

Use Process Control and Digital Transformation to Improve Operating Room Efficiency

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INTRODUCTION

The operating room (OR) accounts for a large part of the hospital's revenue. It is also a department with complex operating procedures, intensive resources and high costs. As competition in the healthcare industry intensifies, it is necessary to find management methods to improve OR usage efficiency and patient safety. Multiple factors have been found to contribute to ineffective OR care and patient safety. These factors range from surgical scheduling, preoperative assessment and care, OR management and postoperative recovery. Within surgical process, prolonged surgical turnover time is often complained by surgeons, also concerned by patients and hospital managers. It is important to enhance OR efficiency by highly coordinating different departments involved in surgical process.

AIM

To improve OR efficiency based on improving surgical process and employing digital technology.

Set an indicator that covers the work of the three main departments according to the surgical process, and set goals based on current data. After improvement, the goals should be reached.

METHOD

Workflow of patients from the ward to the OR for surgery, including waiting after registration, entering the OR, arrival of the anesthesiologist, completion of induction of anesthesia, completion of preoperative preparation by the surgeon, start of surgery, completion of surgery, and transfer to the recovery room and connect the next patient to the OR. Surgical turnover time is defined as time between wound suture of previous patient and completion of pre-incision preparation. According to the control chart, its lower limit is 50 minutes.

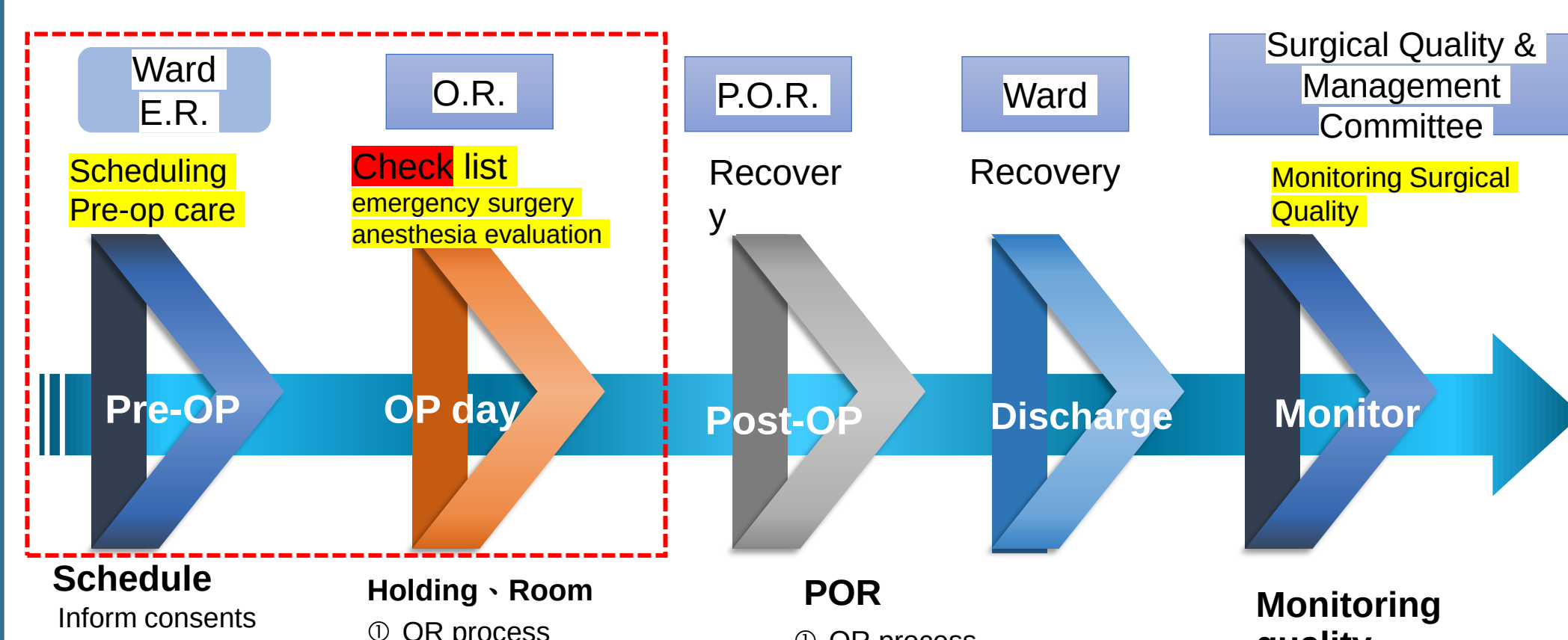
From January to June 2022, the ratio of surgical turnover time exceeding 50 minutes is 43.1%. The improvement goal is set at 36.4% at 3 standard deviations (SD), and the challenge goal is set at 29.7% at 6 SD.

