

Poison Control Center Surge Capacity during an Unusual Increase in Call Volume—Results from a Natural Experiment

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Abbreviations:

ACD = automatic call distribution system
EMS = emergency medical services
NJPIES = New Jersey Poison Information and Education System
NYCPCC = New York City Poison Control Center
PPC = Poison Control Centers
SPI = Specialist in Poison Information

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Abstract

Introduction: Poison Control Centers (PCCs) play an integral role in the preparation for and management of poison emergencies. Large-scale public health disasters, caused by both natural and human factors, may result in a drastic increase in the number of inquiries received and handled by PCCs in short periods of time. In order to plan and prepare for such public health emergencies, it is important for PCCs to assess their ability to handle the surge in call volume and to examine how the unusually large number of calls could affect the level of services. On 26 January 2006, the New York City Poison Center experienced a sudden loss of telephone service. The disruption in telephone service led to the need to reroute calls from that geographical catchment area to the New Jersey Poison Information and Education System (NJPIES) for several hours.

Methods: Data from the NJPIES was abstracted from the telephone switch's internal reporting system and the NJPIES's electronic record system and processed with a standard spreadsheet application.

Results: Compared to the same time and day in the previous week, the total number of calls received by the NJPIES during the four hours after the disruption increased by 148%. A substantial rise in the number of calls was observed in almost every 15-minute increment during this four-hour (h) time period (with some of these increments increasing as much as 525%). Meanwhile, the percentage of calls answered by the NJPIES decreased, and the percentage of calls abandoned during a 15-minute increment reached as high as 62%. Furthermore, the average time for handling calls was longer than usual in most of these 15-minute increments.

Conclusions: Limitations of the telephone technology, which impacted the ability of the NJPIES to respond to the surge of calls, were observed. While the NJPIES was able to handle the unusual increase of incoming calls using available poison specialists and staff, the experience gained from this natural experiment demonstrates the need for PCCs to have a pre-planned surge capacity protocol that can be implemented rapidly during a public health emergency. A number of challenges that PCCs must meet in order to have adequate surge capacity during such events were identified.

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Introduction

The concept of surge capacity has evolved from a contrivance to deal with a sudden increase in needs in military settings (troops and equipment demand) into a concept that is considered an important part of medical preparedness during the onset of a disaster or public health emergency. Although surge capacity for catastrophic events has been addressed in various healthcare settings such as hospitals,¹ microbiology laboratories,² and trauma units,³ limited information is available about the ability of Poison Control Centers (PCCs) to provide public health services during disasters.

Regional PCCs serve all 50 US states and the District of Columbia. In 2004, regional PCCs managed a combined total of 2,438,644 human poisoning exposure cases.⁴ During a public health emergency caused by natural hazards, bioterrorist attacks, or other catastrophic events, the demand for the services of the PCCs likely will increase. In order to prepare for such events, it is crucial to evaluate the ability of the PCCs to respond to a surge in the number of calls and how this surge will affect the quality of services provided by the PCCs.

This report is a summary of the findings from an experience in two neighboring PCCs after a sudden telephone outage disrupted operations in one of them, and dramatically increased the demand for services in the other for a period of several hours. Recommendations that may be used as guidance for other PCCs in their preparedness for public health emergencies also are suggested in this report.

On 26 January 2006, at 11:00 h, an unexpected telephone outage occurred in the New York City Poison Control Center (NYCPCC). The Center was unable to provide services during the time of the power outage, and incoming calls were re-routed, according to pre-designed emergency protocol, to the neighboring New Jersey Poison Information and Education System (NJPIES) located in Newark, New Jersey. The disruption of telephone service in the NYCPCC lasted for four hours, during which time the NJPIES experienced a dramatic increase in the number of incoming calls.

Both the NYCPCC and the NJPIES are regional PCCs accredited by the American Association of Poison Control Centers (AAPCC). They are the only available resources for providing recommendations for the on-site treatment of poisoning exposures through telephone management and consultation in New York City and in the State of New Jersey. The poison specialists who manage the calls at the two centers are physicians, registered nurses, or pharmacists, and manage >150,000 exposure cases annually.

