



# ED PIP: Getting Started

## Introduction to Lean

# Basics of Lean operations

## Beliefs of Lean

- Objective is to deliver what the patient needs and to eliminate any step that doesn't improve
- Waste leads to poor service, quality, and financial outcomes
- Waste must be eliminated

## What it is

- A framework to achieve continual gains in productivity while satisfying patients' expectations for service quality

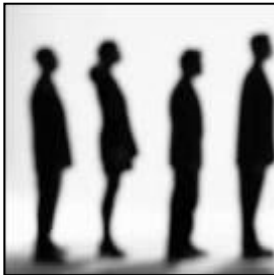
## What it is not

- Making people work harder or do the same with fewer people
- A short-term project
- Limited to manufacturing plants
- Mean!!

## How do you do it?

- First, identify activities which add value vs. those which are waste
- Apply Lean tools to reduce variability and redundancy in order to eliminate waste and improve service, quality, and cost

# Waste affects more than just the patient



## Bad patient experience

- Long waiting time for essential services
- Increased family stress
- Less time for care and education



## Decreased staff morale

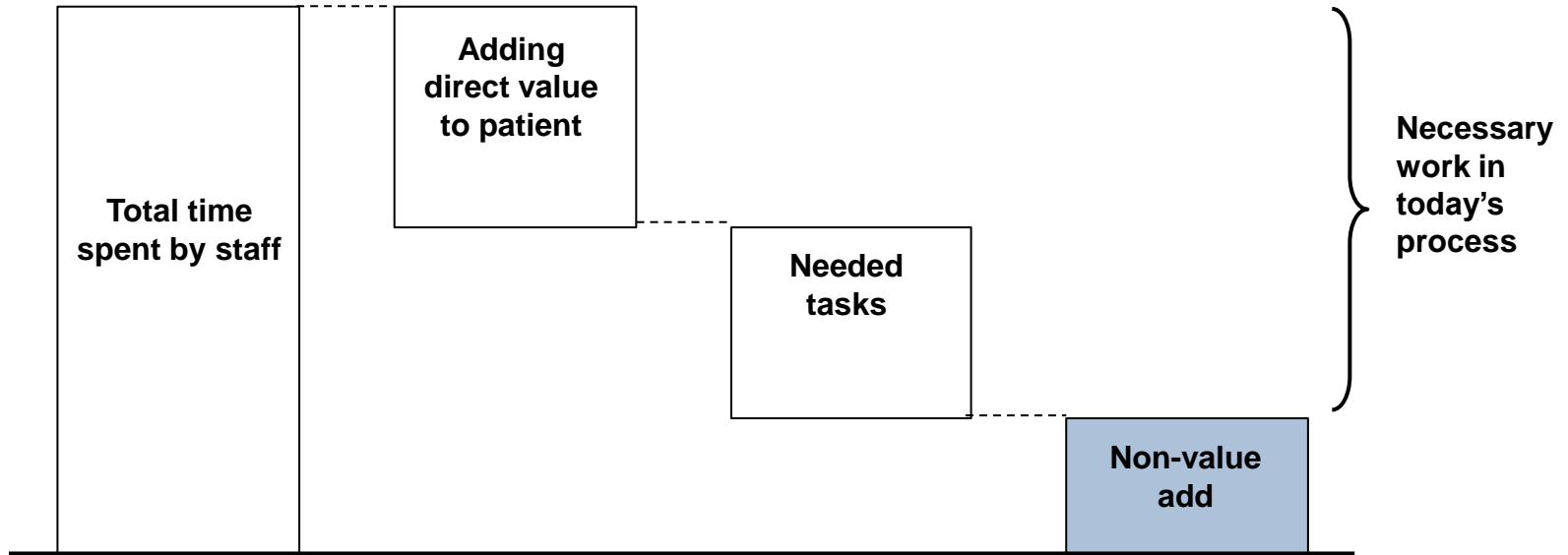
- Unpredictable/uncontrollable work schedule
- Redundant paperwork
- No time for education, psychosocial care



## Operational limits (e.g. “Congestive Hospital Failure”) from lack of beds and/or staff

- Rerouting of patients to other facilities when there is a lack of available beds
- Accelerating costs from “waste” in use of physical materials

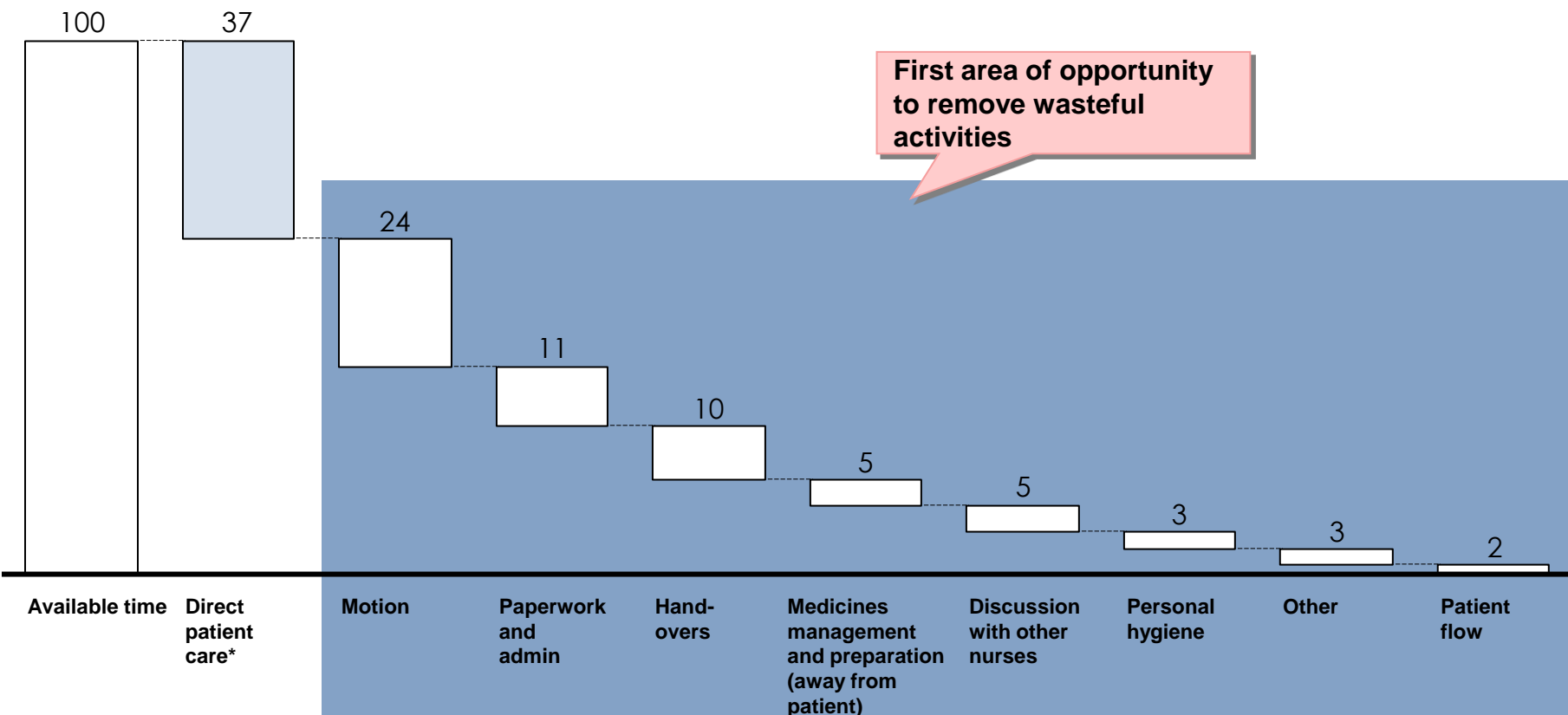
# Lean thinking takes the patients' perspective to assess which activities directly enhance the patients' experience



