



# Whitestone Community Volunteer Ambulance Service

(718) 767 1000 12-15 150 Street, Whitestone, NY 11357

Serving the community of Whitestone since 1947



February 1st, 2020

Attention all:  
Officers of the Volunteer Corps  
Directors and Officers of the Board of Directors

After about decade of great operational success and stability concerning the day to day functions of what we do as a community ambulance service I have to report a looming crisis. I am not certain as to the exact causation of this problem or even what the problem is and I unfortunately have less time to give than I used to. I rely heavily on the Executive Officer to run operations these days and I am preparing to release my title and responsibilities to him entirely in the near future; therefore, as an executive group we must figure out the problem.

I have noticed a general low morale level and lack of activity amongst the ambulance staff as well as a reduction in the amount of basic tours on duty of the ambulance staff as per the schedule; however, we are not low in staff, generally we are at the same staffing level that I always was able to achieve success with. I have noticed a significant rise in the amount calls that we are unable to do and or delay for significant time. I have noticed that the overall bulk of our ambulance activity has been reduced to calls that we receive and delay until members can respond to the station and then complete and then leave.

I have no numbers or studies to substantiate what I am talking about other than the basic monthly tallies that the Service Secretary does. I do however, speak to the members in passing and by text as well as the Dispatchers and they have tell me that something is different but they don't know what is going on. The Dispatchers all report that they rarely ever have crews on duty and usually they receive calls, delay them and contact the Officer on Duty who "works it out". I am sometimes that Officer and I find myself having to "work it out" far more often than ever before.

I want everyone who has a title, an office, a position, seniority, responsibilities to the longevity of the Service to understand my concern that we are fading away. I want to know how this started, when it started and why it started so that we can create a plan to correct this. If we need to find some sort of business practice audit service, which would be expensive, that will be my last resort if we cannot solve this internally.

I call on all of you to dive into this issue fully as it is perhaps the most important one in front of us. I need solutions but first we need to figure out the problem, and I assure you that there is a problem; I know it the way an old man knows that a storm is coming. If we do not handle this, we will fade away and close within a few years. I am not young anymore and I cannot dedicate myself as I once could, I have to rely you all of you to get us through this very real crisis.

In solidarity, I thank you in advance,

**CHARLES J. SILVERSTEIN**  
Captain & Chief Operations Officer (COO)



# Whitestone Community Volunteer Ambulance Service

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February 6th, 2020

Dear Captain Silverstein,

The issue that you have brought to the attention of the Directors and Officers of the Board of Directors is one that I have noticed in recent months as well. The lack of call volume is a serious issue that needs to be addressed at the source and would pertain to understanding how efficiently we are completing our phone demand. If this trend persists, it could foreshadow future problems for our neighbors of the Whitestone community who have relied on our service for over seven decades. Perhaps there is a disconnect between the times crews are being staffed and when residents of the community are actually calling for our services. If we can ascertain how the two are related, understand it, then we can go forth with a solution to keep up with our phone demand.

Looking over the Service Secretary data is a good start to seeing how many calls have been completed per month. In theory, we can go back and review two or three calendar years worth of data so that there is enough information to compare strong months of performance versus the position we are in now. While the tallies could be useful to understanding what order of magnitude operations have failed, I believe that we can go deeper than that. Since the volunteer corps operates on a weekly basis, 24 hours a day, 7 days a week, I suggest we create a database of every instance of demand from 2017 to present. Every call could be cataloged by call type, date, and time as per the paper call records. From there, the data can be further separated to each day of the week and then by the hour.

I understand we keep most of our records in Excel spreadsheets so for ease of accessing the data on behalf other Directors and Officers of the corps, the data can be entered there initially. Given my work experience in handling data from scientific research labs however, I do suggest performing analysis with a more powerful processing tool. I would be happy to implement my knowledge of computer programming in Python which would allow me to manipulate the data much more efficiently. Once I have everything organized, I could generate graphs and visual statistics to summarize the overall performance of our ambulance service in any way possible. Provided a trend in our phone demand can be identified over time, I can even implement machine learning models to provide a generalized pattern of our demand.

