MAYO CLINIC
Mayo Medical Laboratories

Continuous Process Improvement

Using Systems Engineering to Improve Laboratory Operations

Presenter: Mohammed Mustapha

Tackling Phlebotomy's Toughest Challenges:

How Mayo Clinic Balanced Phlebotomy Workload and Reduced Patient Wait time

Case Study :

Reducing patient wait time

phlebotomy lab

6σ define

Laboratory Background

- Size:
  - Largest of 3 phlebotomy lab service areas
- Services:
  - Blood and urine collection
- Workload:
  - Busiest days of the week (Monday – Wednesday)
  - 1000 -1200 patients on busy days
  - 75% of workload between 6 and 10 am

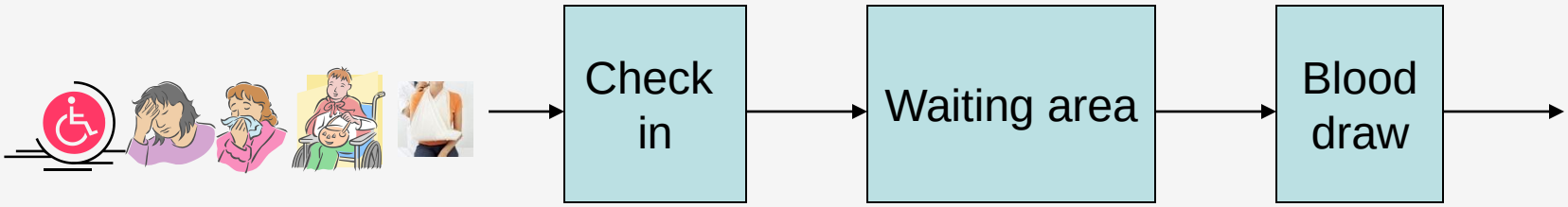
Business Case

- Problems:
  - Patients presenting to the phlebotomy lab on Monday mornings between 6:00 and 10:00 am spend significant amount of time waiting.
  - 53% of patients wait more than 15 minutes
  - More patients arriving early in the morning
- Goal:
  - Less than 20% of patients wait more than 15 min.

Understand the Process

Follow and observe the patient experience

- Time the processes (value and non value added activities)
- Identify bottlenecks and wastes in the processes



