University of Michigan Health System

Program and Operations Analysis

Analysis of Internal Medicine Call Center Operations to Determine Adequate Staffing Needs

Final Report

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Introduction

The Internal Medicine Call Centers C and D at the University of Michigan Health System (UMHS) is a central location for processing telephone-based information. Currently, two agents staff Call Center C and four agents staff Call Center D. The agents perform many tasks throughout the day, offer callers information when they need it, and are a single point of contact for patients and physicians. In addition to handling incoming and outgoing phone calls, call center agents have a great deal of paperwork to do. The Call Center manager believes the number of tasks has increased recently and that the agents are, therefore, not performing necessary tasks to satisfaction, including skipping entire tasks. This report presents the project results, recommendations, and an action plan for future use. The task of our team was to examine the Call Center agents’ tasks and to determine the Full Time Equivalent (FTE) requirements for the current tasks.

Background

The purpose of this project is to improve patient interaction with the Internal Medicine Call Centers C and D. By observing the Call Center activities and testing agents’ workload, we determined the number of agents needed to ensure patients receive adequate service from the Call Center.

The Call Centers schedule appointments for clinic doctors at the Taubman Center as well as other clinics including Briarwood II & V, Riechert, Livonia, and Brighton. Call Center C handles all calls for the Pulmonary and Nephrology (excluding dyspnea) divisions. Call Center D handles all calls for Infectious Diseases, Allergy, Metabolism, Endocrine, Diabetes, and Rheumatology divisions.

All calls in and out of the Call Centers use Rockwell Automatic Call Distribution (ACD) telephone equipment. The Rockwell system places each incoming call in a queue and routes it to an agent as one becomes available. The system also maintains a database of statistics related to the incoming and outgoing calls, such as volumes, dropped and lost calls, call times, and time to answer a call.

Goals and Objectives

As originally proposed, the primary goal of this project is to improve patient interaction with the Internal Medicine Clinic through the Call Centers. Patient interaction includes improving response time, attentiveness to the patients, as well as sensitivity to patient schedules. To achieve this goal, the following secondary goals have been set:

- Determine the impact of recently added tasks on call performance and Call Center agents
- Determine Full Time Equivalent required for Call Center tasks
- Determine if the current staffing is adequate for the amount of work being done

**Key Issues**

As outlined in the Project Proposal, several key issues affect this project.

Key institutional interests affecting this project include the following:

- Patients should have easy access to scheduling and information from the Call Center
- Respect for patient time and schedules should be paramount

Key client interests affecting this project include the following:

- Client believes the agents are overworked and do not have time to perform all necessary tasks
- Client believes some tasks are not performed to patient satisfaction

**Scope**

The scope has remained unchanged from the scope presented in the project proposal. The project includes only the Internal Medicine Call Centers C and D in the UMHS. All tasks performed by the Call Center agents will be observed and analyzed, including incoming and outgoing calls as well as all paperwork performed by the agents. The allocation of tasks between Call Centers C and D will also be analyzed.

Work space analysis and work space design of the Internal Medicine Call Centers will not be included in this project. The specifics of the paperwork performed by the agents, including the contents of patient packets, are also excluded from this project. Scheduling the staff and job design will not be included in the project.

**Support Provided by Operating Entities**

The client described to us a complete description of the project, requirements, expectations, references related to this project, and any contact information needed. She provided the Rockwell phone system data as well as a description of the system for analysis. She acted as a liaison between our team and other individuals pertinent to the project to ensure full awareness of the project’s importance.

The project coordinator was our guide and mentor, and was responsible for maintaining analytical quality and a positive Client relationship throughout this project. She provided
documentation from previous projects that were relevant to our project as well as data collection tools including beepers and clipboards. Also, the coordinator reviewed and provided feedback on our progress and helped us improve our professional skills.

