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Six Sigma in the Cleveland Clinic Call Center

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Abstract: In an increasingly competitive environment, customer satisfaction and loyalty are vital factors for the success of any organization. Six Sigma, as a continuous improvement methodology, has been widely applied in manufacturing and service industries since its introduction in the 1980s. This paper examines the case of the Cleveland Clinic Call Center, aiming to optimize its workflow through qualitative and quantitative analysis to reduce call abandonment rates and enhance customer satisfaction. By collecting weekday call data from November 2021 to September 2022, we found the average daily abandonment rate to be 49.72%. To understand processes beyond traditional time-based measures, we also conducted surveys among Patient Service Specialists (PSSs) and proposed several improvement suggestions, such as hiring more PSSs, establishing standard templates, and updating the call system. Ultimately, through the application of Six Sigma, we helped Cleveland Clinic reduce its call abandonment rate by 30%.

Keywords: call center optimization; customer satisfaction; six sigma methodology

1. Introduction

"Currently, companies are in increasingly competitive environment in which customers' satisfaction and loyalty are vital factors in the success of any organization. This requires the use of continuous improvement methodologies, such as Six Sigma, which enable companies to improve customer satisfaction and meet their expectations." (Patrícia, Sérgio, and Isabel da Silva, 2012). *"Since its introduction by Motorola in the 1980s, six sigma and its philosophy have found widespread application in many manufacturing industries. It has also inspired applications in service industries." (Chakrabarty and Tan, 2007).* Speaking of service industries, we have to think of call centers. "Call Centers are an overall wonder. Nations, for example, the Netherlands, Ireland, UK, Philippines, South Africa and India all have abundant Call Center businesses. In the US there are larger than 55,000 Call Centers utilizing roughly 2.9 million specialists.For some , clients, Call Centers are the main purpose of contact with an association and their encounters can assume a noteworthy job in their choice to remain or leave that association. Nearly everybody in their day by day life has had the experience of reaching one of those Centers for an assortment of reasons." (Gautam, 2019). Because of the high demand for call centers, the requirements for call center efficiency are even higher. Especially for medical centers or hospitals, managers are more concerned about how to reduce waste in the workflow and improve efficiency. In this paper, we will study the case of the Cleveland Clinic Call Center and develop a call center workflow optimization plan for them through qualitative and quantitative analysis to help them reduce call abandonment rates and improve customer satisfaction.

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Cleveland Clinic is a renowned hospital worldwide, and it is known for the medical services it offers people. The number of people trying to access these services is also high. The company offers services to its patients by providing service through phone call centers where providers are available to answer questions or guide the patients through the process.

The West Call Center is currently facing a high amount of abandonment rate of 50%, where patients are hanging up the calls. The company clearly wants to provide the best services for their patients by reducing the abandonment rate to 18% at the beginning and also coming up with some structured procedures that they can implement in the organization to overcome such problems in the future. Due to the higher waiting times, it is resulting in an increase in their abandonment rate. The major challenges that the company is facing currently are Customer Satisfaction, Resource Constraints, Abandonment rates, and Patient Waiting time.

This paper Whether it is data collection and analysis or optimization suggestions, we will start from both qualitative analysis and quantitative analysis.

2. Data Collection (Quantitative Data)

As a primary source of quantitative information, weekday call data from November 2021 to September 2022 was provided in Table 1. The following information was listed for each day:

Table 1. Weekday Call Data from November 2021 to September 2022.

Column Title	Description
Calls Offered	The number of incoming calls received by the West Side Call Center on a specific day
Calls Answered	The number of calls answered by all PSSs on a single day
Calls Abandoned	The number of patients abandoning, or hanging up, prior to
Abandonment Rate w/Out Ring No Answer	The percentage of patients hanging up out of all calls offered
Actual AHT (Minutes)	Average Handle Time a PSS spends working with a patient
Avg Time to Abandon (Minutes)	Of the patients that hang up, the average time they wait on hold prior to disconnecting the call.
Avg ASA (Minutes)	The average waits the patients spends on hold prior to talking to a PSS
Skill	Calls are broken up into three categories: Refills, Provider, and AH (After Hours)

From the preliminary analysis, we were able to see that the daily average abandonment rate for this period was 49.72%. Call volume started off the highest with an average volume of 1820 on Mondays with a steady decrease down to an average of 1285 calls on Fridays. A similar trend in the average abandonment rate is seen, with the value lowering as the week progresses. See Figure 1 for more details.