Getting rid of “non-value adding” time makes an organization “Lean”

# Lean hospital example: frontline nurses can spend as little as 37% of their time on direct patient care activities

Percent of time spent



First area of opportunity to remove wasteful activities

\* Approximately equivalent to time spend within patients bedside area

# Eight major inefficiencies in hospital operations... (1 of 2)

## Wasted motion

- Pharmacy tech spends 20 minutes looking in multiple places for a particular medication



## Rework

- X-ray tech has to re-enter 10-20% of requests because of wrong-side indication



## Over-production

- Admissions paperwork having 7 redundant pages out in the 16 page packet



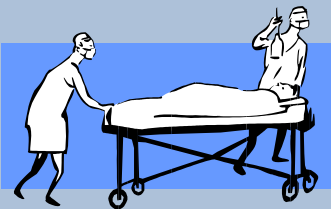
## Excess inventory

- Medicines held beyond the shelf-life because of excess ordering



## Wasted transportation

- 25% of patients admitted to 4M are transferred to a unit with a similar level of care within 36 hours of admission



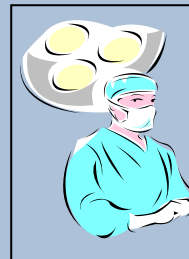
## Excess processing

- Nurse records respiratory rate on 4 different forms in the chart



## Waiting time

- OR team waits 20 minutes for a case to begin, and is not free to do other tasks



## Wasted intellect

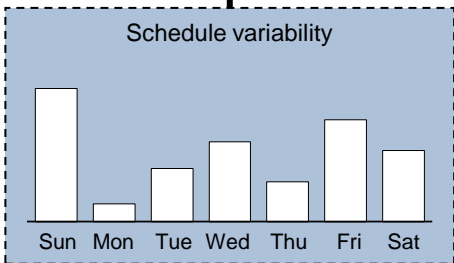
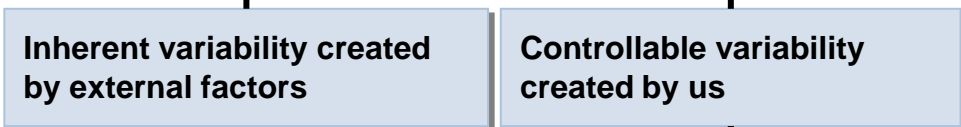
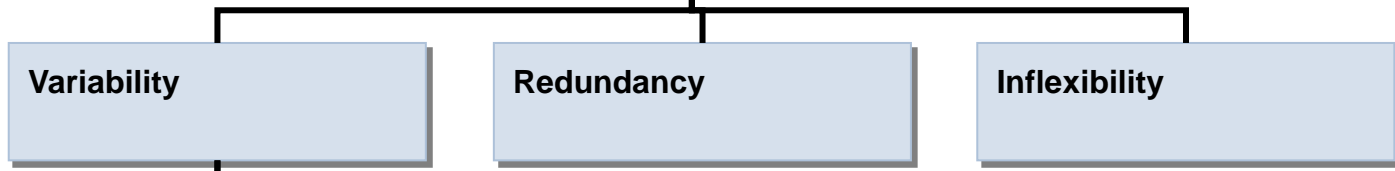
- Numerous ideas are "lost" only to be rediscovered later



