WRIGHT STATE UNIVERSITY

Biomedical Engineering
Industrial and Systems
Engineering

Using Lean Manufacturing Techniques to improve the customer experience at Five Rivers Family Health Center

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Five Rivers HealthCenters

Problem Statement

FRFHC seeks to enhance the experience and satisfaction of patients and staff by improving the patient flow throughout the healthcare center with primary focus related to the cycle time of patients.

Background

Five Rivers Family Health Centers (FRFHC) offers disease management, minor office procedures, obstetrics care, physical exams, wellness promotions, and women's health services [1]. Long cycle times and poor patient flow result in dissatisfaction among patients and staff, as well as reduced productivity [2]. Techniques like brainstorming, process mapping, and statistical analysis can help identify and address areas of waste, leading to improvements in patient experience and system efficiency [2], [3].

Process Development

Initial Analysis:
FRFHC supplied data on no-show rates, patient volume, and patient satisfaction. This data was analyzed to assess the office's status before implementing quality improvements.
Quality Improvement:
Using process maps, data was collected on patient experiences, including interruptions, and process time. Participants gave informed consent. Observations unveiled other issues. The study focused on wait time, cycle time, total time in office, and value-added vs. non-value-added time.
Limitations:
To assess the validity of this study's findings, it's crucial to acknowledge its limitations:
- No staff input
- Confusing office layout
- Lack of time

Further Research:
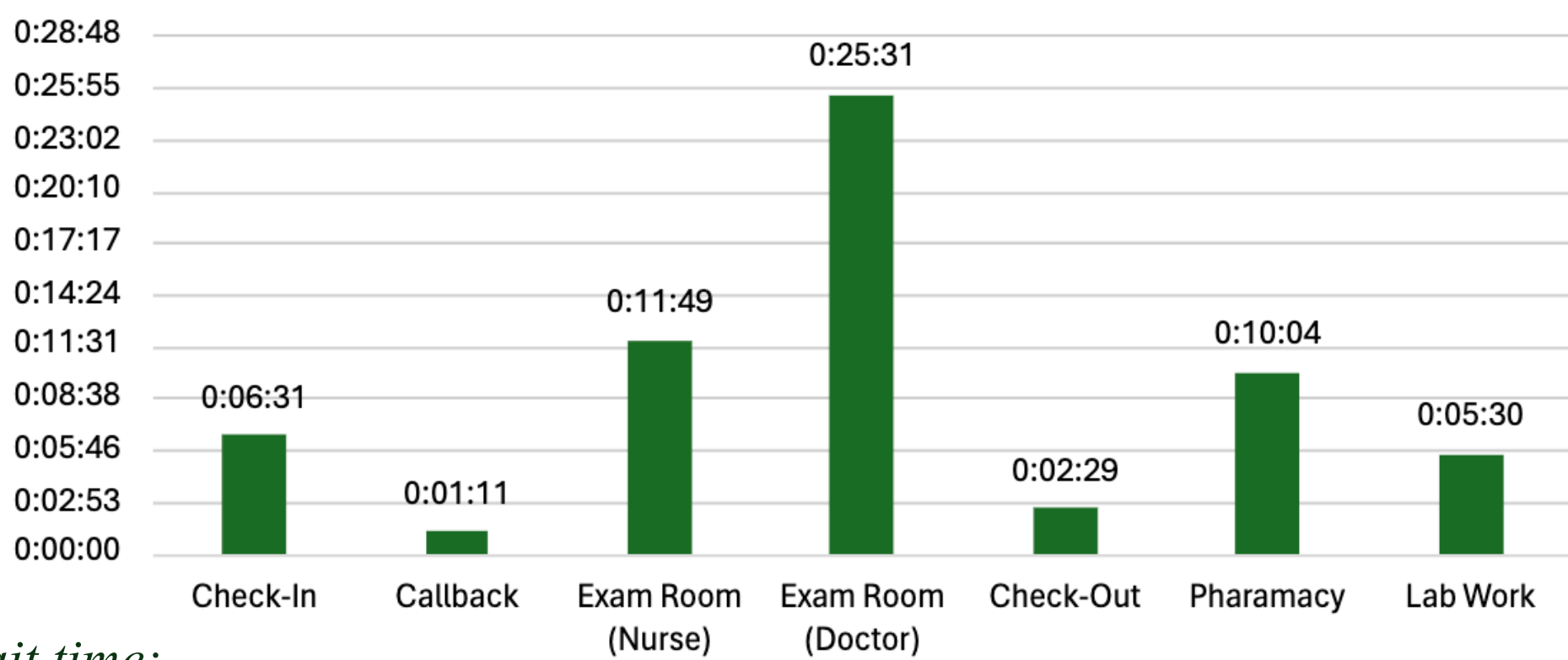Research helped to address the issues highlighted in the study.

