

NYSDOT and Hurricane Sandy: Operational Impacts and Lessons Learned

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ABSTRACT

Hurricane Sandy hit the New York City metropolitan area on October 29, 2012, resulting in flooding and widespread damage which closed or partially obstructed transportation facilities throughout the region. Damaged transit systems and highways crippled commutes for roughly 10 million commuters for weeks after the Storm.

The New York State Department of Transportation (NYSDOT) manages “511NY”, a statewide multi-modal travel and incident information service which serves New York via its 511NY.org website and phone number. TDM outreach and rideshare support is provided by NYSDOT through 511NYRideshare as an Integral element of 511NY. During Hurricane Sandy, 511NYRideshare provided information support and outreach to commuters and employers, especially to medical staff in area hospitals, since access to several hospitals was heavily impacted by the storm.

This paper details the range of traveler information services provided by NYSDOT and 511NYRideshare and outlines the level of emergency preparedness planning and response for providing travel information services. It also highlights the need for traditional TDM operations, including multi-modal travel information services and employer outreach, to be integrated into larger multi-agency emergency preparation and response efforts.

Furthermore, this paper showcases outcomes of employer involvement in emergency response, which further emphasizes the benefits of integrated TDM programs. A commuter survey and employer interviews were conducted to analyze the change of commute behavior and impact of employer involvement in encouraging alternatives for long term commuter travel behavior. The paper also outlines lessons learned and recommendations for further integration of TDM and emergency preparation and response services.

1. INTRODUCTION

Although travel demand management (TDM) has long been recognized as an important strategy to reduce traffic congestion and improve air quality in large metropolitan areas, TDM has often been viewed as independent programs or even “add-on” efforts, rather than fully integrated into other transportation efforts and investment decision-making. As background for this paper, a literature review was conducted. In general, there were no specific “TDM Emergency Plans” identified during the literature and research review, however it is apparent from existing research that TDM services and programs can play an important role in emergency preparedness – before, during and after an emergency event. 511NYRideshare’s role in assisting commuters before, during and after Hurricane Sandy, as detailed in this paper, supports these literature and research findings.

The New York State Department of Transportation’s (NYSDOT) 511NY program is a leader in providing multi-modal travel information. In 2010, NYSDOT’s Travel Demand Management (TDM) Program for Regions 8, 10 and 11, was integrated with the 511NY program and branded as 511NYRideshare. NYSDOT has an active role in managing and operating the program, and an even more integral role in coordinating multiple partner agencies, jurisdictions, transit agencies, contractors and messaging during emergencies. Aside from the benefits of having multi-modal travel options accessible at a single website address (511ny.org) and single phone number (511) NYSDOT has been working to increase the operational effectiveness of the combined program by leveraging 511NYRideshare’s outreach and ridematching services in non-traditional situations, such as in response to emergencies.

511NY provides a wide range of real-time travel information rail and surface transportation (general traffic, HOV’s, buses & trucks), alert messages and social media on the 511NY website. 511NY also provides travel information through its 511NY phone number. 511NYRideshare provides a range of complementary services, including an online ridematching service which assists commuters with finding carpools and vanpools, as well as outreach and transportation consulting services to employers and the general public.

During Hurricane Sandy the integrated 511NY and 511NYRideshare programs experienced unparalleled service demands for real time travel information and ridematching assistance. Prior to Hurricane Sandy, TDM strategies had not been integrated within the overall set of coordinated strategies deployed in emergency preparedness and response plans. However, NYSDOT proactively directed 511NYRideshare to implement elements of its emergency contingency plan. The experience of providing TDM services during Sandy demonstrated the need for NYSDOT to develop an Emergency Preparedness Plan for 511NY, including integration of appropriate TDM services within emergency preparedness plans being updated in New York. This paper will also demonstrate how the Emergency Preparedness Plan should focus efforts on medical care centers, given their need to provide uninterrupted services during emergencies. The need for such a response also underscores the potential benefits of implementing a flexible and adaptive TDM framework for managing emergencies.

Despite the insufficient level of multi-agency coordinated TDM emergency preparedness planning, NYSDOT was able to work with partner transportation agencies to leverage the technology, outreach, and communications functions of the 511NYRideshare program to provide emergency support, real-time information, and travel options. This paper summarizes the combined emergency response services provided and outcomes.

2. STORM EVENT PREPAREDNESS

In anticipation of the storm's severity, NYSDOT took proactive steps to ensure that effective procedures were in place to allow for open flow of information between stakeholders, the 511NYRideshare team, and NYSDOT.

Several years prior to the Sandy storm and in anticipation of phone and web outages, NYSDOT directed 511NYRideshare to prepare the Customer Service & Information Center (CSIC) so that it could remain functional. The 511NYRideshare office had previously installed a cloud-based Voice-Over-Internet-Protocol (VoIP) system. This VoIP system allowed phones to be plugged into any internet connection, at home for example, and operate as if the staff member was located in the office. By equipping the 511NYRideshare CSIC team with VoIP phones, the CSIC staff was able to work remotely and provide nearly uninterrupted services.

511NYRideshare established a staffing contingency plan which included scheduling staff both in the CSIC and at various remote locations with extended hours. This contingency staffing plan was implemented beginning on October 24, 2012.

The CSIC regular hours of operation are Monday through Friday, 6:00 am to 7:00 pm. During Hurricane Sandy, hours of operation were expanded, as follows:

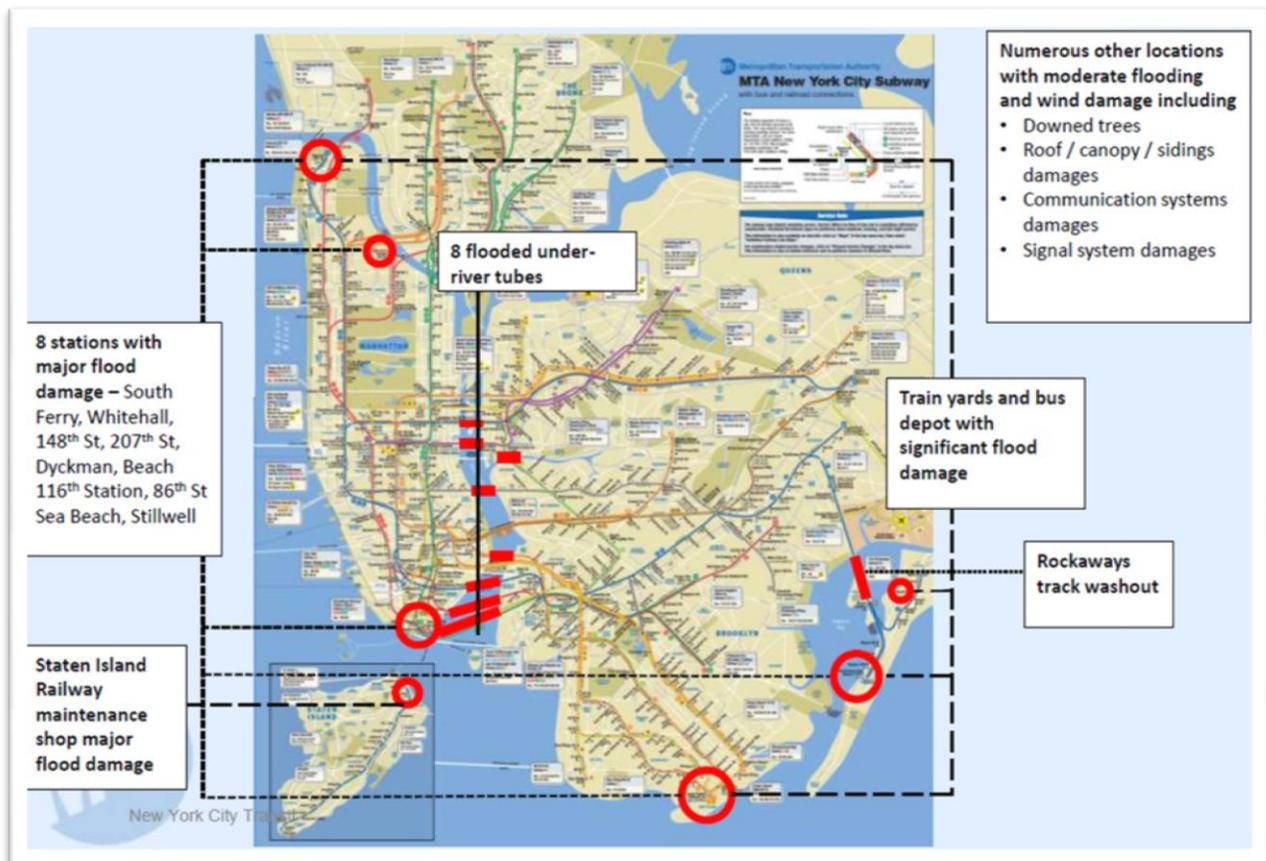
- Hours of operation were extended to 9:00 PM, Monday through Friday;
- Hours of operation were established on the first weekend, from 12:00 pm – 9:00 pm
- Hours of operation were established on the second weekend, from 12:00 pm – 6:00 pm

The CSIC normal hour's operation returned on November 12, 2012.

3. STORM EVENT RESPONSE

Hurricane Sandy hit the New York City metropolitan area on October 29, 2012, resulting in flooding and widespread damage which closed or partially obstructed transportation facilities throughout the region. Damaged transit systems and highways crippled commutes for roughly 10 million commuters for weeks after the Storm. Below is a map depicting the magnitude of the damage to transportation facilities operated by MTA NYC Transit.

FIGURE 1 – Map of Impacted MTA NYC Transit Facilities*



*Source: MTA New York City Transit

511NYRideshare staffs a Customer Service and Information Center (CSIC) to answer a wide range of transportation inquiries – not just those that are rideshare-related. The CSIC provides travelers and prospective users of the 511NY with quick, clear, and accurate answers to their questions and issues leading in many instances to available alternative traveler services. The CSIC acts as a single customer service point of contact, to providing comprehensive, superior transportation information. This single point of contact enables the CSIC to provide seamless customer service.

The CSIC educates and assists travelers in their commute and travel choices. The CSIC provides complete support in moving customers from information-gathering to using multi-modal options. CSIC provides information about 511NY and 511NYRideshare tools and services, including highway congestion and requests for travel directions, ridematching registrations, and the New York Metropolitan Transit Authority (MTA) schedules and services.

Beginning on October 28, the CSIC experienced a spike in requests for travel / transit information, as the MTA, Metro North, Long Island Rail Road (LIRR) & Bridges and Tunnels acted quickly to restore services connecting Manhattan to the interstate network. MTA immediately implemented special bus shuttle services on October 31st, providing connectivity in corridors where subway service was disrupted. The East River Tunnels, which provide access to Manhattan with approximately 1,000 daily buses, were not in operation until the week of November 5th. As in the case of the shuttle buses, a coordinated multi-agency effort was initiated to reroute commuter buses on other bridges into Manhattan. MTA was able to initiate multi-modal operations based on the condition of infrastructure heavily damaged by flooding of key highway/ rail tunnels, bridge structures, stations and signal system. Most transit service impacted by Hurricane Sandy was restored by the week of November 5th while other services were disrupted for many weeks. New York City initiated an HOV3+ policy for all vehicles entering Manhattan (Nov 1st and 2nd) which increased demand for Rideshare services along with the disruptions to transit services as noted above. The following provides a daily summary.

Event Response – Daily Summary

October 28, 2012 (Sunday): Suspension of Transit Services Begins

- Transit agencies in the NYC area suspended all service by midnight.
 - Commuter rail and subway systems were suspended at 7 pm.
 - Bus service was suspended at 9 pm.
 - PATH (rail connecting Manhattan and New Jersey) ended all operations at midnight.
- Emergency shuttle services began.
- CSIC, normally closed on weekends, was fully operational from 3 pm – 9 pm.

October 29, 2012 (Monday): Sandy struck the New York Metro Area

- Commuter rail, subway, bus transit systems, Hugh L. Carey, Queens Midtown, and Holland tunnels remained closed. Limited services opened to the public as conditions permitted the week of November 5, 2012.
- CSIC and management team are in constant contact; decentralized operations are operating effectively.
- Several members of the CSIC lose electricity at the Kew Gardens office, but continue operating using cell service.