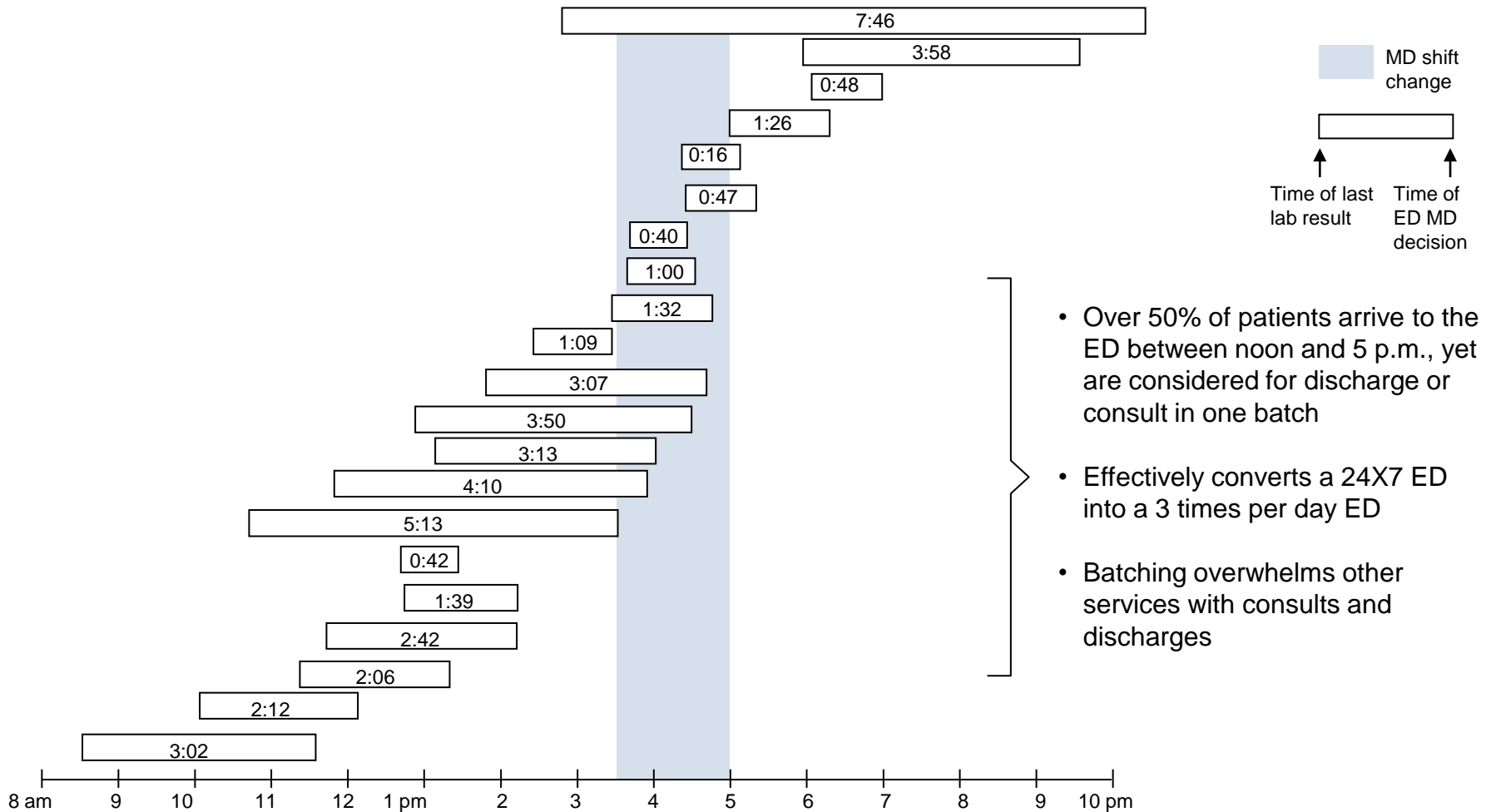
# ...which are driven by three root causes (2 of 2)



<b>Wasted motion</b> • Pharmacy tech spends 20 minutes looking in multiple places for a particular med 	<b>Rework</b> • X-ray tech has to reenter 10-20% of requests because of wrong side indication 	<b>Overproduction</b> • Admissions paperwork having 7 redundant pages put in the 18 page packet 	<b>Excess inventory</b> • Medicines held over the shelf-life because of excess ordering 
<b>Wasted transportation</b> • 25% of patients admitted to AM are transferred to a unit with a similar level of care within 36 hours of admission 	<b>Excess processing</b> • Nurse records respiratory rate on 4 different forms in the chart 	<b>Waiting time</b> • OR team waits 20 minutes for a case to begin, and is not free to do other tasks 	<b>Wasted intellect</b> • Numerous ideas are "lost" only to be rediscovered later 



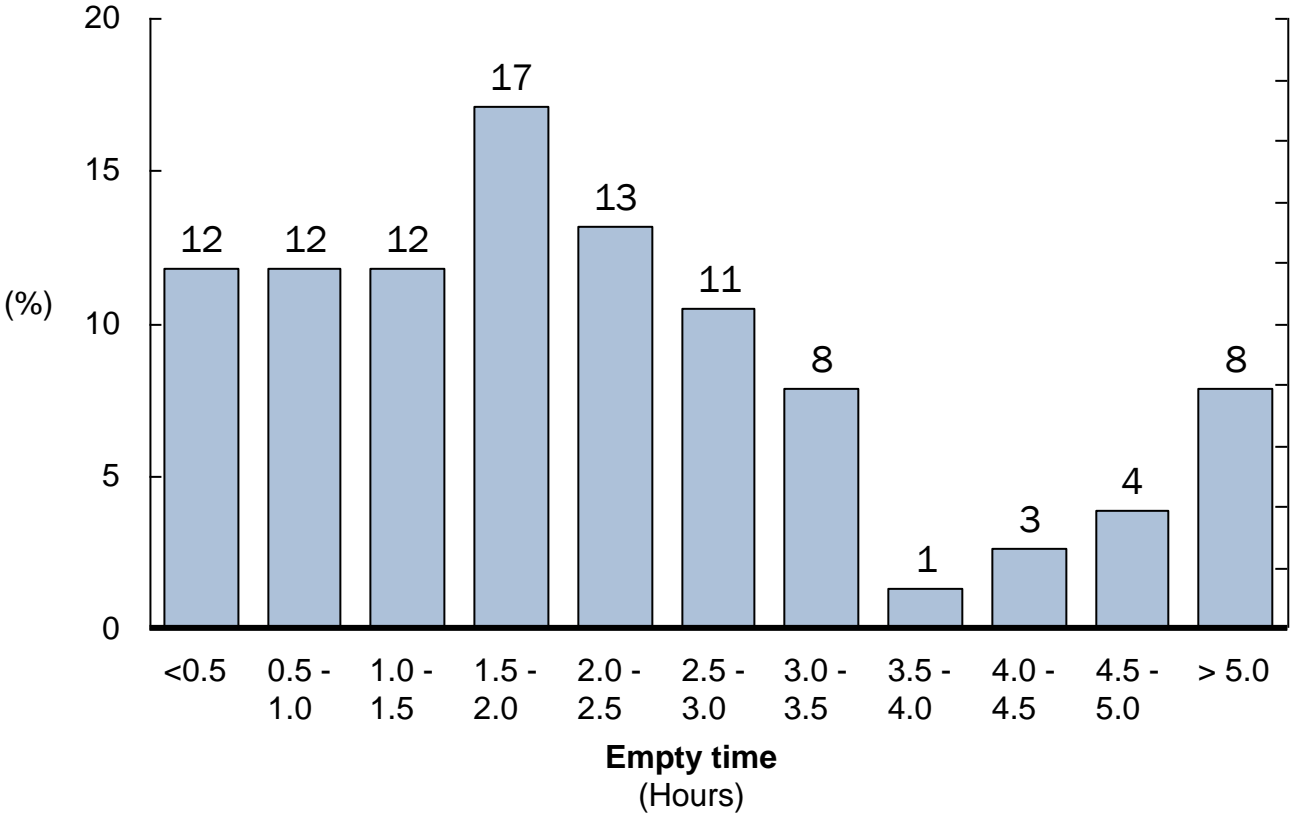
# Variability: Self-induced schedule variability in the conversion of ED patients delays patient care and disrupts other services