Initial data analysis → Quality Improvement Study → Data Analysis → Further research → Improvement generation

Results

Patient's Path:
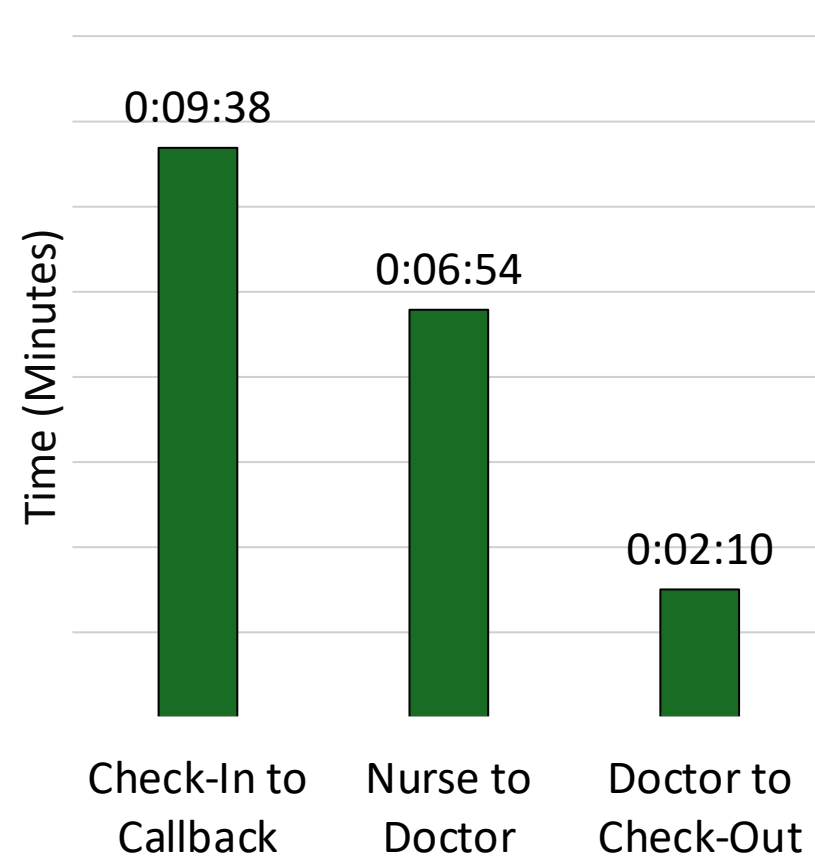Registration → Check-in → Exam Room → Nurse → Doctor → Check-out
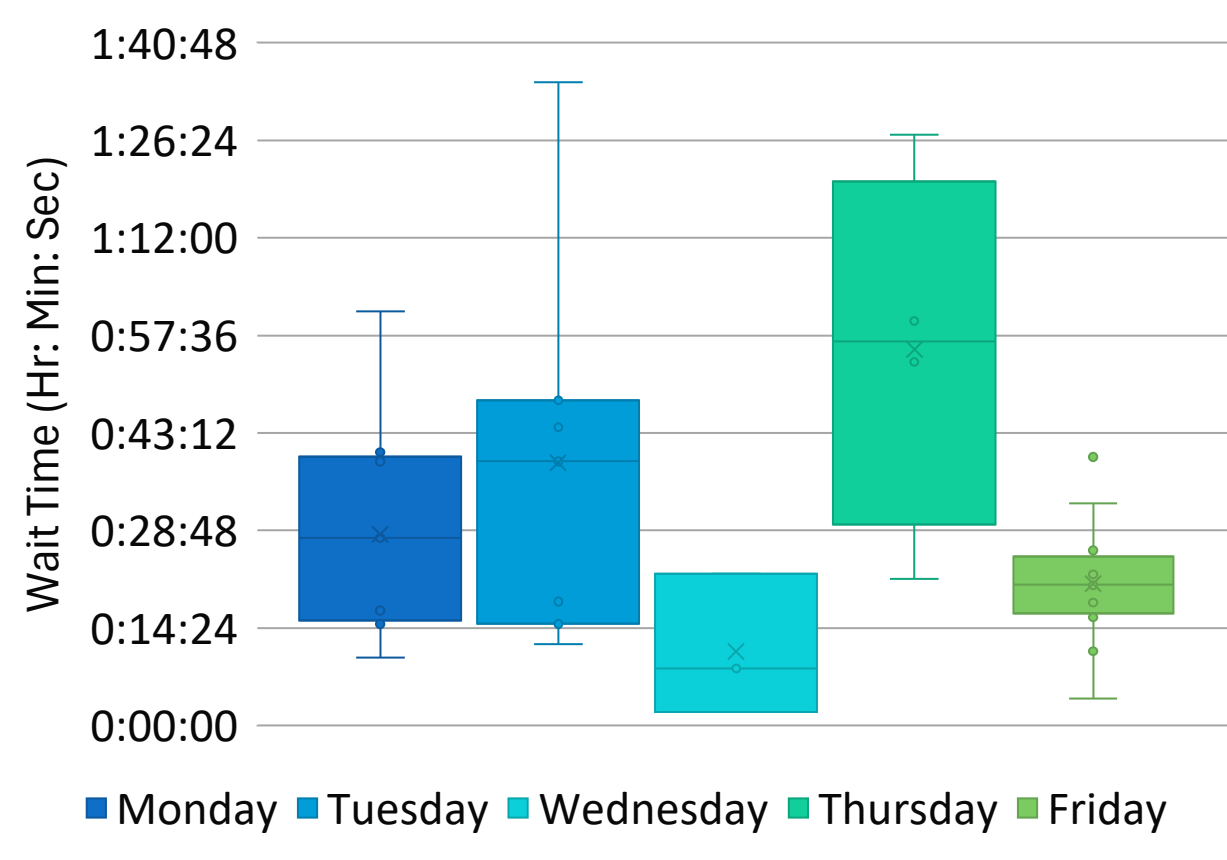
Average Duration of Process Steps