- Storm-related flooding in Downtown Manhattan caused CSIC office phone vendor to lose electricity; backup generators allowed for uninterrupted service.
- Due to flooding in lower Manhattan, approximately half of the MTA phone numbers and websites went offline. As a result, the CSIC provided expanded transit information services, as approximately 50% of the MTA and subsidiary phone numbers were offline, along with most of the MTA and subsidiary websites.

October 30, 2012 (Tuesday)

- The VoIP and communication servers at the CSIC stopped operations in the afternoon, due to lack of fuel for the back-up generator. While the phone vendor was in the process of obtaining fuel for the back-up generator, NYSDOT and 511NYRideshare, were able to secure an alternate server. As a result, the CSIC was able to offer full travel information service by midnight. This close coordination demonstrates the importance of cross-agency collaboration in sustaining CSIC operations, essential for providing important travel updates during the initial days following the storm.
- At 5 pm, limited bus service was restored.

October 31, 2012 (Wednesday)

- Subway service still not operational.
- Bus service continued to restore additional lines.
- Shuttle buses were also fully operational.
- Limited commuter rail was restored in the late afternoon/early evening.

November 1, 2012 (Thursday) & November 2, 2012 (Friday)

- Each day following October 31, restoration of transit service continued.
- November 1, limited subway service was restored. No service south of 34th Street, due to power outages.
- The CSIC VoIP vendor restored phone service by 6:00 am.

Event Response - Multi-modal Information Services & Outcomes

In the aftermath of Hurricane Sandy, as the MTA implemented a program to restore and/or provide alternative transit services there was a spike in requests for multi-modal travel information and types of requests with an increased demand for transit service information. There was also a surge in requests for registrations in the 511NYRideshare Online Ridematching system. This increase began when transit operations were disrupted and then increased further when the City of New York announced the HOV 3+ policy. The following summarizes the information and services provided, as well as outcomes, categorized by transportation mode, including calls per program per day, calls per region per day, callers inquiring about enrollment, and callers requiring support.

Transit Information Provided by CSIC

MTA servers and communication systems, located in Lower Manhattan, were strongly impacted by the Storm event. The CSIC was able to service the increased load of travel information plus the added level of transit information requests until the MTA system was fully restored. This high level of cross collaboration further strengthened the existing working relationship between the NYSDOT, 511NYRideshare, and MTA.

Updated Transportation System Reports

To ensure that callers to the CSIC received accurate and timely information, NYSDOT initiated a process of sharing Transportation System Status Reports (TSSR) and updates from Transportation Operations Coordinating Committee (TRANSCOM – a coalition of 16 transportation and public safety agencies in the New York, New Jersey, Connecticut metropolitan region), operation centers and the major transportation operators in the region. This information provided by the NYSDOT Joint Transportation Management Center (JTMC), TRANSCOM and other operation / information centers along with the full capability of 511NY proved invaluable in CSIC providing important and relevant travel information to the public.

Employer Outreach

The 511NYRideshare outreach staff conducted meetings and transportation days before the storm event with several large employer organizations. It is interesting to note that the 511NYRideshare team outreach staff conducted a transportation day with New York Methodist Hospital and Columbia Presbyterian Hospital not long before the storm. Both hospitals generated a large number of the hospital employees registered with 511NYRideshare during the week of the storm.

Technology

NYSDOT through its 511NYRideshare team worked rapidly to develop and modify 511NY content to keep commuters up to date with the ever-changing services. NYSDOT staff provided a wide range of support services to ensure that 511NY was updated and was able to establish important multi-agency connections to enable 511NYRideshare to carry out its important travel information services. At the request of NYSDOT, Technical Staff resources of the statewide 511NYRideshare team formed an ad hoc group of highly skilled Web site/content management, GIS, and software development specialists to support potential emergency technology needs.

4. RESPONSE OUTCOMES & STATISTICS

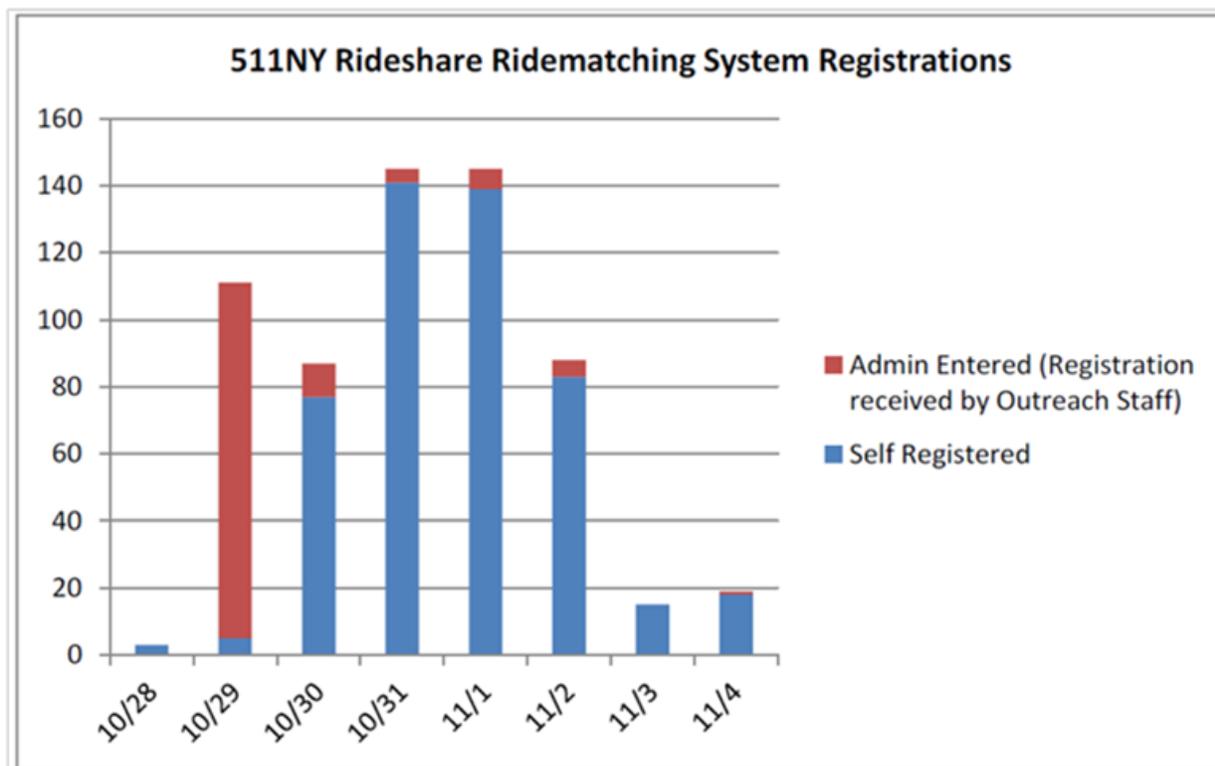
Below are figures that depict and track a wide range of statistics relating to the services provided during and following Hurricane Sandy. Statistics analyzed include number, type and duration of calls per daily, per region per day, percent of calls inquiring about enrollment, and calls requiring support. This data is included below and is used to support on-going program development, evaluation and improvement. NYSDOT also conducted a follow-up commuter survey and employer interviews, which are discussed in more detail in the next section as part of the evaluation conducted.