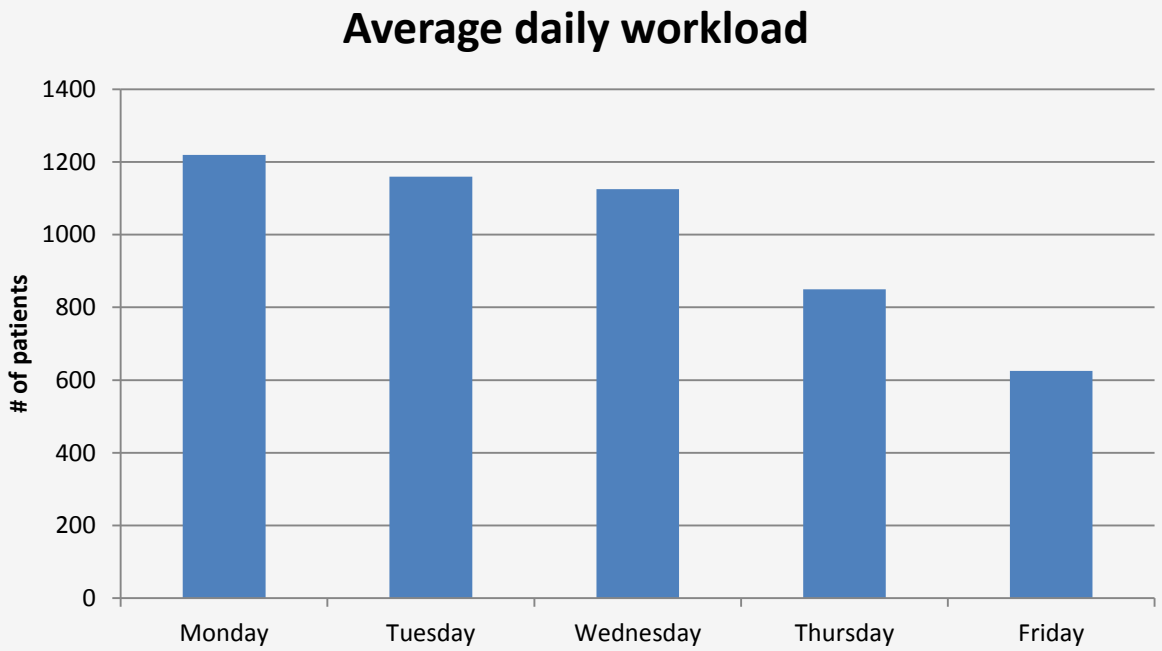
Process map

Data Collection

- Queue time (time spent waiting to check in)
- Check-in time (time to complete checking in a patient)
- Wait time (time spent waiting for blood draw)
- Process time (time to complete a blood draw)
- Number of patients per hour
- Patient arrival times

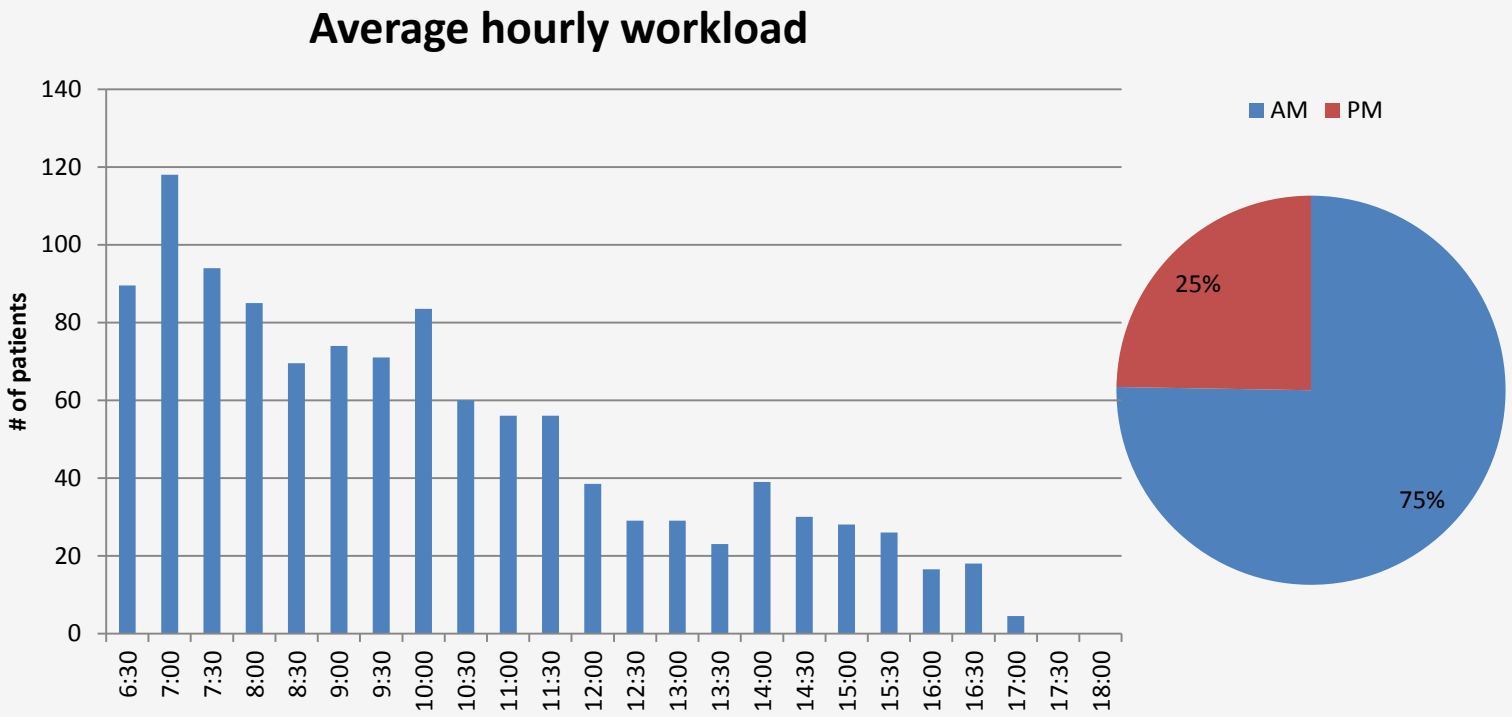
6σ measure

Workload Distribution (M-F)