- Over 50% of patients arrive to the ED between noon and 5 p.m., yet are considered for discharge or consult in one batch
- Effectively converts a 24X7 ED into a 3 times per day ED
- Batching overwhelms other services with consults and discharges

# Variability: Current transfer process results in lost bed time and longer ED wait times for admitted patients

**Bed empty time on General Internal Medicine**  
Percent of beds by empty time

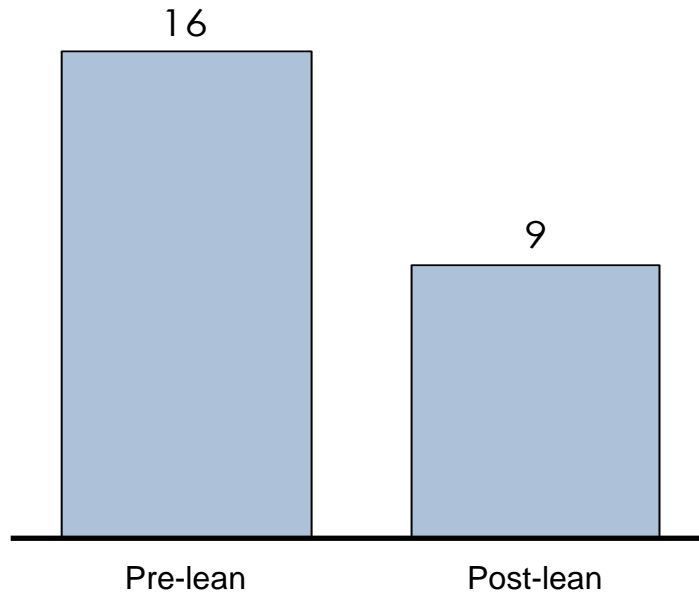


- **Bed empty time is composed of:**
  - *Bed empty to bed cLeaned*
  - *Bed cLeaned to bed filled*
- **Biggest impact will come from implementing prompts** to identify/move patients to empty beds as they are cLeaned

\* Empty time is defined as the time a patient was discharged from the bed until the time the next patient left the ED for that same bed  
 \*\* Sunday is longest with mid-week days (e.g., Wednesday, Thursday) being the shortest

# Redundancy: Non-safety enhancing paperwork increases nurses' workload by 40 minutes per admitted patient

**Nurses' admission paperwork**  
Number of pages



## Benefits of applying Lean:

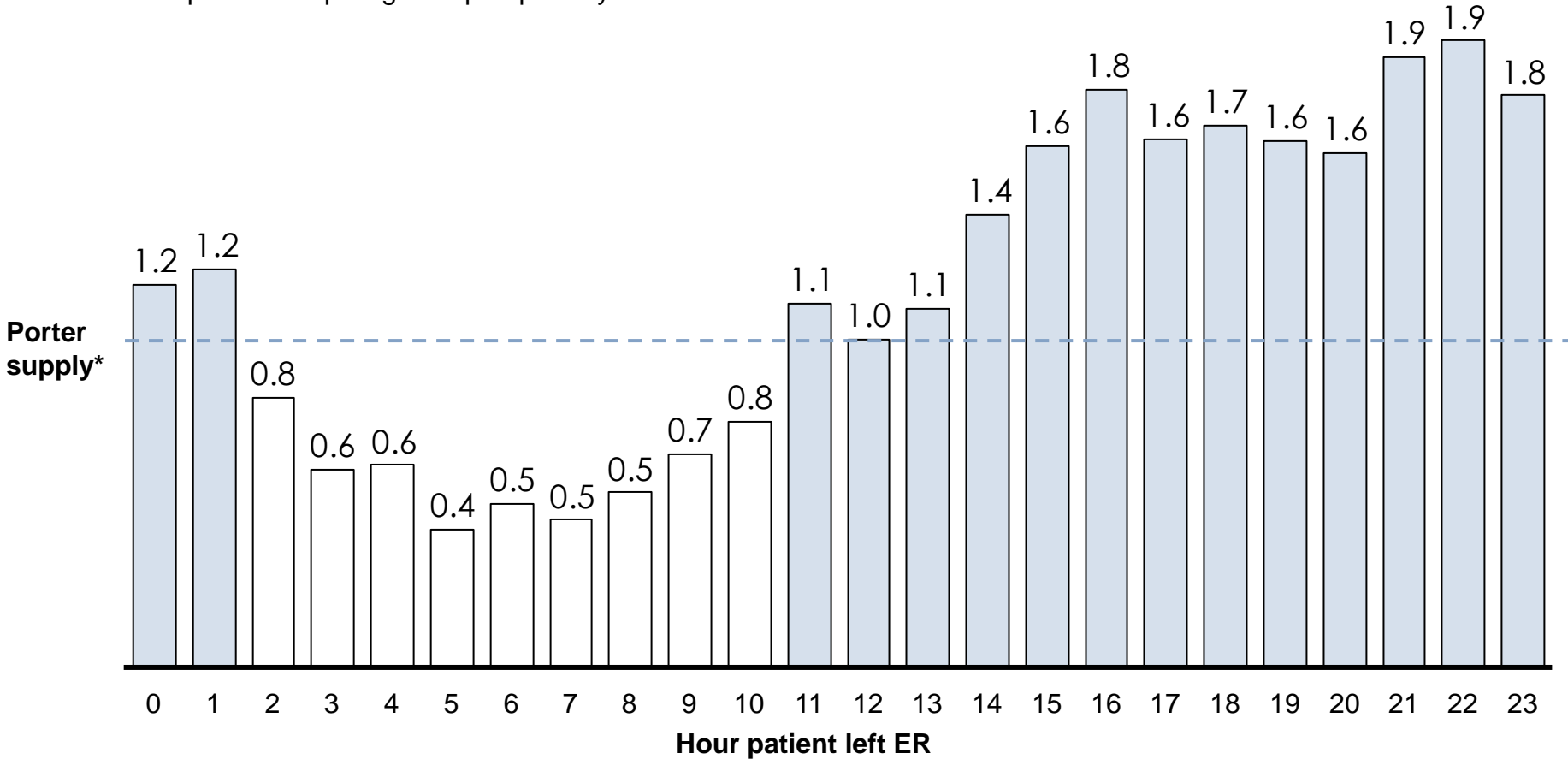
- Reduced time required to admit a patient (e.g, from 90 to 50 minutes)
- Reduced workplace frustration across the nursing staff
- Created time for nurses to spend with patients