Ridematching System Registrations

CSIC staff processed over 130 rideshare applications from 10/29 to 11/4, while another 480 users self-registered at the 511nyrideshare.org site. The following are comparisons to the time prior to Hurricane Sandy:

- In the almost 3 month period leading up to Sandy (8/1 to 10/26) 349 people registered for 511NYRideshare, for an average of 4.0 registrations per day.
- In the 18 days during and post-Sandy (10/28 to 11/16) 773 people registered for 511NYRideshare, for an average of 43.0 registrations per day.
- During the peak impact of Hurricane Sandy between 10/28 and 11/4, 620 people registered for 511NYRideshare, for an average of 103.0 registrations per day.

FIGURE 2. Ridematching System Registrations



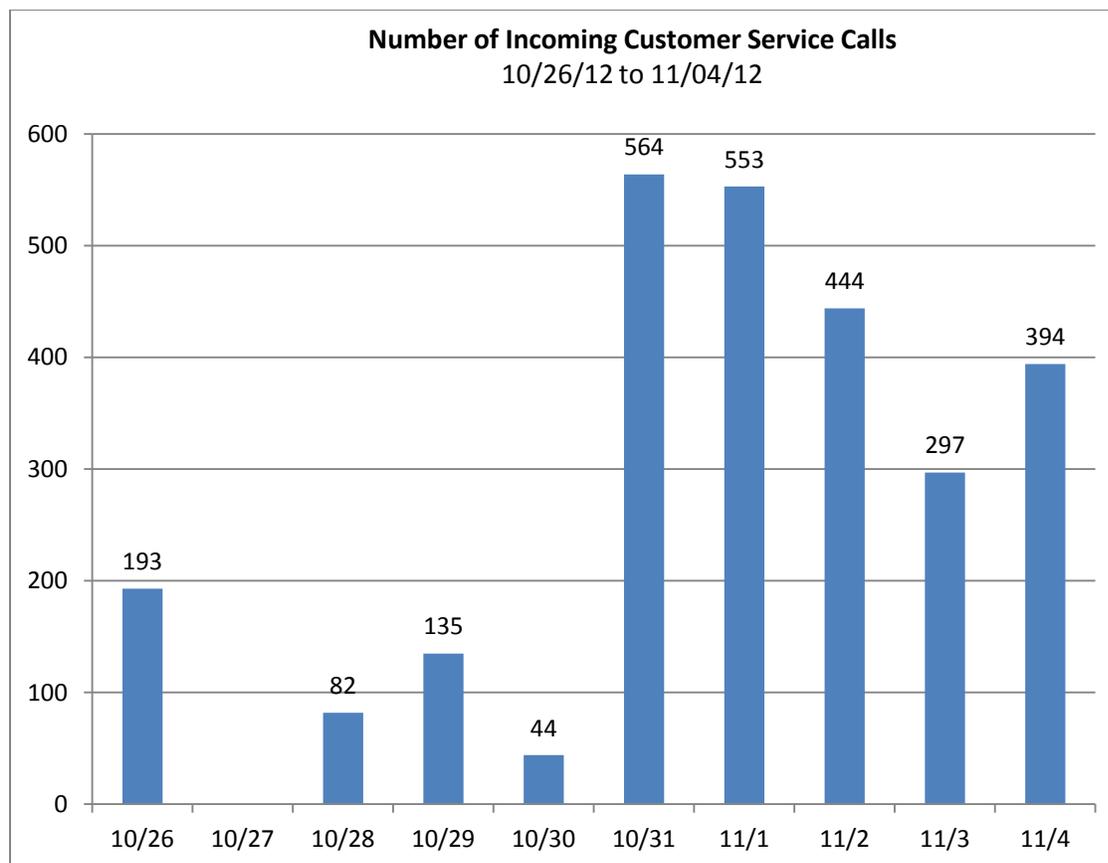
The graph above shows the large number of “admin-entered” registrations on October 29 represents the paper registrations received by administrative staff at the transportation day events the week before. Region 11 administrative staff manually inputted 108 registrations on October 29, which would have included the transportation day event at New York Methodist from the previous week. During the rest of the week, the ridematching system registrations consisted largely of self-registrations, by users who went to 511NYRideshare.org and registered on their own. Hospitals such as New York Presbyterian and New York Methodist generated a majority of the registrations.

New York Presbyterian Hospital was the employer with the most employees who registered in the 511NYRideshare Ridematching System between October 27 and November 4. There was a spike in registrations for the Ridematching System between October 30 and November 4, due to the HOV restrictions, fuel shortages, lines at gas stations and transit shut-downs. The top three employers with employees that registered in the system are as follows:

- New York Presbyterian Hospital: 249
- New York Methodist Hospital: 89
- Maimonides Medical Center: 51

The commuter survey respondents were also largely commuters who worked for New York Presbyterian Hospital, the results of which are discussed in the “Evaluation of Services Provided”.

