

Improving Patient Wait Times for Oncology

Team 29 VA Process

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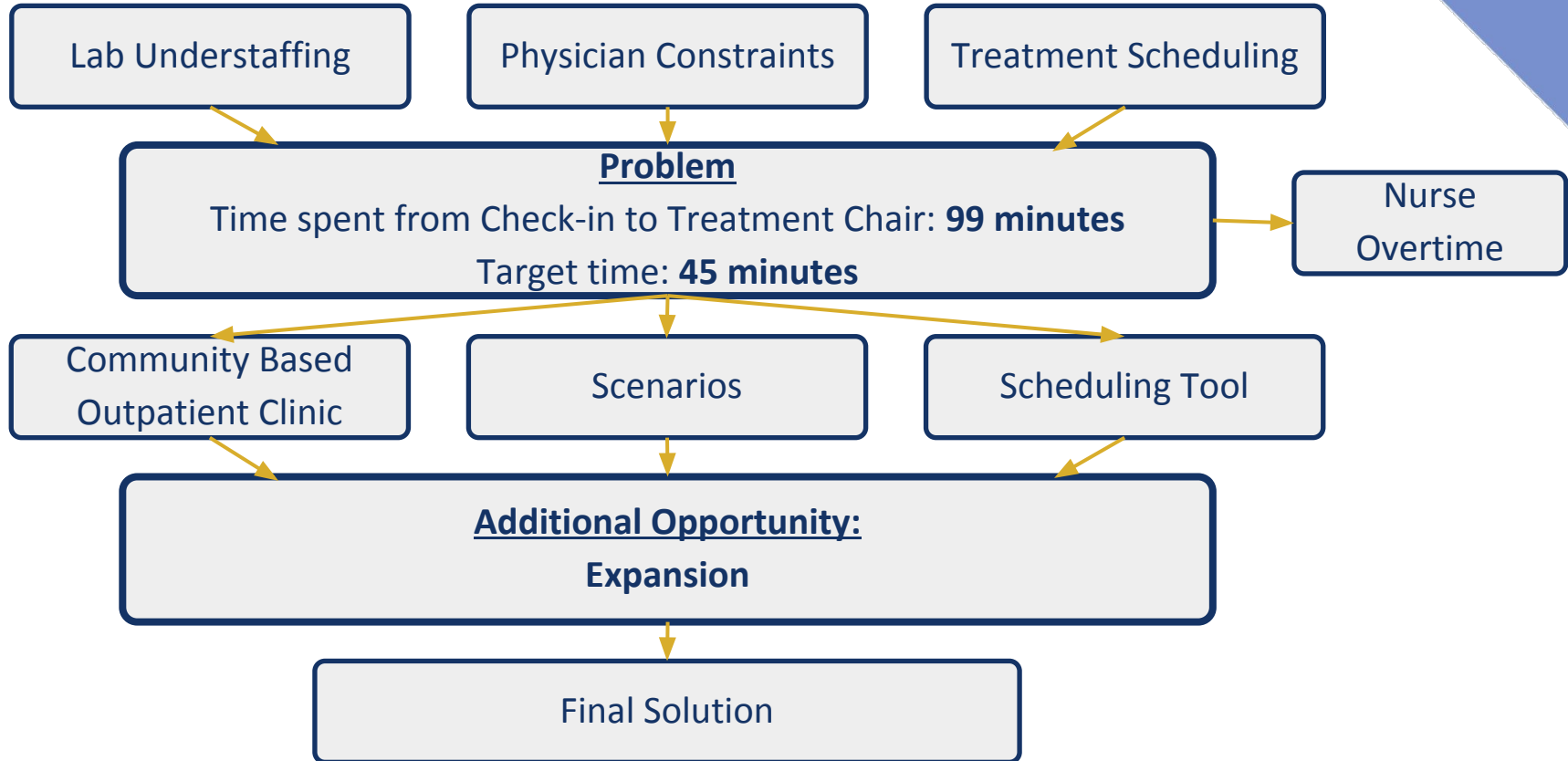
Defining
EXCELLENCE
in the 21st Century

Atlanta VA Medical Center

April 10th, 2017

**Disclaimer:* This project has been created as a part of a student design project at the Georgia Institute of Technology.

Executive Summary



Client Background

Veterans Affairs Medical Center (VAMC)

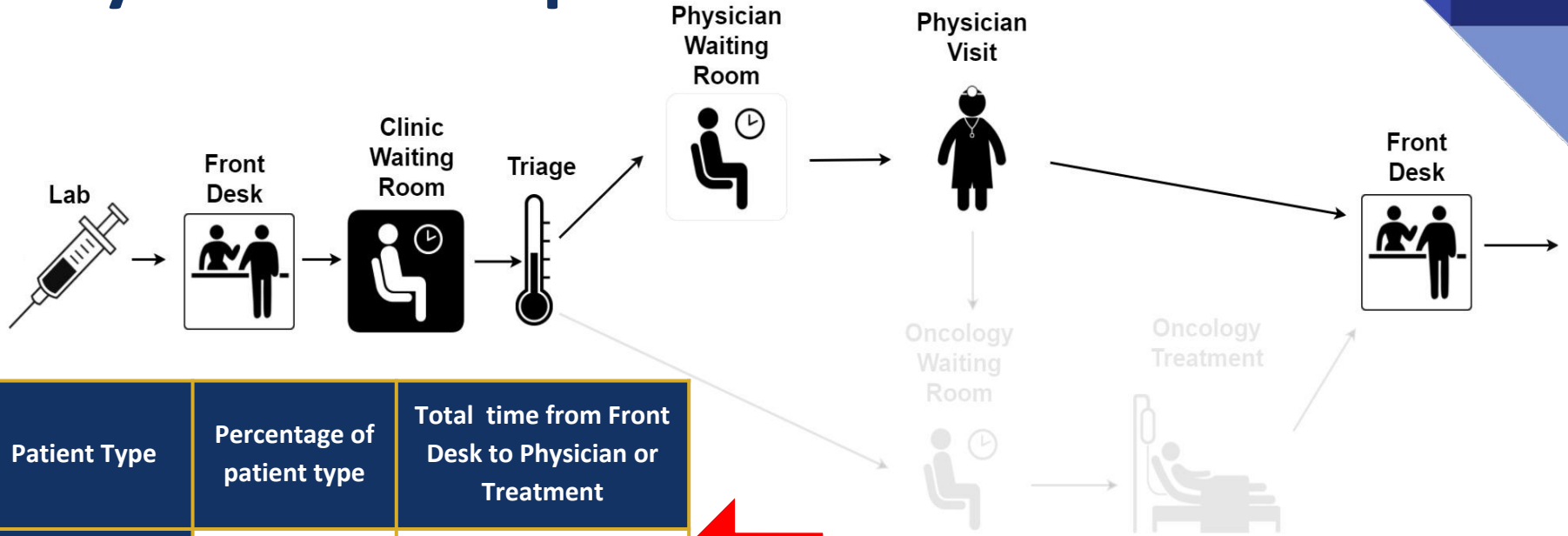
- Provides health care services to veterans
- From general check-ups to surgeries
- More than 130,000 enrolled Veterans



The Oncology Department

- 40 - 60 patients per day
- Recurring appointments
- 35 types of treatment
- Treatment duration range varies
- Oncology Treatment Center resources:
 - 6-7 nurses
 - 15 Chairs & 3 Beds

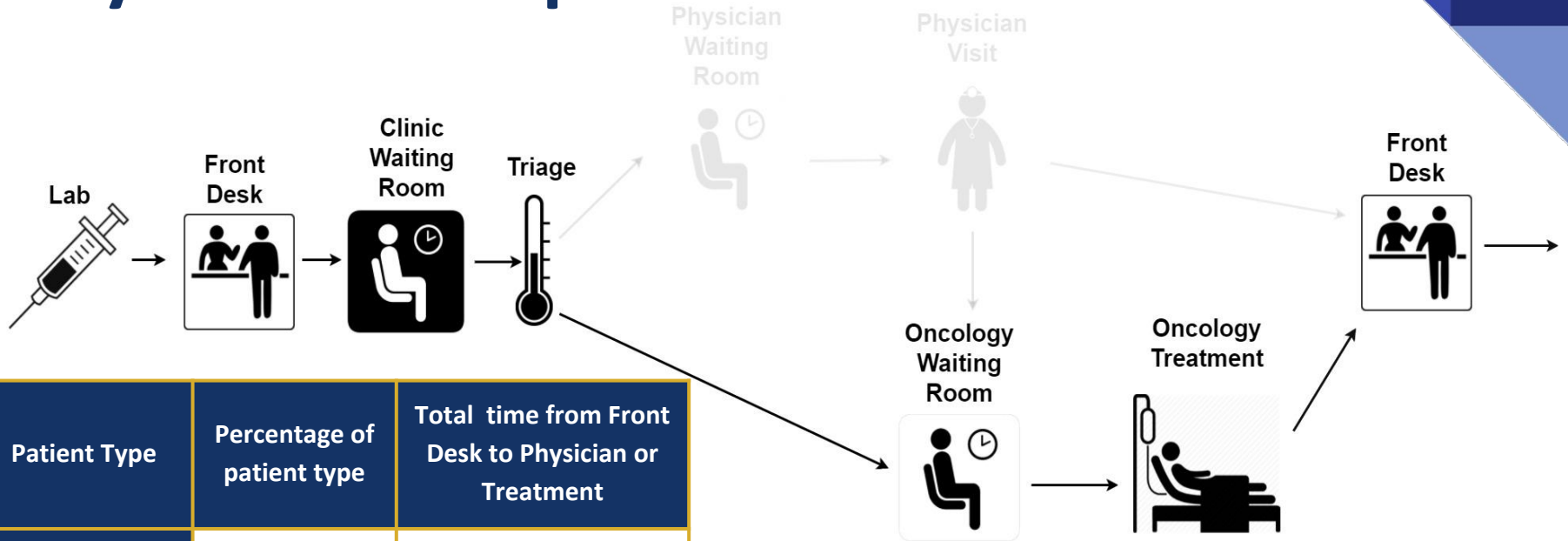
System Description



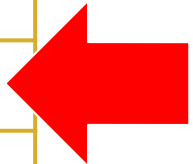
Patient Type	Percentage of patient type	Total time from Front Desk to Physician or Treatment
Physician Only	26%	70 minutes
Treatment Only	52%	99 minutes
Both	22%	146 minutes

*See Appendix Pages 22 for distributions.