Each node of surgical process has a time record, and improvement strategies are proposed through process control and analysis of various delay factors. Based on patient safety, surgeons and anesthesiologists set time benchmarks for different surgeries, and we control those who exceed the time limit. In addition, an electronic whiteboard is used to display the current status of each OR, anesthesia and operating surgeons are notified via text messages, and AI is used to optimize scheduling and improve surgical utilization.

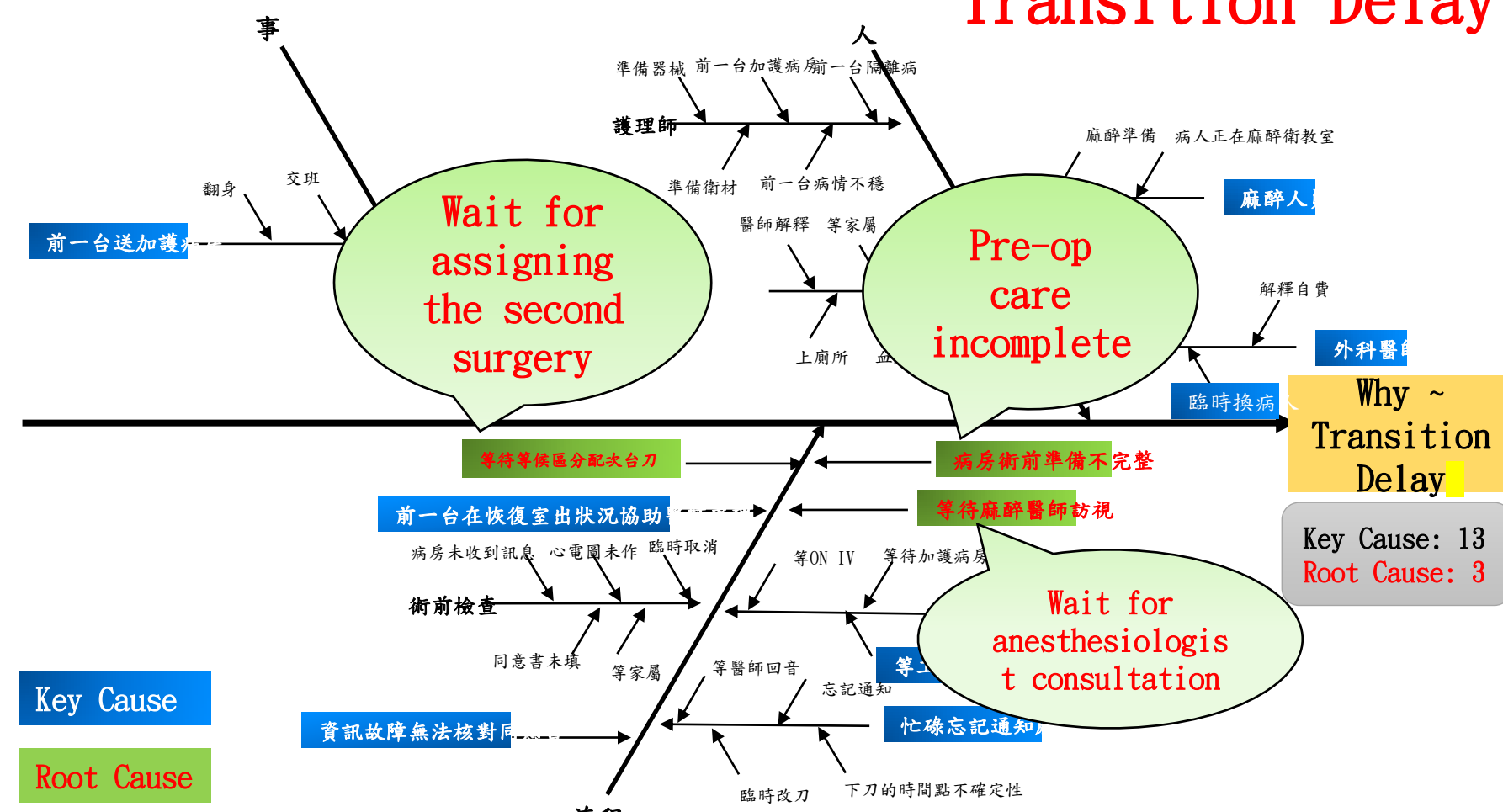
Statistical method is applied to confirm significant level, $P < 0.05$ is statistically significant.