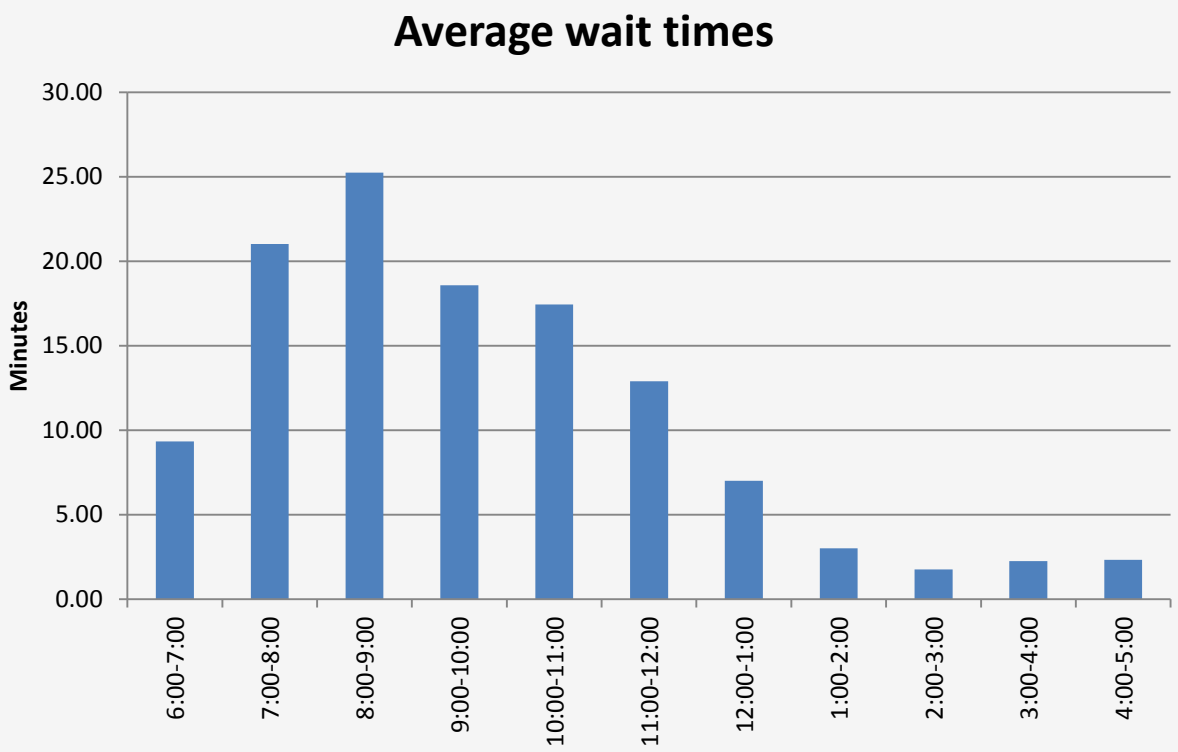


6σ measure

Patient Arrival by Half Hour



Wait time (baseline)