System Description



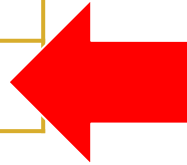
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Problem

Treatment Center

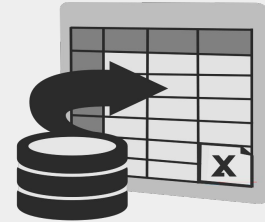
- Reduce time spent from Front Desk to Treatment to target time:
 - Treatment only: 45 minutes
 - Physician and treatment: 1 hour and 15 minutes

Expansion

- Best usage of space
 - Number of beds vs chairs

Methodology

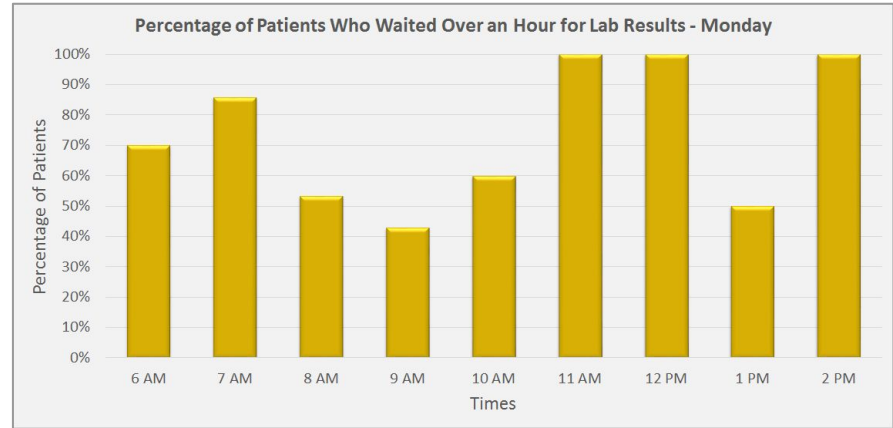
- Data Collection:
 - VistA (Veterans Information System and Technology Architecture)
 - CPRS (Computerized Patient Record System)
 - Time study observations
 - Nurse assignment sheet
- Scenario testing using validated simulation model



Problem - Lab

Long Wait Times

- Time until lab results released
 - Average time: **1 hour and 23 minutes**
 - Standard Deviation: **36 minutes**
- Wait time for lab check-in
 - Average time: **40 minutes**
 - Standard Deviation: **10 minutes**
- Over **60%** of oncology patients delayed

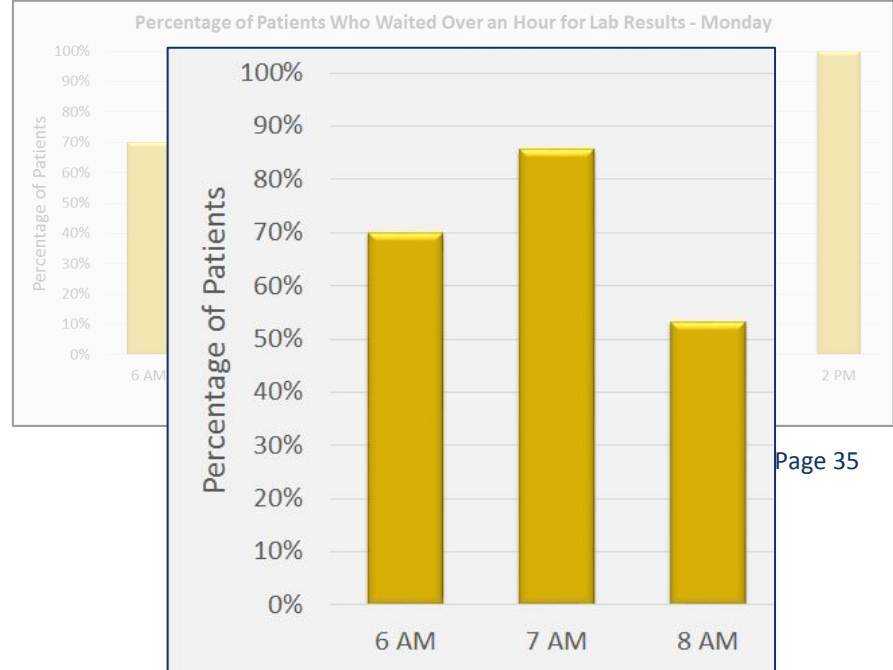


*For breakdown by day, see Appendix Page 35

Problem - Lab

Long Wait Times

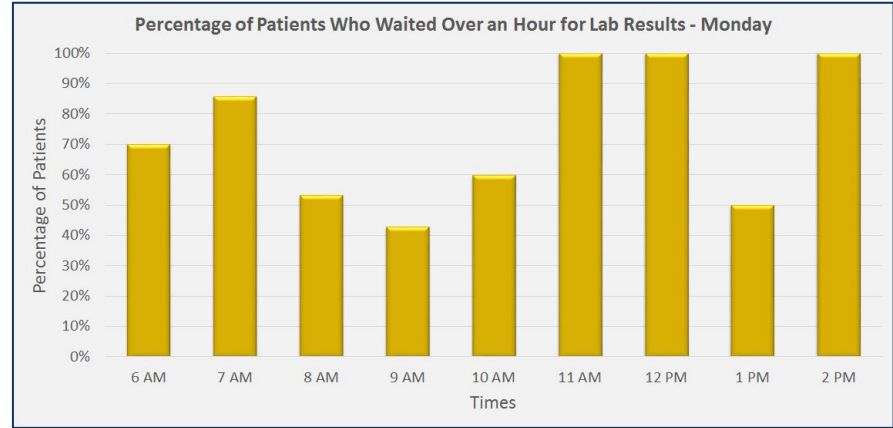
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- Over **60%** of oncology patients delayed



*For breakdown by day, see Appendix Page 35

Solutions

- CBOC: Community Based Outpatient Clinics
 - Lab work, non-specialized treatment
 - 13 locations feed to Atlanta VAMC
- Up to 80 % of patients can go to CBOC
- Hire more phlebotomists due to long wait times and process times

Problem - Physician Constraints

Current State

- No full time physician for Oncology
- Room availability issue
- Each physician has different appointment lengths
 - From 15 minutes to 1 hour

Current Process

- Assigning treatment time and type
- Unable to see oncology schedule
- Great variability in number of patients into treatment center on a daily basis

Appointment Duration	Monday	Tuesday	Wednesday	Thursday	Friday
15 min	21	18	16	9	9
30 min	4	4	4	4	26
45 min	7	9	9		
60 min			4		
Total	32	43	33	13	35

Physician appointment availability

Solutions

- Better visibility of treatment grid
- Balancing oncology appointments with physician visits

Problem - Treatment

Scheduling

- Treatment Scheduling Procedure
 - Appointments scheduled between 7:30 am - 3:00 pm
 - Physicians request appointment
 - Schedulers place appointment
 - Overbooking Policy
- Current Scheduling Grid

Solutions

- Provide Excel tool to help schedule patients
- Change from 1 grid to 6 grids
- Nurses will do return to clinic orders
- Create better communication with nurses and physicians

Vista Grid

TIME DATE	7	8	9	10	11	12			
FR 14	(3)	[C]	[C]	[D]	[J]	[F]	[J]	[G]	[I]
MO 17	[]	[0]	[C]	[A]	(0)	[B]	[E]	[E]	[C]
TU 18	[]	[B]	[0]	[D]	[D]	[D]	[D]	[F]	[D]
WE 19	[]	[B]	[C]	[F]	[A]	[A]	[C]	[0]	[D]
TH 20	[]	[A]	[B]	[A]	[B]	[B]	[A]	[0]	[1]

3 Patients Scheduled

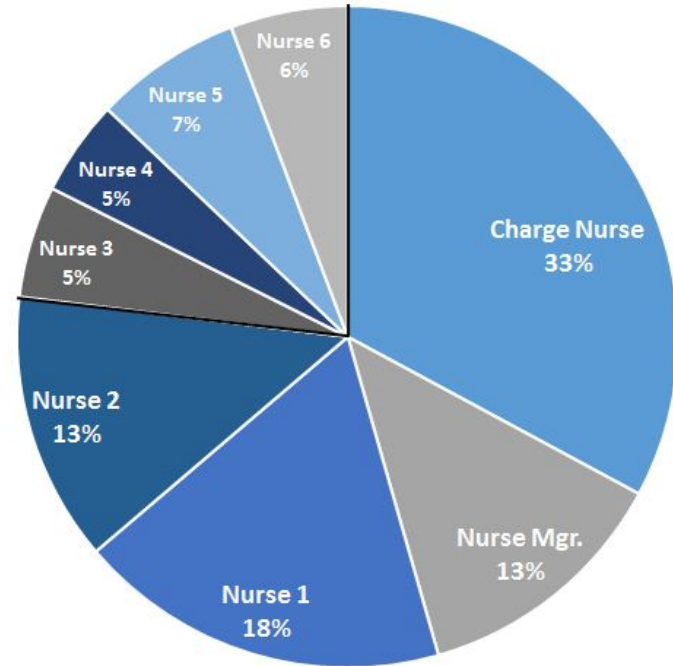
No One Scheduled

10 Patients "Overbooked"

Problem - Nurse Overtime

Nurse Overtime

- Charge nurse comes in early to assign patient and handles late patients
- Analysis:
 - Total of 1830 hours of overtime
 - 4 nurses worked 77% of total overtime hours

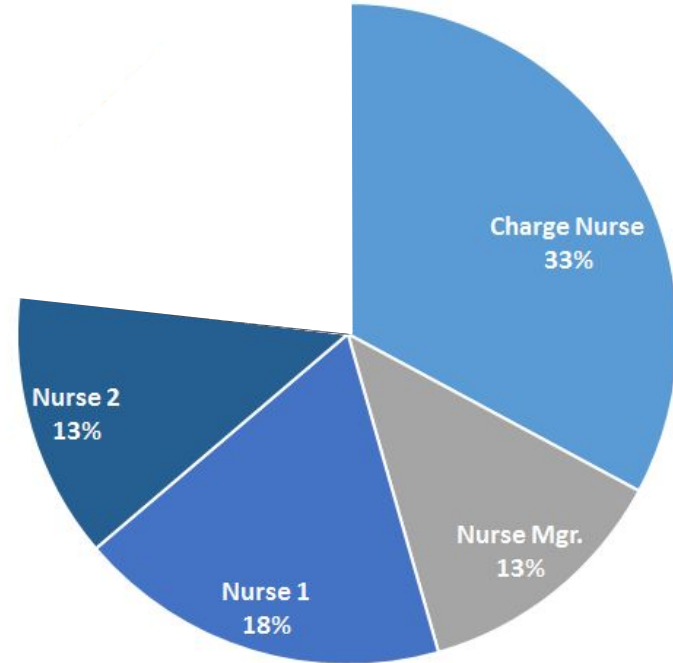


*For cost comparison, see Appendix Page 49

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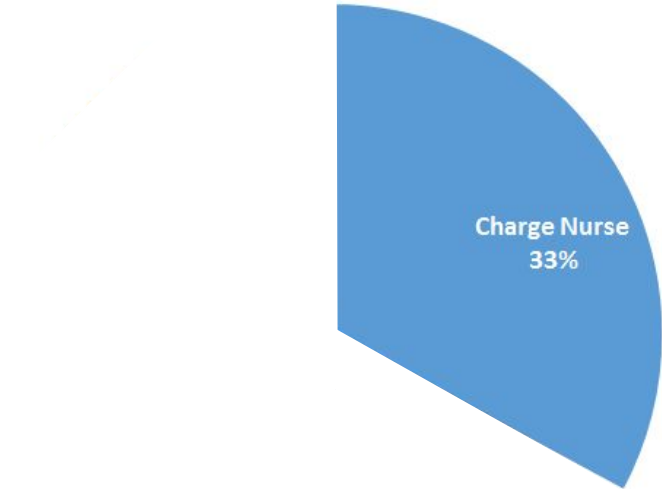