FIGURE 3. Customer Service Calls



The chart above shows the increase in number of calls received and tracked by CSIC from October 28 to November 4, 2012. Call volumes increased exponentially during this time, specifically:

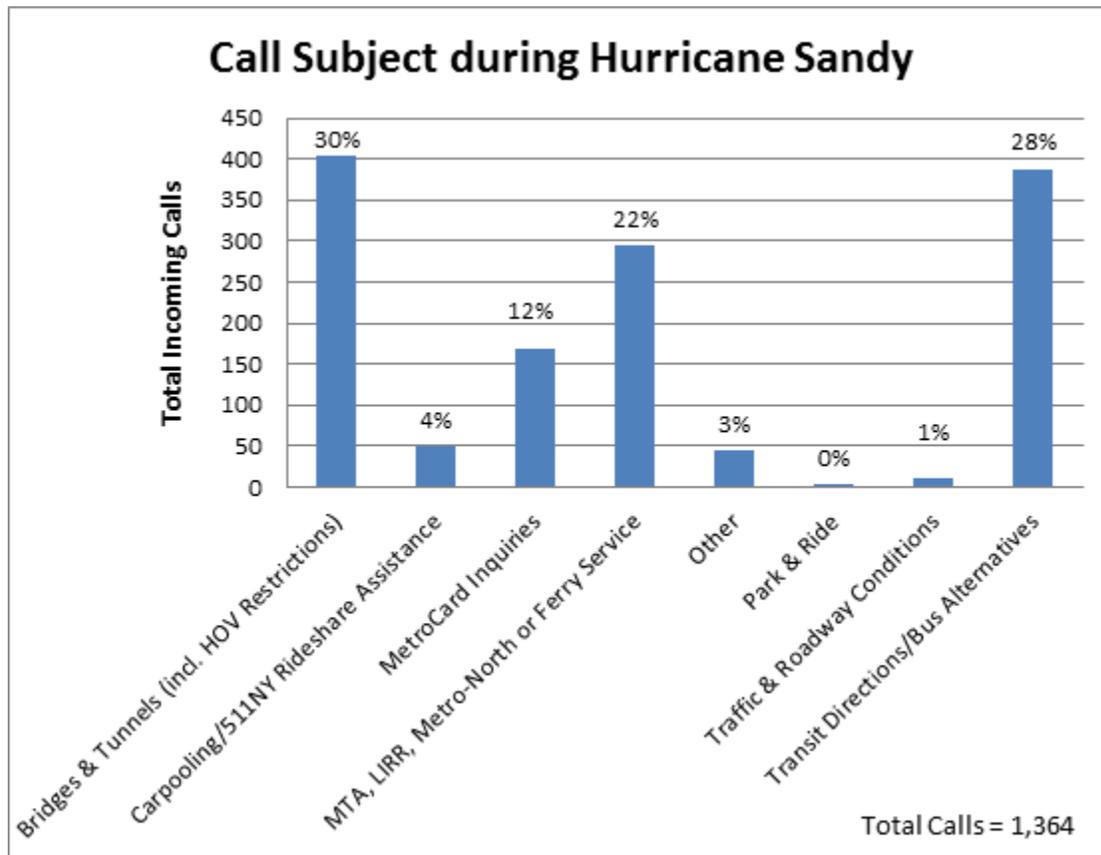
- In the almost 3 month period leading up to Sandy (8/1 to 10/26) 511NYRideshare received 3117 inbound calls, for **an average of 37 calls** per 24 hour period.
- Using just the period between 10/28 and 11/4, 511NYRideshare received 1382 inbound calls of more than 45 seconds gross, for **an average of 234 calls** per 24 hour period.

Contributing to the high call volumes were MTA's callers that were redirected to 511 since their phone system was down, as well as calls to request information about the website, since almost all MTA web pages were offline making it impossible for commuters to access real-time MTA information.

Call Subjects

The chart below breaks out the call subjects. It should be noted that the highest amount of calls occurred on October 31 and November 1, 2012, when the HOV 3+ was in effect.