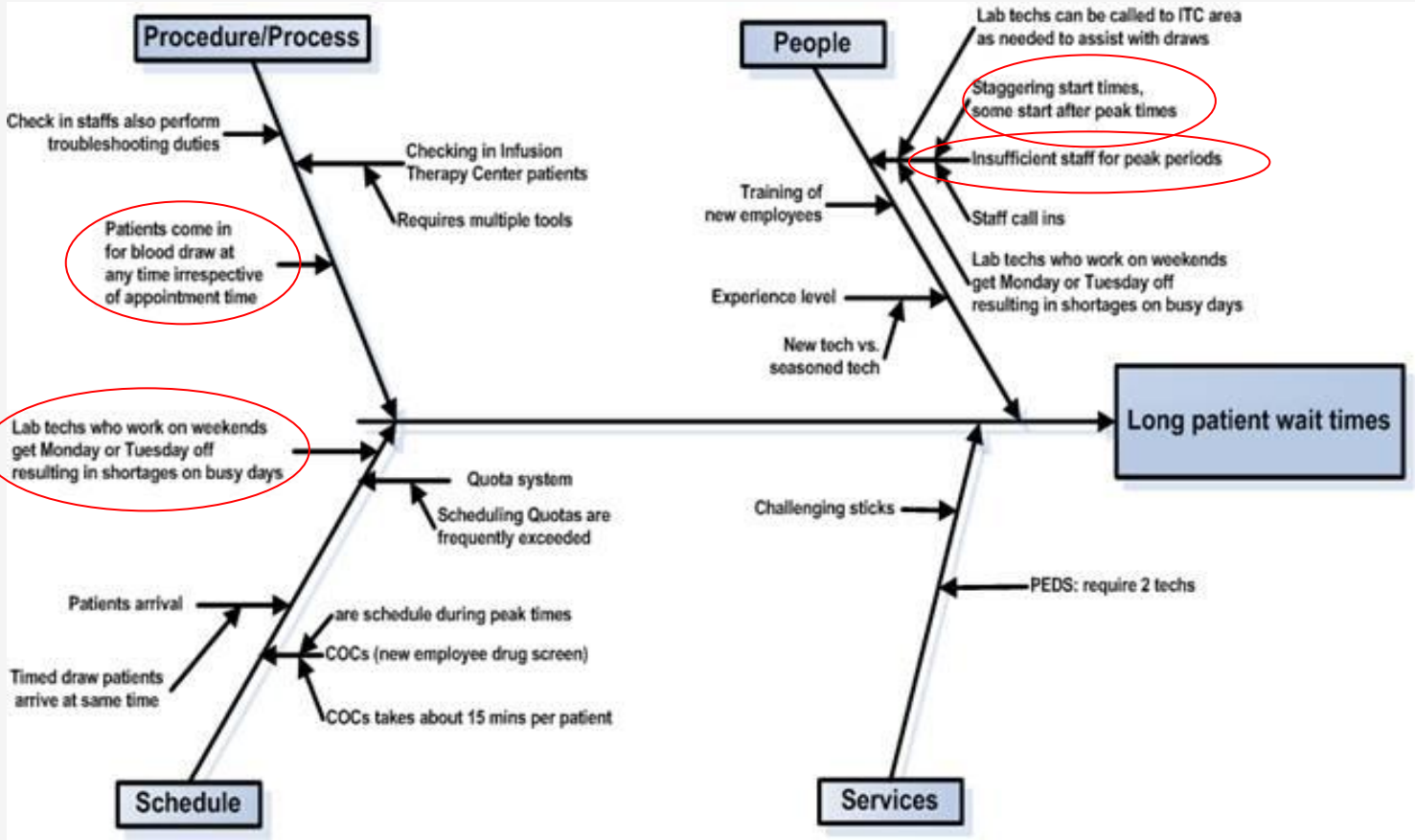


6σ analyze

Factors contributing to long wait times

- Patient arrival pattern
- Service types
- Staffing
- Capacity
- Separate check-in desks
- Patients joining the wrong line

Determine Root Causes of Problem



Improper staffing to workload was a major contributor to long wait times.

Implemented solutions

- Workflow redesign
- Staffing to workload

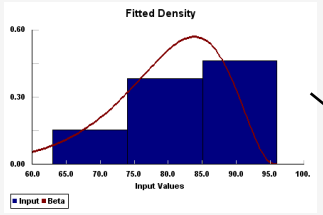
Improvement #1

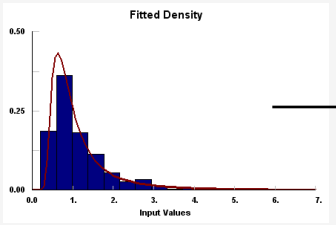
Workflow redesign

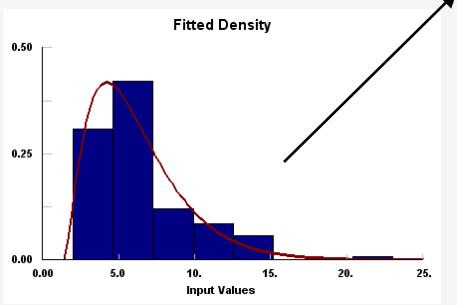
Redesign Goals

- Efficient use of space
- Reduce waste
  - transportation
    - ✓ minimize walking distances
    - ✓ minimize unnecessary movement by staff
  - waiting
    - ✓ reduce work in progress
    - ✓ reduce inventory
- Improve workflow throughout the lab
- Improve visual management
- Maximize overall operational efficiency

