Doctor, Your Patient Is Waiting - Process Wait Time at Bayside Clinic

Abstract

Bayside Family Practice has been growing, but patient dissatisfaction has been growing as well. Patient satisfaction is essential for outpatient clinics to retain and grow patient volumes. Bayside needs to analyze existing Electronic Medical Record (EMR) data to pinpoint process inefficiencies and develop recommendations for process improvement to eliminate bottlenecks. This case illustrates a non-value-add identification problem typical in many medical practices and also in many other settings. The case demonstrates the challenge of analyzing an existing data set to identify trends used to derive data-supported recommendations. Although the problem occurs in the healthcare domain, the problem and associated skills are not healthcare dependent.

Learning Outcomes

By the end of this case study, the student should be able to:

- Analyze a data set to identify trends, support or not support contentions, and draw conclusions to support recommendations
- Apply learning in process analysis to identify process inefficiencies
- Apply critical thinking skills to formulate a comprehensive, data-supported recommendation to a real-world operational problem

Case

Introduction

Bayside Family Practice is a full-service doctor's office with ten board-certified physicians specializing in general family practice. The practice has expanded over the last two years to attract new patients and increase volumes. There are currently ten primary care physicians, four medical assistants, two front desk receptionists, and two billing/collections specialists employed in the clinic.

While the practice has enjoyed high patient satisfaction outcomes over the years, recently, patient satisfaction has decreased as measured through the Clinician & Group Consumer

Assessment of Healthcare Providers and Systems survey (CG-CAHPS). This survey is a part of the Agency for Healthcare Research and Quality (AHRQ) program that studies and reports healthcare patient experience. AHRQ provides surveys for healthcare providers to measure patients' evaluations of their health care experiences (About CAHPS, 2021). The CG-CAHPS survey specifically includes questions concerning "providers and staff in primary and specialty care settings" (CAHPS Clinician & Group Survey, 2019). The Chief of Clinical Operations, Dr. James Millwood, has trended patient satisfaction survey data over the last two years and noticed some troubling trends as patient volumes have risen (refer to Table 1). Additional patient comments have indicated that patients' most frequent concerns center on how long they wait before and during their visits. This trend is concerning to Dr. Millwood because he is aware of several studies demonstrating that the time patients spend waiting is negatively associated with patient satisfaction (Xie & Or, 2017). Since patient satisfaction is critical to retaining and increasing the utilization of the clinic, he has decided that he needs to focus on aspects of the patient visit that contribute to patient wait times.

Table 1: CG-CAHPS Score Summery (Prior & Current Years)

Category	***Prior Year***	***Current Year***
Access to Clinic	80% (90th Percentile)	76% (75th Percentile)
Provider Communication	95% (90th Percentile)	96% (90th Percentile)
Staff Performance	89% (90th Percentile)	83% (75th Percentile)
Use of Information for Care Coordination	83% (90th Percentile)	86% (90th Percentile)
Patient's Rating of Provider	90% (90th Percentile)	86% (75th Percentile)

Dr. Millwood performs some research and turns up evidence in other studies showing that while patient satisfaction decreases with longer wait times, satisfaction increases when paired with more extended time spent with the physician (Anderson, Camacho, and Balkrishnan, 2007). He now considers the two main data points he believes he will need for this project: the time patients spend waiting and the time physicians spend with patients.

Typical Clinic Patient Flow

The clinic is open from 8 am - 5 pm on Mondays through Fridays and has a front desk area with a lobby where two full-time employees work each day of the week. These employees are responsible for checking in patients, answering the phone, and checking patients out. In addition, both employees perform other duties as needed.

There are eight exam rooms available. Typically, four physicians work in the clinic each day, with the physicians rotating different days of the week. In addition, four medical assistants (MA) are on staff daily, with each MA supporting one physician. The MAs are responsible for taking patients back to an exam room from the lobby, taking and recording vital signs, performing medication verification, and taking an initial history of new patient issues, problems, and concerns as part of a process known as "arriving" the patient.

The MA hands the patient off to the physician who provides patient care in the exam room. When the physician finishes with the patient, the physician communicates follow-up orders and instructions to the MA. The MA is responsible for returning to the exam room to begin the follow-up and checkout process. First, patients have the opportunity to ask questions, and the MA communicates any follow-up instructions, prescriptions, or anything else the physician requests. Then the MA walks the patient to the front counter back to the front desk for checkout.

Back at the front desk, the MA communicates the necessary follow-up information to the person performing checkout functions. The front desk employee checks the patient out and schedules any follow-up appointments or tests as required.