The New Jersey Poison Information and Education System was staffed by 17 Specialists in Poison Information (SPIs) including five physicians, 10 nurses, and two pharmacists. Each SPI completed an extensive, in-house training program in the management of the poisoned patient. Approximately one year after being hired, SPIs were eligible to take an in-house examination and a national examination leading to certification as a Certified Specialist in Poison Information. The number of SPIs responding to calls varied with the time of day with a maximum number of six during the day and one from 23:30 to 07:00 hours (h).

The New York City Poison Center employed 16 SPIs. At the time of this event, three were registered nurses, one was a physician assistant, and 12 were registered pharmacists. All were trained in-house over 3–6 months and ultimately passed a national certification examination. During typical hours of operation, 3–4 specialists were present. Their only responsibility was to respond to telephone calls. From midnight until 07:00 h, only one specialist was present in the PCC.

Methods

The data used in this study include information collected by the NJPIES while it was receiving re-routed calls from the NYCPCC. Statistics were derived from the internal reporting system of the telephone switch in the NJPIES by way of the commercially available call center program, PrairieFyre (PrairieFyre Software Inc., Kanata, Ontario, Canada) and from the electronic records of the NJPIES and the NYCPCC.

The total numbers of calls received by the NJPIES, the number of abandoned calls, and the average time for handling a call during the outage period were abstracted. Further, these measures were compared to the same statistics recorded by the NJPIES during normal operations at the same time of the day one week before the event. In addition, the difficulties that were encountered by both PCCs during this sudden-onset event are described.

Results

The average number of incoming calls processed during the time period of the power outage was 8–10 calls per hour for the NYCPCC, and 16–20 calls per hour for the NJPIES. The characteristics of all calls received by the NJPIES during the four-hour telephone outage at the NYCPCC are listed in Table 1. When compared to the same time period on the same day in the previous week, the total number of calls received by the NJPIES increased by 143%. A considerable rise in the number of calls was observed in single 15-minute increments during this period with an increase in some of these increments as much as 525%.

While the total call volume increased dramatically, the percentage of calls answered by the NJPIES decreased, and the percentage of calls that were abandoned (the caller hung up after being on hold) in a single 15-minute period reached as high as 62%. In addition, the average time for handling calls was longer than usual in most of these 15-minute increments.

A number of difficulties were encountered by both PCCs affected by the telephone outage. First, it is estimated that the NYCPCC lost 42–52 calls during the outage. There probably were additional “administrative” calls lost as many people tried to check the number of the PCC when they heard there were problems with it.

The NJPIES was challenged when it had to process calls that required referral to a hospital in New York City or a local emergency health services. In order to manage such cases, the poison specialists at the NJPIES needed the contact information for hospitals and EMS in New York City. However this information was not immediately available.

In addition, the NJPIES telephone switch uses an automatic call distribution system (ACD) which requires SPIs to be logged into a specific telephone individually. Although administrative staff could see that there were calls in the queue, they could not answer the calls until it was determined that they had to log in as a SPI. During that time, only calls on the “panic” lines easily could be answered by the administration. These calls were not routed to the ACD; rather, they were “self-selected” by the callers as being “life threatening,” and thus, bypassed the

Time Increment	Calls Received			Calls Handled			Calls Abandoned			Average handling time (m:s)	
	19 Jan	26 Jan	Change	19 Jan	26 Jan	Change	19 Jan	26 Jan	Change	19 Jan	26 Jan
12:00	3	5	+67	3	4	+33	0	1	--	1:24	5:41
12:15	8	8	0	8	6	-33	2	2	0	2:05	2:12
12:30	4	25	+525	4	10	+150	0	14	--	2:15	2:17
12:45	6	13	+117	5	11	+120	1	1	+100	1:49	2:06
13:00	5	13	+160	5	5	0	0	8	--	0:36	2:08
13:15	4	16	+300	3	12	+300	1	3	+2	1:39	3:10
13:30	4	8	+100	4	6	+50	0	2	--	1:34	5:36
13:45	4	12	+200	4	11	+175	0	1	--	2:52	2:42
14:00	4	17	+325	4	12	+200	0	5	--	3:09	1:25
14:15	7	20	+186	7	12	+71	0	8	--	3:04	1:32
14:30	6	14	+133	5	8	+60	1	6	+5	1:48	2:25
14:45	4	11	+175	4	8	+100	0	2	--	2:58	4:08
15:00	8	19	+138	6	12	+100	3	6	+100	2:41	2:20
15:15	7	22	+214	7	16	+129	0	4	--	3:07	2:54
15:30	6	7	+17	5	6	+20	0	1	--	3:37	2:45
15:45	7	6	-17	7	6	-17	0	0	0	3:19	2:17
Total	87	216		81	145		8	65		2:28	2:17