**Expected Impact**

In conducting this study, the team will provide recommendations that will improve the interaction between the agents and the patients while maximize the productivity of the Call Centers. Specifically, we expect recommendations to result in:

- Improved quality of patient access to schedulers
- Improved efficiency of physicians’ clinic schedules
- Decreased number of lost calls
- Decreased number of missed appointments
- Adequate staffing for required Call Center activities
- Possible space/resource changes for call center staff

**Literature Search**

**GI Call Center Analysis**

A study similar to this project was performed in February 2004 by the team coordinator, Jackie Lapinski. In that study, tasks at the UMHS Gastrointestinal (GI) Call Center were measured to determine FTE requirements. The study used an institutionally accepted method to calculate call center staffing, and also measured non-call activity impact on staffing. We adapted this method to our project to calculate the FTE requirements for Call Centers C and D.

**UMHS Call Quality Standards**

The team compared the Internal Medicine Call Centers C and D with the UMHS Call Quality Standards. This literature source was useful because it gave us information about the ‘best practice’ standards for average calls abandoned to be 7% and average call routed out to be 2%. The most prominent ‘best practice’ is the priority of customer service.

**University Health System Consortium (UHC) Benchmarking Project**

The Consortium Benchmarking Project gave us background information pertaining to Call Centers. This information provided industry standards for average call wait time and lost calls. It also gave a timeline for a new hire reaching average performance standards.
Work Sampling

Approach and Methodology

To complete the work sampling, the agents in the Call Centers used a beeper that alerted them at random times throughout the day to record what task they were currently performing. We collected samples at a rate of 2.5 samples per hour. There were five agents, working 40 hours per week, for three weeks, and one agent working 32 hours per week, for three weeks. The total samples and sampling hours expected was about 1740 samples and 783 man hours. The results of the work sampling were used to determine the proportion of time spent on the various tasks to help us determine the appropriate FTE for the required tasks. The division of tasks is shown in Figure 1.

Training

Properly training the agents was crucial to accurate data collection. We trained the agents on the use of beepers, the purpose of random beeps, as well as explained each task on the data collection sheet, which is shown in Appendix A. The agents were trained for one day to learn how to perform the work sampling task. The training consisted of an introduction to the project, explanation of the data collection sheets, and definitions of each category on the collection sheet. We emphasized that the data collection sheets will not be used for job performance evaluation, and specifically, that the “Idle” and “Other” categories will not reflect negatively on the agents’ performance. The team also explained to the agents that multiple tasks could be checked at the same time. For example, if an agent was talking on the phone and using the EWS scheduling system, he or she should check both the “Incoming calls” and “Computer - EWS” columns. However, if an agent was on hold and folding papers, he or she should only check the “Mailing” column. Agents’ questions in regards to unclear elements were addressed. Due to the agents checking multiple tasks at one time, the actual sample size we collected was greater than the expected sample size. Therefore, the actual number of samples we collected was 2039 during 783 man hours.

Description of Current Systems

Currently, there are two agents working in the pod C call center and four agents working in the pod D call center. One manager oversees both call centers. Each call center does the same tasks but for different departments within internal medicine. The call center for pod C does scheduling for the Pulmonary and Nephrology (excluding Dyspnea) divisions. The call center for pod D schedules for the Infectious Disease Clinic, Allergy, Metabolism, Endocrine, Diabetes, and Rheumatology divisions. The call centers are currently located in room numbers XXX and XXX, located on the third floor of the Taubman Center flanked by pods C and D. Pictures of the call center rooms can be seen below in figures XXX and XXX.
Tasks that the call center agents do on a daily basis include the following: Answer phone calls, Schedule appointments, Make phone calls, Check their e-mail for updates from doctors, Prepare and send mailing - packets for patients with instructions for their visit, Deliver the mail to a location outside of their office, Attend regular training, Attend department meetings, Communicate with co-workers (nurses, manager, walk-in’s etc...), Send and receive faxes, Print important papers, File papers, Take breaks and lunches.

Both call centers do not: Review doctors’ and fellows’ schedules on a daily or weekly basis to ensure the best possible schedule for the doctors and fellows or Call patients to remind them of their appointment, but these calls are being done by another department (Medical Records).

Findings and Conclusions

The following contains a summary of data collected for all three weeks of the work sampling for both Call Centers C and D.

