**Capstone Project**

**GEB 6527 – Spring 2023**

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**Discussion Questions**

QUESTION 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.**

The value and non-value process time was identified from the stream map which is provided below.

**Value added process** - The term "Value-Added Process Steps" refers to the stages of a medical process where the patient receives benefits or value. In a typical medical process that takes 77.94 minutes to complete, there are several stages where the patient gains value, such as the check-in period (which takes 1.72 minutes) where the patient provides their personal information, the medical assistant patient care stage (which takes 13.94 minutes) where the medical assistant takes care of the patient's medical records, the physician care stage (which takes 12.11 minutes) where the patient is consulted by the physician and receives treatment, and the follow-up and check stage (which takes 7.53 minutes). All of these value-added stages add up to a total duration of 35.3 minutes.

**Nonvalue added process** - In addition to the value-added process steps, there are also non-value-added processes that occur during a medical process. These are characterized by patients waiting without receiving any value. In a typical medical process that takes 77.94 minutes to complete, patients spend an average of 42.64 minutes performing non-value-added process steps, such as waiting for a room (10.83 minutes), waiting for a doctor (18.57 minutes), and waiting until check-out time (13.24 minutes).

**Stream map** **–**

Diagram

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**Suggestions -**

Dr. Millwood should consider the implementation of an EMR system, and the use of Medical Assistants.

At this clinic, there are ten physicians who rotate on different weekdays, and four senior physicians who work from Monday to Friday. Each physician is currently assigned two examination rooms per shift, which means that a maximum of four physicians can attend to patients simultaneously.

Dr. Millwood is finding it difficult to give a satisfactory answer regarding the clinic's capacity since the current utilization of the clinic is not known. While he has been able to put off dealing with this issue in the past, two physicians have recently started expressing their discontent more openly.

Despite concerns, the Clinic has implemented an EMR system, offering advantages such as improved communication, reduced miscommunication, and complete data collection. Dr. Millwood acknowledges that consistent and effective use by physicians and staff is crucial for accurate timestamp data analysis. Value-Added Process Steps can be:

* When patients spend more time with the physician, it leads to increased satisfaction.
* Patients approach the front desk to check in.
* Medical Assistants (MAs) escort patients to exam rooms, record vital signs, verify medications, and take a preliminary history of new issues as part of the arrival process.
* The MA transfers the patient to the physician for medical care in the exam room.
* After the physician is done with the patient, they communicate follow-up orders and instructions to the MA.
* The MA returns to the exam room to begin the follow-up and check-out process.
* During this process, the patient can ask questions while the MA relays physician instructions, prescriptions, or requests.
* The MA escorts the patient back to the front desk for check-out.
* At the front desk, the MA communicates the necessary follow-up information to the person performing the check-out functions.
* At the front desk, patients are checked out and follow-up appointments/tests are scheduled. Non-Value Process is.
* The time that patients spend waiting.
* Front desk employees answering the phone.
* Front desk employees checking patients out.
* After checking in, patients are asked to sit in the lobby until they are called back for their appointment.

QUESTION 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.**

We would like to address various explanations for the missing data in EMR datasets, examine a few possible causes in the process by both humans and systems, and discuss potential approaches to prevent future occurrences of similar circumstances caused by missing data.

According to the provided EMR data, we can see that a significant amount of time has elapsed between the departure of the Medical Assistant and the arrival of the Physician. By determining the doctor's exact availability and scheduling appointments accordingly, we might cut down on patient wait times. to cut down on the patient's waiting time.

Additionally, we could send a reminder to the patient if he is able to make it to the appointment on time, or we could provide an option to reschedule if he is unable to attend. This would save time for the physician, and if the patient appointment is cancelled early, we could also display the slots on the website so that someone else could fill the vacancy, which would also help the management staff.

Also important is maintaining and following the schedule appropriately. Physicians arriving unscheduled would not benefit patients, as no one would be scheduled for the date in.  Therefore, it is advisable to finalize the physicians' schedules for the forthcoming weeks in advance so that patients can plan/schedule their visits accordingly.

Also, below are the Potential causes and solutions for the missing data in EMR. 

**Potential causes of the Missing data** –

* Mistakes made by humans are possible for a variety of reasons, including multitasking on the side of the receptionist or the patient.
* The receptionist could potentially make a mistake by entering information into the wrong fields or uploading it altogether.
* Furthermore, there is always the chance that data will be misinterpreted while being stored in the database due to software or server difficulties. Also, a power outage is always a possibility.