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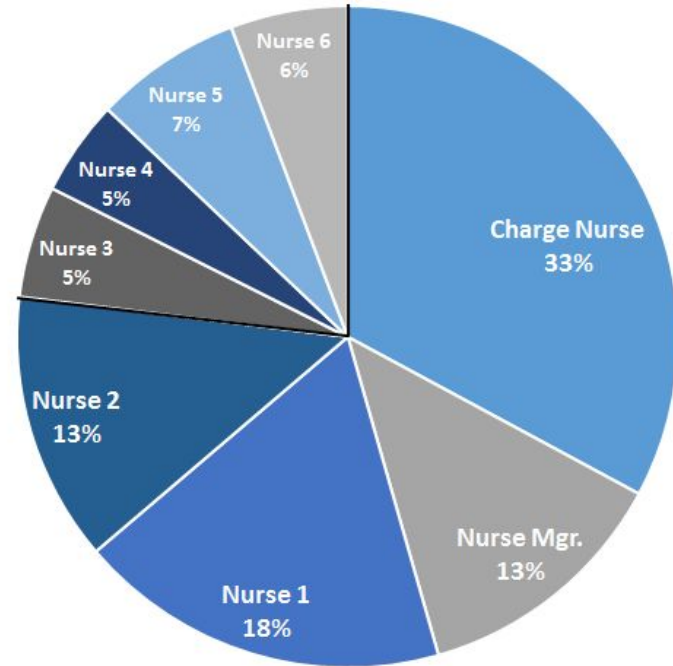
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Solutions

- Due to hiring freeze:
 - Re-allocating available treatment nurses to assist
 - Scheduling Scenarios/Tool



*For cost comparison, see Appendix Page 49

Deliverables

Treatment Center

- Scheduling guidelines
- CBOC percentage
- New VistA grid design
- Scheduling tool and documentation

&

Expansion

- Scheduling guidelines
- CBOC percentage
- Layout within the federal guidelines

Simulation - Validation

Inputs

- Patient arrivals
- Resources for each process
- Process times

Outputs

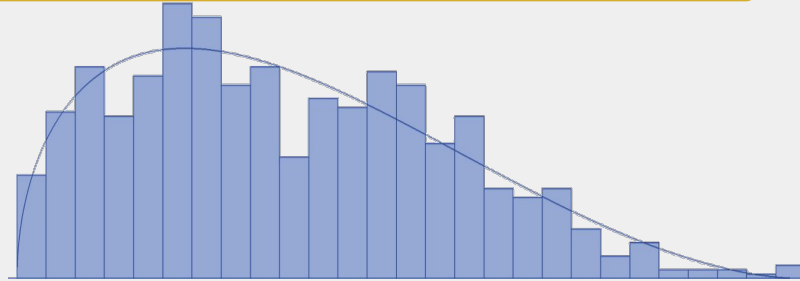
- Time in the system
- Waiting times

Front Desk to out of Oncology Treatment Center

Beta Distribution

Mean: 234 mins

SD: 129 mins

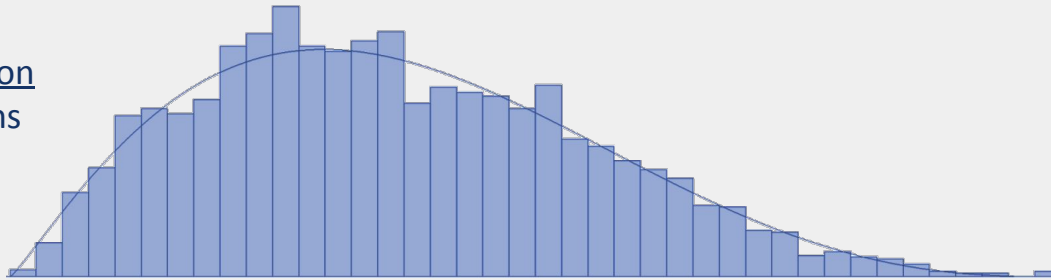


Simulation Output

Beta Distribution

Mean: 232 mins

SD: 97 mins



Kolmogorov-Smirnov Test:

Test Statistic: 0.0223

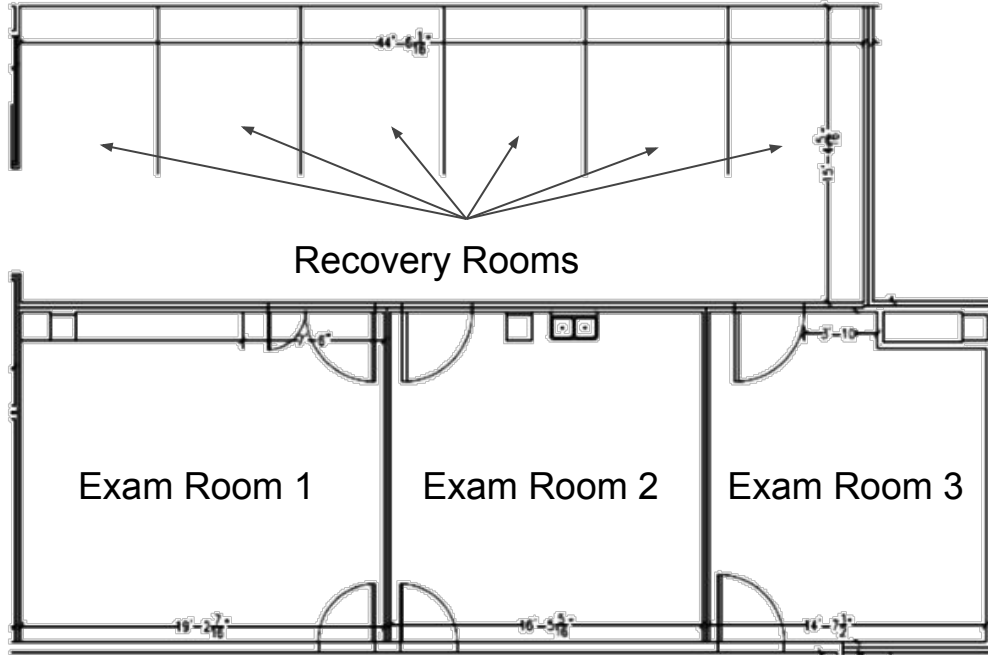
Failed to reject Null Hypothesis

Anderson-Darling Test:

Test Statistic: 0.36276

Failed to reject Null Hypothesis

*Refer to appendix pages 25-28 for all other days and appendix page 34-35 for simulation inputs and distributions



Simulation - Treatment Scenario

8 AM	9AM	10AM	11AM	12PM	1PM	2PM	3PM	4PM	5PM
------	-----	------	------	------	-----	-----	-----	-----	-----

Short (3 - 22 minutes)

Short

Short Medium (22 - 85 minutes)

Medium (85 - 130 minutes)

Medium Long (130 - 205 minutes)

Long (More than 205 minutes)

Best treatment scheduling scenario from simulation

Scheduling Tool

	7:30 AM - 8:00 AM	8:00 AM - 8:30AM	8:30 AM - 9:00 AM	9:00 AM - 9:30 AM	9:30 AM - 10:00 AM	10:00 AM - 10:30 AM	10:30 AM - 11:00 AM	11:00 AM - 11:30 AM	11:30 AM - 12:00 AM	12:00 PM - 12:30 AM	12:30 PM - 1:00 PM	1:00 PM - 1:30 PM	1:30 PM - 2:00 PM	2:00 PM - 2:30 PM	2:30 PM - 3:00 PM	3:00 PM - 3:30PM
Chair 1																
Chair 2																
Chair 3																
Chair 4																
Chair 5																
Chair 6																
Chair 7																
Chair 8																
Chair 9																
Chair 10																
Chair 11																
Chair 12																
Chair 13																
Chair 14																
Chair 15																
Bed 1																
Bed 2																
Bed 3																
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Times	7:30:00 AM	Schedule Patient	Delete Entire Grid
Duration	30 minutes		
Bed or Chair	Chair 2		

Undo	Delete Specific Appointment
------	-----------------------------

Key	
Button Type	Defintion
Schedule Patient	Schedule a patient into the grid by selecting Times, Duration, and Bed Or Chair from the drop down list located in F23, F24, F25
Undo	Delete the most recent patient scheduled into the grid
Delete Entire Grid	Delete the entire grid of scheduled patients
Delete Specific Appointment	Delete a specific appointment from the grid by selecting Times, Duration, and Bed Or Chair from the drop down list located in F23, F24, F25

Scheduling Tool

	7:30 AM - 8:00 AM	8:00 AM - 8:30AM	8:30 AM - 9:00 AM	9:00 AM - 9:30 AM	2:30 PM - 2:30 PM	3:00 PM - 3:00 PM	3:00 PM - 3:30PM
Chair 1							
Chair 2							
Chair 3							
Chair 4							
Chair 5							
Chair 6							
Chair 7							
Chair 8							
Chair 9							
Chair 10							
Chair 11							
Chair 12							
Chair 13							
Chair 14							
Chair 15							
Bed 1							
Bed 2							
Bed 3							
Total	0	0	0	0	0	0	0

Times	7:30:00 AM	Schedule Patient	Delete Entire Grid
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Scheduling Tool

	7:30 AM - 8:30 AM	Times	7:30:00 AM	8:30 AM - 9:30 AM
Chair 1		Duration	30 minutes	
Chair 2		Bed or Chair	Chair 2	
Chair 3				
Chair 4				
Chair 5				
Chair 6				


- Chair 2
- Chair 3
- Chair 4
- Chair 5
- Chair 6
- Chair 7
- Chair 8
- Chair 9

Schedule Patient

Scheduling Tool

	7:30 AM - 8:00 AM	8:00 AM - 8:30AM	8:30 AM - 9:00 AM	9:00 AM - 9:30 AM
Chair 1				
Chair 2				
Chair 3				
Chair 4				
Chair 5				
Chair 6				

Microsoft Excel

 Appointment Time: 7:30 AM
Duration: 30 minutes
Bed or Chair: Chair 2

Scheduling Tool

	7:30 AM - 8:00 AM	8:00 AM - 8:30AM	8:30 AM - 9:00 AM	9:00 AM - 9:30 AM
Chair 1				
Chair 2				
Chair 3				
Chair 4				
Chair 5				
Chair 6				



	7:30 AM - 8:00 AM	8:00 AM - 8:30AM	8:30 AM - 9:00 AM	9:00 AM - 9:30 AM
Chair 1				
Chair 2	1			
Chair 3				
Chair 4				
Chair 5				
Chair 6				

Created using Excel VBA

Scheduling Tool

	7:30 AM - 8:00 AM	8:00 AM - 8:30AM	8:30 AM - 9:00 AM	9:00 AM - 9:30 AM	9:30 AM - 10:00 AM	10:00 AM - 10:30 AM
Chair 1		1	1			
Chair 2	1			1	1	
Chair 3		1	1	1	1	
Chair 4						
Chair 5			1	1	1	
Chair 6						
Chair 7						1
Chair 8		1	1			
Chair 9	1	1	1	1	1	1
Chair 10						
Chair 11						
Chair 12						
Chair 13						
Chair 14						
Chair 15						1
Bed 1		1	1	1	1	1
Bed 2						
Bed 3						
Total	2	5	6	5	5	4

Scheduling Tool - Grid Design

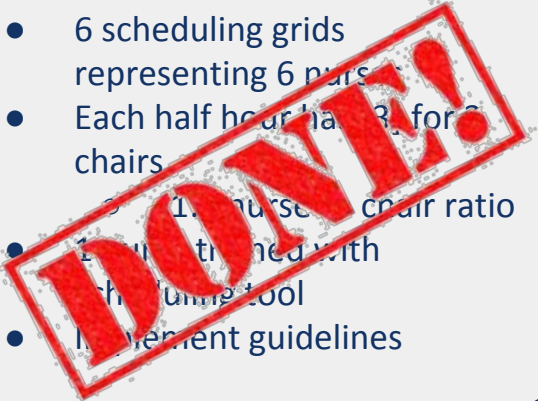
Phase 1: 6 grids

- 6 scheduling grids representing 6 nurses
- Each half hour has [3] for 3 chairs
 - 1:3 nurse to chair ratio
- 1 nurse trained with scheduling tool
- Implement guidelines