Clinic Staffing

The clinic has ten physicians on staff rotating various days of the week and four MAs hired, each working Monday through Friday. The current practice is to allow each physician to have two exam rooms when working, resulting in a limit of four physicians seeing patients at any given time. Based on an equitable allotment of days, each physician has an opportunity to see patients two days per week. Unfortunately, the schedule rarely works out as planned. Physicians switch days and sometimes show up when not scheduled. Several physicians have expressed concern to Dr. Millwood that two days a week do not provide enough patient schedule time to build their individual practices. They have also expressed concern that clinic capacity is not fully utilized. Figure 1 provides a sample of the physician room schedule.

Monday January 4	Tuesday January 5	Wednesday January 6	Thursday January 7	Friday January 8
Exam Room #1 Miles Castillo	**Exam Room #1** Anthony Baker	**Exam Room #1** Ava Kim	**Exam Room #1** Anthony Baker	**Exam Room #1** David Kennedy
Exam Room #2 Miles Castillo	**Exam Room #2** Anthony Baker	**Exam Room #2** Ava Kim	**Exam Room #2** Anthony Baker	**Exam Room #2** David Kennedy
Exam Room #3 Daniel Edwards	**Exam Room #3** Michael Wells	**Exam Room #3** Amelia Robinson	**Exam Room #3** Daniel Edwards	**Exam Room #3** Reena Kumar
Exam Room #4 Daniel Edwards	**Exam Room #4** Michael Wells	**Exam Room #4** Amelia Robinson	**Exam Room #4** Daniel Edwards	**Exam Room #4** Reena Kumar
Exam Room #5 Reena Kumar	**Exam Room #5** David Kennedy	**Exam Room #5** Benjamin Stewart	**Exam Room #5** Michael Wells	**Exam Room #5** Amelia Robinson
Exam Room #6 Reena Kumar	**Exam Room #6** David Kennedy	**Exam Room #6** Benjamin Stewart	**Exam Room #6** Michael Wells	**Exam Room #6** Amelia Robinson
Exam Room #7 Sofia Lu	**Exam Room #7** Miles Castillo	**Exam Room #7** Sofia Lu	**Exam Room #7** Ava Kim	**Exam Room #7** Benjamin Stewart
Exam Room #8 Sofia Lu	**Exam Room #8** Miles Castillo	**Exam Room #8** Sofia Lu	**Exam Room #8** Ava Kim	**Exam Room #8** Benjamin Stewart

Figure 1: Physician & Exam Room Schedule: January 4 through January 8

Clinic capacity is defined as the total number of patients that can be seen on a given day. At Bayside, a room is considered to be fully utilized when at least 20 patients are seen per day. This value has been set by Dr. Millwood considering room turnaround time (cleaning between patients) and lunch hours.

So far, Dr. Millwod has explained the physical exam room limitation and MA labor limitation that constrain him from offering more patient schedule time to each physician above their two days per week. He has not been able to craft a good answer for the clinic capacity question since no one, at the moment, knows the actual clinic utilization. While he has been able to push the problem "down the road" in the past, at least two of the physicians have been more vocal lately, expressing their displeasure.

Electronic Medical Record Data and Process Measurements

The clinic utilizes an Electronic Medical Record (EMR) system. An EMR system is a software application where physicians electronically document medical history, diagnoses, medications, immunization dates, allergies, lab results, and notes. In addition, the system captures timestamp audit data to indicate when staff or physicians complete various functions

within the system. These timestamps help calculate time lengths for multiple steps of the patient experience process.

EMR systems have provided many benefits to clinical practices. The systems allow physicians to collect and share information electronically, which offers many advantages over paper records. One critical benefit to clinical practices is improved communication between the physician and support staff (Dunn, 2007). EMRs reduce miscommunications and should ensure that all relevant data is collected. However, as with most computer systems, the information is only as good as the inputs to the system. Studies have demonstrated that a high degree of physician and staff willing participation and rules and procedures are necessary for EMR data to be complete and accurate (Liu, Zowghi, & Talaei-Khoei, 2019). Dr. Millwood realizes that the physicians and staff need to be using the EMR system consistently and effectively for the timestamp data to be accurate enough to analyze.

Dr. Millwood worked with an IT analyst to pull data from the Electronic Medical Record (EMR) system. First, they collected timestamp data from the system for when physicians and MAs performed different functions in the EMR that represent various milestones in each patient's visit (refer to Table 2). Then, using the differences between the multiple timestamps, the team calculated measurements representing separate components of the patient visit. The nine process measurements are defined in Table 3.

