Suicide-Related Syndromic Surveillance: CuSum and SatScan Alerts User Guide

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SECTION 1: SYNDROMES AND PARTICIPATING FACILITIES

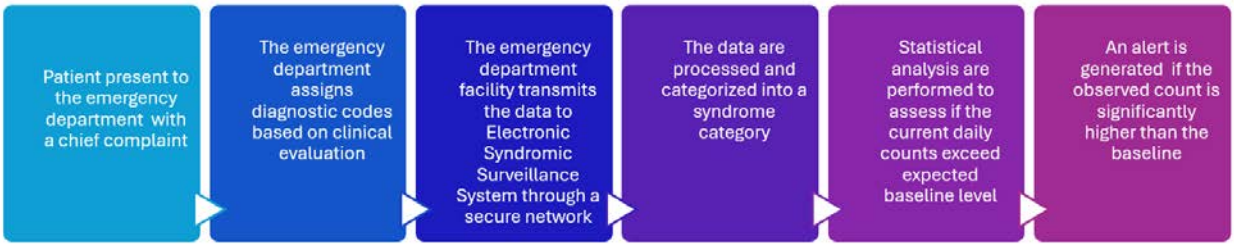
I. SYNDROMIC SURVEILLANCE:

The New York State Department of Health Electronic Syndromic Surveillance System (ESSS) is a statewide disease surveillance system designed to provide near real-time situational awareness by tracking health indicators during a public health emergency. Currently, 132 (100%) New York State hospital emergency departments outside NYC voluntarily report data to the Electronic Syndromic Surveillance System within 24 hours of patient's emergency department visit. This patient visit data is then processed and categorized into one or multiple **syndromes** based on patient **chief complaints** and **diagnosis codes**. The system continuously tracks near real-time syndrome counts and analyzes trends using statistical methods at the community level. Increases in syndrome counts may indicate emerging public health events.

- **Chief Complaint**: free text self-statement from the patient describing reasons for the emergency department visit
- **Diagnosis Code**: ICD-10 diagnostic codes
- **Syndrome**: a disease or medical condition characterized by a predefined set of symptoms and/or diagnosis codes.

II. New York State Department of Health, Electronic Syndromic Surveillance System Data Flow and Processing:

The New York State Department of Health Electronic Syndromic Surveillance System captures these syndromes based on the emergency department patient ICD-10 diagnostic codes combined with patient chief complaints.



Graph 1: Electronic Syndromic Surveillance System data flow and processing.

III. SYNDROME DEFINITIONS:

As of May 2026, the Electronic Syndromic Surveillance System has developed 40 syndromes, such as drug overdose syndrome, suicide-related syndrome, self-harm syndrome, asthma syndrome, etc.

For suicide-related surveillance, three syndromes are developed and utilized: parent syndrome, including suicide-related, and two subsyndromes, including suicide attempt and suicide ideation.

These suicide-related syndromes are used to identify suicide-related emergency department visits, monitor trends, identify high risk and disproportionality impacted population. Findings are subsequently communicated to local health department to enhance and support targeted suicide prevention efforts.

In addition to trend monitoring, suicide-related syndromes are used within the Electronic Syndromic Surveillance System for near real-time surveillance. Daily suicide-related emergency department counts are continuously monitored and compared against the baseline (mean counts of the previous 28 days). Statistical algorithms are applied to detect significant deviations (i.e., higher than three standard deviations) from expected levels, triggering automated alerts when the thresholds are exceeded.

Table (1) provides a description of the current suicidal-related syndromes utilized by the Electronic Syndromic Surveillance System.

Syndrome	Description	ICD-10 Codes Examples	Chief Complaint Examples
Suicide Ideation	Capture visits in which a patient expresses suicidal ideation or intent to die	R45.851 (suicide ideation)	SI (suicide ideation), "I want to kill myself", "Exhibit suicidal thoughts"
Suicide Attempt	Capture visits in which a patient made a suicide attempt	T14.91 (suicide attempt)	"Attempted suicide", "Tried to kill myself", Any combination of self-harm act (e.g., overdose) and suicide ideation (e.g., SI)
Suicide-Related	A parent syndrome includes suicide ideation and/or suicide attempt subsyndromes	Any suicide-related ICD-10 code such as R45.851	Any suicide ideation or suicide attempt chief complaint terms such as "tried hanging myself this morning"

Table 1: Description of suicide-related syndromes used at the New York State Department of Health, Electronic Syndromic Surveillance System.