Task Division

Figure 3, below, depicts the division of tasks for Call Centers C and D together. It shows that the agents spend the highest percentage of time, 25.7%, answering incoming calls while using the EWS scheduling system. Originally the Incoming calls and Computer-EWS were separate categories, but we realized that a high portion of the agents’ time was spent answering incoming calls while also using the EWS scheduling system. Therefore, we made a separate category that combined these two tasks to demonstrate the overlap. Therefore, the “Incoming Calls” and “Computer – EWS” categories only represent the number of times the agents only answered an incoming call or only used the EWS system. 36% of the agents’ time was spent either answering incoming calls or answering incoming calls while using the EWS system. Therefore, 63% of the time was spent completing other tasks.
Figure 3: Division of Tasks (Totals) for Call Centers C and D combined.
Source: Minitab Pareto Chart of Work Sampling data in Call Centers C & D
Date: February 7-25, 2005
N = 2039 samples

Number of Samples for Each Call Center Task

Figures 4 and 5 display the number of times a Call Center task is performed in Call Centers C and D, respectively. For both Call Centers, the greatest frequency of beeps was for Incoming Calls and Computer – EWS at the same time.
Figure 4: Call Center C Tasks
Source: Excel Chart of Work Sampling data in Call Center C
Date: February 7-25, 2005
N = 2039 samples
Figure 5: Call Center D Tasks
Source: Excel Chart of Work Sampling data in Call Center D
Date: February 7-25, 2005
N = 2039 samples

Figure 6, below, compares the number of times a task is performed per agent in C with the number of times the task is performed per agent in D. As the figure shows, the number of incoming calls for D is much higher than for C. We think this is due to one of the agents not recording incoming calls and Computer – EWS at the same time. The figure also demonstrates that Call Center C has a higher value for Incoming and Computer-EWS together. This is because Call Center C takes fewer incoming calls, but each appointment takes longer to schedule. Therefore, if an agent does three appointments per hour, but Call Center D takes less time per appointment than C, it is more likely that when the beeper goes off the agents in C will check Incoming and Computer-EWS together. This will most likely allow the agents in D to do something else in between the incoming calls.
Figure 6: Comparison of Tasks in Call Centers C & D.
Source: Excel Chart of Work Sampling data in Call Centers C & D
Date: February 7-25, 2005
N = 2039 samples

Rockwell Data

Approach and Methodology

The Rockwell ACD phone logs key statistics for the phone system use. Because the system purges each summer, data from July 2004 through January 2005 was analyzed. First we compiled the data into numerous charts, as seen in Appendices B and C. That data was then used to find averages over days and months. The data and averages calculated were used both to determine the Call Centers’ performance as compared to industry standards and as inputs in the Ambulatory Care Tool.
Findings and Conclusions

Figure 7, below, shows the average time it took an agent in Call Center C to answer a phone call. This is shown by a blue (diamond) line for the six month period of July 2004 through January 2005. This data has been compared to the industry standard of thirty seconds for a phone to be answered by an agent. Call Center C’s average times exceed this industry standard by more than five seconds.

Figure 7: Call Center C Average Speed Answered
Source: Rockwell Reports
Date: July 1, 2004 – January 31, 2005
N = 14,532 samples

Figure 8, below, shows the average time it took an agent in Call Center D to answer a phone call. This is shown by a blue (diamond) line for the six month period of July 2004 through January 2005. This data has been compared to the industry standard of thirty seconds for a phone to be answered by an agent. Call Center D’s average times exceed this industry standard by more than thirty seconds.
Figure 8: Call Center D Average Speed Answered
Source: Rockwell Reports
Date: July 1, 2004 – January 31, 2005
N = 39,896 samples

Figure 9, below, shows the percentage of total calls per month that were abandoned in Call Center C. The percentage of calls that were abandoned is denoted by a blue (diamond) line for the six month period of July 2004 through January 2005. The percentage abandoned exceeded the Ambulatory Care Standard by a minimum of three percent.
Figure 9: Call Center C Abandoned Calls  
Source: Rockwell Reports  
Date: July 1, 2004 – January 31, 2005  
N = 14,532 samples