This process may take weeks or even months before tangible results are available, but I believe a thorough investigation of our call volume would provide invaluable information of our service patterns and responses to emergencies. If the project is successful, it can be automated to accept new data so that we can track our performance moving forward as well. Please let me know if you believe my suggestion may lead to us identifying the problem and ultimately a solution to restore future call volume.

Thank you,

**JOHN MAVROUDES**

Whitestone Community Ambulance Service Officer - Director of Grants

Email: jmavroudes@whitestoneambulance.org



# Whitestone Community Volunteer Ambulance Service

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March 26th, 2020

Dear Captain Silverstein,

As per your request, I have collected over 2,000 calls consisting of phone demand and radio activity. Most of the data has come from our patient care reports ranging from January 2017 to present and includes record of the call location, date, time of call and other relevant patient information. Also included in my call volume records are instances of unmet phone demand. To acquire this data, I scanned through several call sheets containing the call location, date and time of incomplete calls. In any instance where information was lacking from the call sheets, I carefully went through several previous dispatcher logbooks to piece together the missing elements of information.

All the calls were entered into an Excel database and then imported into a Python program as a DataFrame. I structured the data in such a way that a selection criterion was implemented to separate the data into phone demand that was met and unmet, as well as responses to radio activity. Taking advantage of the datetime and calendar modules, I was able to sample every call by year, month, day, and hour. Having the ability to iterate through the calls in this fashion yielded invaluable insight to understanding the call volume behavior over the past three years. Enclosed in my report is a detailed summary of the yearly and monthly call volumes as of now. No two years perform identically but there are distinct trends and lack of ones thereof which are highlighted throughout my analysis.

I would now like to take the opportunity to state when and potentially why our monthly phone demand call volume has not been meeting expectations. Starting with the monthly call volumes in 2017 and 2018, most of the phone demand was met. Majority of the months during this time did not have any unmet demand with exception of occasional missed calls throughout the 24-month period. Despite the relatively equal met phone demand call volumes totaling over 300 calls for each year, I did notice a change transitioning into September 2018 and onward, as every month during this period had some form of unmet demand. Prior to September however, there were only a few missed calls per month and several of those months were free of unmet demand. Unfortunately, this is not the case anymore as a higher portion of our phone demand has gone unmet and is increasing each subsequent month.

In 2019, there were two major turning points which caused met phone demand call volume to drop by 50% for the year. June 2019 for instance, saw the greatest increase in unmet calls over a one-month period and in turn met phone demand hit an all-time low. The quantity of phone calls that were responded to in June was nearly equal to the number of calls that were going unfulfilled – a very concerning statistic that I believe has never occurred during my decade of service to the organization. By the Fall of 2019, the unthinkable happened again where for the first time in the history of the service unmet phone demand exceeded met phone demand call volumes as seen in September and October. It should also be noted that merely three out of seven calls were completed in October signifying the weakest response rate to date because the least amount of calls were responded to, the total call volume was the lowest and the percentage of calls met relative to the total was at a minimum to date. Closing out the end of 2019, it is clearly evident that there is a lack of activity relative to the two preceding years and that the negative trend in call volume won't stabilize any time soon. If the same staffing patterns that were used in 2019 are currently in use, I urge that they be terminated or altered immediately.

Given the timing of these observations I do recall some operational changes were made back in September of 2018 concerning the staffing responsibilities of the officers. I do not have access to the master schedule, so I suggest that it be reviewed in order to pinpoint who was managing most of the shifts during these months. I understand that in the midst of the COVID-19 pandemic, phone demand is being suppressed as reflected in the March data, so it's hard to tell if the damage done during the later half of 2019 is responsible for our current dilemma as well. As more data appears, I will continue to enter and monitor the monthly call volume trends to better ascertain what course of action needs to be taken. In the interim, I will also remain dedicated to delving deeper into understanding what days and times our phone demand and radio activity occurs so this way we can work towards a solution to restore call volume. I have a plan to visualize the data with various histograms which will display the hourly call volume over a weekly timescale. By understanding past behaviors of demand, we may be able to proactively staff ambulance crews using a model portraying the highest likelihood of an emergency on a given day for a particular window of time. As always, I'm open to feedback and suggestions.