RESULTS

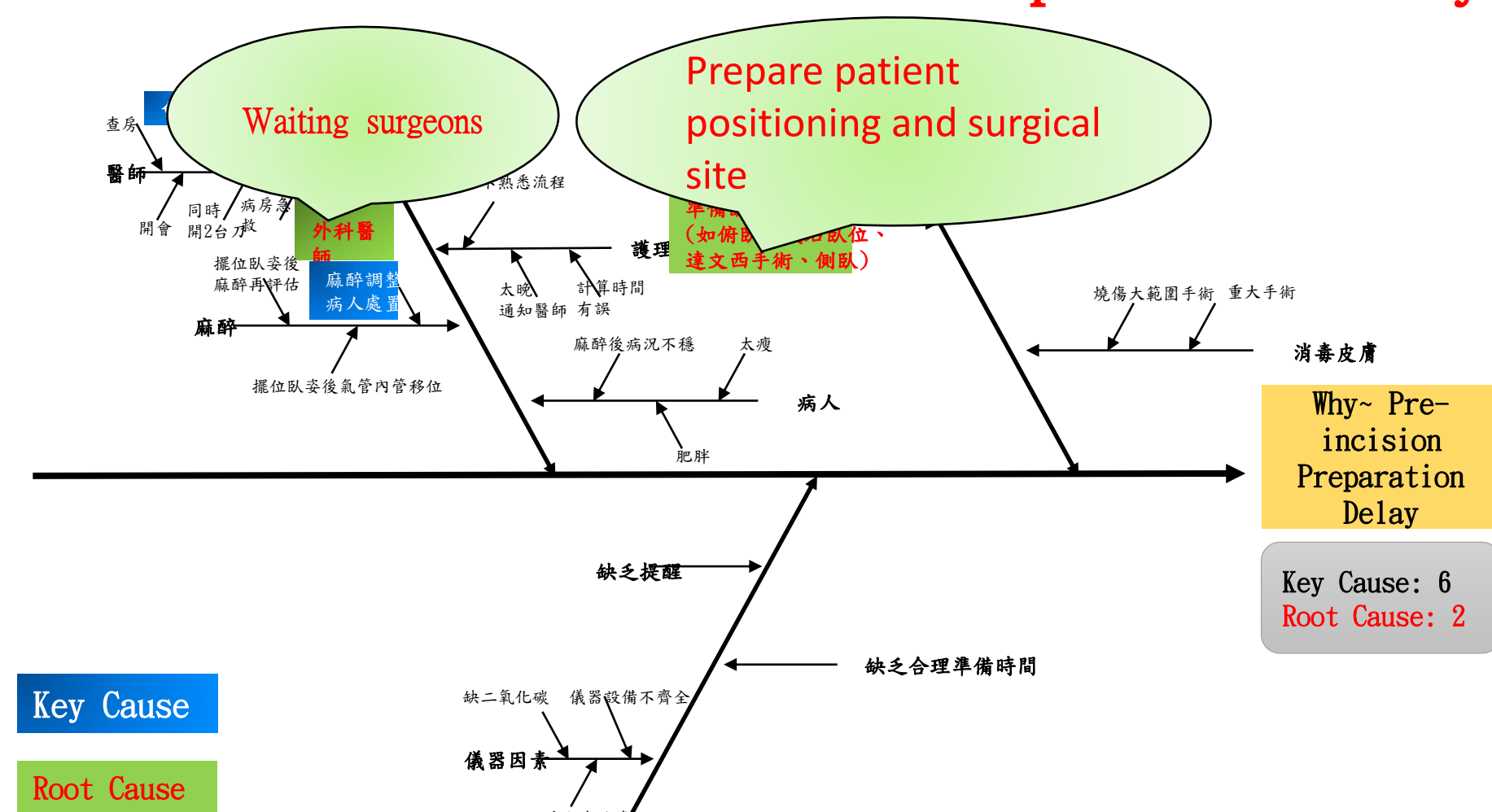
PERIOPERATIVE CARE PROCESS



Possible Causes: Fishbone Diagram (1)