Table 2: EMR Function Timestamps and Process Measurements

EMR Function Timestamp (Milestones)	***Measurements***
Begin Check-In	
End Check-In	When coupled with the "First Contact with Receptionist" timestamp, the difference can represent the length of the Check-In Process.
Patient Roomed	When coupled with the "End Check-In" timestamp, the difference can represent the length of time the patient waits in the lobby.
MA Leaves Exam Room	When coupled with the "Patient Roomed" timestamp, the difference can represent the length of time the MA spends with the patient.
Physician Enters Exam Room	When coupled with the "MA Leaves Exam Room" timestamp, the difference can represent the length of time the patient waits in the exam room.
Physician Leaves Exam Room (Visit Ends)	When coupled with the "Physician Enters Exam Room" timestamp, the difference can represent the physician's length of time with the patient.

Follow-up & Check-out Begin	When coupled with the "Physician Leaves Exam Room" timestamp, the difference can represent the length of time the patient waits prior to the checkout process.
Check-Out Ends	When coupled with the "Follow-up and Check-Out Begins" timestamp, the difference can represent the length of time of the patient checkout process

Table 3: Patient Visit Process Measurements

Difference between EMR Function Timestamp (Milestones)	***Process Measurement***
End Check-In and Begin Check-In	Check-In Duration
Patient Roomed and End Check-In	Wait from Check-In To Room
MA Leaves Exam Room and Patient Roomed	MA Patient Care Duration
Physician Enters Exam Room and MA Leaves Exam Room	Wait from MA to Physician
Physician Leaves Exam Room and Physician Enters Exam Room	Physician Patient Care Duration
Physician Leaves Exam Room and Follow-Up and Check-Out Process Begins	Wait Until Check-Out
Check-Out Ends and Follow-Up and Check-Out Process Begins	Follow-Up & Check-Out Duration

Data Description

The Microsoft Excel spreadsheet provided with this case study contains the data you need for your analysis. The dataset has three main sections giving information about over 4000 patient appointments. The first section includes the first three columns of data and contains the physician's name, the appointment date, and the length of the scheduled appointment. The second section of data includes the EMR timestamp data. Finally, the last section of data contains the length of different segments of patient visits, including the following data elements:

- *Check-In Duration* – duration in minutes of the check-in process
- *Wait from Check-In To Room* – duration in minutes of patient wait time from the point of check in to the time the patient arrives in an exam room
- *MA Patient Care Duration* – duration in minutes of the length of time the MA spends with the patient
- *Wait from MA to Physician* – duration in minutes of patient wait time from the point of the MA leaving the exam room to the time the physician enters the exam room

- *Physician-Patient Care Duration* – duration in minutes of the length of time the physician spends with the patient
- *Wait Until Check Out* - duration in minutes of patient wait time from the point of the physician leaving the exam room to the time the MA begins the follow-up and checkout process.
- *Check Out Duration* – duration in minutes of patient wait time from the point of the physician leaves the exam room to the time the checkout process begins

While reviewing the data, Dr. Millwood noticed that there were several data records with missing data values in various variables (you can identify these issues in the case dataset). Missing values can pose significant problems when analyzing data (Kang, 2013). The most concerning problem in Dr. Millwood's study is the potential for the missing data to reduce the representativeness of the sample and potentially lead to incorrect conclusions.

Clinic Stakeholders

Physicians

Dr. Millwood seeks to recruit the best family practice physicians to the practice. Accomplishing this goal requires him to provide physicians some flexibility concerning the scheduling of patients. Each physician is required to be available for 20 appointments per day. However, there is no policy concerning the appointment scheduling strategy. For example, some physicians prefer to schedule patients every 15 minutes for the first 5 hours of the day and then have the afternoon free for other activities. Other physicians prefer to space the appointments out throughout the day and have free time between each appointment.

In the past, Dr. Millwood experimented with standardized patient scheduling expectations for all physicians, but several physicians left the practice. While compensation is an important satisfaction consideration, Dr. Millwood has realized that physician satisfaction with nonfinancial aspects of the clinic is equally important in keeping physicians at the practice. Focus on physician satisfaction is essential since the relative cost for physicians to change practices is low, making it reasonably easy for physicians to move from one practice to another to seek higher satisfaction.

Medical Assistants

Medical Assistants have been quite vocal in the last year concerning challenges in keeping up with the workload. They have expressed concern that even with new staff, there are times

when they cannot keep up with the work required for each patient. The MAs have indicated specific times when workloads are less likely to be completed in the allotted time. The most common criteria have been when patients are scheduled 15 minutes apart. The MAs indicate that there is not enough time between patients to transition from one patient to another without causing schedule delays. The transition requires cleaning the leaving patient room, getting the entering patient room ready, pulling up the entering patient data, and retrieving the entering patient from the lobby.

