DALHOUSIE UNIVERSITY
FACULTY OF ENGINEERING

NOVA SCOTIA HEALTH
GERIATRIC NURSE PRACTITIONER PROGRAM

nova scotia health

Department of Industrial Engineering

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PROBLEM DEFINITION

Dartmouth General Hospital's Emergency Department (ED) has long wait times and extended stays for older patients with complex medical needs.

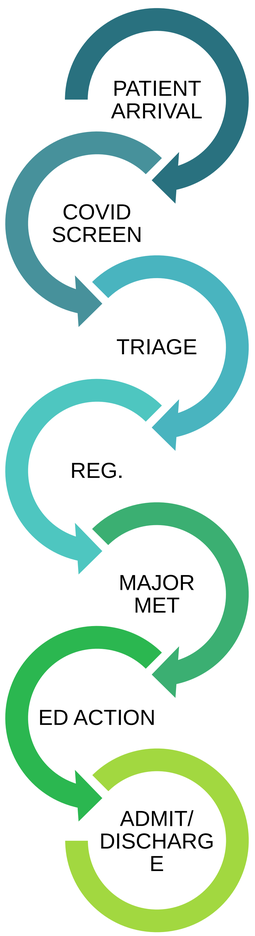
A lack of geriatric care specialists increases the workload for ED staff and physicians, leading to hospital overcrowding and decreased care quality.

Delayed care negatively impacts older patients' health outcomes and well-being.

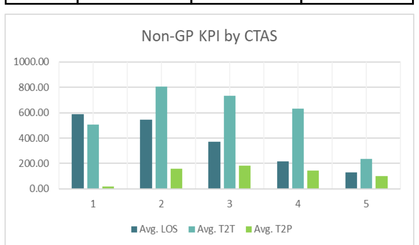
KEY OBJECTIVES

1. Reduce ED Length of Stay by **360** minutes, Lab/DI Time by **20%**
2. Evaluate the cost-effectiveness of the geriatric nurse practitioner program
3. Develop and implement a simulation model of the Geriatric Nurse Practitioner Program for process study

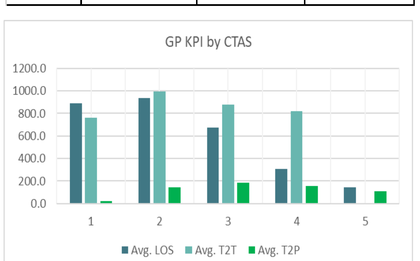
CURRENT STATE



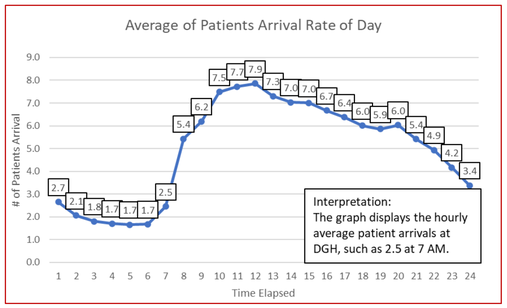
CTAS	Avg. LOS	Avg. T2T	Avg. T2P
1	588.85	507.43	19.10
2	545.19	806.32	158.54
3	370.60	733.64	184.85
4	217.06	633.54	145.74
5	128.79	238.00	99.72

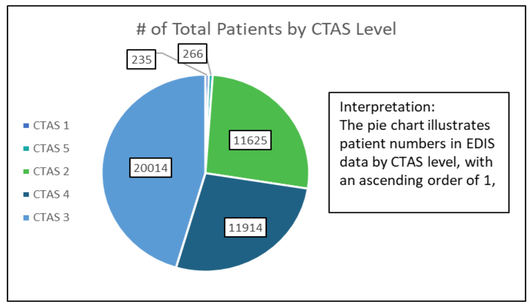


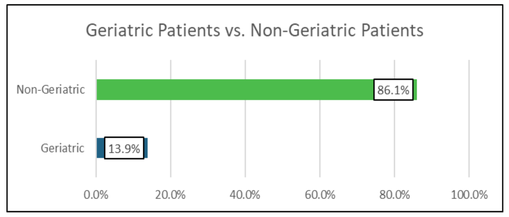
CTAS	Avg. LOS	Avg. T2T	Avg. T2P
1	887.0	761.0	20.8
2	937.7	994.0	145.5
3	676.0	880.0	183.2
4	308.8	822.5	153.9
5	144.7	N/A	109.6