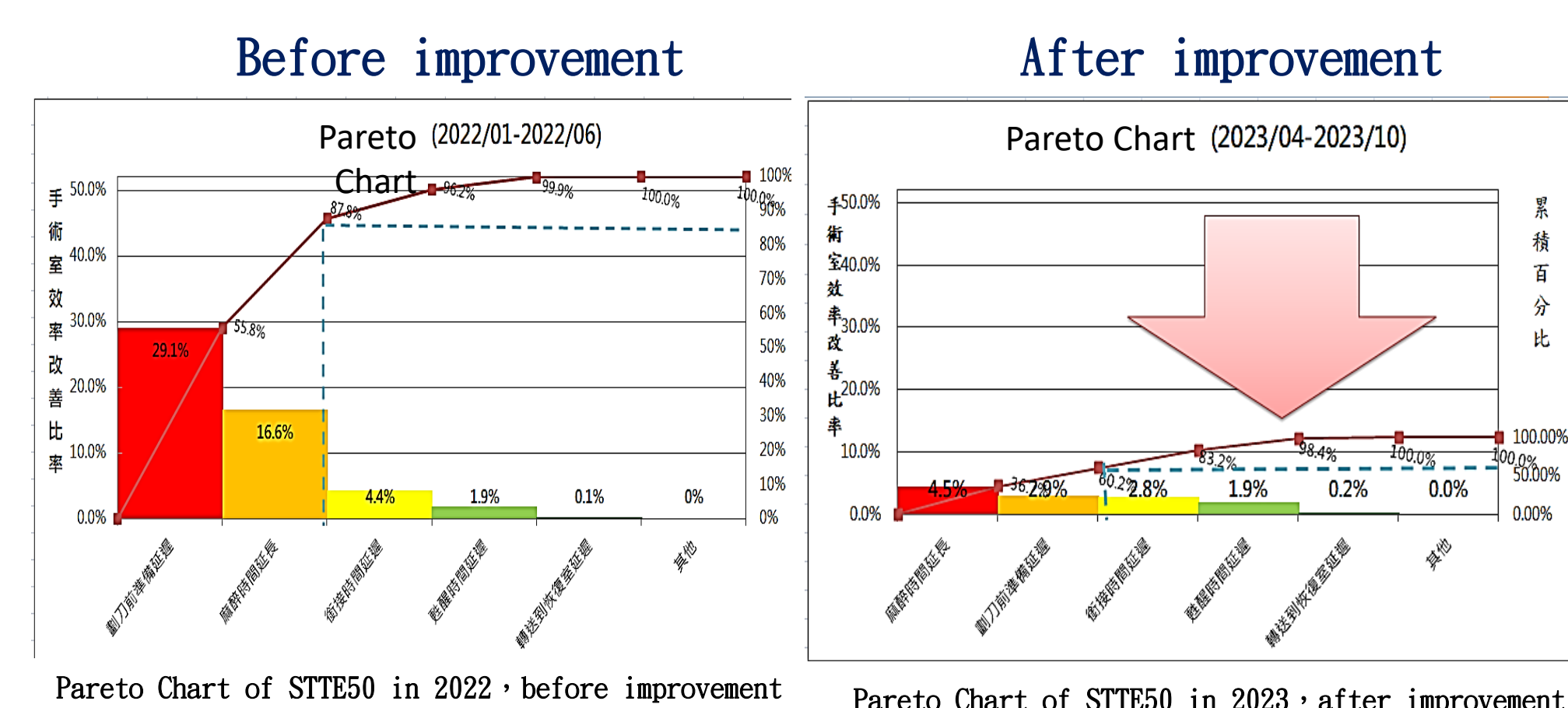


Possible Causes: Fishbone Diagram (3)



Effectiveness Confirmation