Scheduling Tool - Grid Design

Phase 1: 6 grids

- 6 scheduling grids representing 6 nurses
- Each half hour has [3] for 3 chairs
- 1:1 nurse to chair ratio
- 1 nurse trained with the scheduling tool
- Implementation guidelines



Phase 2: 18 Grids

- Transition to 18 grids
 - 1 grid per chair
- Each half hour has [1] for 1 patient
- Train all nurses to use scheduling tool

Vista Grid for Chair 1

TIME	7	8	9	10	11	12	1	2	3
FR 14	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
MO 17	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
TU 18	[1]	[1]	[1]	[0]	[0]	[0]	[0]	[0]	[0]
WE 19	[1]	[0]	[0]	[1]	[1]	[1]	[1]	[1]	[1]

No One Scheduled

1 Patient Scheduled

Expansion Options

Alternative 1: Cost Conservative

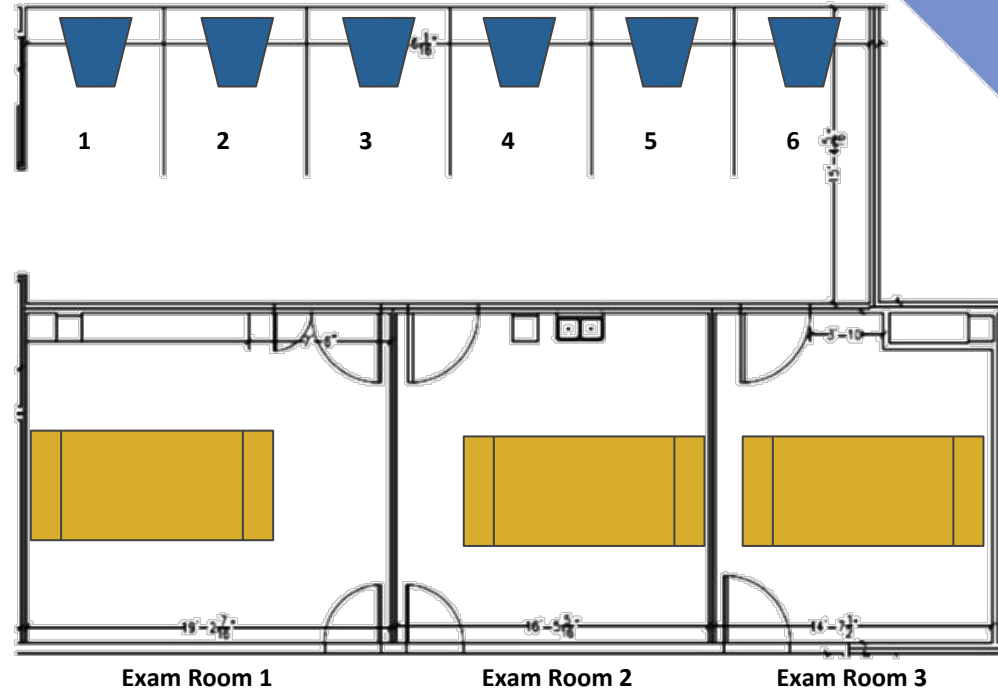
- 1 bed per exam room (3 total)
- 1 chair per recovery room (6 total)

Alternative 2: Maximum Resources

- 2 beds, 2 chairs in exam room 1
- 4 chairs in exam room 2
- 2 chairs in exam room 3
- 1 chair per recovery room (6 total)

Alternative 3: Hybrid

- 2 beds, 2 chairs in exam room 1
- Convert room 2 into physician exam room
- Convert room 3 into physician exam room
- 1 chair per recovery room (6 total)



Expansion Options

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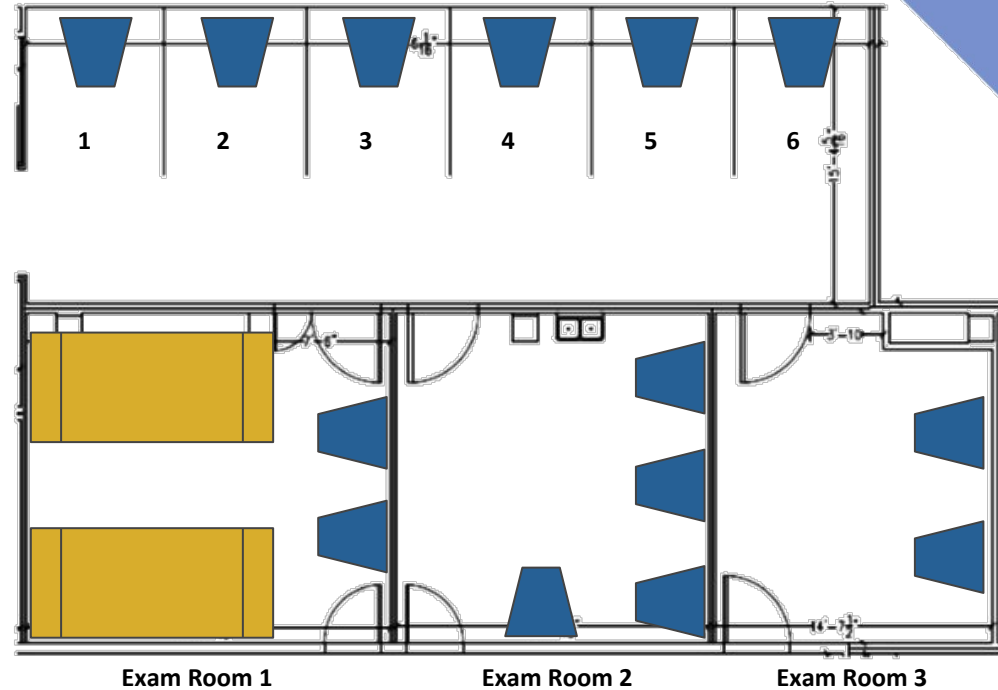
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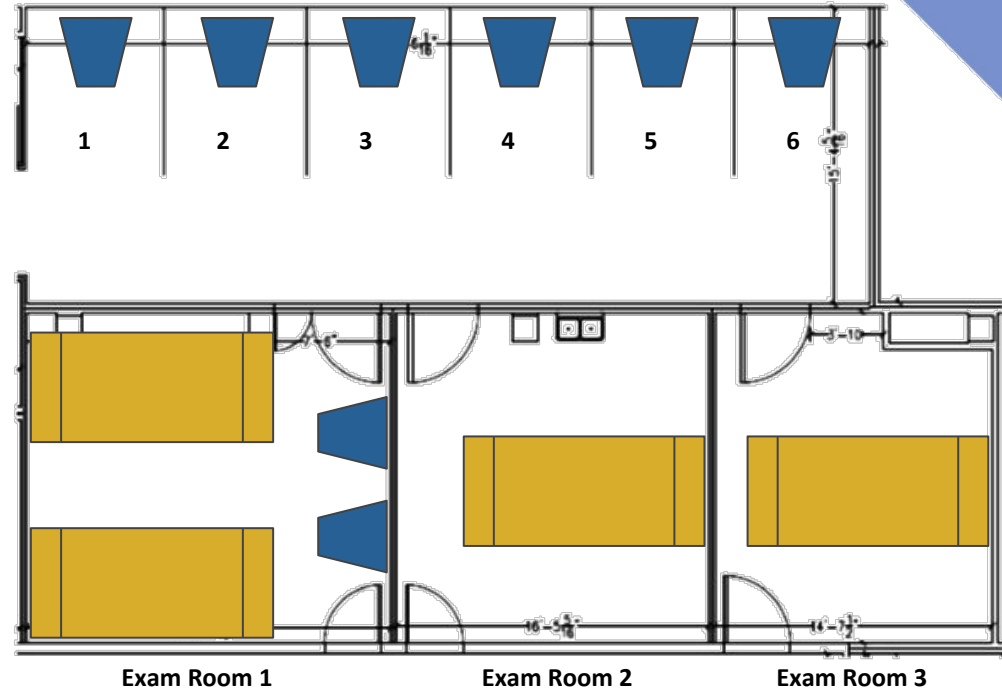
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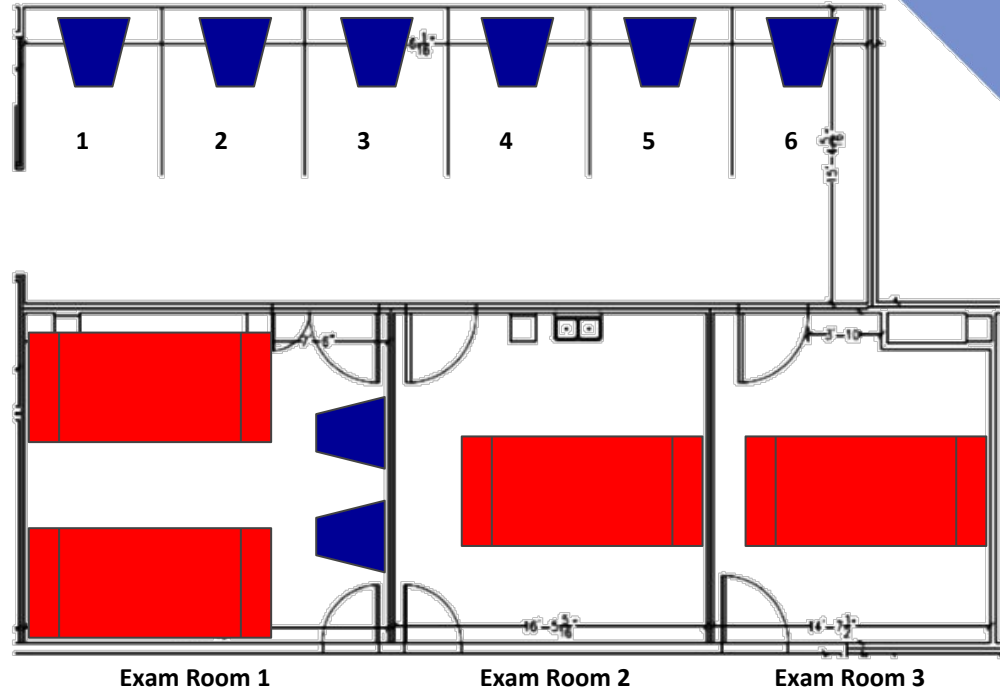
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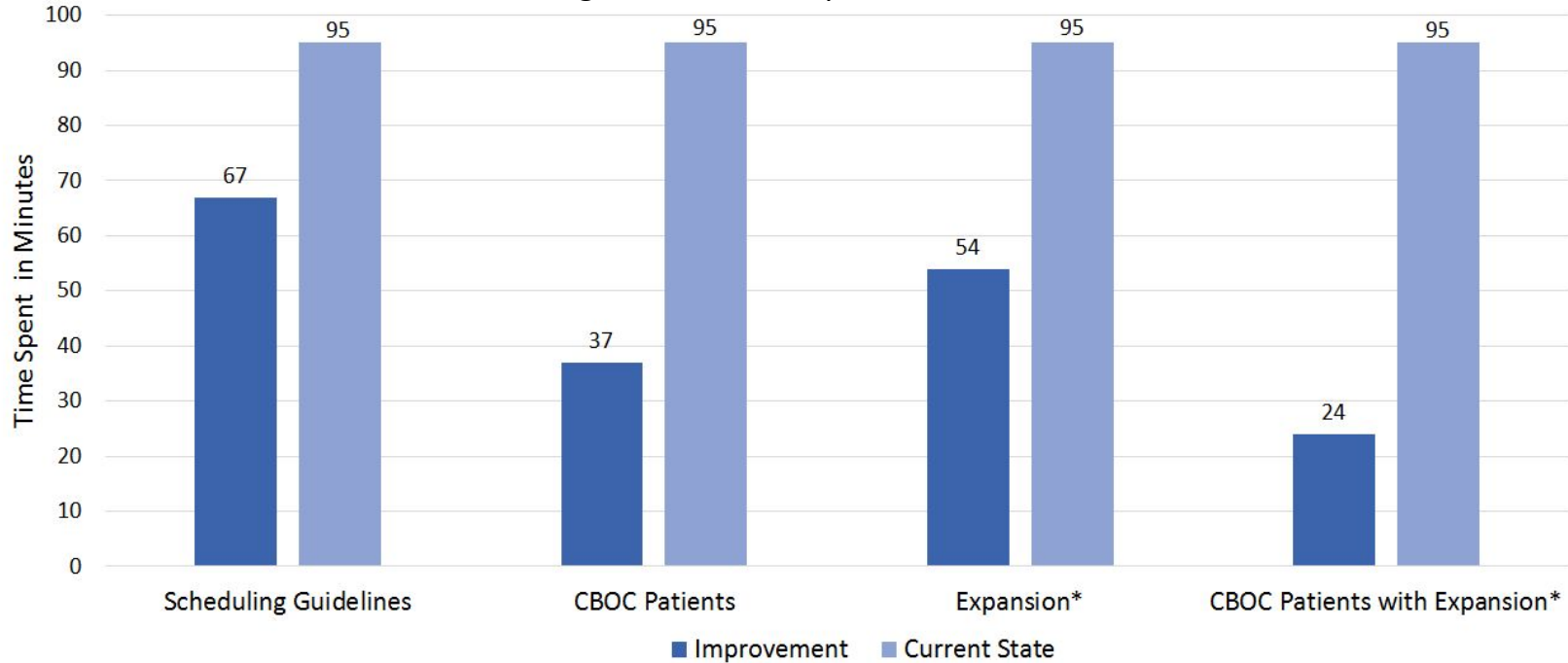
SOLUTION