Figure 10, below, shows the percentage of total calls per month that were abandoned in Call Center D. The percentage of calls that were abandoned is denoted by a blue (diamond) line for the six month period of July 2004 through January 2005. The percentage abandoned exceeded the Ambulatory Care Standard by a minimum of seven percent.
Figure 10: Call Center D Abandoned Calls  
Source: Rockwell Reports  
Date: July 1, 2004 – January 31, 2005  
N = 39,896 samples

Figure 11, below, shows the percentage of total calls per month that were routed out in Call Center C. The percentage of calls that were routed out is denoted by a blue (diamond) line for the six month period of July 2004 through January 2005. The percentage routed out was within the Ambulatory Care Standard but started to exceed the standard by a minimum of one percent. The percentage routed out was within the Ambulatory Care Standard as of January 2005.
Figure 11: Call Center C Calls Routed Out  
Source: Rockwell Reports  
Date: July 1, 2004 – January 31, 2005  
N = 14,532 samples

Figure 12, below, shows the percentage of total calls per month that were routed out in Call Center D. The percentage of calls that were routed out is denoted by a blue (diamond) line for the six month period of July 2004 through January 2005. The percentage routed out exceeded the Ambulatory Care Standard by a minimum of four percent.
Figure 12: Call Center D Calls Routed Out
Source: Rockwell Reports
Date: July 1, 2004 – January 31, 2005
N = 39,896 samples

Ambulatory Care Tool

Work Sampling Related to Ambulatory Care Tool

The following chart, Figure 13, below, shows the division of tasks performed by agents in Call Center C. Included in the “Traditional Call Center Activities” are: answering incoming calls, making outgoing calls, scheduling appointments using the EWS computer program, combined answering an incoming call and scheduling using EWS, communicating with walk-ins, meetings and training, break/lunch, and idle. We found that the agents spend 77% of their time doing traditional call center work and the remaining 23% doing other tasks such as paperwork for mailings, checking their e-mail, sending and receiving faxes, and other activities. These figures were used for the Ambulatory Care Tool to determine the number of agents needed at any one time to do traditional call center work.
Figure 13: Call Center C Division of Tasks
Source: Pie Chart of Work Sampling Data in Call Center C
Date: February 7-25, 2005
N = 2039 samples

The following chart, Figure 14, below, shows the division of tasks performed by agents in Call Center D. We found that the agents spend 76% of their time doing traditional call center work and the remaining 24% doing other tasks such as paperwork for mailings, checking their e-mail, sending and receiving faxes, and other activities.
Approach and Methodology

The Ambulatory Care Tool is an institutionally accepted tool used to determine sufficient call center staffing. To use the tool, we collected Rockwell ACD phone reports from July 2004 through January 2005. Analyzing those reports gave numbers to input into the Ambulatory Care Tool. The following Table 1 shows those inputs.

Table 1: Inputs for Ambulatory Care Tool
Calculations were then performed using the above inputs to find the required FTE for the work being done in Call Centers C & D. Upon the conclusion of calculating required FTE and current available FTE, recommendations will be made on the appropriate number of additional FTE to be hired for each Call Center.

## Findings and Conclusions

### Current Tasks

The above approach was used to step through the prescribed algorithm of the Ambulatory Care Tool. The follow table shows key steps in the tool.

<table>
<thead>
<tr>
<th>Table 2: Ambulatory Care Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Center C</strong></td>
</tr>
<tr>
<td><strong>Incoming</strong></td>
</tr>
<tr>
<td>One agent can handle (calls/hr)</td>
</tr>
<tr>
<td>Agents are being offered – Mondays (calls/hr)</td>
</tr>
<tr>
<td>Peak day call volume requires (FTE)</td>
</tr>
<tr>
<td>Required staff hours for current work (hours)</td>
</tr>
<tr>
<td>Current staff hours (hours)</td>
</tr>
<tr>
<td>Additional FTE required for current work (FTE)</td>
</tr>
</tbody>
</table>

### Desired Additional Tasks

As stated in the key issues section of this report, our client believes that some required tasks are not being completed. The key incomplete tasks are patient reminder calls and clinic schedule maintenance. Reminder calls are assumed to take an average of sixty seconds to handle for both Call Centers. The average number of appointments for Call Center C and D are 46.8 appointments and 158 appointments, respectively. Inputting those values into the Ambulatory Care Tool yielded the need for an additional 0.28 FTE in Call Center C and 0.96 FTE in Call Center D to complete reminder calls.