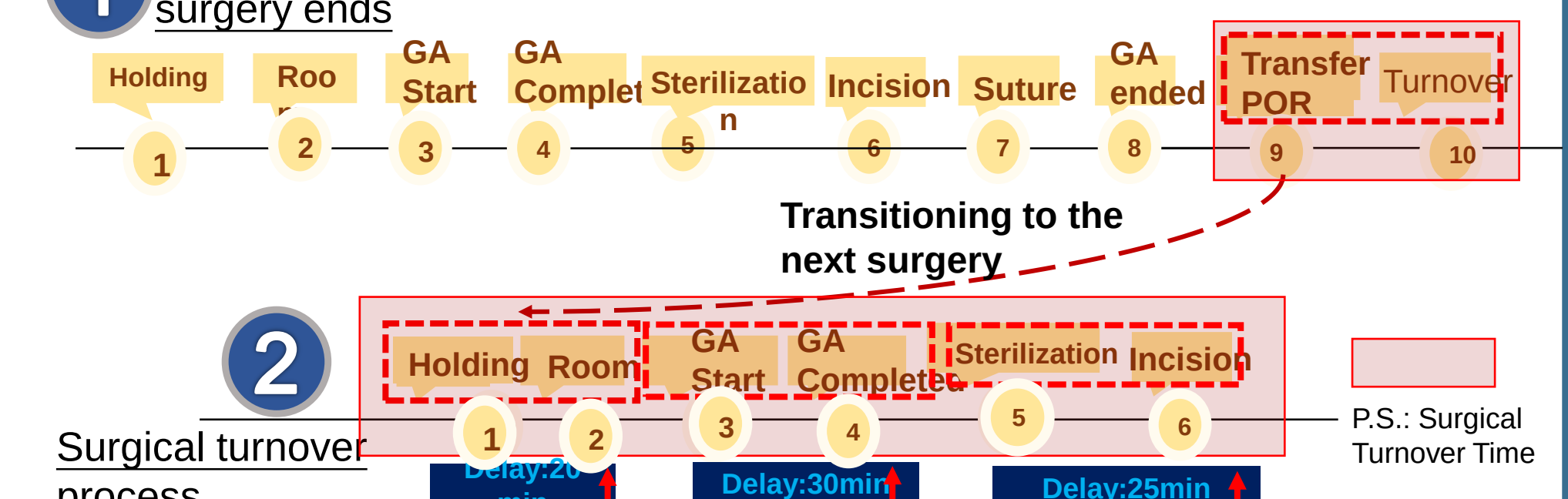
Proportion of Surgical Turnover Time exceeding 50 minutes