Dr. Millwood is sensitive to the MA concerns because it has been challenging to recruit and retain employees to fill these positions. There is a great deal of competition for MAs in the local market. According to the US Bureau of Labor Statistics, the average pay for an MA is $17.23 per hour, placing the job in direct competition with many other equally paying but less intensive jobs that do not require certification. Bayside has difficulty outcompeting larger physician practices on pay and benefits, so MA job satisfaction is also critical to Dr. Millwood.

Challenge

Dr. Millwood believes that the data he has collected provides insight into possible solutions for the practice. He needs to investigate the following.

- What are the average wait times for patients in the clinic across the patient experience (i.e., are there specific process steps where wait times are higher, indicating a bottleneck)?
- What is the average time physicians and MAs spend with patients delivering care?
- Do average patient wait times differ by physician or MA?
- Does evidence exist to support the MA's contention that scheduling patients 15 minutes apart contributes to longer patient wait times?

Dr. Millwood needs to obtain information from the data to formulate a plan to address the potential conflicting elements of the physician, medical assistant, and patient satisfaction. You are on Dr. Millwood's team and must analyze the data provided with this case study to provide a recommendation. Your analysis of the data will help you formulate answers to the following discussion questions.

Discussion Questions

1. Identify the average value-added process step times and the non-value added process step times. Value-added process steps are those steps where the patient receives some value, while non-value added process steps are steps where patients are waiting and not receiving any value. Identify and discuss areas of the patient process about which Dr. Millwood should be concerned based on your findings from your data analysis. Include any discussion about specific physicians that are of concern. If there are missing data values in the dataset, you will need to develop a strategy for accounting for any missing data. You can take several approaches, but whatever approach you choose, you must discuss the approach and justify how your method will not reduce the sample's representativeness.
2. Dr. Millwood has identified missing data in the EMR dataset. The missing data indicates that some action was not taken or some data was not collected in the EMR system. Consider the data variables in the data set that are missing values. Identify and discuss possible causes in the processes (human or system-related) for the missing data and develop potential solutions to how Dr. Millwood can prevent missing data in the future. A Cause & Effect diagram may help brainstorm possible missing data causes. You can then discuss mitigations to the causes with either process, policy, or practice changes.
3. Using the data, determine the validity of the medical assistants' concerns regarding patient scheduling cadence and workload. Discuss your conclusions supported with evidence from the data.
4. Process bottlenecks are constraints that slow the throughput of patients as they move through their clinic visits. Considering your answers to the questions above, formulate a recommendation for Dr. Millwood to address any process bottlenecks and non-value-added activities you have identified in your data analysis. Your solution recommendation should also address any concerns you may have identified concerning medical assistant workloads. Address each of the three stakeholder satisfaction impacts in your suggestions. Finally, support your proposal with evidence.
5. Dr. Millwood needs to develop a solution concerning clinic capacity and the physician's requests to see more patients. Consider the current clinic capacity constraints from both a physical space and labor perspective. Develop a solution that will work within each of these constraints. If your solution does not fall within the constraints (i.e., you recommend hiring more labor or propose a physical space modification solution), you

must justify any increased capital or operating costs. This problem requires an understanding of clinic capacity and current utilization rates. Calculate these values and use them in your analysis, and include supporting evidence for your recommendation.

References

About CAHPS. (2021, June). Retrieved July 22, 2021, from https://www.ahrq.gov/cahps/about-cahps/index.html

Anderson, R. T., Camacho, F. T., & Balkrishnan, R. (2007). Willing to wait?: The influence of patient wait time on satisfaction with primary care. *BMC Health Services Research, 7:31,* doi:10.1186/1472-6963-7-31.

CAHPS Clinician & Group Survey. (2019, March). Retrieved July 22, 2021, from https://www.ahrq.gov/cahps/surveys-guidance/cg/index.html

Dunn, M.J. (2007). Benefits of electronic medical records outweigh every challenge. *Wisconsin Medical Journal, 106*, 159-160.

Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal of Anesthesiology, 5,* 402-406.

Liu, C., Zowghi, D, & Talaei-Khoei, A. (2019). An empirical study of the antecedents of data completeness in electronic medical records. *International Journal of Information Management, 50*, 155-10.

Xie, Z., & Or, C. (2017). Associations Between Waiting Times, Service Times, and Patient Satisfaction in an Endocrinology Outpatient Department: A Time Study and Questionnaire Survey. *The Journal of Health Care Organization, Provision, and Financing, 54*, 1-10.