Wait time:
- Day with the longest avg. wait time: Thursday (56 minutes 43 seconds)
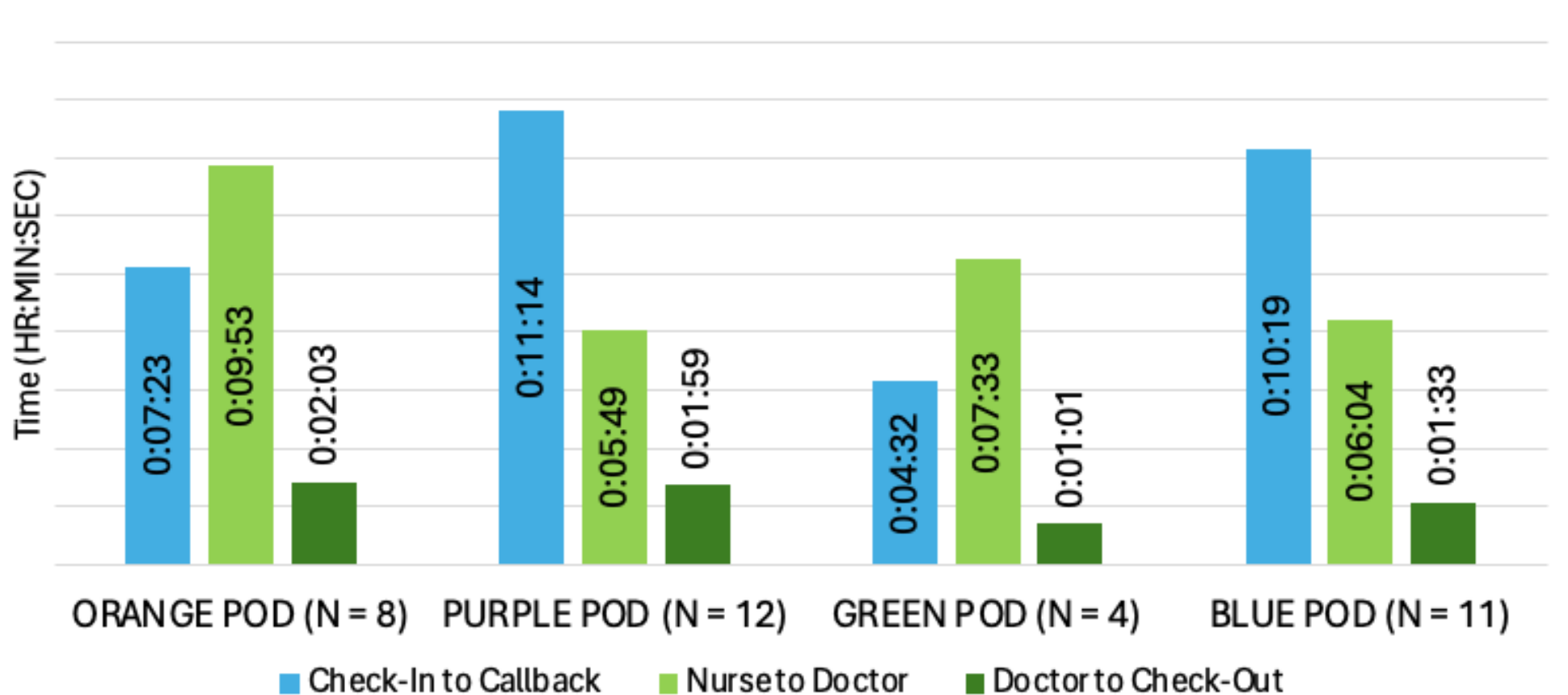- Day