Schedule maintenance involves searching through a doctor’s or fellow’s schedule to find and attempt to fill any holes during each day. This task was measured in a similar call center and adapted to the number of doctors and fellows in Call Centers C and D. For Call Center C, two hours per day are required for schedule maintenance, which requires 520 hours per year. To complete this task in Call Center C would require an additional 0.33 FTE. Call Center D would
require 2.77 hours per day for schedule maintenance, taking up 720 hours per year of the agents’ time. To complete schedule maintenance in Call Center D would require an additional 0.46 FTE.

Recommendations

After completing the analysis of the Internal Medicine Call Centers C and D, we believe there is financial opportunity by reducing the number of lost calls. To quantify the amount of money lost from these calls, we calculated the number of lost appointment calls because these calls bring in revenue. To calculate the total lost appointment calls we multiplied the number of lost calls times the percentage of appointment calls. The percentage of appointment calls, 71%, was found from the work sampling data to be the percentage of incoming calls that are also Computer-EWS. Table 3, below, summarizes the number of lost calls and total lost appointment calls in Call Centers C and D.

Table 3: Number of lost calls and lost appointment calls in Call Centers C and D

<table>
<thead>
<tr>
<th></th>
<th>Call Center C</th>
<th>Call Center D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lost Calls</td>
<td>3,551 calls</td>
<td>23,039</td>
</tr>
<tr>
<td>Percent of Appointment Calls</td>
<td>71%</td>
<td>71%</td>
</tr>
<tr>
<td>Total Lost Appointment Calls</td>
<td>2,536</td>
<td>15,742</td>
</tr>
</tbody>
</table>

Source: Rockwell Reports
Dates: July 2004 – January 2005
N= Call Center C – 14532; Call Center D - 39896

New patients pay $390 per visit and return patients pay $123 per visit. Table 4 shows the amount of revenue per year lost from the total number of missed calls for Call Centers C and D. Combining C and D, the total lost revenue per year is $240,529. These values were calculated assuming that 10% of the callers who abandon their call or their call is routed out do not call back.

Table 4: Lost new patient and return visit revenue from the number of lost appointment calls.

| Lost New Patient Revenue | $22,618 | $140,382       |
| Lost Return Visit Revenue | $24,063 | $149,350       |
| Total Lost Revenue       | $37,993 | $202,536       |

Source: Rockwell Reports
Dates: July 2004 – January 2005
N= Call Center C – 14532; Call Center D - 39896

Table 5 shows the recommended additional FTE for the current tasks, the addition of reminder calls, and the addition of schedule maintenance.
Table 5: Summary of recommended additional FTE for current work, reminder calls, and schedule maintenance.

<table>
<thead>
<tr>
<th></th>
<th>Call Center C</th>
<th>Call Center D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Work</td>
<td>0.74 FTE</td>
<td>2.31 FTE</td>
</tr>
<tr>
<td>Reminder Calls</td>
<td>0.28 FTE</td>
<td>0.96 FTE</td>
</tr>
<tr>
<td>Schedule Maintenance</td>
<td>0.33 FTE</td>
<td>0.46 FTE</td>
</tr>
<tr>
<td>All Work</td>
<td>1.35 FTE</td>
<td>3.73 FTE</td>
</tr>
<tr>
<td>All Work in Both Call Centers</td>
<td>5.08 FTE</td>
<td></td>
</tr>
</tbody>
</table>

Source: Ambulatory Care Tool
Dates: July 2004 – January 2005
N= Call Center C – 14532; Call Center D - 39896

From our calculations the shortfall in the Internal Medicine Call Centers C and D is validated and quantified by the Ambulatory Care Tool to be 5.08 FTE. Therefore, we recommend hiring five additional agents to decrease the number of lost appointments. One agent is paid $11.30 per hour for 2080 hours per year and 33% of the salary is benefits. Therefore, the salary of one agent is approximately $31,260. Using this salary information, it will cost $158,800 for the recommended addition of 5.08 FTE. The addition of 5.08 FTE is valid because the amount of money to add 5.08 FTE is less than the amount of total revenue lost from lost appointments.