- 2 beds, 2 chairs in exam room 1
- Convert room 2 into physician exam room
- Convert room 3 into physician exam room
- 1 chair per recovery room (6 total)



Simulation - Results

Simulation Scenario Testing Results: Time Spent from Front Desk to Treatment



*All scenarios include scheduling guidelines

***The scenario that includes the expansion has 30% more patients with 10 more chairs/beds, 4 more physicians, 2 more triage nurses from 6AM-3PM**

See Appendix page 42 for break down of time spent

Valuation

1

Time Saved: Scheduling

- Current Time: **99 minutes**
- New Improved Time: **67 minutes**
- Time saved: **32 minutes**

Savings: Scheduling

- Nurse Overtime: **\$90,624/year**
- Reducing time to 67 minutes will save: **\$186,500/year**

\$277,124

2

Time Saved: 1 + CBOC

- Current Time : **99 minutes**
- New Improved Time: **37 minutes**
- Time saved: **62 minutes**

Savings: 1 + CBOC

- Nurse Overtime: **\$90,624/year**
- Reducing time to 37 minutes will save: **\$256,439/year**

\$347,063

3

Time Saved: 2 + Expansion

- Current Time: **99 minutes**
- New Improved Time: **24 minutes**
- Time saved: **75 minutes**

Savings: 2 + Expansion

- Nurse Overtime: **\$90,624/year**
- Reducing time to 24 minutes will save: **\$332,204/year**

\$422,828

Valuation

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Time Saved: Scheduling

- Current Time: **99 minutes**
- New Improved Time: **67 minutes**
- Time saved: **32 minutes**

Savings: Scheduling

- Nurse Overtime: **\$90,624/year**
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Time Saved: 1 + CBOC

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- Reducing time to 37 minutes will save: **\$256,439/year**

\$347,063

3

Time Saved: 2 + Expansion

- Current Time: **99 minutes**
- New Improved Time: **24 minutes**
- Time saved: **75 minutes**

Savings: 2 + Expansion

- Nurse Overtime: **\$90,624/year**
- Reducing time to 24 minutes will save: **\$332,204/year**

\$422,828

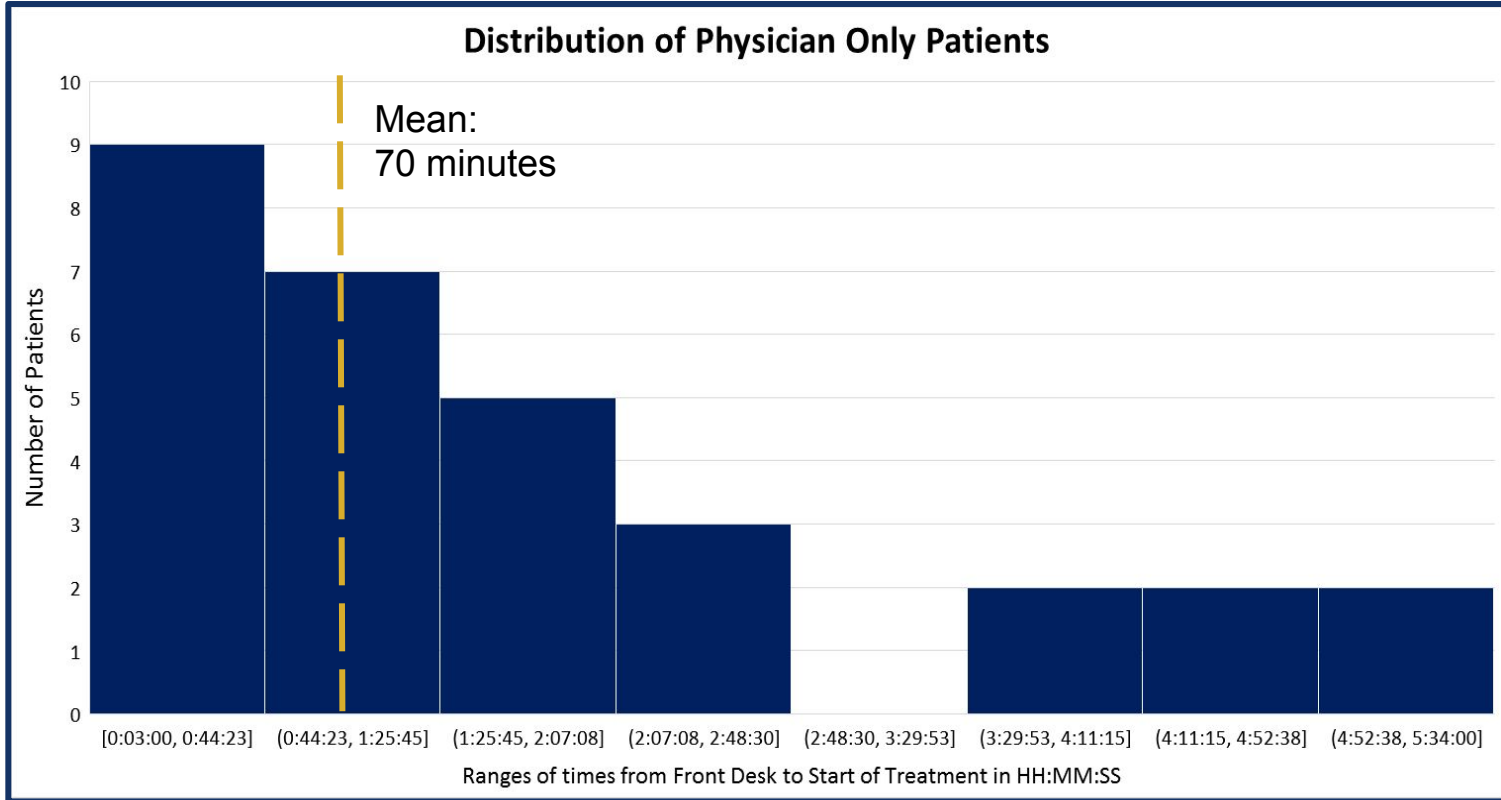
Thank you for your time!