**Next step:  
Lean the discharge  
paperwork**

# Inflexibility: Fixed porter staffing means demand outstrips supply 15 hours of the day

Demand

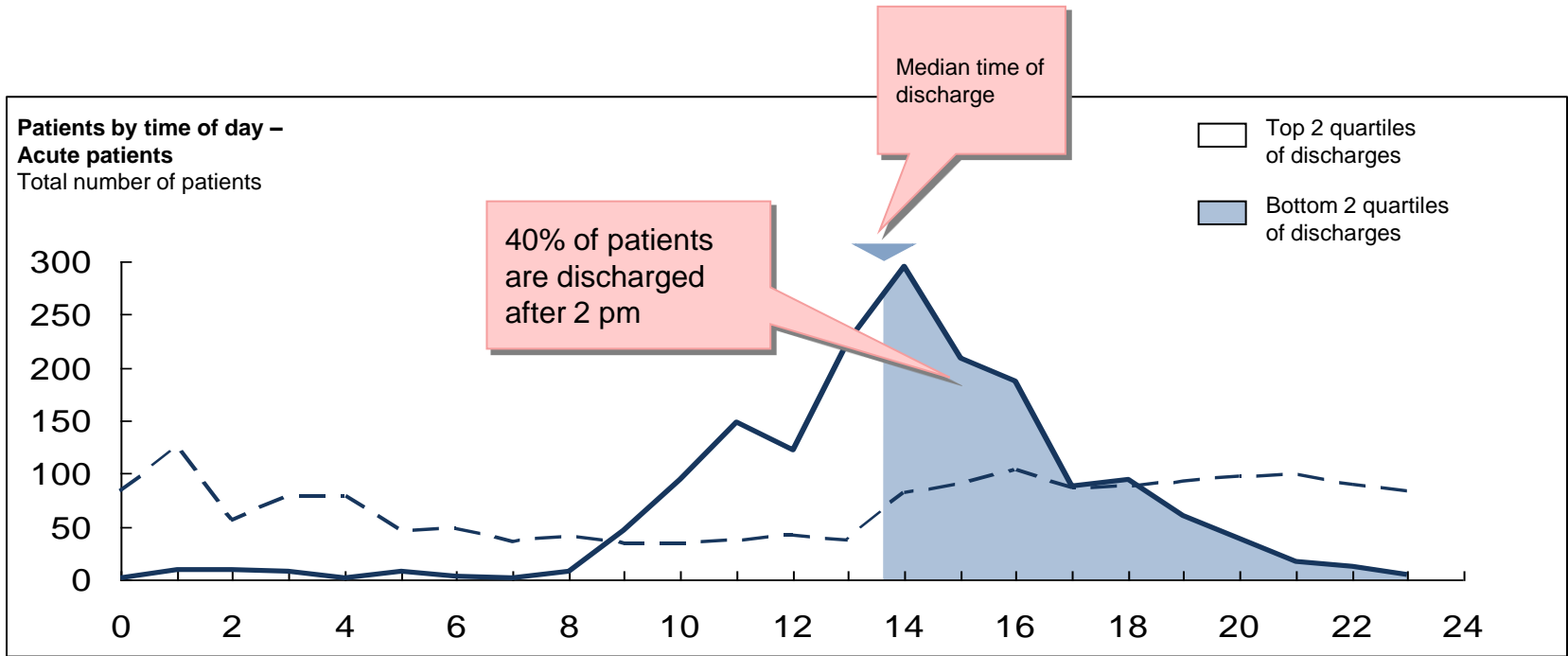
**Admissions to the ward from the ER by time of day**  
Number of patients requiring transport per day



\* Based on 2 ER porters transporting patients up to wards 25% of their time; assumes 30 minutes per transport  
Source: July 2005 to April 2006 data

