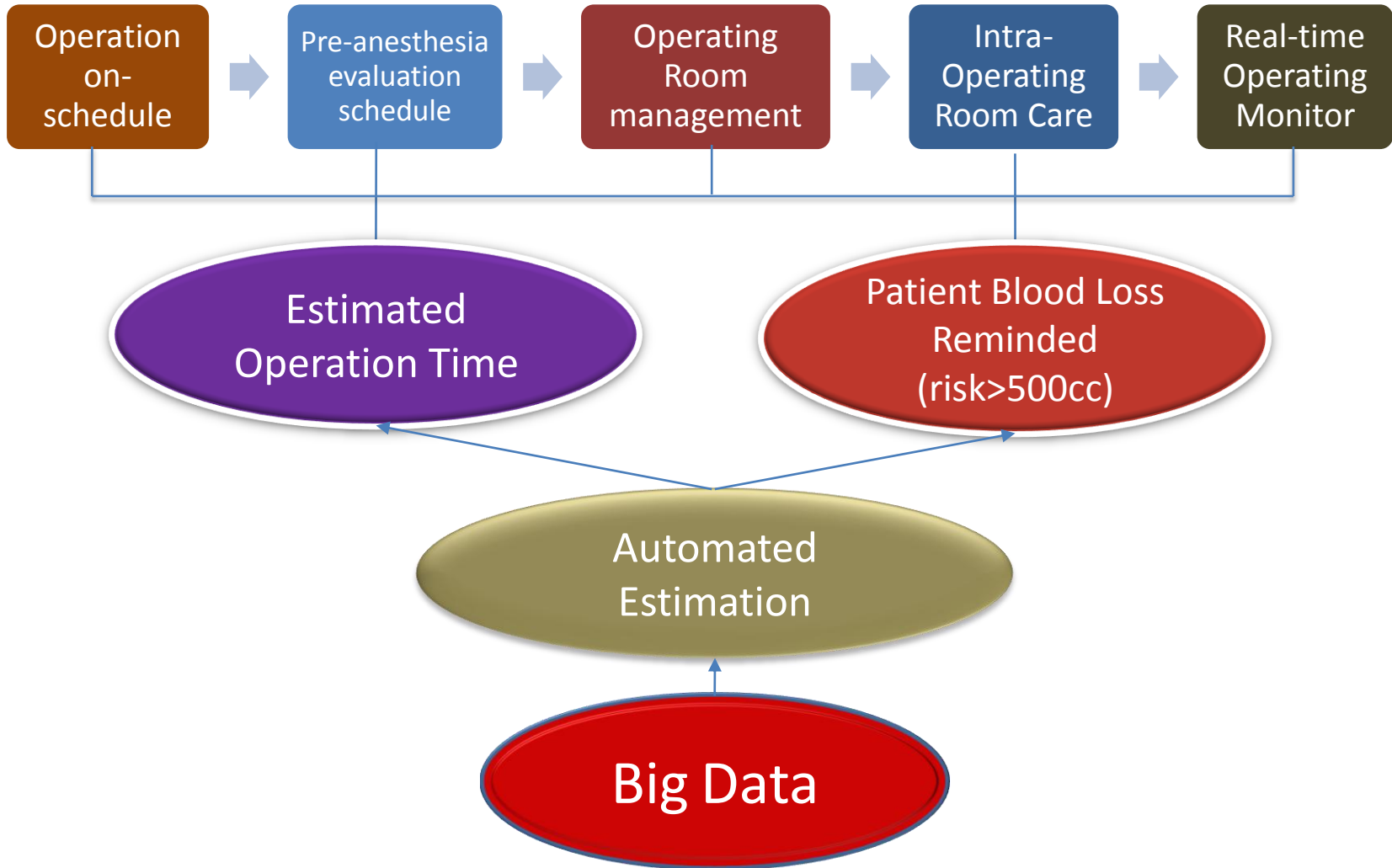
■ **Conversion time –**

the interval from operation finished till next patient's surgeon preparation

■ **First operation punctuality rate –**

first operation in the morning begins on-time

E-Stream Solutions Map of OR Management



Efficiency and Safety

Improved Rooms Utilization



Prime-Time Utilization (8 am to 6 pm)