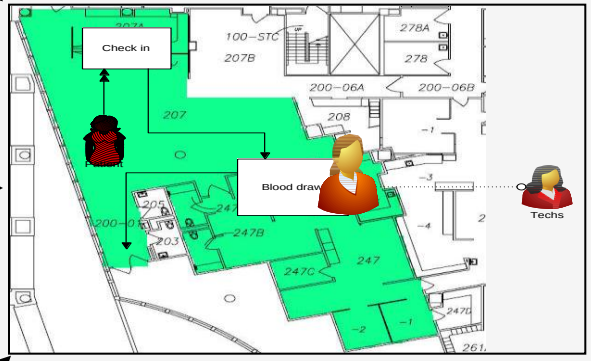
Simulation



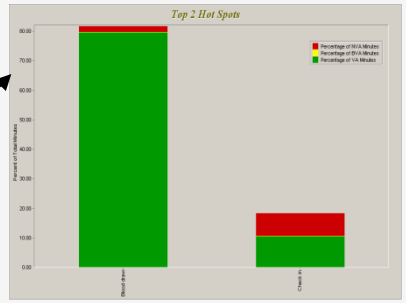


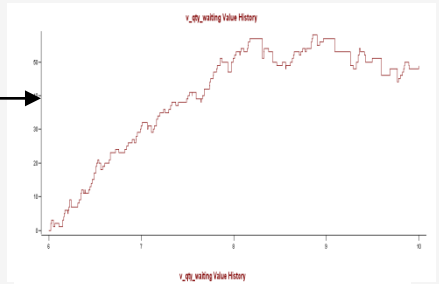


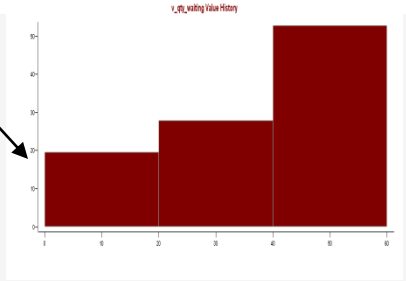
Input



Process





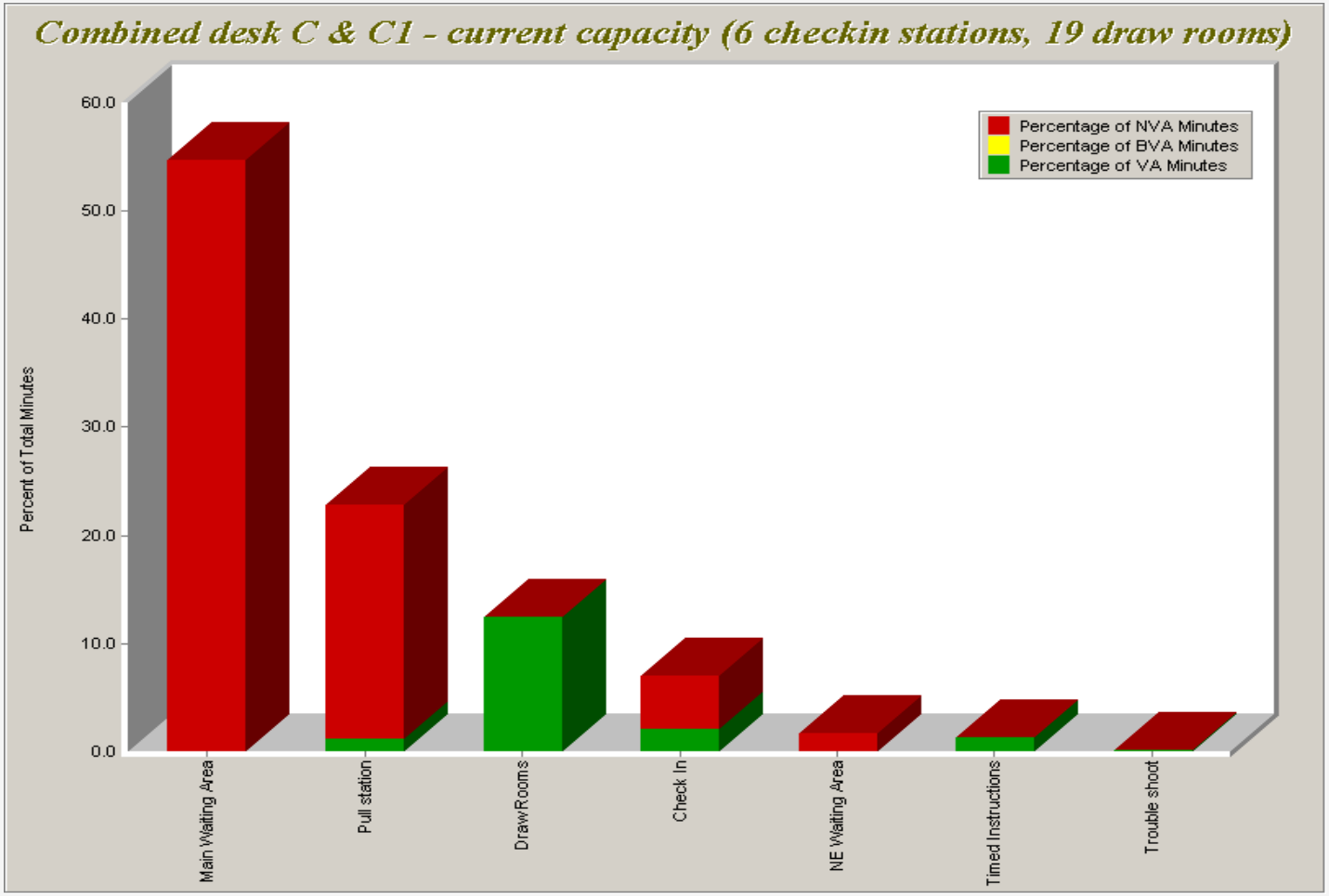


Output

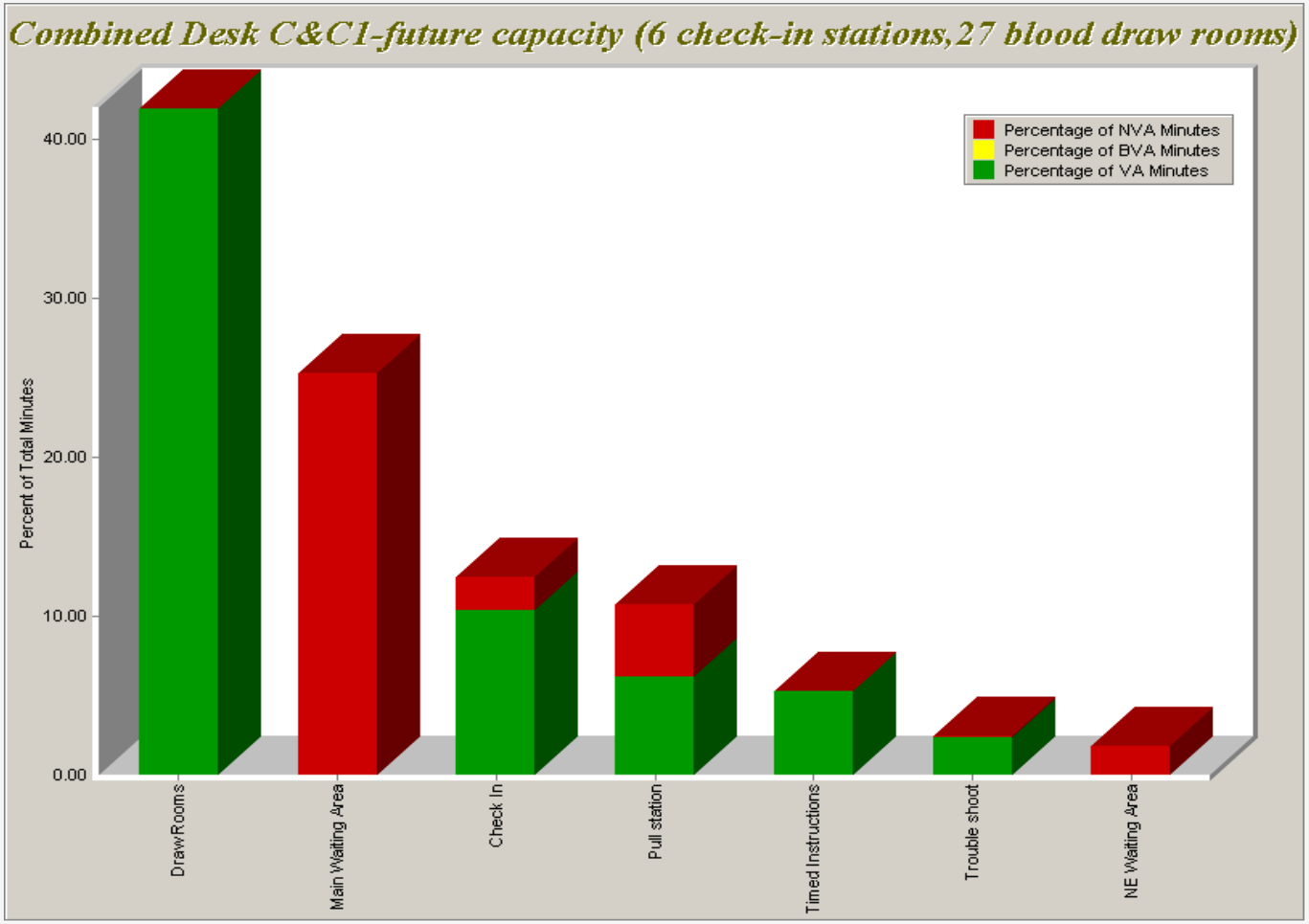
Simulation Goals

- Improve workflow
  - Patient flow
  - Specimen flow
- Reduce patient wait time
  - Check-in line
  - Waiting area

Results: current state



Results: future state



Improvement #2

Staffing to workload

6σ define

Why Staffing to Workload?

- Respond to changes in demand
  - Patients arriving early in the mornings
- Patient satisfaction
  - Reduce patient wait time
- Respond to staff complaints (fatigue)
  - Reduce staff burn out
- Staff resource planning
  - Capacity planning tool