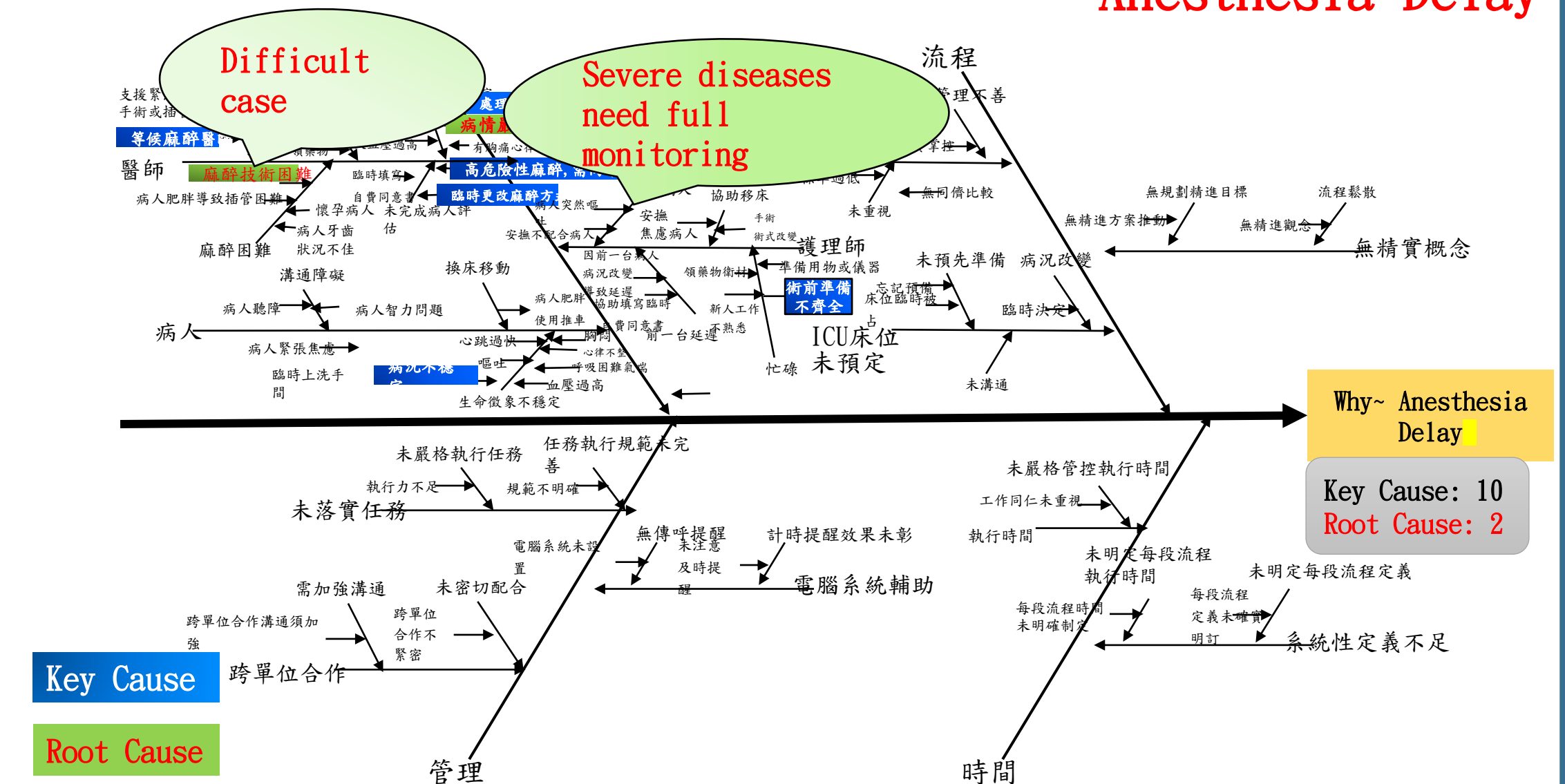
Pareto Chart shows those 3 major causes related with PSTTE50 all are improved after our actions.