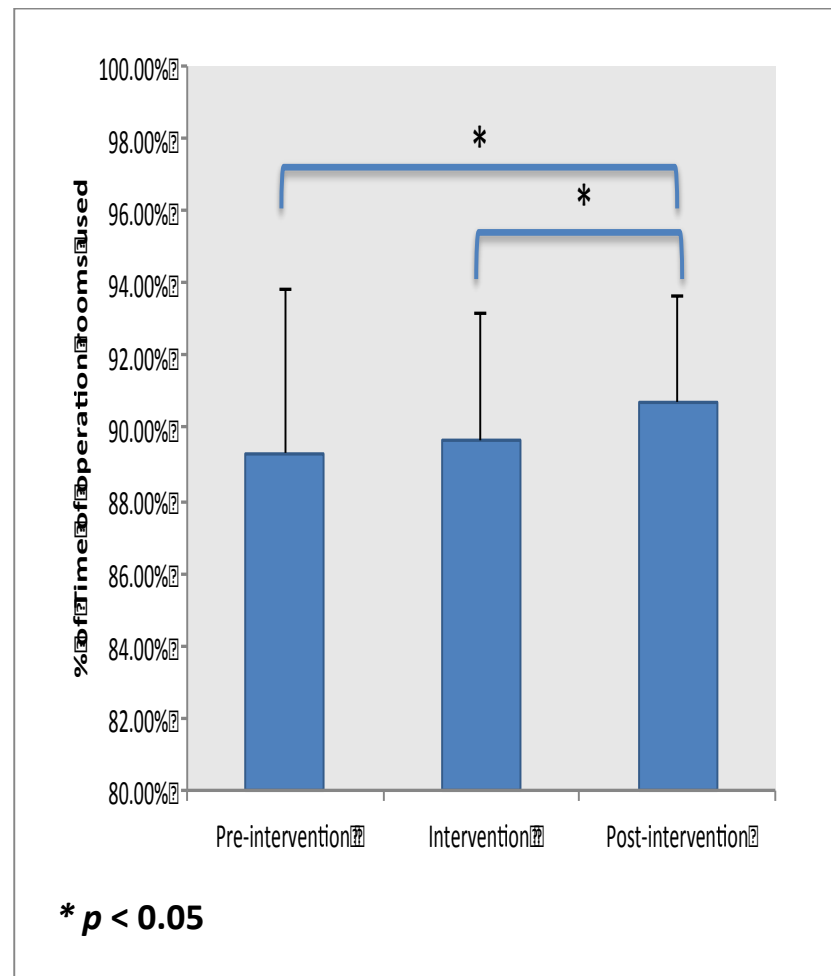
	Utilization(%)		Turnover
	2015/07	2018/06	
ORA	85.7	88.1	2.1
ORC	78.3	81.8	1.3
ORB	58.8	70.7	2.8
Total	79.1	83.8	2.2