Sincerely,



**JOHN MAVROUDES**

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# Whitestone Community Volunteer Ambulance Service

(718) 767 1000 12-15 150 Street, Whitestone, NY 11357

Serving the community of Whitestone since 1947



July 22nd, 2020

The Whitestone Community Volunteer Ambulance Service has generously been providing a free emergency ambulance to the residents of Whitestone since 1947. Over the course of seven decades, the service has gone through multiple phases of leadership but has always held true to its original mission. As an organization that relies solely on donations from its community, fulfilling emergency calls has always been an utmost priority. Since 2012, the service shifted to operate 24 hours, 7 days a week and for the greater part a decade has remained the only volunteer ambulance in NYC to still do so. In this current incarnation, the service has helped thousands of more ill, injured, and infirmed people than ever before. Up until recently however, the Captain of the Volunteer Corps noticed an unprecedented drop in call volume. With such a dire situation manifesting into a looming crisis, it would only be a matter of time before we would have to consider closing our doors. With great due diligence, I offered to pursue a study to identify when, why, and how this problem came to be. Over the past five months, I have made a collection of over 2,000 calls from 2017 to present to pinpoint this failure. The calls in this study include emergency calls made directly to the ambulance station and optional calls that the crews completed through the 911 network. These calls will be referred to as phone demand and radio activity, respectively.

The operations of the service have always been maintained with rigor and exceptional quality. During 2017 and for the majority of 2018, almost all phone demand was continuously met which was the standard we have always known. After carefully examining the monthly call data, I found three specific time points to address the issue at hand. September 2018 was when the Executive Officer assumed a greater role managing the Volunteer Corps. Along with these operational changes, the Executive Officer became responsible for staffing ambulance crew shifts and worked to get crews together when a call came in. After this initial change, about 90% of our phone demand was met on average for the first nine months. This meant that among the 20 calls received per month on average, only about 1-3 calls were missed per month. Performance never reached the quality exhibited prior to the operational change but call volume for the service was reasonably stable.

Naturally, the slight decline in call volume and response rate to phone demand was to be expected. The Captain had solely commanded the service for nearly a decade and to meet the same standards involves a steep learning curve. Only through time, experience, and patience would a replacement come close to meeting this goal. With hopeful expectations, the Executive Officer exhibited potential to be groomed into the next Captain.

In June 2019, that all began to dissolve as unmet phone demand started to spike. During this turning point, met and unmet phone demand call volumes were nearly identical. These effects were immediately detrimental to phone demand because the percentage of met calls began to oscillate between 50 and 80% per month. As these calls continuously went unmet, radio activity and met phone demand call volumes were taking downward spirals. It became clear that the Executive Officer was unable to maintain a consistent routine over their assigned watches. The situation exacerbated and by September 2019, the service saw the two worst consecutive months of performance. Phone demand hit an all-time low and less than half of the demand was met during this substandard period. October 2019 was the epitome of poor performance as three out of seven or 43% of the calls received were met. From June 2019 to the end of the year, call volume dropped to 15 calls per month on average and about 7 calls were missed per month.

Had the historically low call volume and poor response rate to phone demand been brought to attention back in 2019, action would have been taken immediately. By January 2020, the phone demand completion rate unexpectedly rebounded to nearly 70%. The influx of phone demand call volume exhibited elasticity since it took two months to recover the losses endured between June and October of 2019. January also saw 30 responses to radio activity, the highest monthly total since June 2019. It seemed that a reactive effort was made by the Executive Officer to push performance in the right direction. Though there was optimism for this positive trend to continue, no one would have predicted the devastating impacts of the COVID-19 pandemic that set forth the following month.