- Needs of the patient come first
  - Achieving Mayo's mission

6σ define

How to get started

- Collect and Analyze data
  - Patient volume (daily, hourly)
  - Processing times
  - Wait times
  - # of scheduled staff
- Share findings
- Develop solution options
- Ask for feedback to optimize solution

Findings

- Insufficient staff to meet early morning peak demand (6:00 – 10:00 am)
- Patients are waiting longer
- Overcrowding in the lobby

Improvements

- Proactive
  - Adjust staff to match expected workload based on capacity analysis
- Reactive
  - Manage staff based on need
  - Float staff by sending or asking for help from other work units
  - Offer same day vacations

6σ control

Maintaining the Gains

- Tracking mechanisms
  - Continue to monitor patient volumes per hour/day
  - Continue to monitor patient waiting times
- Compare patient volumes to staffing
  - “Tweak” schedule
  - Adjust float assignments, breaks, lunches
- Monitor the workload - more than once daily

Challenges / Lessons Learned

- Floating staff to other outpatient areas
  - Provide cross functional training
  - Ensure room availability

- Balancing daily staff to workload
  - Over staffing
    - Too much down time
  - Under staffing
    - Insufficient staff to deal with sudden increase in patient load

Implemented solutions

- Rearranged staff schedule to match workload at peak hours
- Float staff to areas that need help
- Introduced dedicated staff to deal with check in issues

6σ control

Future Plans

- Monitor patient wait times
- Respond quickly to issues
- Continue to improve processes

Questions ?