Rooms Utilization : **+ 4.7%**

Saving **874min**/day

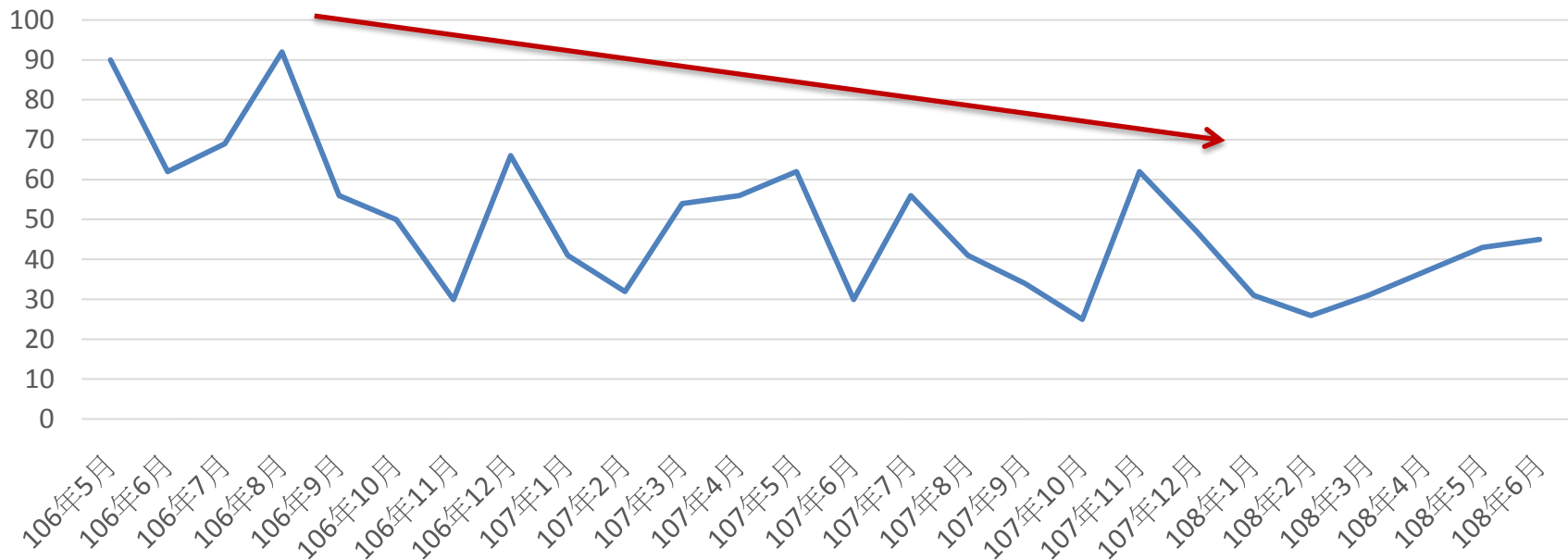
Increasing available **3,846.5 hours**/year

% Time of OR used



The Cases of Medical Adverse Events

Reported quantity



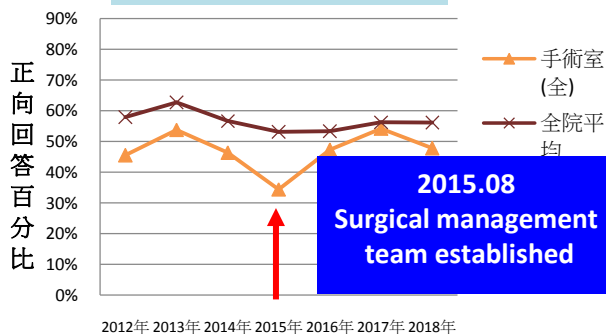
1. Manage pre-anesthesia evaluation schedule
2. Developed pre-operation preparation checklist display
3. First and second operation patient must finished pre-anesthesia evaluation the day before surgery
4. Rental-equipments process improvement
5. High-cost equipment managements
6. Overcrowding of Recovery Room→POR departure standardization

Improvement of Surgical Team's Patient Safety Culture

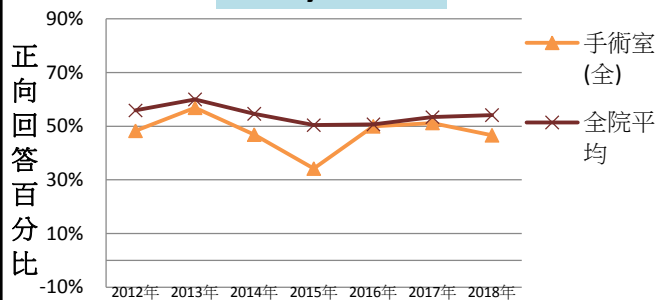


The resign rate of nurse: before 21%, after 5.4%.