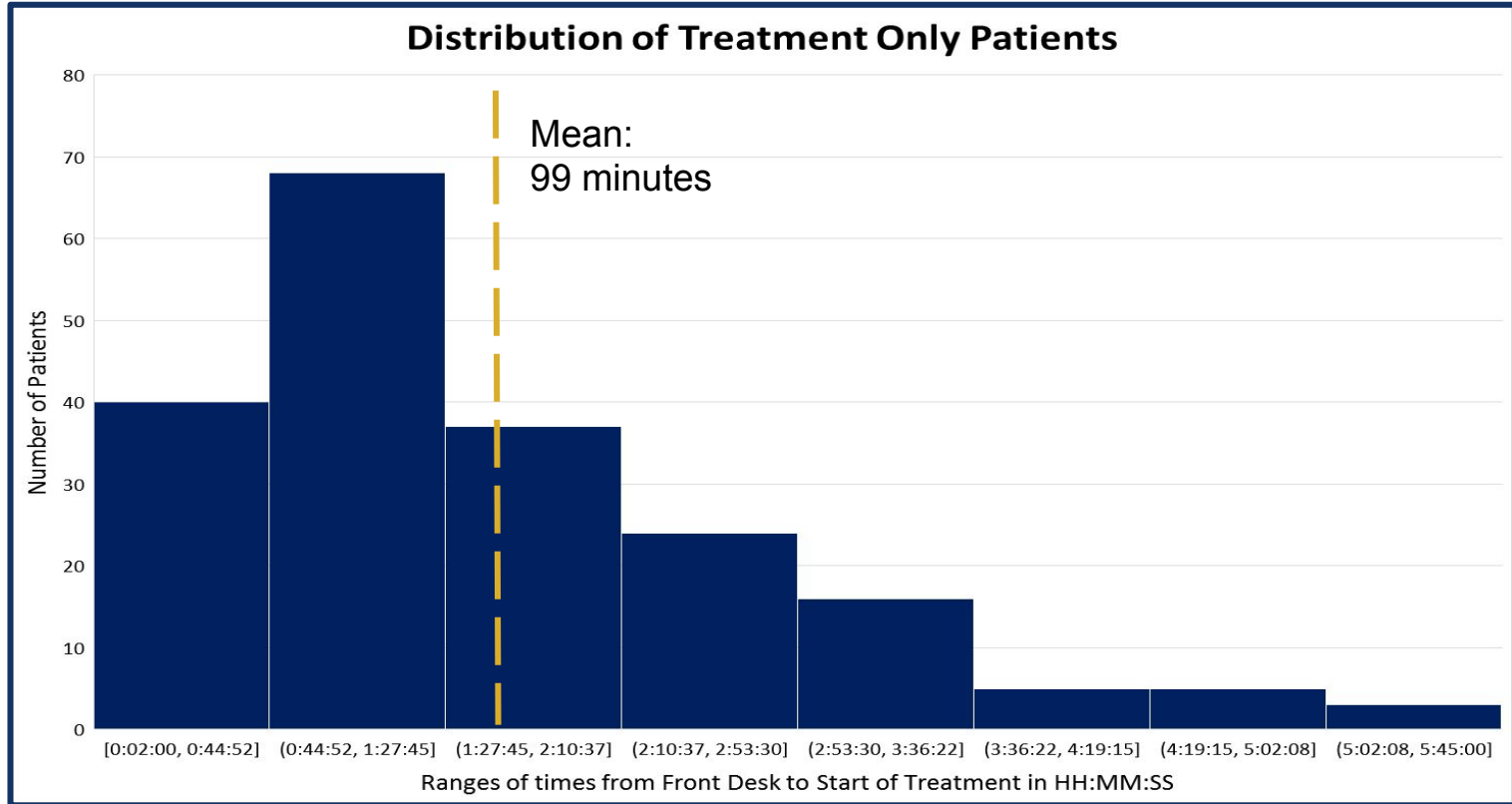
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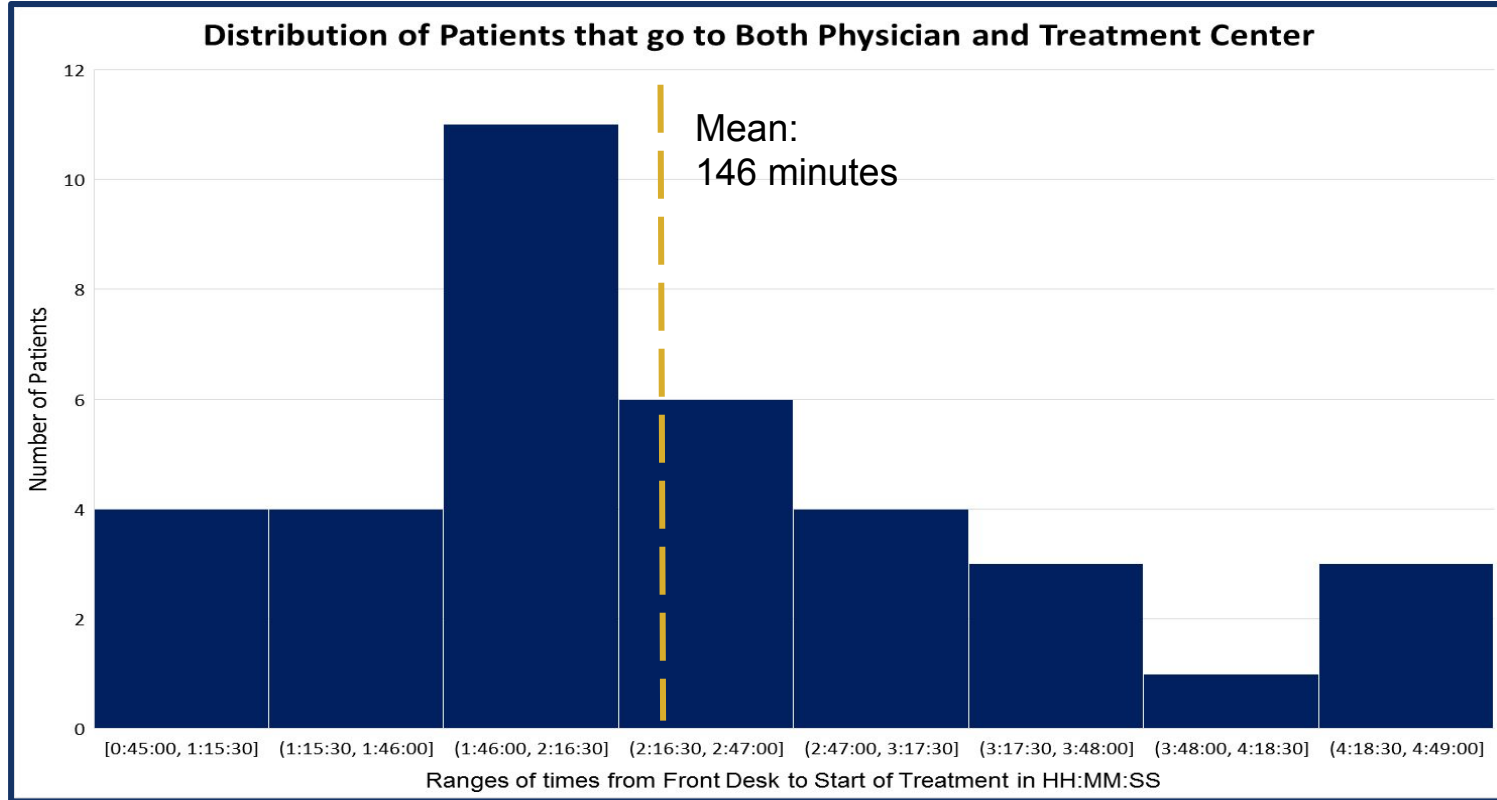
Appendix- Flow



Appendix- Flow

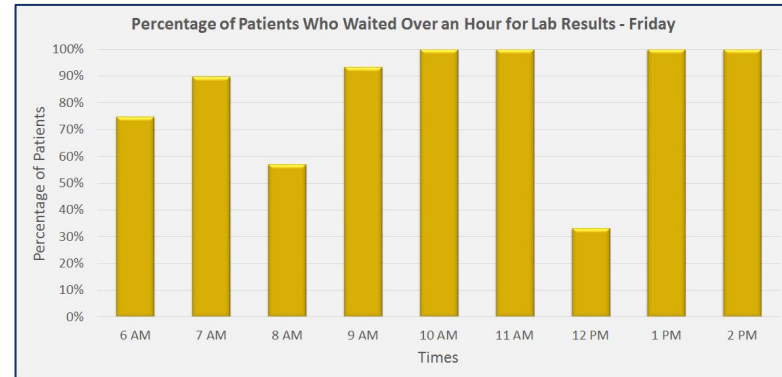
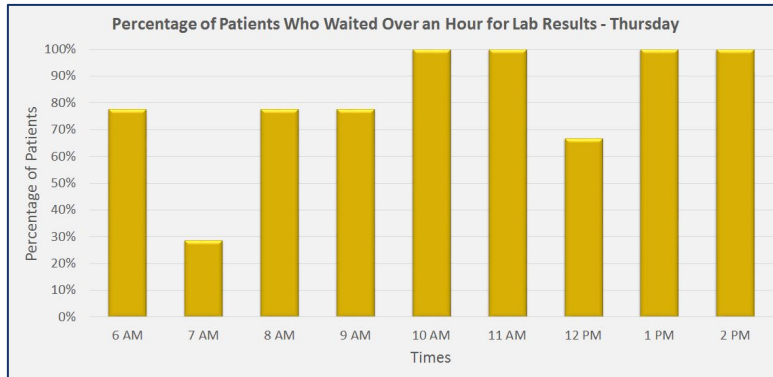
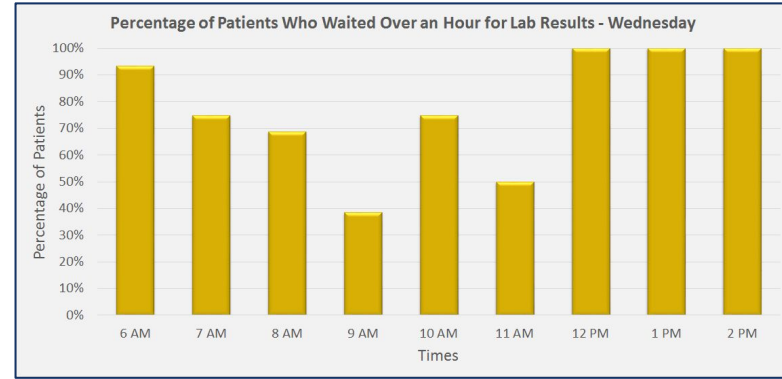
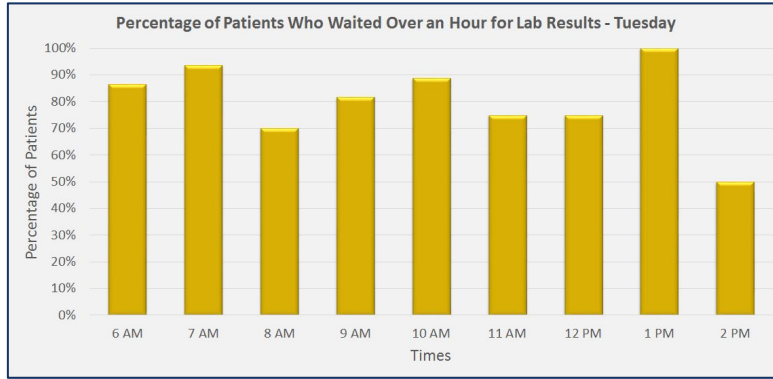


Appendix- Flow



Appendix- Lab

Below are the percentages of patients who wait longer than an hour for lab results by day.



Appendix- Simulation Inputs (part 1 of 2)

Below is part one of the input distributions and data sources for the simulation model.

Process type	Location	Probability distribution in Arena	Probability distribution	Source
Lab waiting time and blood drawn to be processed (6am – 9am)	Lab	NORM(30,10)	Normal(30,10)	Time study & expert opinion
Lab waiting time and blood drawn to be processed (9 am – 1 pm)	Lab	NORM(60,10)	Normal(60,10)	Time study & expert opinion
Lab waiting time and blood drawn to be processed (After 1 pm)	Lab	NORM(30,10)	Normal(30,10)	Time study & expert opinion
Processing of blood samples	Lab	86.52 * GAMM(1, 13.96)/GAMM(1, 14.23)	Pearson Type VI(0, 86.52, 13.96, 14.23)	Historical data (CPRS)
Front desk check in service time	Medical clinic	TRIA(3,5,7)	Triangular(3,5,7)	Time study
Triage service time	Triage	1.64*GAMM(1,9.73)/GAMM(1,4.54)	Pearson Type VI(0,1.64,9.73,4.54)	Historical data (CPRS)

Appendix- Simulation Inputs (part 2 of 2)

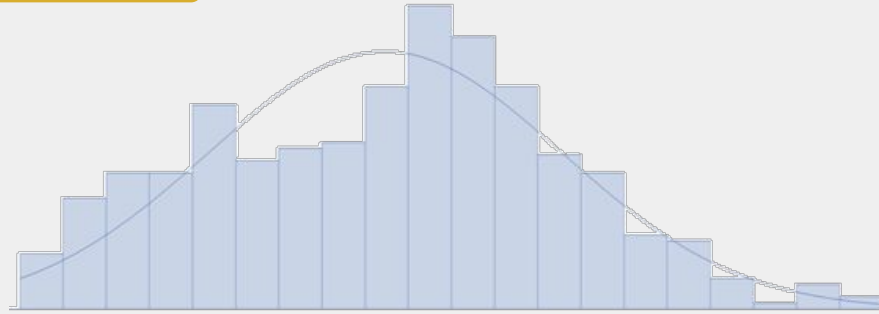
Below is part two of the input distributions and data sources for the simulation model.