**Action Plan**

**Projected Results**

To measure results of additional agents, Rockwell ACD call statistics should be examined. Judging the average wait time and lost calls against the industry standards will provide an indication of improvement. On the financial side, examining the number of appointments scheduled as well as the ratio of new and return patients will show financial improvements from the addition of agents.

The University HealthSystem Consortium projects seven to eleven weeks for a new call center agent to achieve average performance standards. Because of this learning curve, allow approximately one quarter before judging improvement of the Call Centers C and D.

**Implementation**

Our team recommends hiring 5.08 additional FTE for Call Centers C and D combined. Call Center C requires 1.35 additional FTE and Call Center D requires 3.73 additional FTE. Because these are not even numbers, we suggest exploring the possibility of cross-training an employee or multiple employees to work in both Call Centers. Another possibility to explore is staggered schedules to accommodate for the partial FTE requirements.
Because current space for both Call Centers is limited, additional space should be considered when hiring additional FTE. Resources such as computers and phones will also need to be considered.
# Appendix A: Data Collection Sheet

**Front of Data Collection Sheet**

<table>
<thead>
<tr>
<th>#</th>
<th>Time of Day</th>
<th>Comments / Reason for Cancellation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8-9 AM</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9-10 AM</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10-11 AM</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>11-12 PM</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>12-1 PM</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1-2 PM</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2-3 PM</td>
<td></td>
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<tr>
<td>8</td>
<td>3-4 PM</td>
<td></td>
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<td>9</td>
<td>4-5 PM</td>
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<tr>
<td>10</td>
<td>5-6 PM</td>
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<td>1-2 PM</td>
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<td>7-8 PM</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>8-9 PM</td>
<td></td>
</tr>
</tbody>
</table>

Week 1 Day 1
Feb 7, 2005
Data Collection Task

Incoming Calls
- schedule appointment
- reschedule
- cancellation
- transfer/give information

Outgoing Calls

Computer - EWS
- Rescheduling from canceled clinic
- Schedule new patient

Check e-mail

Mailing
- Collect/sort daily mail
- Prepare appointment packets, including copying, writing, highlighting, folding, stuffing
  envelopes, apply sticker/stamp

Out of Office (work related)
- take mailing to mail room
- look at a file
- talk to check-in/check-out/Doctors/Nurses

Sending/receiving faxes

Filing Communication Records

Communicate with walk-ins
- talking with anyone who comes in the room (i.e. Doctors, Nurses, Linda, etc...)

Meeting/Training
- work related (out of office)

Break/Lunch

Idle
- between calls, done with mailing

Other
- bathroom/personal

Comments
- reason for cancellation (i.e. bad weather, change doctor, change in their schedule etc...)
### Appendix B: Compiled Rockwell ACD Data — Call Center C

#### Call Center C Call Number Data

<table>
<thead>
<tr>
<th>Center</th>
<th>Department</th>
<th>Month</th>
<th>Avg Spd Ans</th>
<th>Svc Lvl</th>
<th>Offered</th>
<th>Handled</th>
<th>Abandon</th>
<th>Routed Out</th>
<th>% Abandoned</th>
<th>% Routed Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>All</td>
<td>July 04</td>
<td>46</td>
<td>72</td>
<td>2134</td>
<td>1893</td>
<td>173</td>
<td>68</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>All</td>
<td>August 04</td>
<td>37</td>
<td>77</td>
<td>1946</td>
<td>1776</td>
<td>133</td>
<td>37</td>
<td>7</td>
<td>2</td>
</tr>
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Year (extrapolated) 24912

#### Call Center C Call Time Data

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Appendix C: Compiled Rockwell ACD Data – Call Center D

Call Center D Call Number Data

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Year (extrapolated) 68393

Call Center D Call Time Data

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