FIGURE 4. Call Subjects

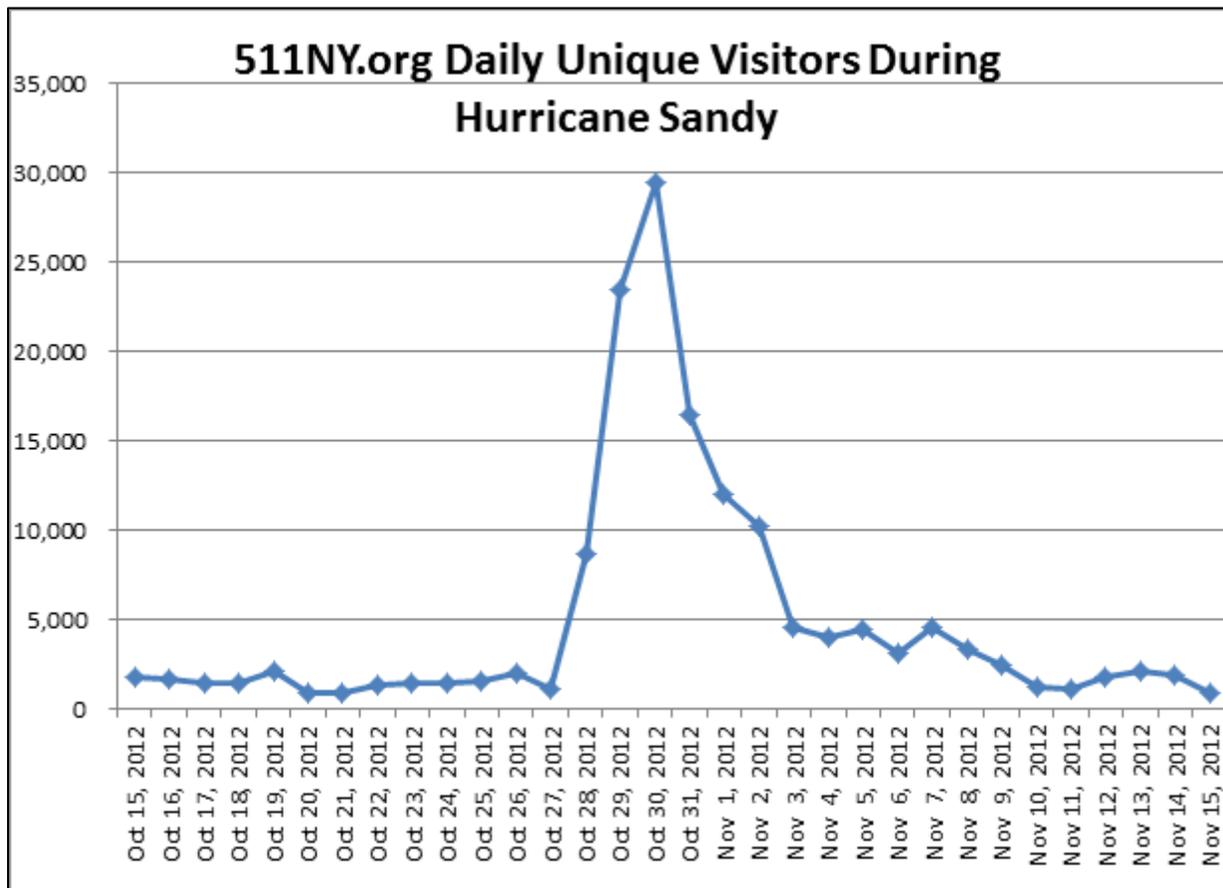


Of the calls that were tracked, the largest proportion of calls was about bridges and tunnels, including the HOV 3+ restriction. The second highest proportion of calls requested transit directions or bus alternatives. The third highest proportion of calls inquired about MTA, LIRR, or ferry service. Interestingly, on both October 31, the day with the most number of calls to the CSIC, and November 1, the day with the second-most calls to CSIC, the highest proportion of calls inquired about transit directions and bus alternatives. On November 2, when the HOV restriction was lifted, 111 of the 290 calls that were tracked (almost 40%) inquired about bridge and tunnel information.

Website Analytics

The increase in web traffic correlated with the different announcements made related to the storm, including posts on 511NY’s Facebook page, the Mayor’s HOV restriction announcement, and the Governor’s transportation emergency declaration. Figure 4 illustrates the spike in unique visitors to 511NY.org. On October 30, almost 30,000 unique visitors visited the 511NY.org website.

FIGURE 5. 511NY.org Homepage Visits



511NYRideshare was further able to track which websites had visitors who were directed to the Rideshare page on the 511NYRideshare website, as follows:

- New York Presbyterian Hospital (nyp.org): 607 referrals / 62.7%
- North Shore Long Island Jewish Hospital (northshorelijhelps.com): 93 referrals / 9.6%
- NY Rides (nyrides.com): 39 referrals / 4.0%

It is interesting to note that a link to 511NYRideshare.org on NYP.org referred over 60 percent of the visitors that came from other websites. The New York Presbyterian Hospital was a very active partner, and as such, this indicates that employer involvement had a significant impact in encouraging employees to register. This is further proven by the significant number of

registrations from New York Presbyterian Hospital, as detailed in the following section. As well, the overwhelming majority of people that responded to the commuter survey (discussed in the Evaluation of Services Provided section) also work for New York Presbyterian Hospital.

511NY Transit Trip Planner

In response to the high number of transit disruptions and traveler feedback, 511NY deployed a feature to the existing 511NY Transit Trip Planner that alerts travelers of transit incidents in their trip planner itinerary results. When commuters generated a transit trip itinerary during this time, their itinerary would have displayed a bright red notification, if a particular route was temporarily shut down or not running. Providing real time travel information in the trip planning process promotes smarter travel choices.

Social Media

As a result of 511NY's storm-related posts on its Facebook page, it received increased activity, with over 1,700 interactions. In addition, the 511NY Facebook page gained over 300 new followers in the 10-day period leading up to and following the storm. Posts that included photos of the storm damage tended to have the greatest number of "likes", comments and shares.

Employer Outreach

Following the storm, the 511NYRideshare outreach teams in Regions 8, 10 and 11 received requests from employer contacts for staff to conduct transportation days, to send rideshare-related flyers, and to review various aspects of the rideshare program, including the Guaranteed Ride Program for employees.

NYSDOT initiated an effort to advance the development of a new employer-based ridematching service which will enable employment sites to integrate a portal in their corporate websites. These portals could be utilized during transportation emergencies to direct employees, students and visitors to use a wide range of alternative transportation services while the standard transportation services are being restored to active level of operations. The customized employer-based ridematching portal is scheduled to be piloted during the summer of 2013 with New York Presbyterian and Adelphi University.

5. EVALUATION OF SERVICES PROVIDED

NYSDOT conducted an evaluation of the services provided in response to Hurricane Sandy. The evaluation consists of two parts: (1) a commuter questionnaire and qualitative analysis and (2) interviews with key employers. The purpose of the commuter questionnaire was to gain insights into the impact of employer involvement in emergency preparation. The purpose of the employer interviews was to gain insight about their capabilities in encouraging and assisting their employees in emergency preparation, as well as to gain insights on services that 511NYRideshare could provide in the future.

Commuter Questionnaire Methodology

A total of 677 people registered in the 511NY Rideshare ridematching system between October 29, 2012 and November 9, 2012. We emailed a questionnaire to all 677 registrants, of which 32 emails bounced back as undeliverable. So, the questionnaire successfully reached a total of 645 registrants.

The initial email with survey link was sent on July 11, 2013. To maximize the responses, two reminder emails were sent to those who had not yet taken the survey. The full schedule of emails sent is as follows:

- Initial email: July 11, 2013
- Reminder email #1: July 16, 2013
- Reminder email #2: July 19, 2013

The questionnaire closed at midnight on July 21, 2013.