Process type	Location	Probability distribution in Arena	Probability distribution	Source
Physician service time	Exam rooms	TRIA(15, 20, 30)	Triangular(15,20,30)	Time study
Short treatment time	Oncology treatment center	TRIA(3,15,20)	Triangular(3,15,20)	Historical data (Nurse assignment sheet)
Short Mid treatment time	Oncology treatment center	JOHN(-0.31,0.56,65.03,21.33)	Johnson Bounded Continuous(21.33,86.36,-0.31,0.56)	Historical data (Nurse assignment sheet)
Mid treatment time	Oncology treatment center	84.16 + 48.14 *BETA(1.47, 1.27)	Beta(84.16, 132.3, 1.47, 1.27)	Historical data (Nurse assignment sheet)
Mid Long treatment time	Oncology treatment center	JOHN(-0.28,0.64,79.55,127.79)	Johnson Bounded Continuous(127.79,207.35,-0.28,0.64)	Historical data (Nurse assignment sheet)
Long treatment time	Oncology treatment center	203.92 + WEIB(66.17,1.16)	Weibull(203.92,66.17,1.16)	Historical data (Nurse assignment sheet)
Front desk check out service time	Medical clinic	TRIA(3,5,7)	Triangular(3,5,7)	Time study

Appendix- Simulation Validation

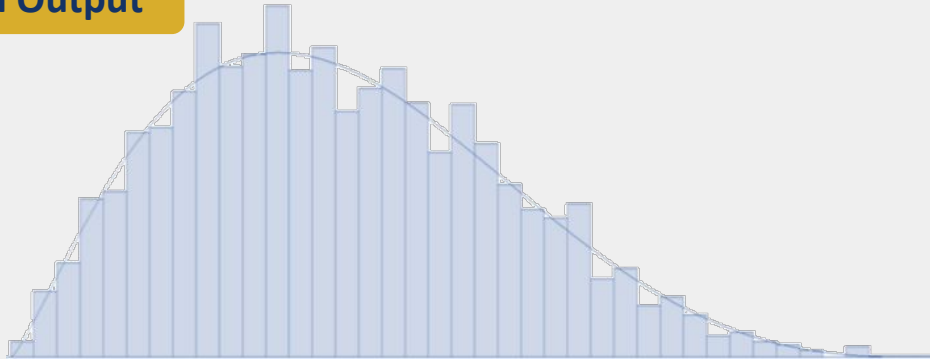
Monday Patient Data

Normal
Mean: 252 min
SD: 119 min



Monday Simulation Output

Beta
Mean: 247 min
SD: 101 min



Kolmogorov-Smirnov Test:

Test Statistic: 0.0221
Failed to reject Null Hypothesis

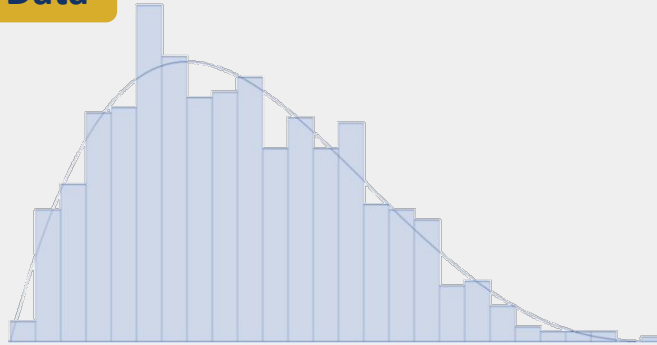
Anderson-Darling Test:

Test Statistic: 0.31020
Failed to reject Null Hypothesis

Appendix- Simulation Validation

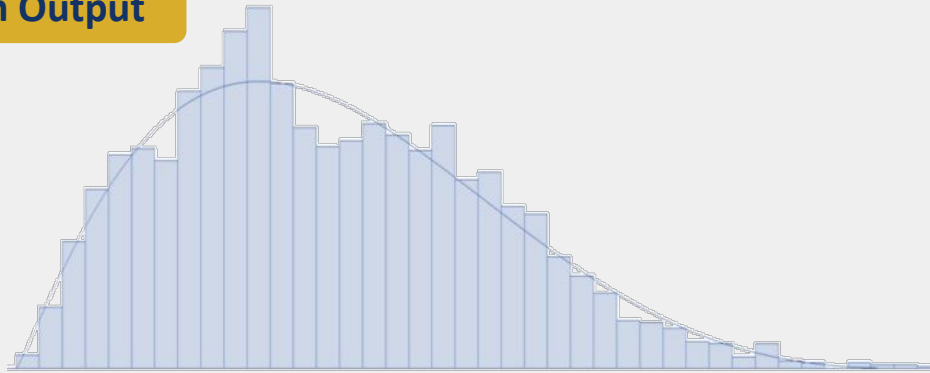
Tuesday Patient Data

Beta
Mean: 239 min
SD: 125 min



Tuesday Simulation Output

Beta
Mean: 233 min
SD: 99.2 min



Kolmogorov-Smirnov Test:

Test Statistic: 0.01983
Failed to reject Null Hypothesis

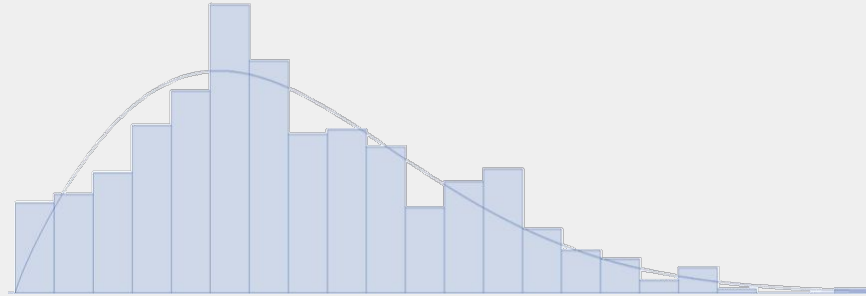
Anderson-Darling Test:

Test Statistic: 1.10846
Failed to reject Null Hypothesis

Appendix- Simulation Validation

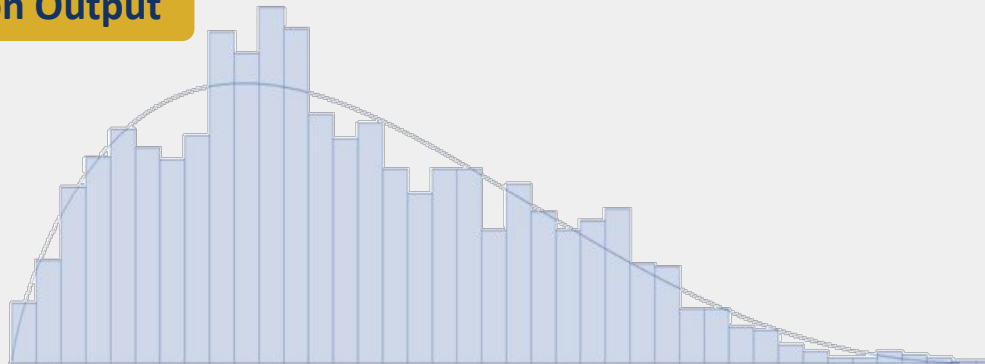
Thursday Patient Data

Weibull
Mean: 205 min
SD: 106 min



Thursday Simulation Output

Beta
Mean: 217 min
SD: 95.4 min



Kolmogorov-Smirnov Test:

Test Statistic: 0.0263
Failed to reject Null Hypothesis

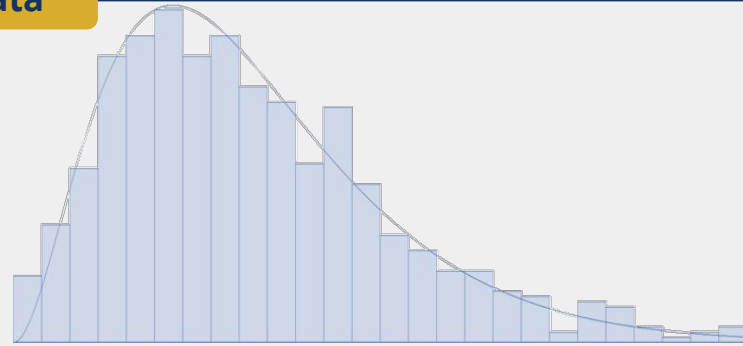
Anderson-Darling Test:

Test Statistic: 0.98035
Failed to reject Null Hypothesis

Appendix- Simulation Validation

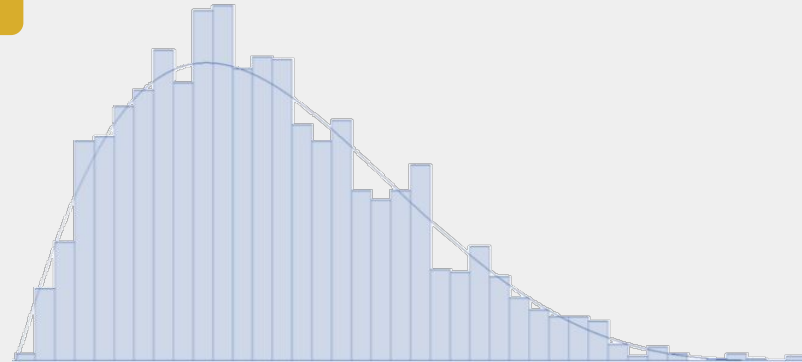
Friday Patient Data

Erlang
Mean: 201 min
SD: 109 min



Friday Simulation Output

Beta
Mean: 214 min
SD: 93 min



Kolmogorov-Smirnov Test:

Test Statistic: 0.01369
Failed to reject Null Hypothesis

Anderson-Darling Test:

Test Statistic: 0.32196
Failed to reject Null Hypothesis

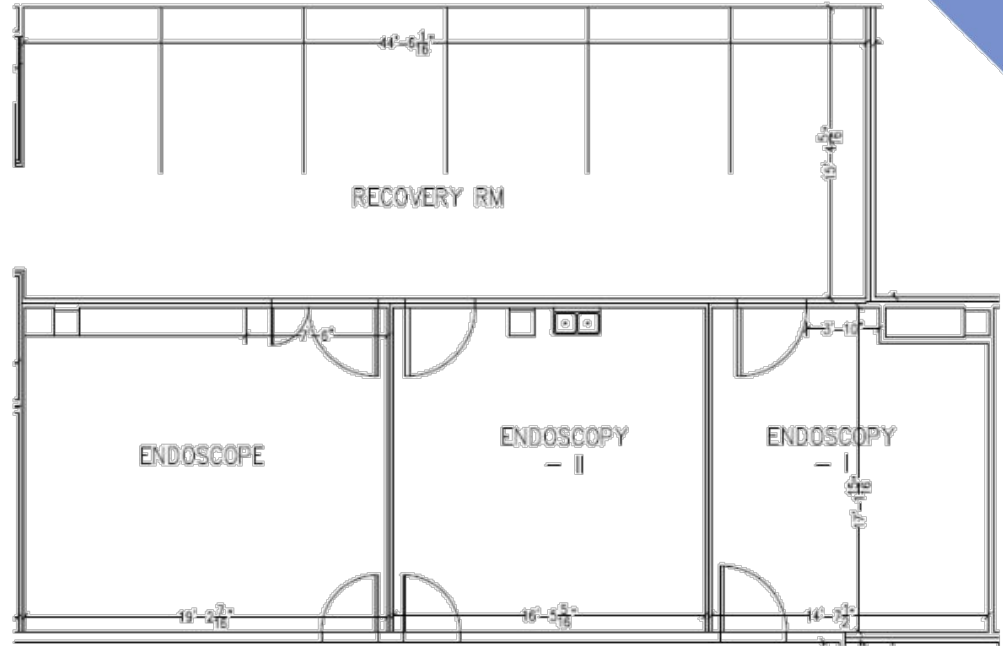
Appendix- Expansion (part 1 of 2)

The resources, costs, and measurements are listed below, as well as the expansion space.