with the shortest avg. wait time: Friday (20 minutes 51 seconds)
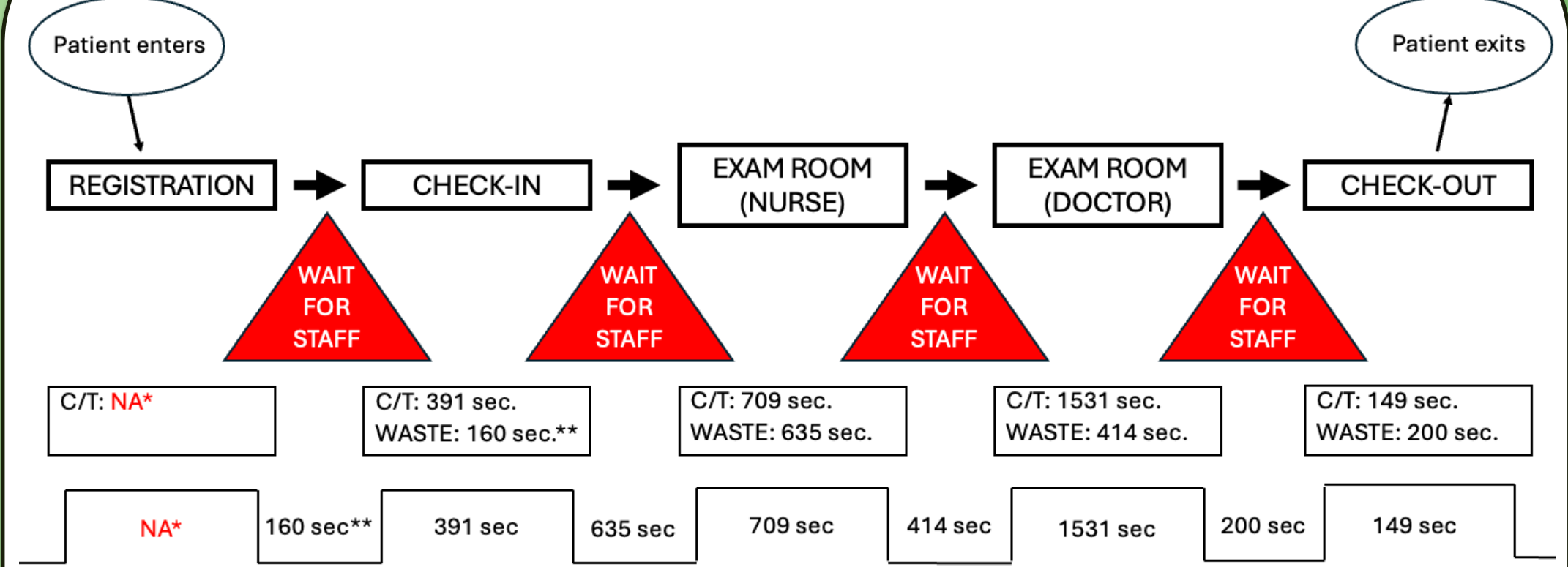
Average Wait Times