# Inflexibility: Discharge planning process results in bottlenecks and reduced flow

— Discharges  
- - Admissions



# Lean includes frameworks not only for diagnosis but also treatment of waste

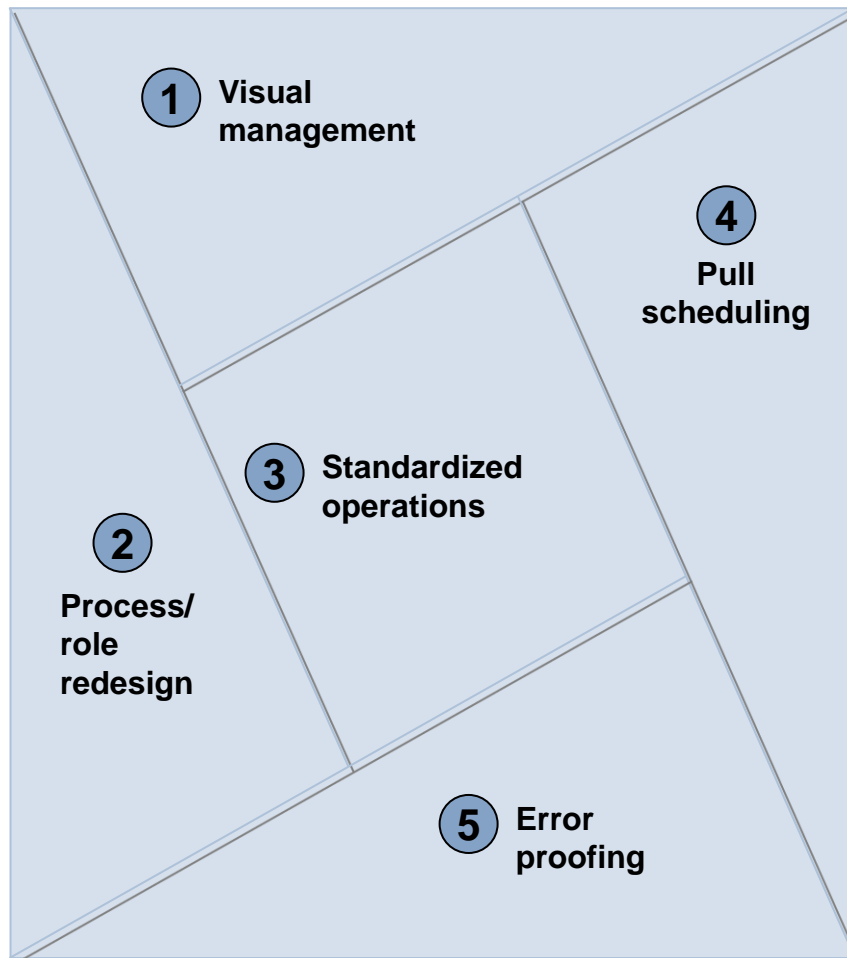
Now that we know the root causes of waste . . .

Variability

Redundancy

Inflexibility

. . . we can apply a set of Lean levers



# ① Major Lean tools: visual management in the emergency department

## Could this be CAP?

If so, consider treating with either:

Option 1:

Levaquin 500 mg iv qd

Option 2:

Rocephin 1 g iv qd + Zithromax 500 mg iv qd

Option 3 for life-threatening pneumonia:

Rocephin 2 g iv q12hours +  
Zithromax 500 mg iv qd +  
Vancomycin per pharmacy dosing

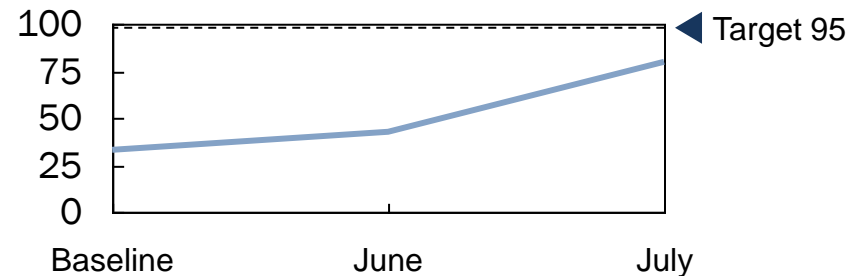
### Benefits:

- Raises awareness of community acquired pneumonia and importance of timely administration of antibiotics
- Empowers nurses to ask ED physicians to consider the diagnosis of CAP
- Standardizes pharmacotherapy selection to evidence-based regimens

### Results:

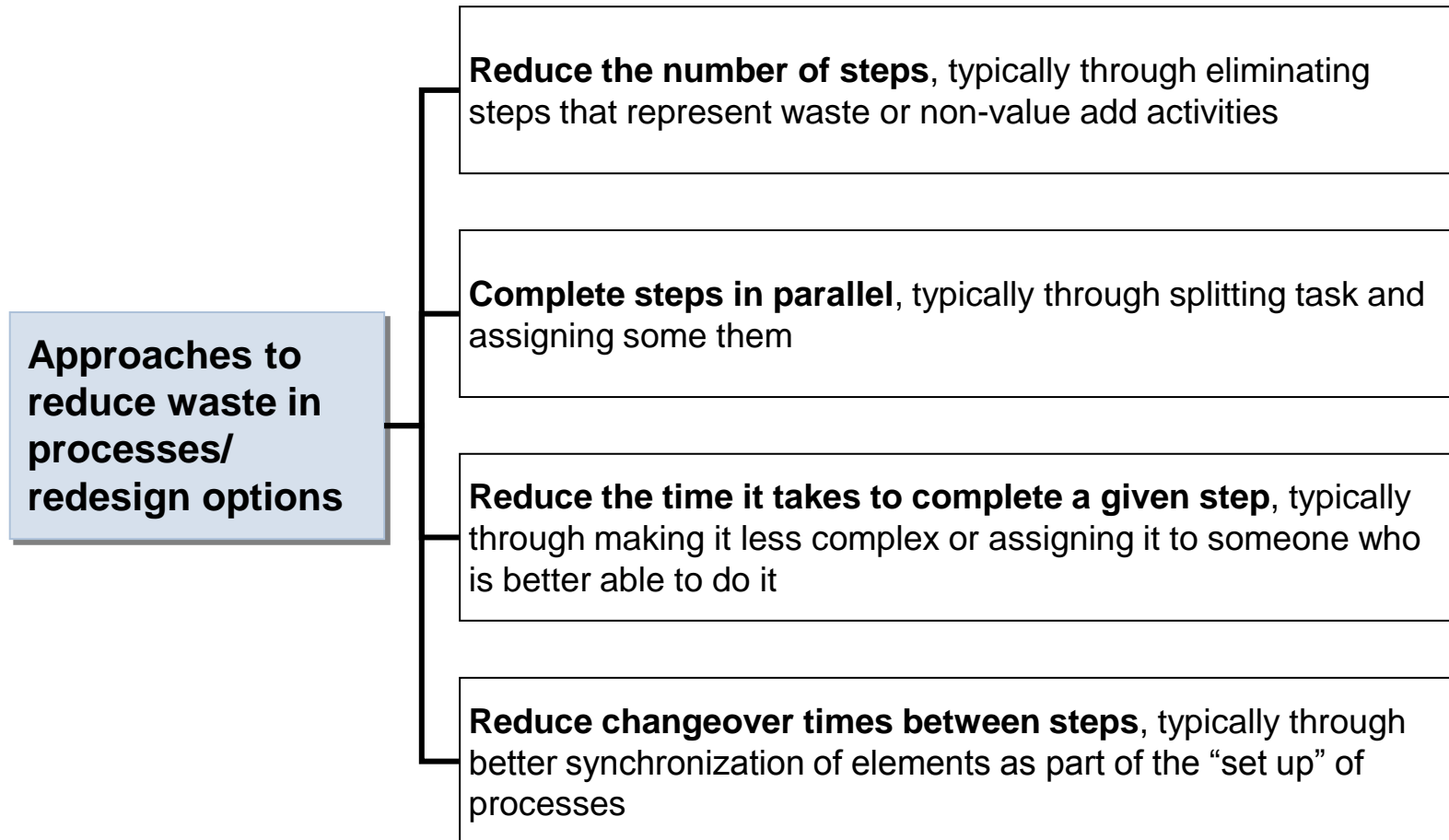
**CAP patients receiving IDSA approved antibiotics**