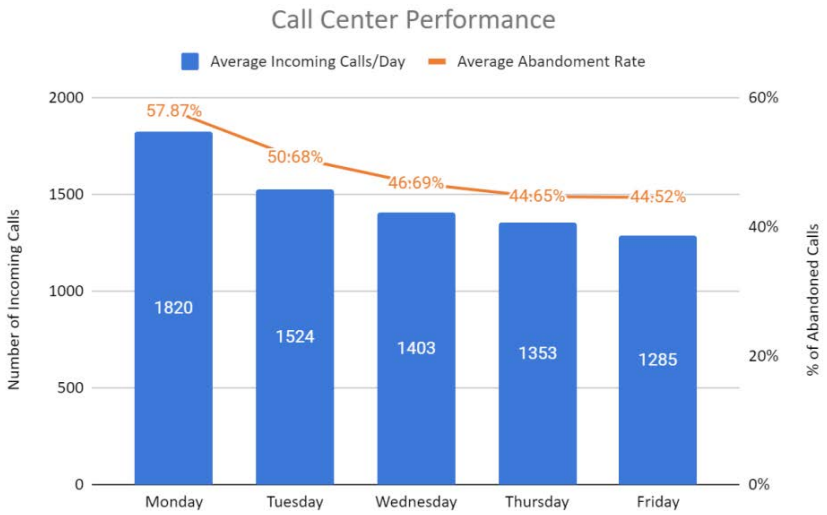

Figure 1. Call Center Performance from November 2021 to September 2022 by Day of Week.

In addition to this larger dataset, Ms. Caitlyn Rushwin, clerical manager of the West Side Call Center, has started to collect daily call metrics. This information includes the call volume and abandonment rate of each day, as well as the new benefit of noting the number of PSSs working that day. Other comments, such as training or changes in procedures, are also noted, enabling management to track improvements.

3. Data Collection (Qualitative Data)

To understand the process outside of a traditional time-based measure, surveys were created and distributed to caregivers. One survey was targeted toward current Patient Service Specialists - PSSs, those who answer the calls coming into the call center. A total of ten questions were sent out asking about what each PSS thought about the call center performance, what frustrates them, and ideas they had to improve the process. After leaving the survey open for a week, 12 responses were gathered.

An additional survey was sent to clinical caregivers who work at various sites served by the West Side Call Center. Specifically, questions were asked to see if PSSs are clearly communicating patient needs to the correct clinical teams. After leaving the survey open for a week, only five responses were collected. Even with a low response rate, ideas coming from the clinical team will allow West Side Call Center management to see its effect on other divisions.

4. Analysis (Quantitative)

We decided on two targets for quantitative analysis: Muda calculation and Capacity calculation.

4.1. Muda Calculation

The "Muda" means the waste in a system. In our project, we define the Muda as the waiting time of every patient who calls the West Call Center. We split the calls into 2 different scenarios. Then, we defined 2 formulas:

1) Get Response: Avg ASA * Calls answered
2) No Response: Avg Time to Abandon * Calls Abandoned

The West Call Center divided the call source into three kinds: After Hours, Provider, and Refill. Based on this information, we summarized the data from the data set and generated Table 2 below:

Table 2. Data from the West Call Center.

	Time to Abandon (Min/calls)	Calls Abandoned (per weekday)	Average Speed of Answer (Min/calls)	Calls answered (per weekday)
After Hours	3.15	11.87	2.34	42.5
Provider	5.69	614	12.68	1227.2
Refill	5.45	106.16	12.72	203.3

The Muda would be the waiting time of every patient:

$$\frac{3.15 * 11.87 + 5.69 * 614 + 5.45 * 106.16 + 2.34 * 42.5 + 12.68 * 1227.2 + 12.72 * 203.3}{11.87 + 614 + 106.16 + 42.5 + 1227.2 + 203.3} = 10.14 \text{ minutes per patient}$$

This result indicates that every patient needs to wait about 10 minutes on the line.

4.2. Capacity Calculation

For further research, we got the data file, including the amount of PSS every weekday. After discussion, we chose six parameters and calculated the weighted average values. The results are as the following Table 3:

Table 3. The Amount of PSS Every Weekday.

OFFERED	ANSWERED	ABD	ABD %	ASA	# STAFF
1394 calls/day	750 calls/day	639 calls/day	44.80%	10.46 mins	11.87

From this table, we can get the Call Center's performance from August 2022 to October 2022:

The total number of calls for West Call Center is 1394 calls every weekday. The West Call Center can answer about 750 calls every weekday.

The Abundant amount is 1394-750 = 639 calls every weekday.

The Abundant rate is 639/1394 = 44.80% every weekday.

Every patient needs to wait about 10.46 minutes before they get the answer.