IV. TYPES OF ALERTS

Two primary types of alerts are generated within the Electronic Syndromic Surveillance -System: CUSUM ("signal") alerts and SatScan ("cluster") alerts. CUSUM stands for Cumulative SUM, and SatScan is an abbreviation for Space and Time Scan Statistics. CUSUM alerts monitor significant increases in syndrome counts at the facility, county, or region level and are triggered when the observed counts exceed expected baseline level. In contrast, SatScan alerts identify spatial-temporal clusters of cases within a predefined geographic radius, detecting statistically significant concentrations of suicide-related visits over a specified period of time.

Alerts are generated and sent via email to Public Health Directors, Health Commissioners, Directors of Mental Hygiene (suicide only) for each county. Any of the above recipients can request additional staff to be added to the recipient list by emailing syndsurv@health.ny.gov.

CuSum "Signal" Alerts	SatScan "Cluster" Alerts
√ Assessed at the emergency department, county, or regional level.	√ Based on spatial analysis using patient residential zip code.
√ Detect temporal increases in syndrome counts as compared to a historical baseline level.	√ Identify clusters within a defined geographical radius (20km). The radius can include more than one county.
√ generated daily.	√ generated weekly.
√ Triggered when observed counts exceed the expected baseline level derived from recent historical data (e.g., above the previous 28-day mean plus three standard deviation).	√ Triggered when statistically significant clusters are identified over a defined time window (21-day period).
√ Both include case listings.	

V. REGION MAP

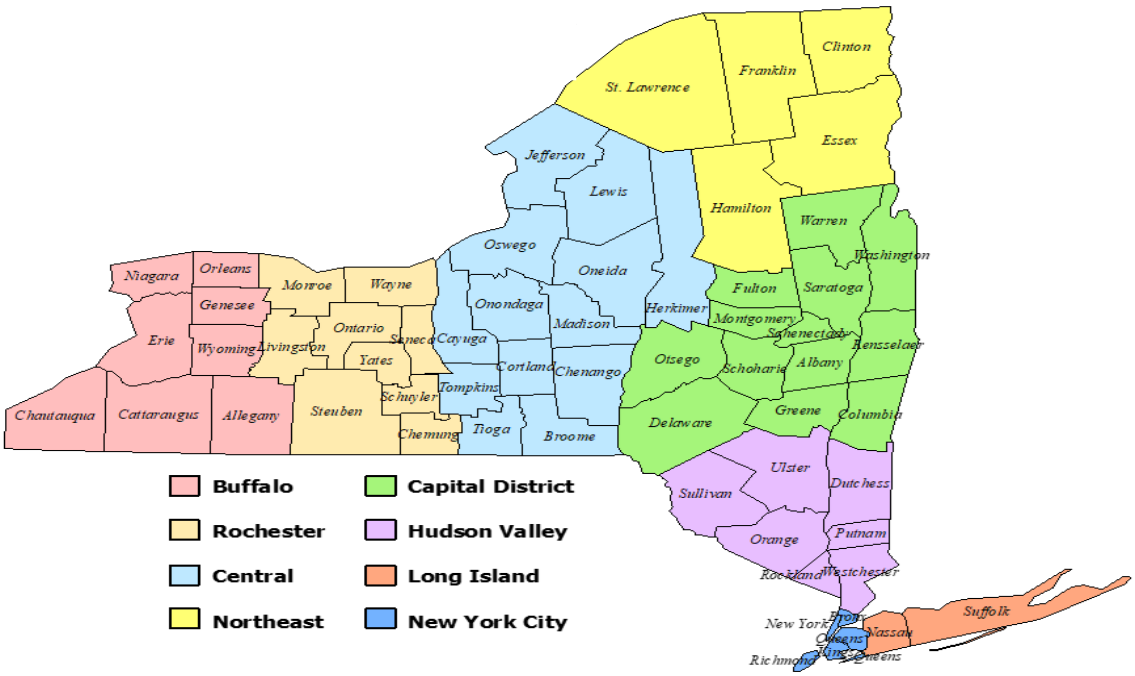


Image 1: Region definition used by New York State Department of Health, Electronic Syndromic Surveillance System

VI. PARTICIPATING EMERGENCY DEPARTMENT FACILITIES

The Electronic Syndromic Surveillance System receives daily data from 132 hospitals. The list of participants emergency department facilities is included in the appendix.