Percent



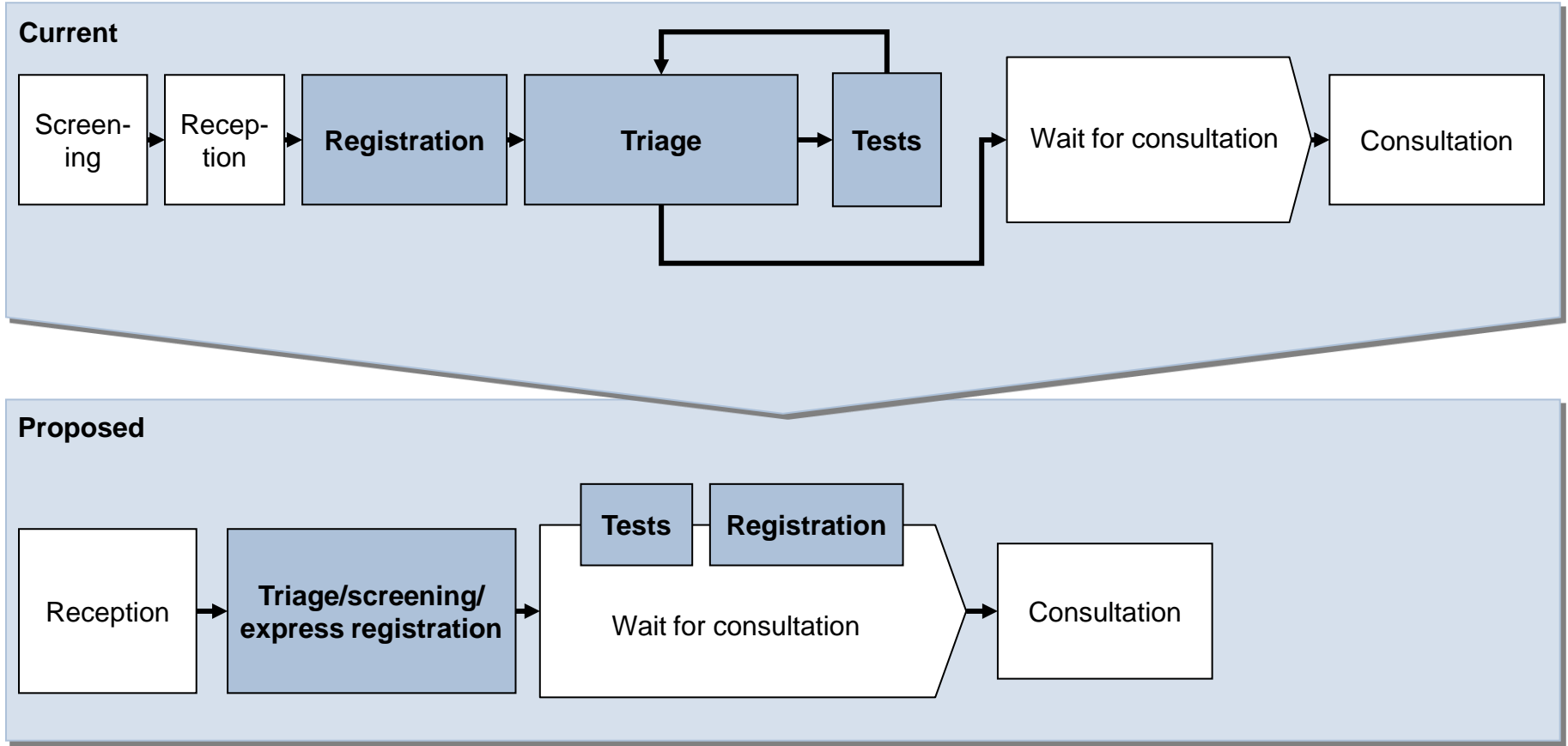
**Where can you use visual management in your department?**