INPUT ANALYSIS





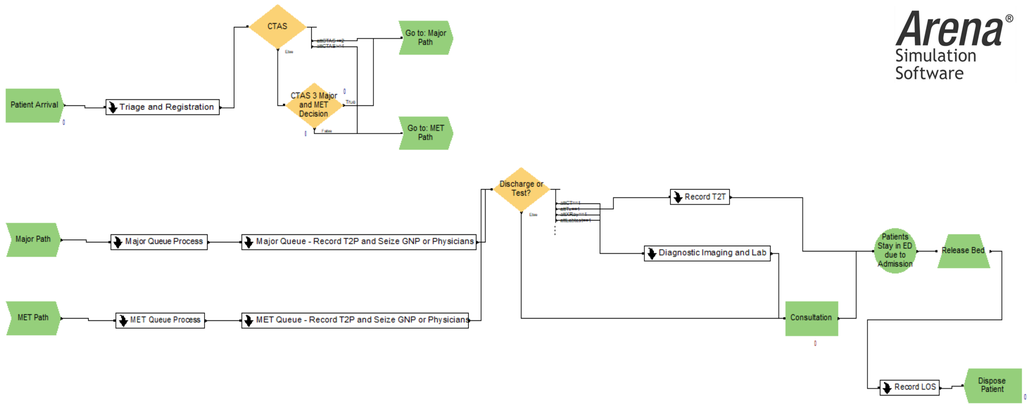


Assumed Processing Time	
Patient Assessment (Major)	TRIA* (15, 30, 35)
Patient Assessment (MET)	TRIA (15, 20, 35)
Xray (DI)	TRIA (5, 10, 15)
CT (DI)	TRIA (20, 40, 60)
Blood Lab (DI)	TRIA (5, 10, 15)
Patient Discharging (of CTAS 1, 2, 3)	EXPO* (9), (8.5), (3)

*Triangular Distribution, TRIA(min., median, max.)

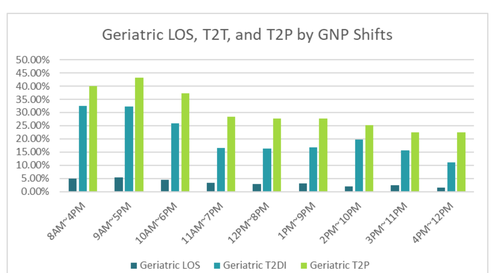
**Exponential Distribution, EXPO(mean)

SIMULATION MODEL



OUTPUT ANALYSIS

- The subsequent graph illustrates how GNP shifts impact various Key Performance Indicators (KPIs), Geriatric Length of Stay (LOS), Time-to-Diagnostic Imaging (T2DI), and Time-to-Provider (T2P).
- The heat maps presented below offer a more in-depth representation of the degree to which it exerts an influence.



Length of Stay

GNP Shift	LOS	Geriatric LOS	LOS CTAS 3	LOS CTAS 4	LOS CTAS 5
8AM~4PM	2.16%	5.00%	2.50%	5.70%	1.69%
9AM~5PM	2.67%	5.34%	3.19%	7.32%	9.20%
10AM~6PM	1.99%	4.53%	2.13%	6.96%	1.59%
11AM~7PM	1.97%	3.28%	2.17%	4.57%	-0.06%
12PM~8PM	1.89%	2.83%	2.31%	4.62%	6.72%
1PM~9PM	2.32%	3.03%	2.59%	6.10%	6.15%
2PM~10PM	2.14%	1.96%	2.47%	6.47%	1.33%
3PM~11PM	2.89%	2.52%	3.35%	7.76%	6.04%
4PM~12AM	2.19%	1.43%	2.57%	6.75%	7.60%