SURGERY PROCESS

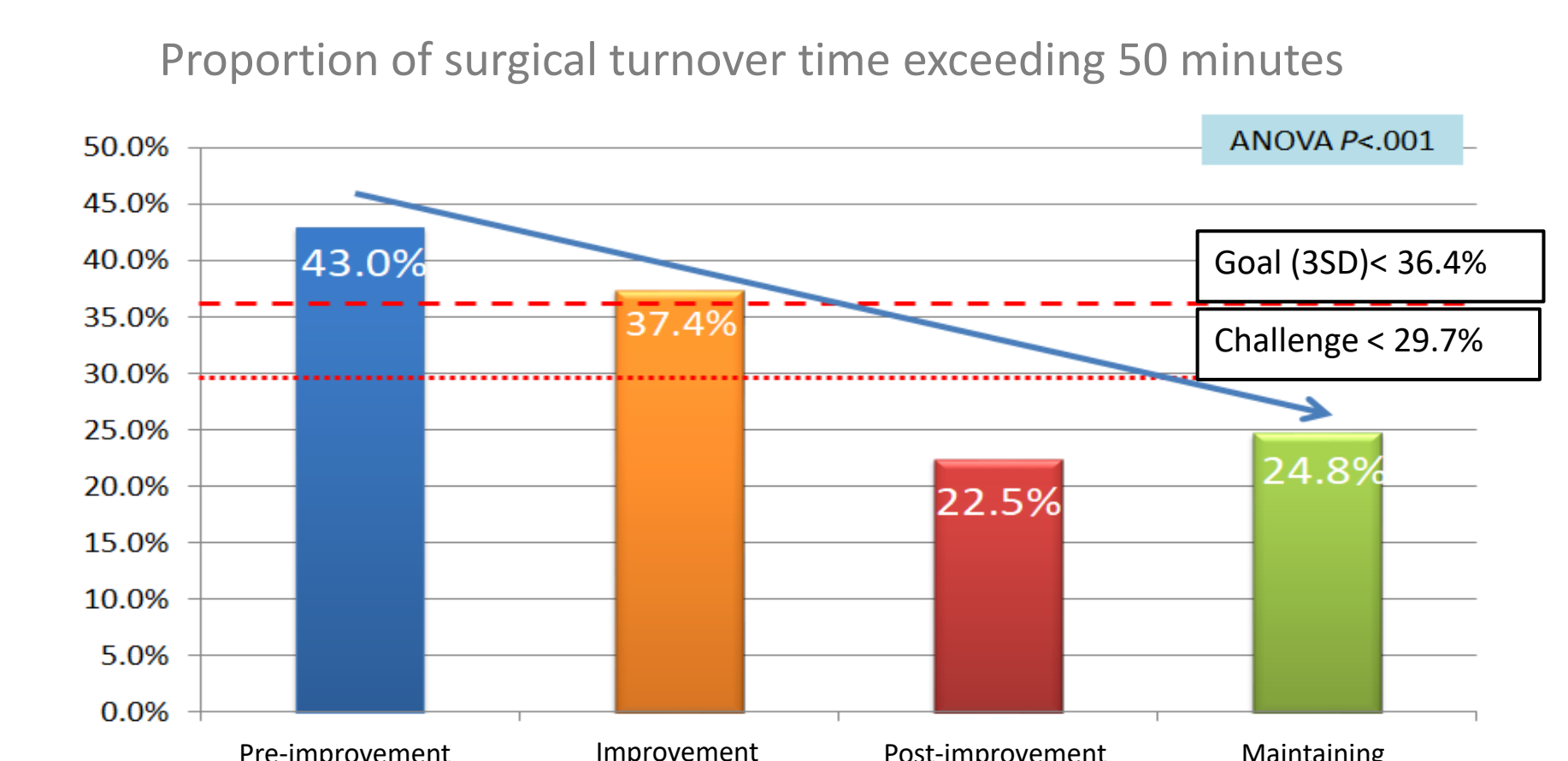
Documenting O.R. Workflow Timestamps



Possible Causes: Fishbone Diagram (2)