Clearance Measurements	Length (ft)	Width (ft)
Chair	8	8
Bed	11.5	9

Actual Measurements	Length (ft)	Width (ft)
Chair (Oncology)	7	6
Bed (Oncology)	11.5	9
Chair (GI Space)	8	7.5
Bed (GI Space)	Not Measured	

Cost Parameters	Price
Cost of Chair	\$1,500.00
Cost of Bed	\$3,000.00
Portable Oxygen + suction + air	\$300.00



Appendix- Expansion (part 2 of 2)

Alternatives	Room 1	Room 2	Room 3	Recovery Rooms	Added beds	Added chairs	Estimated Cost
1	2 beds, 2 chairs	4 chairs	2 chairs	6 chairs	2	14	\$31,800.00
2	2 beds, 2 chairs	2 beds	2 chairs	6 chairs	4	10	\$31,200.00
3	2 beds, 2 chairs	1 bed, 1 chair	2 chairs	6 chairs	3	11	\$29,700.00
4	2 beds, 2 chairs	4 chairs	1 bed	6 chairs	3	12	\$31,500.00
5	2 beds, 2 chairs	2 beds	1 bed	6 chairs	5	8	\$30,900.00
6	2 beds, 2 chairs	1 bed, 1 chair	1 bed	6 chairs	4	9	\$29,400.00
7	4 chairs	4 chairs	2 chairs	6 chairs	0	16	\$28,800.00
8	4 chairs	2 beds	2 chairs	6 chairs	2	12	\$28,200.00
9	4 chairs	1 bed, 1 chair	2 chairs	6 chairs	1	13	\$26,700.00
10	4 chairs	4 chairs	1 bed	6 chairs	1	14	\$28,500.00
11	4 chairs	2 beds	1 bed	6 chairs	3	10	\$27,900.00
12	4 chairs	1 bed, 1 chair	1 bed	6 chairs	2	11	\$26,400.00
13	1 bed	1 bed	1 bed	6 chairs	3	6	\$20,700.00
14	Exam room	Exam room	Exam room	6 chairs	0	6	\$10,800.00
15	2 beds, 2chairs	Exam room	Exam room	6 chairs	2	8	\$27,000.00
16	Exam room	Exam room	1 bed	6 chairs	1	6	\$20,100.00
17	Exam room	2 beds	Exam room	6 chairs	2	6	\$23,400.00
18	Exam room	1 bed, 1 chair	Exam room	6 chairs	1	7	\$21,900.00
19	2 beds, 2 chairs	1 bed, 1 chair	Exam room	6 chairs	3	9	\$29,100.00

Appendix - Simulation Results

The table shows a detailed breakdown of process and waiting times from Check-in to Treatment for each scenario tested.

	Check-In Wait Time (minutes)	Check-In Process Time (minutes)	Triage Waiting Room (minutes)	Triage Process Time (minutes)	Treatment Waiting Room (minutes)	Lab Process Wait Time (minutes)	Check-In to Treatment Center (minutes)
Current State	3	5	3	7	47	30	95
Scheduling Guidelines	3	5	7	7	15	30	67
CBOC Patients	3	5	7	7	15	0	37
Expansion*	3	5	1	7	8	30	54
CBOC Patients with Expansion*	3	5	1	7	8	0	24

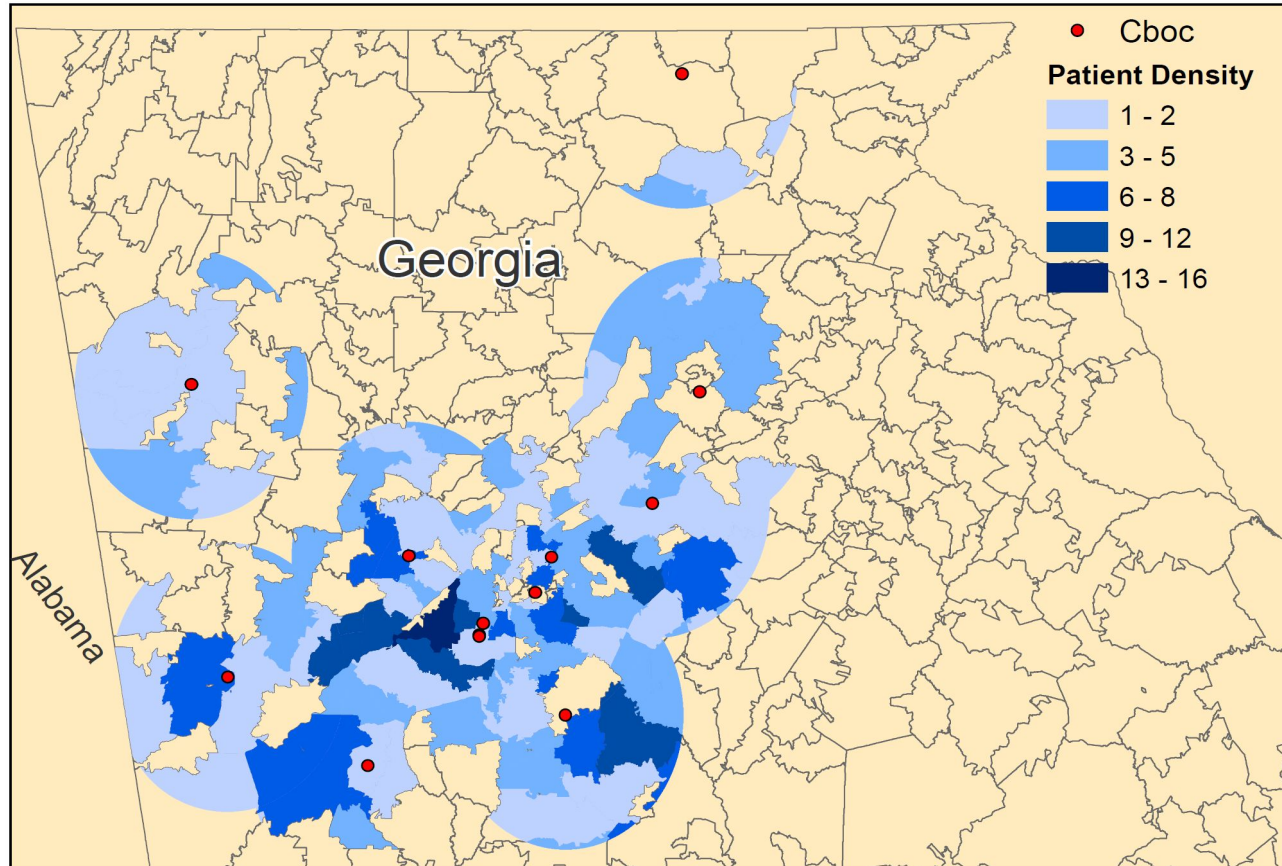
*The scenario that includes the expansion has 30% more patients with 10 more chairs/beds, 4 more physicians, 2 more triage nurses from 7AM-3PM

Appendix- Nurse Overtime

Cost Comparison of Overtime Hours	
Total Overtime of all nurses (hours:minutes)	1829:55
Additional cost spent on overtime (Assume 1.5 x \$40 nurse hourly wage x 1829:55)	\$109,795
Salary of 1 nurse (total over 63 weeks)	\$100,800

The table shows overtime data collected over 63 weeks

Appendix- CBOC Patient Densities



The figure shows the number of patients that are within a 20 mile radius of a CBOC. 80% of patients fall within this range. A random sample of 526 patient zip codes were used.

Appendix- Indirect Cost

Scheduling
guideline

$$20,074 \frac{\text{visits}}{\text{year}} * 32 \frac{\text{min}}{\text{visits}} * \frac{1\text{hr}}{60 \text{ mins}} * \frac{\$17.42}{\text{hr}} = \$186,500/\text{year}$$

CBOC
guideline

$$\text{CBOC} \left[0.4 * 20,074 \frac{\text{visits}}{\text{year}} * 62 \frac{\text{min}}{\text{visits}} * \frac{1\text{hr}}{60 \text{ mins}} * \frac{\$17.42}{\text{hr}} \right] + \text{Non CBOC} \left[0.6 * \frac{\$186,500}{\text{year}} \right]$$
$$= \$256,439/\text{year}$$

Both

$$\text{CBOC} \left[.4 * 20,074 \frac{\text{visits}}{\text{year}} * 75 \frac{\text{min}}{\text{visits}} * \frac{1\text{hr}}{60 \text{ mins}} * \frac{\$17.42}{\text{hr}} \right] + \text{Non CBOC} \left[0.6 * \frac{\$262,266.81}{\text{year}} \right]$$
$$= \$332,204/\text{year}$$

Appendix- VistA Scheduling Grid

Before

TIME DATE	7	8	9	10	11	12	1	2	3							
FR 14	[3]	[C]	[C]	[D]	[D]	[J]	[F]	[J]	[G]	[I]	[D]	[D]	[0]	[A]	[1]	[3]
MO 17	[3]	[0]	[C]	[A]	[0]	[D]	[B]	[E]	[E]	[C]	[0]	[0]	[1]	[2]	[2]	[3]
TU 18	[2]	[B]	[0]	[D]	[D]	[H]	[D]	[D]	[F]	[D]	[D]	[A]	[1]	[1]	[1]	[2]
WE 19	[3]	[B]	[C]	[F]	[A]	[C]	[A]	[C]	[0]	[D]	[A]	[0]	[0]	[1]	[0]	[1]
TH 20	[3]	[A]	[B]	[A]	[B]	[F]	[B]	[A]	[0]	[1]	[2]	[2]	[2]	[2]	[3]	[3]
FR 21	[3]	[B]	[A]	[C]	[D]	[E]	[C]	[C]	[1]	[0]	[2]	[0]	[1]	*[2]	[2]	[2]
MO 24	[3]	[0]	[1]	[1]	[0]	[A]	[3]	[A]	[0]	[B]	[0]	[0]	[0]	[1]	[2]	[2]
TU 25	[3]	[0]	[0]	[C]	[E]	[D]	[D]	[0]	[A]	[A]	[0]	[0]	[2]	[2]	[3]	[3]
WE 26	[3]	[A]	[C]	[B]	[E]	[C]	[B]	[E]	[B]	[E]	[0]	[0]	[A]	[A]	[1]	[2]
TH 27	[3]	*[3]	[0]	[B]	[A]	[C]	[C]	[A]	[2]	[1]	[0]	[2]	[2]	[2]	[3]	[1]
FR 28	[3]	[0]	[1]	[D]	[E]	[B]	[B]	[A]	[C]	[E]	[C]	[C]	[0]	[C]	[0]	[3]
MO 31	[3]	[1]	[2]	[2]	[2]	[B]	[2]	[2]	[1]	[3]	[3]	[2]	[3]	[3]	[3]	[3]

After

TIME	7	8	9	10	11	12	1	2	3
FR 14	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
MO 17	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
TU 18	[1]	[1]	[1]	[0]	[0]	[0]	[0]	[0]	[0]
WE 19	[1]	[0]	[0]	[1]	[1]	[1]	[1]	[1]	[1]

Here is a before and after look of the scheduling grid design.