Transitioning into February 2020, I was just starting to gather the data for this study which parallels to the “storm” that the Captain foresaw occurring. The effects of the pandemic in February and March were detrimental to the service as 70% of ambulance staff was out sick, quarantined or not viable to serve at any given time. Officers were apprehensive about risking the health of available staff due to lack of PPE and responses to phone demand were limited to non-COVID emergencies until further notice. Suspected COVID calls were not included in this study because the demand was insurmountable to even consider keeping up with. Even with filtering out demand to a more manageable call volume, the staffing roster was so compromised that the phone demand call completion rate dropped to approximately 30%, despite making these changes. The service was already in a vulnerable state and the pandemic facilitated the problem even further. Acknowledging the hardships of the pandemic along with the existing struggles of meeting demand, a change was necessary for survival.

In April 2020, the issue was addressed with the addition of a 3<sup>rd</sup> party private ambulance service; a fallback system where dispatchers can forward phone demand in the event of no scheduled duty crew. By doing so, the service has effectively been meeting 100% of its demand, a feat which has not been achieved since August of 2018. This system also allows our organization to provide services that were never possible before. Callers who are requesting non-emergency use of an ambulance or reside outside of Whitestone can now be assisted because dispatchers are able to provide an alternate solution. Callers will be informed of the benefits of using one of our partnered services than just calling one on their own. The services provided by a 911 ambulance typically cost \$800 to \$1,000. Comparatively, the expenses of a private partnered ambulance with health insurance would come at little or no cost to the caller.

Moving forward, our unmet phone demand call volume will virtually be zero because the demand will be fulfilled by either our staff or one of our partnered services. Emergency response rates in the new system will now include what percentage was handled in house versus one of the partnered services. The goal is to minimize the use of a 3<sup>rd</sup> party ambulance and investigate the instances of when and why it was needed. Officers of the Volunteer Corps are no longer burdened with staffing last minute emergencies and can focus on the bigger issues at hand. By better understanding our demand patterns, we can further shift away from this dependency because crews will be staffed on the optimal windows of demand. In turn, outsourcing demand will be deemed more appropriate during off peak hours when the chance of receiving a call is lower. Other outliers such as a cancelled call or refusal of partnered services will also be documented but are ultimately factors out of our control.

Now that handling our phone demand has been stabilized, emphasis needs to be reinstated on responding to radio activity to restore the phone demand call volume. For several years, the Captain always believed that this theory was true, and now the data confirms it. During the first eight months of 2017, duty crews responded to 40 or more radio calls per month. In turn, monthly phone demand saw a positive trend to its peak at 42 emergency phone calls in November of 2017. Stressing this fact would not only be beneficial for the service but it would also help our staff as well. The extra experience gained through additional clinical hours, patient contact and transport can happen much more rapidly for EMTs than just relying on phone demand alone. Evidently phone demand is extremely moldable and contingent upon the public seeing our ambulance active. By implementing this concept as more members return to duty, I confidently believe monthly call volume can achieve the same excellence seen in previous years.

The element of unpredictability in fulfilling phone demand with a crew short notice will be entirely removed. In the newly adopted system, members of the service will be scheduled by Officers of the Volunteer Corps based on the results of the daily demand patterns found in this study. To identify what the daily demand patterns were, I had to delve much deeper than just relying on monthly call volume data. Obtaining this solution took multiple attempts of sampling call volume. For good measure, the data was broken down into call volume by year, day and hour until a recurring pattern was identified.