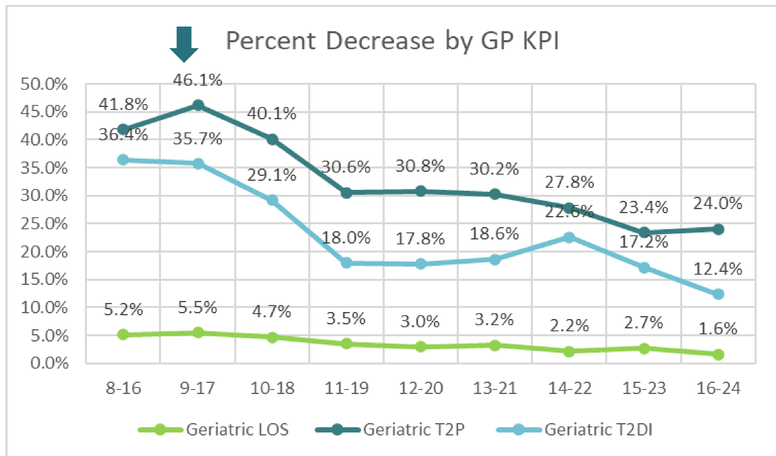
Time to Diagnostic Imaging

GNP Shift	T2DI CTAS 3	T2DI CTAS 4	T2DI CTAS 5	Overall T2DI
8AM~4PM	9.96%	35.68%	51.81%	9.11%
9AM~5PM	12.05%	35.27%	49.33%	10.54%
10AM~6PM	7.36%	29.18%	41.29%	8.31%
11AM~7PM	5.51%	23.06%	20.95%	7.13%
12PM~8PM	6.28%	20.76%	21.80%	6.98%
1PM~9PM	5.67%	18.51%	25.98%	7.77%
2PM~10PM	6.07%	17.88%	35.57%	7.41%
3PM~11PM	6.53%	16.21%	23.87%	9.20%
4PM~12PM	4.30%	9.71%	19.09%	6.72%

Time to Provider

GNP Shift	Geriatric T2P CTAS 3	Geriatric T2P CTAS 4	Geriatric T2P CTAS 5
8AM-4PM	34.78%	44.11%	40.98%
9AM-5PM	35.48%	44.04%	50.05%
10AM-6PM	30.11%	37.11%	44.25%
11AM-7PM	23.23%	30.16%	31.59%
12PM-8PM	20.78%	27.39%	35.10%
1PM-9PM	22.37%	26.91%	33.64%
2PM-10PM	20.02%	25.21%	30.65%
3PM-11PM	21.98%	22.83%	22.33%
4PM-12AM	21.40%	21.10%	25.18%

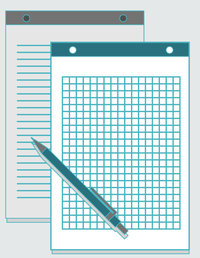
RESULT



Our findings indicate that the most effective work schedule for a new geriatric nurse practitioner is from 9 AM to 5 PM, as it yields the highest rate of decrease in the core KPIs compared to other schedules. Upon successful integration of the nurse practitioner into our system, it is projected that the time-to- initial assessment (T2P) will decrease by 46.1 percent, the time-to-diagnostic imaging (T2DI) will decrease by 35.7 percent, and the length of stay (LOS) will decrease by 5.5 percent.

CONCLUSION & RECOMMENDATION

Implementing Geriatric Nurse Practitioners brings positive impacts in reducing patients' length of stay, time to provider assessment, and time to treatment.



Our team highly recommends the recruitment of a nurse practitioner who is available to work from 9 am to 5 pm, in order to accelerate the care of geriatric patients. Upon the successful integration of the nurse practitioner into our system, it is anticipated that the core key performance indicators (KPIs) such as Length of Stay (LOS), Time-to-Patient (T2P), and Time-to-Diagnostic Imaging (T2DI) will experience significant improvement.