**Potential solutions that could be Implemented** -

* Before placing the staff on the floor, they should be trained well.
* Keep a backup database server in case the main server goes down during the working hours.
* Put up some important rules or terms and conditions on the website. Also, display necessary guidelines when the patient completes making his appointment.

A fishbone diagram, also known cause and effect diagram, is a tool used to identify the root causes of a problem. Below is the fishbone diagram for the business case    
   
Diagram

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QUESTION 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.**

Medical assistants are in great demand, and Dr. Millwood relies heavily on them. However, there are some problems with the current method that need to be fixed.

The provided graph shows that the usual duration of medical appointments is over ninety minutes, whereas doctors spend just twelve minutes with their patients on average. This information implies that medical visits involve an extended period, and the amount of time doctors must engage with their patients is short. This may suggest that healthcare professionals face significant time constraints, leading them to prioritize the most important medical issues, but not being able to delve deeper into a patient's medical history. It could also imply that there is an urgent need for medical staff to manage their time effectively, which may improve patient care and reduce waiting times.

Chart, bar chart

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According to the graph below, each healthcare provider spends between 9 to 15 minutes with a patient during their visit. However, the entire check-in process, the time it takes to provide medical care, and the interaction between the patient and provider last between 20 to 25 minutes at a minimum.

Chart

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This information suggests that while the time spent with the provider is relatively short, there are other factors that contribute to the overall length of a patient's visit. The check-in process, medical procedures, and any additional consultations with the provider can all add to the time spent at the clinic.

Chart, line chart

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Based on the above graph, we can identify three different scheduled visit lengths: 15, 20, and 30 minutes. The average time spent by MA with patients for each visit length category has been calculated. For patients with a 15-minute visit length, the average time spent is 18.2 minutes, which means that each patient is waiting for an additional 3 minutes on average. The graph shows that the average time spent on patients is greater than 15 minutes for a 15-minute scheduled visit length, validating the MR's concerns. However, for 20 and 30-minute intervals, the time spent is less than or equal to the scheduled visit length.

    
Some recommendations to improve patient satisfaction and provide better service:

Streamline administrative tasks: One reason doctors may only spend 12 minutes with each patient is because they are burdened with administrative tasks, such as filling out paperwork and entering data into electronic health records. By streamlining these tasks, either using technology or delegating them to support staff, doctors can spend more time with their patients.

**Increase appointment length**: While the typical length of an appointment may be one hour and thirty minutes, doctors are only spending 12 minutes with patients. By increasing the length of appointments, doctors can spend more time with each patient, allowing them to provide more comprehensive care and address any concerns the patient may have.

**Optimize medical procedures**: Find ways to make medical procedures more efficient without sacrificing quality of care. For example, some clinics have started using telemedicine to allow patients to have remote consultations with their providers, reducing the need for in-person visits.

**Utilize technology**: Implementing technology such as electronic health records and appointment scheduling software can streamline processes and reduce appointment times. This can also help staff to manage patient data more efficiently.

**Evaluate and improve processes**: Regularly evaluate appointment processes and identify areas for improvement. This could include adjusting appointment scheduling protocols, refining patient intake processes, or revising staff training programs.

QUESTION 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.**

Based on the analysis of data and responses to prior questions, we have pinpointed several bottlenecks in processes and activities that do not add value within Dr. Millwood's clinic. Our recommendations aim to resolve these issues and address concerns related to the workloads of medical assistants, keeping in mind the satisfaction of patients, medical assistants, and physicians.

**Improve patient check-in and check-out procedures**: Develop a digital check-in system that allows patients to input required information and fill out paperwork prior to their clinic visit. This saves the time spent on administrative chores during patient visits and decreases patient wait times. Ensure that all follow-up appointments and medication information are effectively provided to patients at check-out, possibly via a secure patient portal.

Evidence: According to the data analysis, patients spend 1.72 minutes on check-in and 13.24 minutes on check-out. Improving these procedures can reduce patient wait times and boost patient satisfaction.

**Refine room management and appointment scheduling**: Reevaluate the current room management and scheduling system to decrease patient waiting time. This may involve allocating more rooms to doctors during peak hours or fine-tuning the schedule to prevent rooms from being unoccupied for lengthy periods. Moreover, consider staggering appointment times to avoid multiple patients arriving at the same time.