The amount of PSS is 11.87 (rounded up to 12) every weekday.

Thus, we can calculate the capacity of one PSS: 1394 /11.87 = 63.7 calls every weekday.

5. Analysis (Qualitative)

When we sent the survey to the call center caregivers (PSSs) and asked them to state some of the concerns and improvements they provided us with some of the details. Based on the results obtained we performed some qualitative analysis and developed a Pareto chart in Figure 2:

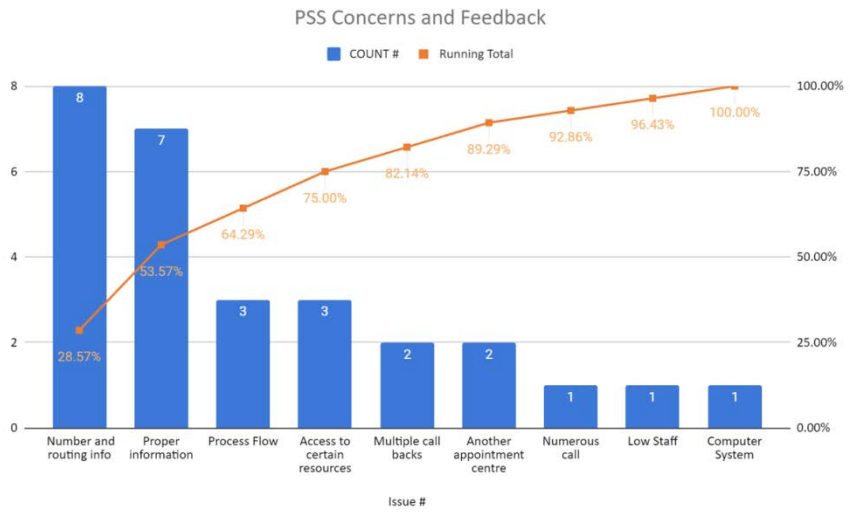

Figure 2. Major Concerns and Opinions from the PSS.

Based on the survey to the PSS we categorized them into the following sections based on their concerns which are

1) No proper number and routing information - 28.57 %
2) Proper information - 53.57%
3) Process flow - 64.29 %
4) Access to certain resources - 75.00%
5) Multiple call backs - 82.14%
6) Another appointment center - 89.29%
7) Numerous calls - 92.86%
8) Low Staff - 96.43 %
9) Computer System - 100.00 %

Here are the improvements in the following Figure 3:

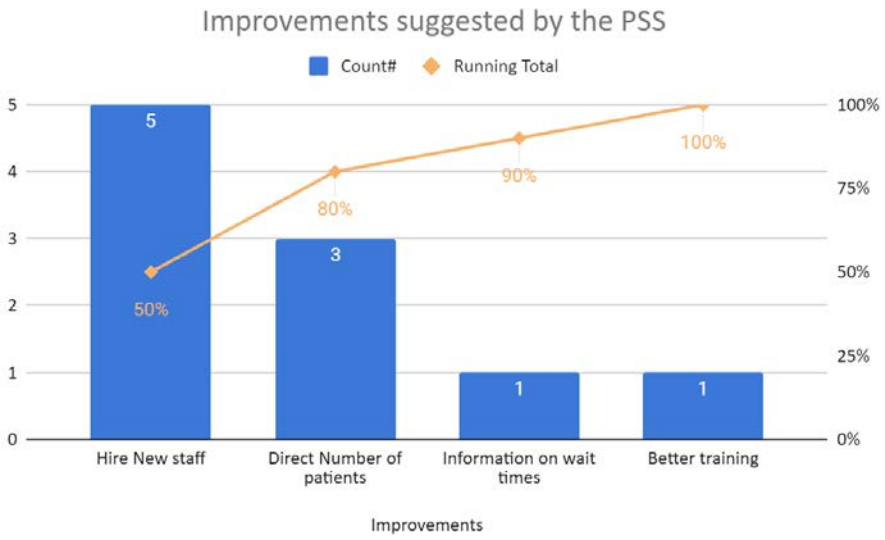

Figure 3. Improvements Suggested by the PSS.

The staff members also suggested the improvements that they are looking forward to in the organization which they would like to see implemented to make them work more efficiently and effectively for satisfying their customer needs:

1) Hiring new staff - 50%
2) Direct number of patients - 80%
3) Information on wait times - 90%
4) Better training - 100 %

6. Key Findings (Quantitative)

Our key finding is to correct the previous full trust and analysis of offered calls. We ignored the number of patients who had a call-back because patients who called back repeated their demands, this increased the total number of calls recorded by system . If the Cleveland Clinic call center had enough staff to handle the daily calls capacity, the call-back phones would not have occurred. This means that the number of calls recorded by the system is higher than the actual customer demand. Due to the falsely high number of offered calls will lead to errors in calculating the number of staffs needed, resulting in labor waste, we recalculated the true number of staff required by the Cleveland Clinic call center by taking into account the case where a customers' call-back been answered after their first call were unanswered.