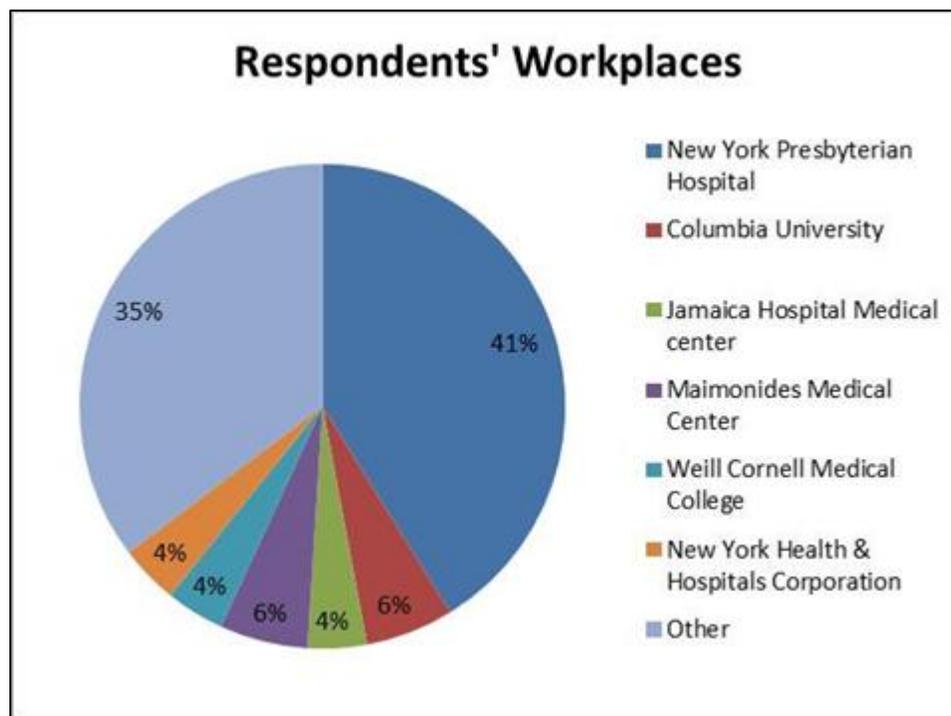
Commuter Questionnaire Responses

Of the 645 registrants that received the email invitation to fill out the questionnaire, 59 registrants partially completed the survey and 51 registrants completed the survey. As such, we used a qualitative data analysis method to analyze and present the results.

Commuter Questionnaire Analysis

Of the registered commuters that responded to the commuter questionnaire, the majority (41%) worked for the New York Presbyterian Hospital. The chart below shows the breakdown of companies where respondents worked.

FIGURE 6. Distribution of Respondent



Of the registered commuters that responded to the commuter questionnaire, many stated that they did in fact change how they regularly commuted to work. Many stated that their motivations for changing their commute were disruptions in transit service, city travel restrictions limited to HOV3+ and gas shortages or lines at the gas stations. These findings indicate that disincentives can be significant contributing factors in commuters' decisions about how they get to work.

Many respondents stated that their employer had provided information in advance of Hurricane Sandy to help them with planning their alternative commutes. This is consistent with the fact that of the 677 registrants, 62.7% linked to the 511NYRideshare ridematching system from the New York Presbyterian hospital website. Many of those same respondents indicated that their employer had provided emails with links to both the 511NY and the 511NYRideshare websites, as well as emails with attached electronic flyers that contained transportation information.

These findings indicate that commuters are either more likely to find out about services that are advertised on their employer's website and/or are more likely to register in a system when it has been "blessed" by their employer. Additional quantitative data analysis could be conducted to explore exactly what it is about the 511NYRideshare matching system being affiliated with their employer that convinces them to register. Knowing these motivations could also provide insight into the design and functionality of the 511NYRideshare employer portals that are currently under development.

Interestingly, while the respondents of the questionnaire had all registered in the 511NYRideshare ridematching system, many of the respondents said they did not have success in finding matches. Follow up responses to this question indicate that many of the respondents registered in the system but did not reach out to their matches, nor did their matches reach out to them.

Again, this indicates that in future emergency preparedness efforts, NYSDOT through 511NYRideshare, along with its agency partners should enhance the employer-based outreach program to encourage commuters to register and establish their carpools/vanpools in advance, as a contingency plan, rather than waiting until the emergency has occurred, etc. This recommendation is supported with the answers to a follow-up question, which asked commuters which modes they would consider in future emergencies. Many respondents indicated they would consider carpooling, transit and emergency shuttles. If incentivized in advance, respondents could have their carpool arrangements made, reducing the demand for emergency shuttles and alternate transit.

NYSDOT through 511NYRideshare may also consider promoting this message to employers in the region on a regular basis, since the respondents also indicated that their employers played a role in their decisions to research alternate commutes, as stated above. 511NYRideshare may also consider placing follow-up calls and/or emails to registrants, inquiring whether they would appreciate assistance in finalizing their carpool/vanpool arrangements. Since Hurricane Sandy, NYSDOT has directed 511NYRideshare to test this procedure, by asking registrants if they would appreciate this kind of assistance. If it proves to be successful in increasing the matching rate, it could be expanded to a larger sample of registrants.

An overwhelming number of respondents said they would contact 511NYRideshare in the event of a future emergency. This supports NYDOT to develop 511NYRideshare as a reliable and trusted resource for employers and commuters in emergency situations and build on this trust with employers and commuters year-round.

Employer Interviews

511NYRideshare conducted follow-up interviews with employers to evaluate services provided, corroborate findings in the commuter questionnaire, and to learn suggestions for services in future emergencies.

New York Presbyterian Hospital

As mentioned previously, 62.7% of the web referrals came from the New York Presbyterian Hospital (NYPH) website. The human resources staff was a valuable partner in helping to provide transportation information to their employees. The following summarizes the follow-up interview.

The NYPH contact knew that Hurricane Sandy was going to be another “hundred year storm”. Having worked with 511NYRideshare for many years, contact made call to 511NYRideshare Tuesday morning when it was apparent that transportation systems would be

down for several days. The NYPH contact was aware that subway lines that many of her staff used daily were flooded and not operating. In addition the City was already indicating that a HOV 3+ restriction into Manhattan was being contemplated. The NY Presbyterian medical facilities had to operate at full capacity, so the NYPH contact reached out to 511NYRideshare to request commute assistance so that staff could find alternate ways to get to work.

NY Presbyterian has always considered 511NYRideshare a supportive partner, and an eager participant in the hospitals sustainability programs. 511NYRideshare is part of an emergency action plan the Presbyterian put in place following Sandy. Furthermore, NY Presbyterian stated that they are very eager to have the ridematching system employer portal developed; this confirms the recommendations and findings from the commuter questionnaire.