## ② Redesigning processes includes 4 approaches to gain faster and more efficient throughput



# ② ED process redesign: shorten, combine, and move in parallel

## Value stream mapping



### ③ There are 3 methods for standardizing operations

#### A. Make timing constant

Takes the guessing and the waste out of “when” an event will occur



#### B. Make roles constant

Takes the guessing and the waste out of “who” will do what during an event



#### C. Make materials and information constant

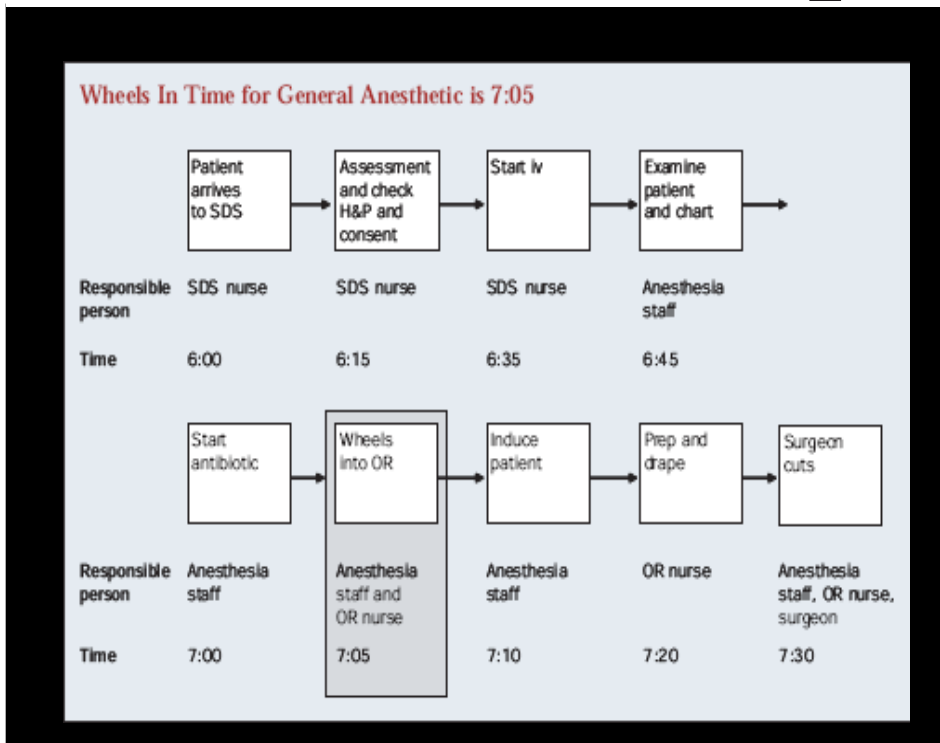
Takes the guessing and the waste out of materials and information needed to implement an event



### ③ Major Lean tools: standardize operations and process/role redesign in the operating room

## WHERE DO YOU FIT INTO MAKING A 7:30 INCISION TIME HAPPEN?

Area of interest

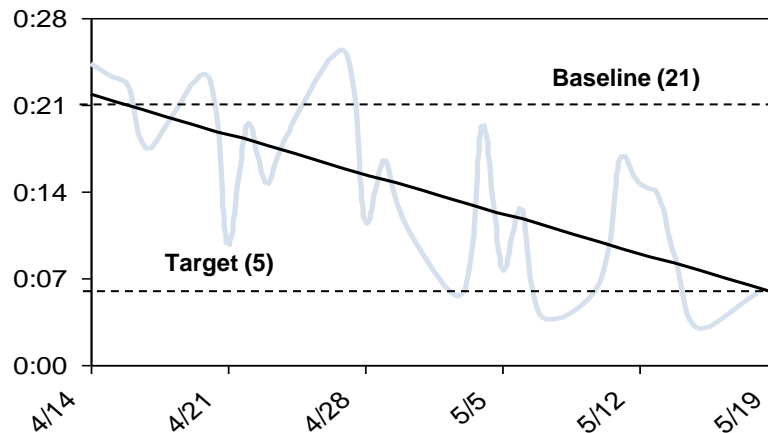


**Benefits:**

- Sets expectation of “start time = cut time”
- Choreographs each person’s role throughout the process
- Enables earlier recognition of delays and prompts corrective action

**Results:**

Average first case delay  
Minutes



**Where can you use visual management in your department?**

## ④ Pull scheduling helps reduces waste caused by waiting



### **Features of a traditional “push” system**

*(Patient from the ED is ready for a medicine bed)*

- Trigger for patient movement is completion of task, not available capacity in upstream area
- Morale suffers because nurses from the two area have differing interests
- System encourages hiding of GIM beds



### **Features of a “pull” system**

*(Medicine is ready for an ED patient)*

- Patients pulled to next area when capacity is available
- Trigger for patient movement is capability to serve patient
- Aligns interests and creates tighter linkages between the two areas

## ④ Hospital benefits of pull scheduling

1. Improved discipline and **control over patient flow**
2. **Smoother leveling of tasks** by managing input from controllable sources (e.g. scheduled cases) to avoid peaks and valleys
3. Potential **elimination of “crisis state”** when we need to find empty beds for patients “pushed” from ED or ICU
4. Closer **matching of nursing** and other capacity **to anticipated demand**
5. More consistent delivery of **higher service levels** (e.g. less wait time with lower variability)

## 5 “Error proofing” is a set of actions designed to promote quality in activities and outcomes

### “Error proofing” solutions:

### Why do adverse outcomes happen?

**Error prevention via task simplification**

- Tasks are difficult, creating a higher likelihood that something will not be done properly

**Error prevention via task standardization**

- Tasks have no guidelines or guides to promote correct actions in a consistent manner

**Error early detection via automated feedback**

- Tasks have no feedback mechanisms to alert the human user that an error is “in progress”

**Error mitigation via reduction of consequences**

- Tasks have no means of preventing an adverse outcome from an error

## ⑤ Error proofing designs

### Everyday example



#### Fueling area of car has 3 mistake-proofing devices:

- Filling pipe insert keeps larger, leaded-fuel nozzle from being inserted
- Gas cap tether does not allow the motorist to drive off without the cap
- Gas cap is fitted with ratchet to signal proper tightness and prevent over-tightening

### Medical example



#### Needle-injury prevention:

- The needle is withdrawn into the barrel of the syringe upon retraction of the plunger
- The sharp container is a 1-way container with locking cap