Disseminating the yearly call volumes was a valuable way to ascertain the dynamics of the service over larger periods of time. Looking back at the previous service history, over 2,000 calls have been documented from 2017 to date and slightly more than half of those calls were responses to radio activity. The remaining calls pertain to phone demand and relative to the total call volume merely 5% of those calls were unmet. By putting this into perspective, that is only about 100 missed calls over three and a half years. Logically, the data would suggest that on average 20-30 calls would be missed per year or 2-3 calls per month assuming consistency among staffing and operations. When the statistics are separated out by year however, the data presents itself differently. In 2017 and 2018 there were only 12 and 17 missed calls for the year respectively, less than the expected average. 2019 was the most problematic year with a skewed total of 53 missed calls. Noticeably, 2020 only had 29 missed calls because unmet demand was curtailed in April. Had 2020 continued at the same rate without any intervention, unmet call volume had a potential to be twice the 2019 total. As the total call volume increases for the remainder of the year, the percentage of unmet phone demand will continue to shrink.

Jumping from 2017 to 2018, the yearly call volume dropped by 200 calls. While this change appears concerning, taking the demand type into account alters this perspective. The difference observed originated from a lack in radio activity and imposed no impact on phone demand in 2018. Comparing these two years, staffing for calls was being handled appropriately because total phone demand was nearly identical at 340 and 339 for 2017 and 2018, respectively. Essentially, the high amount of radio activity in 2017 set the precedent for a good stream of phone demand. Staffing was optimal at this point since phone demand was met approximately 95% of the time. Each year also boasted 4 phenomenal months where 100% of all phone demand was met. Considering call volume was at its peak during these occurrences, makes these statistics even more impressive and appreciated.

Continuing this call volume evaluation, the same cannot be said about 2019. While responses to radio activity were on a comparable level to that of 2018, total phone demand dropped by 40% from 339 to 201 and met phone demand dropped by 54% from 322 to 148. Clearly, the operational changes started taking a toll on phone demand from the June 2019 turning point and on. Total call volume dropped by almost 200 calls again but this time it is mildly concerning because lack of phone demand is mainly the cause. So far, we know that the total call volume for 2020 is fractional with respect to the underperforming year of 2019. Moving forward with our solutions however, the service can be productive for the remainder of the year.

Sampling call volume by day revealed which days of the week were the busiest by call type. The tallies for calls were compiled over every week to create an aggregate week for each year. In 2017, phone demand had a normal distribution during the week centered around the most active day which was Tuesday. The second busiest day for phone demand was a weekend outlier and fell on Saturday. A year later, daily call volume reconfigured. Monday became the most active day for phone demand followed by Saturday and Sunday, respectively. The remaining days of the week had steady daily call volumes at 40 or more calls for the year. How did this reconfiguration and shift happen? Observing the aggregate week of 2017, radio activity exceeded phone demand every day with exception of Tuesday. On days when radio activity was 70 calls or more, phone demand saw a net increase the following year. Saturday was already a regularly active day for both call types, so phone demand call volume remained steady at 50 or more calls for both years.

Looking at the daily call volumes for 2019 and 2020, there was no longer a discernable daily relationship between phone demand and radio activity. All days of the week saw a decrease in phone demand and an increase in unmet demand. In an extreme case for example, half of all phone demand on Fridays went unmet in 2019. Responses to radio activity were dropping dramatically despite that some crews remained active on Thursdays, Saturdays, and Sundays. The data from the 2020 daily call volume was a testament to the breaking point in our operations.

Sampling call volume by the hour gave the best perspective of how demand changed over a 24-hour period. Phone demand and radio activity were collected as aggregate weeks as done previously but this time the call frequency was separated by time of call received. Consequently, the histograms generated from the phone demand data are the daily demand patterns we were looking for. The highest likelihood of receiving a call varied by day of the week. Some pairings of daily demand patterns had more similarities than others, but each day exhibited common trends as indicated in the results. This information is extremely valuable because a compromise can be reached to meet the needs of the staff and cover optimal windows of demand. Since crews will now be scheduled for either six, eight or twelve-hour shifts, Officers of the Volunteer Corps can take everything into account when scheduling ambulance crews based on staff availability. If an EMT and MVO (motor vehicle operator "ambulance driver") are available for six hours on a Sunday for example, they will likely be staffed from 1000 to 1800 hrs. because the chance of a call is the highest during the late morning and early afternoon hours.