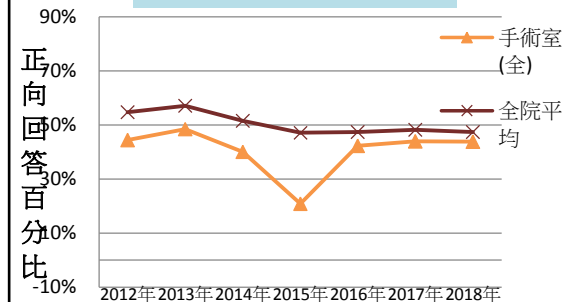
Cooperation of team



Safety culture



Satisfaction of work

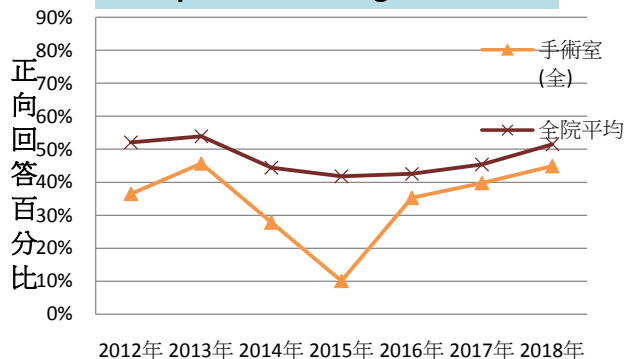


Cooperation of team

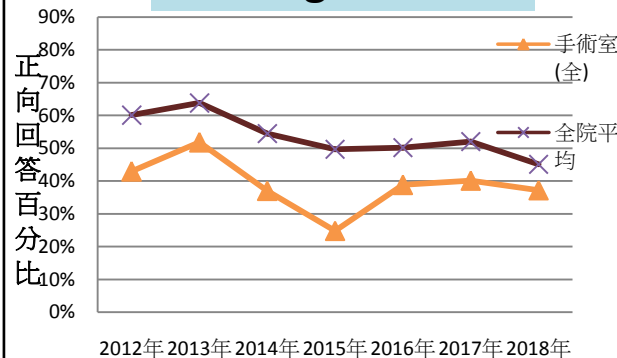
Safety culture

Satisfaction of work

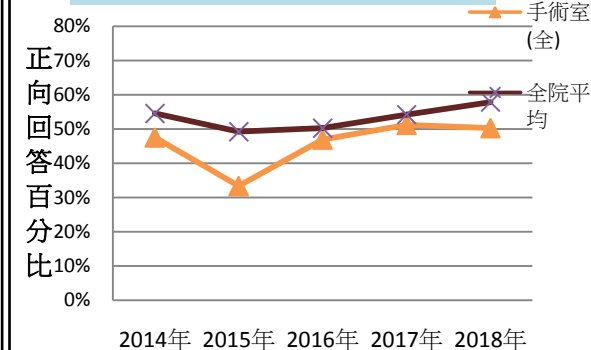
Perception for manager's attitude



Working condition



Equability between work & life



Perception for manager's attitude

Working condition

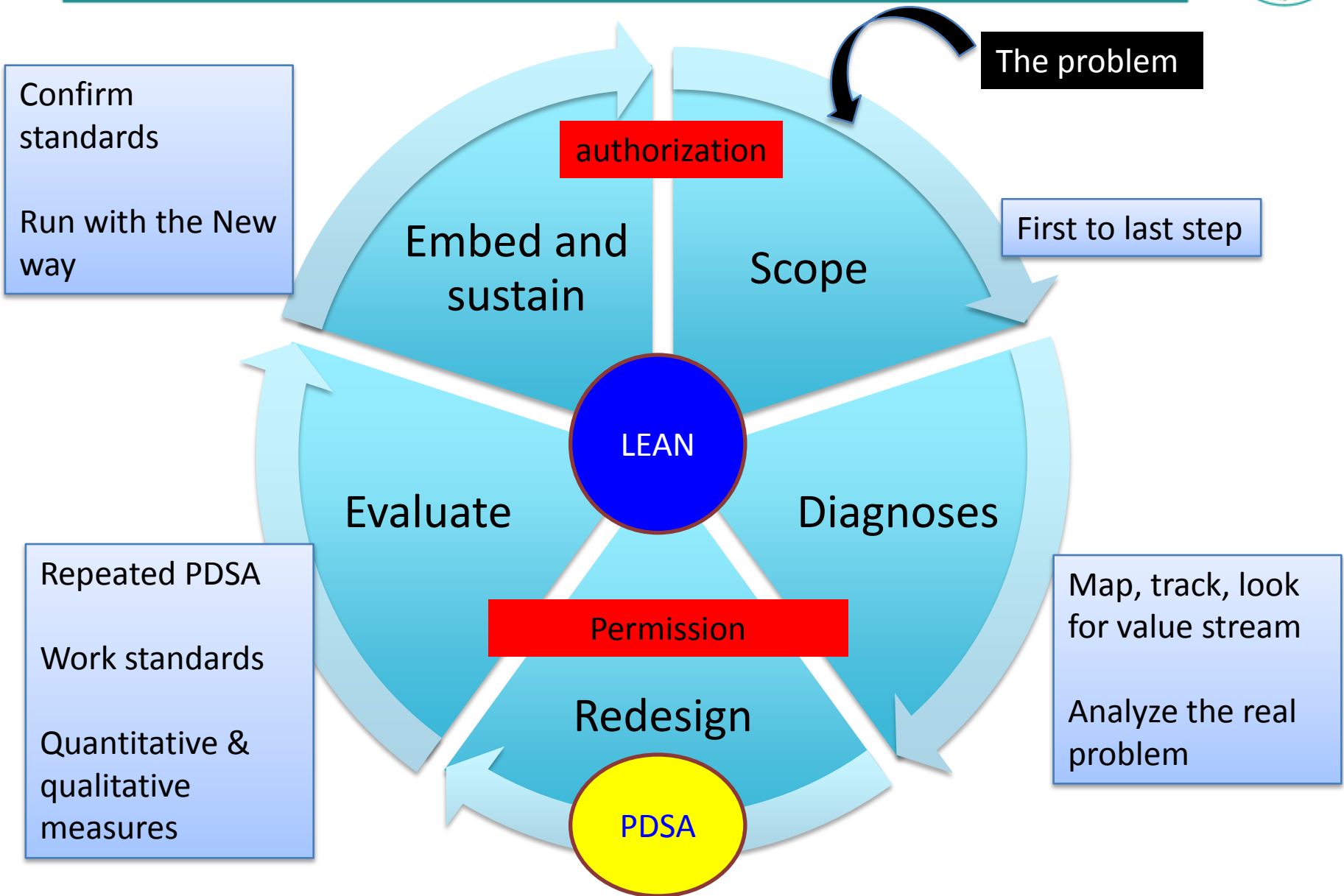
Equability between work & life

Conclusion



The smart utilization of big data	can Improve management efficiency of operating room
The use of computer-aids and web-base monitoring system	can increase OR efficiency
The OR Dashboard and data visualization	help OR team collaboration and improve the performance
Process mapping, leadership support, staff engagement, and state-of-art information technology support	keys to enhancing OR efficiency

Future-the virtuous circle of health care process redesign using Lean



Create Patient-Centric Smart Lean Healthcare



Quality 、 Efficiency Medicine



臺中榮民總醫院
Taichung Veterans General Hospital



中榮官網



中榮FB

Thanks for Your Attention



愛心 · 品質 · 創新 · 當責
Compassion · Quality · Innovation · Accountability