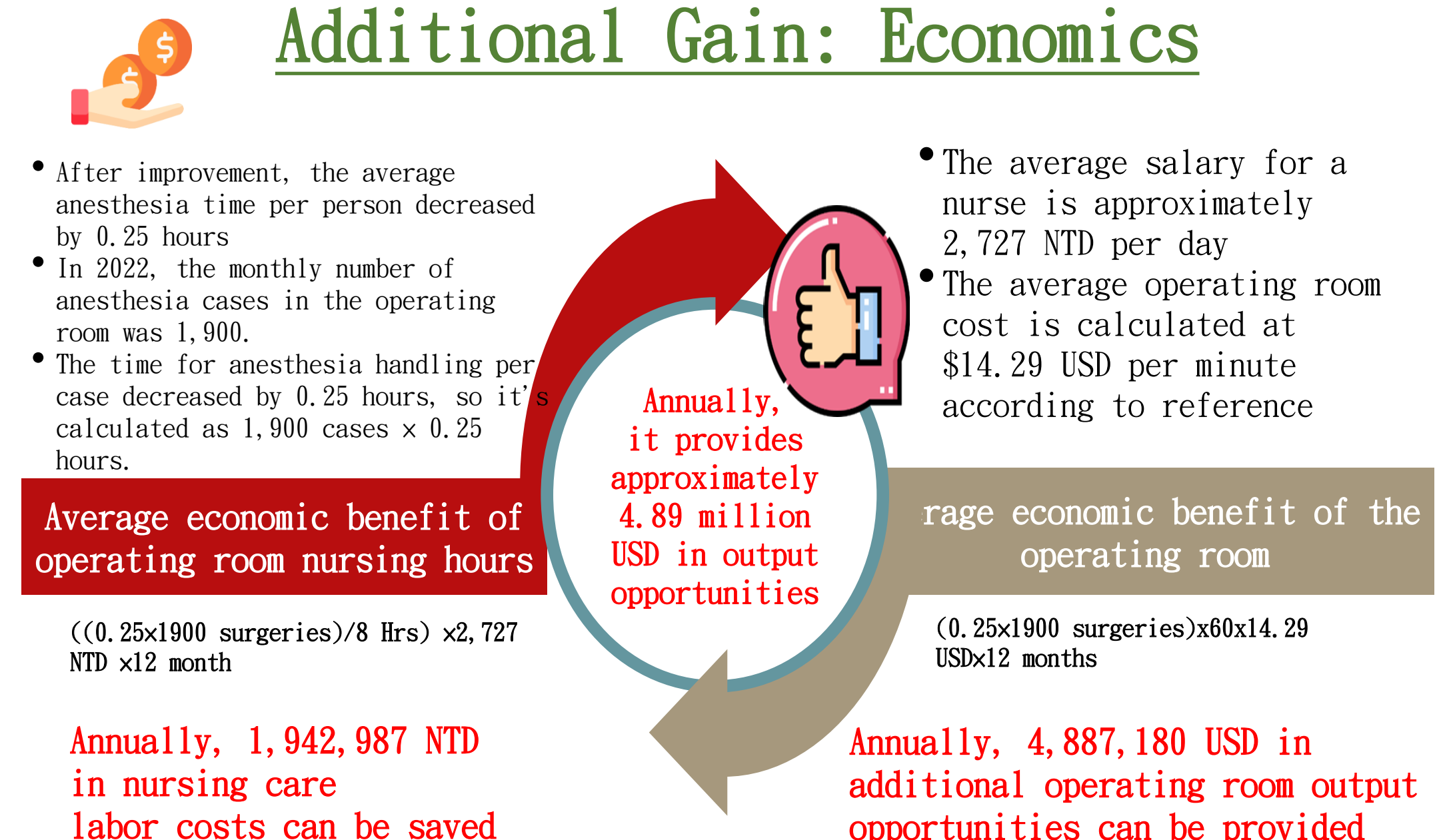


Effectiveness Confirmation



Continuous tracking: the effect PSTTE50 was effectively reduced from 43.1% to 22.5%, maintains well, and all values are below the target

Effectiveness Confirmation – Additional Gain: Economics



CONCLUSIONS

Smart surgery management integrates patient safety, humanity, digital transformation, and all aspects of surgery.

Our series achieve the goal of improving OR efficiency and accompanying added benefit.

ACKNOWLEDGEMENT

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REFERENCES

Chen BP et al. Global hospital and operative costs associated with various ventral cavity procedures: a comprehensive literature review and analysis across regions. *J Med Econ.* 2019; 22:1210-1220

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