New York Hospital, Queens

New York Hospital, Queens (NYHQ) is another institution that 511NYRideshare had worked with in the past, but not for several years before Sandy. Although not in Manhattan like NY Presbyterian and therefore less affected by subway shutdowns and HOV restrictions, the Human Resources contact at NYHQ faced the same issues all hospitals were facing – they had to operate at full capacity. Being slightly less transit dependent than the hospitals in Manhattan, hospital staff were more affected by the fuel shortages that quickly developed.

This feedback confirms the finding from the commuter questionnaire related to disincentives being a significant factor in the registrants' decision to sign up for carpooling. The fuel shortages comment also confirms the findings that commuters would be willing to consider emergency shuttles for alternate ways to get to work, if provided in the future.

NYHQ expressed gratitude for the assistance 511NYRideshare provided to their employees following Sandy. The hospital also understands that it is in their best interest to continue and grow this re-established partnership. Building on these positive employer partnerships established during Hurricane Sandy are ideal opportunities for 511NYRideshare. This also reinforces the finding from the commuter questionnaire where the majority of respondents stated they would contact 511NYRideshare in future emergencies for assistance with their alternate commute planning.

Maimonides Medical Center Interview

Like NYHQ, Maimonides Medical Center is in one of the outer-boroughs of New York City. As such, they faced similar issues as NYHQ - the need to ensure that staff could get to work when all transportation in the area was affected. Maimonides had very limited exposure to ridesharing, and therefore was not sure what to expect. Their human resources staff stated that working with 511NYRideshare was an excellent experience.

6. LESSONS LEARNED

The proactive, collaborative and dynamic approach that NYSDOT employed during Hurricane Sandy led to many successes, some challenges and several lessons learned that will serve to improve response to future emergencies.

TDM Emergency Preparedness Plan

NYSDOT will develop an Emergency Preparedness Plan in collaboration with its agency partners for the 511NYRideshare Program, which would integrate the appropriate range of TDM services within emergency preparedness plans being updated in New York. A major focus of the plan will be working with medical facilities to develop site specific TDM emergency preparedness plans and also incorporated a TDM component within existing medical center emergency plans.

NYSDOT, in coordination with State Emergency Management Office (SEMO) and New York City Office of Emergency Management (NYC OEM) will prepare an outreach plan to assist employers in preparing in advance of emergencies, and a communications plan to be used during emergencies. The outreach plan will include talking points for outreach staff, as well as tips for promoting emergency preparedness year-round. The communications plan will include the use of PSA's and will be distributed by the State and the City highlighting the use of 511NY and its integrated set of travel information and services during emergencies.

Building on Established Trust in Employer Partnerships

NYSDOT through 511NYRideshare is building on relationships with employers established during the Sandy storm throughout the year. NYSDOT 511NYRideshare will enhance its level of services provided during emergencies as it works with employers year-round.

Information Sharing and Updates

NYSDOT is working with all involved agencies and centers to ensure that there are follow-up steps to improve information sharing processes between 511NYRideshare and other agencies and operations and set up alerts for CSIC from 511NY, TRANSCOM and NYSDOT TSSR reports.

NYSDOT and the 511NYRideshare team have stepped up efforts to proactively work with hospitals, medical centers, universities and other large organizations to implement transportation contingency plans, and etc. In addition, customized rideshare portals are in development for employers, as a way to build critical mass of users in the rideshare system, providing optimal travel alternatives during emergencies. Furthermore, NYSDOT is developing rideshare matching system enhancements that enable users to register for carpools and be sent notifications only in emergencies.

Rideshare System Enhancements

Based on lessons learned, 511NYRideshare is building several enhancements to the rideshare system, including: the capability for creating customized employer-based

ridematching portals and ability to establish emergency carpools. The customized portal will explain how and why commuters should set up carpools in advance of an emergency. Another feature 511NYRideshare is building is a feature that will enable registrants to set up emergency carpools, and activate those carpools only during emergencies. The hospitals impacted in Hurricane Sandy indicated that they are very interested in deploying these features.

511NYRideshare will also add a data-feed for the park & ride lot database, such that temporary park & ride lots can be shown on ridematch lists dynamically. (See Park & Ride Lots Database for more background below.)

Encouraging Emergency Preparedness Year-Round

NYSDOT is outreaching to employers and commuters to prepare contingency commute plans. NYSDOT has requested that 511NYRideshare as part of its regular messaging and outreach, remind commuters that emergency situations are unfortunately inevitable and it is in everyone's best interest to prepare. Commuters will also need to be reminded to prepare for emergencies; much like the Red Cross reminds and encourages people to prepare their homes for emergencies with keeping water and supplies.

Enhanced CSIC Procedures

511NYRideshare has begun testing of follow-up call procedures, whereby staff provide assistance to commuters in connecting with one another. Staff ask registrants if they are interested in contact center staff contacting matches on a registrant's ridematch list on his/her behalf. If these targeted services prove successful in increasing the number of carpools established, 511NYRideshare may expand these procedures in future emergencies.

The CSIC is improving working relationships with transportation operation agencies for providing dynamic transportation information during emergencies.

Park & Ride Lots Database

511NYRideshare will update and enhance existing 511NY Park and Ride data base to include potential park & ride areas that can be used during an emergency for both transit and carpools.

Increased Use of Social Media

While 511NYRideshare posted several storm-related updates on its FaceBook page, the 511NY Twitter feeds did not incorporate any customized updates other than non-specific auto-generated incident and event report-outs. In future emergencies, 511NY will utilize Twitter to a greater extent, to inform the public in real-time about alternative travel options and drive users to the 511NYRideshare website. Social media will also be addressed in the Communications Plan. Furthermore, 511NYRideshare will integrate social media features in the rideshare system, such as the ability to register and sign in with an existing social media account, and the ability to post announcements on social media pages about their activity on the 511NYRideshare site.

Summary

The increased potential value of demand management strategies in supporting multiple goals, in a broader, more integrated context was confirmed during Hurricane Sandy. The NYSDOT deployment of TDM services during the Sandy event demonstrated the benefits of implementing a flexible and adaptive TDM framework for managing weather emergencies that affect the travel network. NYSDOT is taking proactive steps to develop a TDM Emergency Preparedness plan and suite of support tools based on the outcomes and lessons learned during Hurricane Sandy.

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This paper is solely the responsibility of the authors. Any errors are theirs and not of those of the NYSDOT.

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