According to the records from Daniel (PAC of Cleveland Clinic call center), we know that 15% to 20% of the daily calls are callback calls. We subtracted the number of callback calls from the number of offered calls to obtain the actual daily demand of the patient.

Dividing the actual number of calls by the capacity of each employee, we get the corresponding actual number of staffs needed. As shown in the Table 4 below:

Table 4. The Capacity of Each Employee.

OFFERED/Day	ANSWERED/Day	ABD/Day	ABD %	ASA	# STAFF	Average Calls/Staff
1394	750	639	44.80%	10.46	11.87	63.7
Assume Repeated%	**Repeated calls**	**Actual calls**	**Needed PSS**			
15%	95.85	1298.15	20.4			
20%	127.8	1266.2	19.9			

In order to better help the Cleveland Clinic call center understand the impact of the number of staffs on the actual incoming call capacity, we have also made the following Table 5, from which we can see that in the case of 20 PSS staffs, the number of calls offered per day is closest to the number of patients' real demands and there is no labor waste.

Table 5. The impact of the Number of Staffs on the Actual Incoming Call Capacity.

Total Calls/Day	ABD/Day	PSSs Per Shift	Approximate Incoming Call Capacity
1394	639	12	764
Assume Repeated	**Actual Demand**	13	828
15%	1298.15	14	892
20%	1266.2	15	956
Capacity/PSS		16	1019
63.7	calls/day	17	1083
		18	1147
		19	1210
		20	1274
		21	1338
		22	1401
		23	1465
		24	1529

7. Key Findings (Qualitative)

For the qualitative analysis, we conducted several meetings with the Cleveland Clinic team to discuss and summarized the fishbone diagram which describes the reasons for the increase in call abandonment. As shown in the Figure 4 below, the five main factors affecting the call abandonment rate are variability, resources, process failure, people, and provider response time.

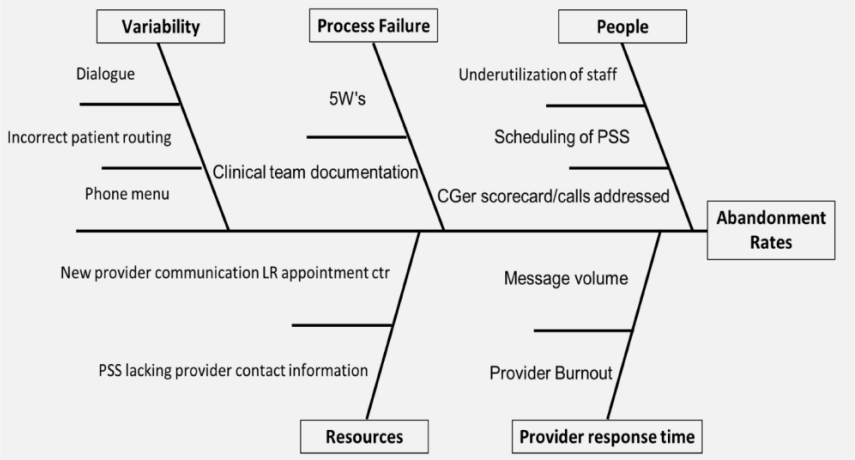

Figure 4. The Reasons for the Increase in Call Abandonment.

7.1. Variability

The Cleveland Clinic team believes that the factor that most affects workflow. Since they don't have standardized mail or communication format, their conversations are always inefficient, and they always get the wrong patient routing. This means that when employees get the wrong information, they have to repeat their work. In the analysis part of the Pareto chart, we can also see that the two most frequently reported problems by PSS staff are wrong numbers, routing information, and patient information.

7.2. Resources

Clinic team believes that PSS staff always miss patient contact information. The lack of patient contact information prevents PSS: staff from being able to contact patients, which virtually increases the probability of patients calling back. Therefore, in the survey for PSS employees, 10% of PSS employees hope to be able to access certain resources.

7.3. Process Failure

The potential waste that leads the process failure comes from the unskilledness of PSS staff in the workflow. Cleveland Clinic has certain documents and 5Ws to guide the work of PSS staff, but wrong orders and operations of staff will lead to unnecessary processing time.