Staffing patterns can also be generalized into three waves of demand if we consider the call history of all days. By using this approach, a simplified recurrent pattern for demand over a 24-hour period is established. From highest to lowest probability these times are: 1100, 1800 and 2300 hrs. An Officer can use their discretion on their staffing approach depending on what day is being staffed or the circumstances of crew availability. After much effort and data manipulation, daily demand patterns for each day of the week and a simplified recurrent demand pattern are now practical options to solve staffing issues. As the Corps is continuously built up, we can work from the optimal windows of demand and outward to efficiently cover more hours of the day per week based on priority.

Through the dedicated endeavors of the membership committee, 20 new members were sworn into the Volunteer Corps this past month. Not only has this been the most members inducted in a single meeting, but the staffing roster has also increased by 33%. As membership continues to flourish and members cycle from dispatchers to ambulance crew members, more staffing combinations are viable. At the end of August, 6 new EMTs will be cleared for duty. For every two individuals that are added to the ambulance staff as an EMT or MVO, that is another potential crew for duty. In theory, six-hour shifts add 4 more days of coverage per month during the hottest windows of time. By this logic, a free ambulance will be available to the community for 12 additional days per month for every new crew added.

Coming full circle with the proposed solutions, the limiting factors that come with training, clearing, and staffing members on the ambulance must also be acknowledged. The time provided by the Training Officer to educate members in these roles is extremely valuable. This investment will solely be put into those that show the motivation and meet the requirements for training. There is no assumed guarantee however, that everyone eligible for training is suitable to provide service as an EMT or MVO. The ability to serve in another capacity other than a dispatcher is dependent upon driving and physical abilities. A crew is defined as either an EMT and MVO or a pair of EMTs. Assumedly the role of MVO is the limiting factor because anyone who wishes to be an EMT must be cleared as an MVO first. Understanding this, staffing combinations are maximized when more EMTs are added to the roster because they can fulfill the role of either position. One tradeoff in new system is that when a member of a scheduled crew cancels a shift their partner cannot remain on duty alone. If this adverse event occurs, the calls will be forwarded to the 3<sup>rd</sup> party ambulance service and not be completed in house. Although this is a factor that cannot be controlled, it is more beneficial to handle phone demand instantaneously through a private partner than delay the call until a crew is available.

Since the commencement of this study, an unbelievable amount of knowledge and insight on our organization has been gained. We have made incredible strides past the traditional pen and paper method of monthly call volume tallies. The days of countless fumbling through folders of paperwork in filing cabinets are gone because the data is easily and digitally accessible. The computer program crafted for this study has also been automated so that anyone can process and handle the graphical updates for years to come. Since the data can always be visualized and quantified to monitor performance, it is possible to act on an issue immediately. After many hours spent on attention to detail, the task of statistics of staff and data have now been streamlined to be concise and efficient.

Recapping the observations by year, 2017 was highly active, 2018 was consistent, 2019 contained a pivotal failure and 2020 was the victim of existing struggles and unforeseen circumstances. The turning point of operations and the cause of failure were identified based on the monthly call volume data. A means to stabilize phone demand call volume was enacted by establishing a relationship with a 3<sup>rd</sup> party private ambulance service. Existing as a safeguard, emergency calls for help will never be turned away or delayed regardless of the call location. The longstanding and suspected theory that radio activity responses positively impact phone demand call volume has finally been proven. Employing this practice will rejuvenate phone demand and improve the skills of ambulance crew members. Officers of the Volunteer Corps possess a better foundation to understand when our demand occurs so that crews are staffed optimally. All solutions that emerged from this study are reactive with respect to the data but are proactive in practice. The service will never succumb to an operational pitfall again because a system of checks and balances has been set to abide by. We will continue to uphold the glory and tradition of our mission statement for generations to come.

Thank you,



**JOHN MAVROUDES**

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