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Table 1—Calls to the New Jersey Poison Information and Education System on 19 January and 26 January 2006 (from 11:45 h to 15:45 h)

ACD and appeared on all telephone sets as “panic” calls that could be picked up at any telephone set. Once the administrative staff became aware of the limitation of the ACD situation, they were able to log on as SPIs and helped to answer calls.

Discussion

Although scarce, previous literature on the topic has documented a sharp increase in the number of calls to PCCs following terrorist attacks and other catastrophic events.⁵⁻⁷ It has been suggested that PCCs should be prepared to handle not only the unusually high call volume during such emergencies, but also to become an important link for

communication and coordination of services between the critical care practitioners and other health and government agencies.^{8,9} The experience from a real-life situation such as the one described in this report, should be used as a guidance to prepare better for a sudden increase in demand for PCC services that may occur in conjunction with disasters or terrorist attacks.

Both the NJPIES and the NYPCC have disaster plans that allow for telephone calls to be re-routed to one Poison Center if the other experiences an emergency. The disaster plans allow for the relocation of staff and poison specialists from the affected center to the PCC receiving the calls, in case the Poison Center receiving the re-routed calls needs the assistance.

The analyses of the statistics from the telephone switch and the electronic records indicate that during the telephone outage at the NYCPCC, the total number of calls to the NJPIES increased dramatically. While this particular finding was not surprising, some of the results deserve closer attention. During the surge in call volume, the percentage of calls decreased, while the average time for processing the calls increased, and the percentage of abandoned calls reached 62%.

There could be several possible explanations for these observations. As noted before, the poison specialist at the NJPIES did not have easy access to the contact information for hospitals and the EMS system in the New York metropolitan area. This may have prolonged the time for handling some cases that needed referral to a healthcare facility in New York. Undoubtedly, if such information had been available readily at the NJPIES, the time for handling many of those calls would have been shorter. Joint training exercises between the two Poison Centers could be helpful in addressing these and other similar issues that may arise when the next emergency occurs.

Additionally, because of the overwhelming number of incoming calls in short periods of time, on occasion the poison specialists at the NJPIES needed to put callers on hold while they managed other calls. This also may have increased the average time for handling calls, and may have contributed to the very high percentage of abandoned calls. Certainly, in the event of a public health emergency, all calls to the PCC should be handled in a timely manner.

Therefore, PCCs should have a planned surge capacity protocol that will be implemented during times of a sudden increase in needs for PCC services.

Another factor that may have contributed to the longer time for handling calls is the possible fatigue that the poison specialists may have experienced after processing large numbers of calls during the first hour or two of the surge. The work of the specialists during the call surge may have suffered due to the increased volume of data entry, frustration generated from being asked to do more, and the inability to have breaks.

Conclusions

Although many calls appear to have been lost, some undoubtedly were hang-ups that were redialed and ultimately got through. The true number of callers who were not handled is unknown. The positive aspects of handling the surge included the ability to redirect calls to New York City on single lines and the ability to consult with staff from the NYCPCC for local issues of concern. Also, the pre-determined protocol to transfer calls in an emergency worked reasonably well, as a large number of calls were redirected successfully to the NJPIES (and other poison centers) where they were handled. This experience suggests that management of a surge may require increasing the number of staff, shortening the calls according to triage standards, and forgoing thorough documentation. Alternatively, other methods may be developed to distribute the work among additional poison centers when a similar situation or public health emergency occurs.

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