7.4. People

Uncertainty in personnel also increases processing time. For example, the Clinic team stated that all PSS staffs work from home, and an unsupervised work environment will reduce employee utilization. For scheduling of PSS, the temporary leave of absence of employees will make it impossible for the Clinic team to arrange replacements in time. The lack of labor due to temporary leave not only increases the workload of other employees but also reduces the call center's capacity for the day.

7.5. Provider Response Time

The number of daily calls in the call center is oversaturated, which is twice the existing capacity. This results in insufficient response time for PSS employees. Patients hung up on the phone after long waits, and the abandonment rate increased rapidly.

In addition to the survey for PSS employees, we also conducted a survey for Clinical Staff. Although we only received 4 responses, the nurse station is the front line of the work, and their opinions have also played an important role in process optimization.

Clinical Staff recommends including Name, Medical Record Number, DOB, Appropriate Phone Number, and Patient Problem Information in the standard template to help

them better locate the patient, understand the patient's situation, and deal with the patient's needs in a timely and correct manner. They also recommend that PSS staff remind patients to turn on voicemail when transferring so that even if the patient does not receive a call from the nurse, they can receive medical advice from the nurse. Clinical Staff also hopes that Cleveland Clinic can schedule appointment training and standardize the introduction of PSSs. Clinical nurses said that many times when they answered the phone, patients said they had spoken to another nurse, but the reality is that the patient just communicated with the PSS staff. The confusion over identification confuses nurses and increases their processing time. They think improving the communication between Clinical teams and the Call Center is crucial.

8. Conclusion

"Telephone call centers are an integral part of many businesses, and their economic role is significant and growing. They are also fascinating sociotechnical systems in which the behavior of customers and employees is closely intertwined with physical performance measures. In these environments, traditional operational models are of great value—and at the same time fundamentally limited—in their ability to characterize system performance" (Gans, Koole, and Mandelbaum, 2003). Therefore, we offer four suggestions based on the traditional call center operation model.

Firstly, although the Cleveland Clinic (CC) currently lacks the ability to hire more Patient Service Specialists (PSS), we strongly recommend doing so once the staff level constraints are eased. This would significantly reduce the abandonment rate as the current number of PSS is 12, with each handling calls for 6.5 to 8 minutes. Hiring approximately 8 more PSS would achieve the goal, as increased staffing would decrease the time per call, allowing more daily calls to be handled.

Secondly, building a standard template to improve capacity is essential. For new trainees, shadowing the trainer until EPIC training is crucial. This includes listening live to trainer calls and discussing each call once completed. Ensuring caregivers fully understand their new role, encouraging out-of-the-box thinking, and having trainees familiar with EPIC prior to formal training will build their confidence. They should review LA Communications (Sharepoint) daily to get familiar with provider names and scheduling instructions. The EPIC training spans six days, covering basic skills needed for call-center functions. After organization-wide training, reviewing current EPIC knowledge is necessary to ensure full capability in insurance entry, registration, referrals, and scheduling on the EPIC playground. Cisco phone system training will review inbound and outbound call basics, nurse triage lines, and phone book utilization, with trainees practicing outbound calls to the trainer's cell phone. The refill skill group overview involves reviewing the top 100 prescribed medications, with trainees writing key patient requests and completing their first refill/lab schedule under trainer supervision. The process will be repeated for the provider skill group, focusing on scheduling instructions and accurate decision tree completion. The final training phase involves reverse shadowing, where the trainer listens to trainee calls and helps navigate as needed, fostering independent call handling.

Thirdly, call system updates are recommended. Reorganizing call options is necessary as provider calls, which make up 83.43% of total calls, are often incorrectly routed. We suggest making the Normal Appointment option first and Refill second to reduce confusion. Adding a waiting time and call-back option will also be more efficient, allowing patients to know their waiting time and choose to receive a call back, thereby reducing abandonment rates.

Finally, launching the One Click Roll-Out Plan will improve efficiency. PSS can schedule nurse call-back appointments for patients, reducing their wait time. When scheduling, PSS should include the reason for the call and the patient's number. The nurse will call three times within 10 minutes, and if unreachable, the patient will be added to

the nurse pool for a later call. This system ensures patients do not lose their waiting list place while handling their duties until they receive a call back.

"The development and application of Six Sigma performance measures that cover both strategic and operational performance measures lead to a more sustainable approach to business improvement, rather than traditional call centre internal performance measures which may be misleading for the overall performance of the call centre" (McAdam, Davies, Keogh, and Finnegan, 2009). By combining qualitative and quantitative analysis to identify waste in the process and using Six Sigma to optimize the overall operational process, we ultimately helped Cleveland Clinic reduce its call abandonment rate by 30%.

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