Average Wait Time per Day
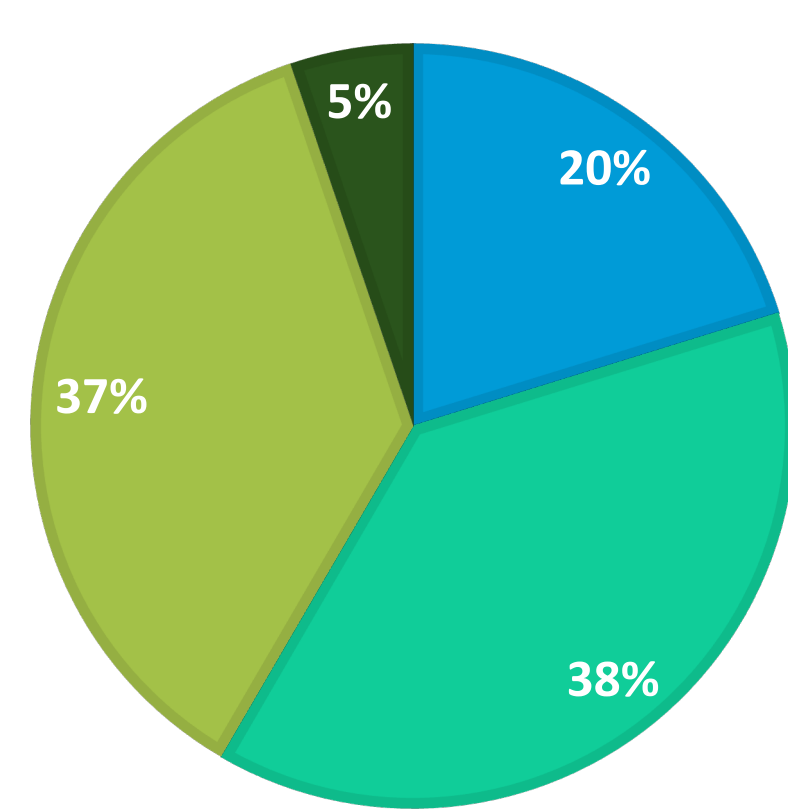

Wait Time Between Pods

Results Cont.

Total lead time for a visit was 4189 sec. (~70 min.). Total value-added time was 2780 sec. (~46 min.) and non-value-added time was 1409 sec. (~24 min.). The VSM revealed that while majority of the time spent in the office is productive to the patient, ~33% can still be improved on.

OVERALL PATIENT ARRIVAL TIME

Additional Patient Statistics:
Patient Volume:
- Highest volume of patients occurred on Mondays and Thursdays
- Lowest volume of patients occurred on Wednesday

Common languages spoken by patients (not English):
- Spanish, French, Arabic, Swahili, Kinyarwanda

No show/ late/ on time-early:
- Largest population of no-show patients occurred on Fridays
- Largest population of late patients occurred on Mondays or A.M. appointments

Recommendations

Wait Time:
Increasing staff-to-patient ratio reduces wait times by preventing staff from becoming overworked. Buffer times in schedules accommodate unexpected delays. PDSA cycles enable experimental improvements [4].
Duration of Process Steps:
No information was collected in exam rooms. Time with doctor is value-added time. No recommendations given unless further studies identify waste.
No-Show Rates:
Dynamic overbooking analyzes patient characteristics/history to reduce no-shows. Spaced-out overbooking appointments based on high no-show rates are key [5]. Multiple reminders especially from staff, help reduce missed appointments. Understanding reasons for no-shows aids in prevention.
Signage:
Use simple, visible symbols and clear text with high contrast. Traditional arrows indicate direction. Differentiate locations with color. Choose appropriate font for legibility. [6].
Wrong Patient Location:
Provide printed instructions for navigation apps and request correct office name entry for navigational apps.

Future Work

Future works and analyses are needed for optimal improvement.
- Collecting staff input to obtain workers insights and suggestions.
- Collecting process data within the examination room to identify waste
- Analysis on recommendations implemented within the office to test their effectiveness in improving patient and staff experience

Acknowledgments

References

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[2] J. Robinson, M. Porter, Y. Montalvo, and C. J. Peden, "Losing the wait: improving patient cycle time in primary care," *BMJ Open Qual*, vol. 9, no. 2, p. e000910, May 2020, doi: 10.1136/bmjoq-2019-000910.
[3] S. Hipp and N. A. Jnanesh, "Application of Lean Six Sigma methodology to reduce the cycle time of out-patient department service in a rural hospital," *International Journal of Healthcare Technology and Management*, vol. 14, p. 222, Jan. 2014, doi: 10.1504/IJHTM.2014.064257
[4] Yuzeng S, Hui LL. Improving the wait time to triage at the emergency department. *BMJ Open Qual*, vol 9. e000708. doi: 10.1136/bmjoq-2019-000708.
[5] J. Creps and V. Lotfi, "A dynamic approach for outpatient scheduling," *Journal of Medical Economics*, vol. 20, no. 8, pp. 786–798, Aug. 2017, doi: 10.1080/13696998.2017.1318755.
[6] R. Rodrigues, R. Coelho, Tavares JMRS. Healthcare Signage Design: A Review on Recommendations for Effective Signing Systems. *HERD: Health Environments Research & Design Journal*. 2019;12(3):45-65. doi:10.1177/1937586718814822