Evidence: The data analysis demonstrates that patients wait 10.83 minutes for a room and 18.57 minutes for a doctor. By refining room management and appointment scheduling, the clinic can reduce waiting times and improve the overall patient experience.

**Introduce a workload management system for medical assistants**: Implement a system to manage medical assistant workloads, ensuring they have sufficient time to support patients and doctors. This may include monitoring the number of patients assigned to each medical assistant and redistributing tasks when required.

Evidence: Medical assistants spend an average of 13.94 minutes on patient care. By introducing a workload management system, the clinic can tackle concerns related to medical assistant workloads, leading to better job satisfaction and improved patient care.

**Promote communication and teamwork between medical assistants and doctors**: Encourage an atmosphere of open communication and collaboration between medical assistants and doctors. Regular team meetings and training sessions can ensure all team members are aligned with patient care expectations and help identify any issues that need resolution.

Evidence: The data analysis indicates that doctors spend 12.11 minutes on patient care, and medical assistants play a vital role in supporting them. By promoting better communication and teamwork, the clinic can ensure that both doctors and medical assistants collaborate effectively, ultimately enhancing patient satisfaction and overall care quality.

In summary, addressing these process bottlenecks and non-value-added activities will not only improve the experience for patients but also enable medical assistants and doctors to work more efficiently. By enhancing check-in and check-out procedures, refining room management and appointment scheduling, introducing a workload management system for medical assistants, and promoting improved communication between medical assistants and doctors, Dr. Millwood's clinic can boost stakeholder satisfaction and provide higher-quality care to patients.

QUESTION 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.**

As per our discussions, getting the right care at the right time is a preliminary requirement for any kind of hospital or clinic. After analyzing the given data, we found that there is scope to utilize the time in a much more productive manner. According to the given data, there were 4500 doctor consultations recorded in one quarter. In a general scenario, as per our knowledge, there are 20 patients visiting the four doctors in the hospital every day, which makes a total count of 80 patients a day. Also considering there are 23 working days in a month, excluding a week for holidays, doctor’s emergencies, etc., which makes a count of 1840 (80 patients \* 23 days). So, for one quarter, it makes a count of 5500 patients. There is a significant difference between the recorded number of patients and the general estimation that we made. It is evident that there is some underutilization of the resource in Bayside Family Practice.

To get this situation rectified, concerning clinical capacity and the physician’s request to see more patients, a few suggestions and alternatives can be developed. From the given data, out of all the provided time utilizations, the wait time to see the doctor is comparatively taking more time. It is obvious that the intensity of the health issue varies from patient to patient. Prioritizing the patients depending on the level of intensity and assigning the time accordingly can be one good solution. For example, if a patient has a less simple health issue, it is recommended to allot a smaller time slot, and vice versa. Also, it is important to make sure that the time slot of whatever duration needs to satisfy the patient. Secondly, we recommend hiring a few medical assistants. This could potentially act as a productive layer before meeting the doctor directly. The patient will be sent to the doctor after all the formalities are done, which saves some time. This way, the wait time can be used productively, and the medical assistants let the doctor know the actual reason, which makes the treatment quick. The medical assistants can be responsible for making the wait time shorter. This enhances customer satisfaction. With this provision, if the patient count increases, then it is recommended to develop the clinical space with some sophisticated equipment. If the performance of the hospital is good with this strategy, it can be continued as usual.

**FMEA (Failure Modes and Effects Analysis):**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Function | Potential failure Mode | Effects of potential failure mode | Severity | Potential causes | Occurrence | Current Process control | Current design control | Detectability | RPN |
| Doctor | Clinic capacity | Count of patients being treated | 8 | Irregular use of capacity | 5 | Sorting out capacity resources and requirements | Getting sophisticated equipment, optimizing the capacity usage | 7 | 280 |
| Patient | Treatment delay | Health complexity issues, Patients dissatisfaction | 9 | Irregular time slot distribution | 8 | Estimation of time according to the complexity level of health issue | Development of new system that allocate the time slots accordingly | 8 | 576 |
| Assistant | Maintenance and recording data | Improper treatment,  Patient discomfort | 7 | Untrained staff, good medical equipment | 5 | Improving standards | Quality training, Budget provision for maintenance | 5 | 175 |

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