SECTION 2: READING A CUSUM "SIGNAL" ALERT

CuSum "signal" alerts compare the daily counts of suicide-related visits seen at a facility, county, or regional level to an expected baseline. Baseline is the average of the previous 28 days of data minus the past 1-2 days. If a daily count is significantly above this baseline average (i.e. higher than three standard deviations), a signal alert is generated. Signal alerts include case listing, 10-day syndrome counts, short- and long-term graphs, and resource guides.

CuSum reports updated two times a day, with the final daily report finishing at approximately 3:30pm. When a signal is detected, the report is typically disseminated via email to the designated county representative(s) within 24 hours based on protocol (within 72 hours during weekend). All reports will be reviewed by the Electronic Syndromic Surveillance System staff before dissemination to remove all patient identifiable information.

According to protocol, alerts are disseminated if the generated signal is historically high (the highest count of visits on the long-term trend) or equal to historically high. Otherwise, alerts are disseminated if the case listings include a vulnerable population (i.e. school age group).

Graph (2) shows a case listings example.

1	2	3	4	5	6	7	8	9	10	11
Hospital County	**Hospital Name**	**Visit Date/Time**	**Syndrome**	**Age**	**Sex**	**Zip Code**	**Chief Complaints**	**Diagnostic Codes**	**Clinical Impression**	**Triage Notes**
Example County	Example Hospital	12Jan26:04:37:00	SUICIDA-RELATED	18	Male	Example	Threatened Self and family. Mental Health Evaluation (MHE)	R45.851 # F31.3		Patient having suicide ideation and threatened family he is going to overdose
Example County	Example Hospital	12Jan26:07:14:00	SUICIDA-RELATED	68	Male	Example	Pt Presents with parents Hx (History) of Cutting. Suicide Ideation denies SH (Self Harm)	R45.851		Patient was sent by therapist for thoughts of self-harm. Pt placed on 1:1 observation
Example County	Example Hospital	12Jan26:08:12:00	SUICIDA-RELATED	22	Female	Example	Suicide attempt #Pt (Patient)Tried to hang self. # aggressive behavior	T14.91 # T71.162A # Z91.51		Pt tried hanging self-7:30 pm. Pt had a fight with a friend and then tried to kill self # neck injury. Pt placed on 1 :1 observation

Table 2: An example of case listings of a generated signal alert: all examples used in this document are simulated for learning purposes.

1: Hospital County: The county where the emergency department facility is located at.

2: Hospital Name: The name of the emergency department facility.

3: Visit Time/Date: Time stamp at which the patient was seen.

4: Syndrome: The syndrome as being categorized and assigned by the Electronic Syndromic Surveillance System.

5: Age: patient age at the date of the visit.

6: Sex: patient gender as reported.

7: Zip Code: patient reported residential zip code.

8: Chief Complaints: recorded complaints reported by the patient during the initial assessment.

9: Diagnostic Codes: ICD-10 codes assigned by physicians.

10: Clinical Impression: notes provided based on the clinician's judgment.

11: Triage Notes: side notes added by the medical staff during the assessments.

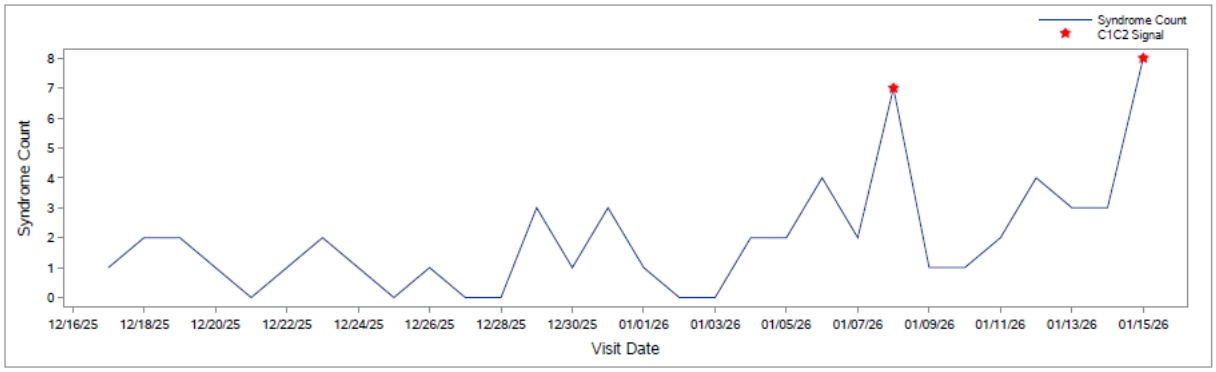
Hospital Emergency Department (ED) SUICIDE-RELATED Daily Syndrome Counts

in the past 15 days at Facility level

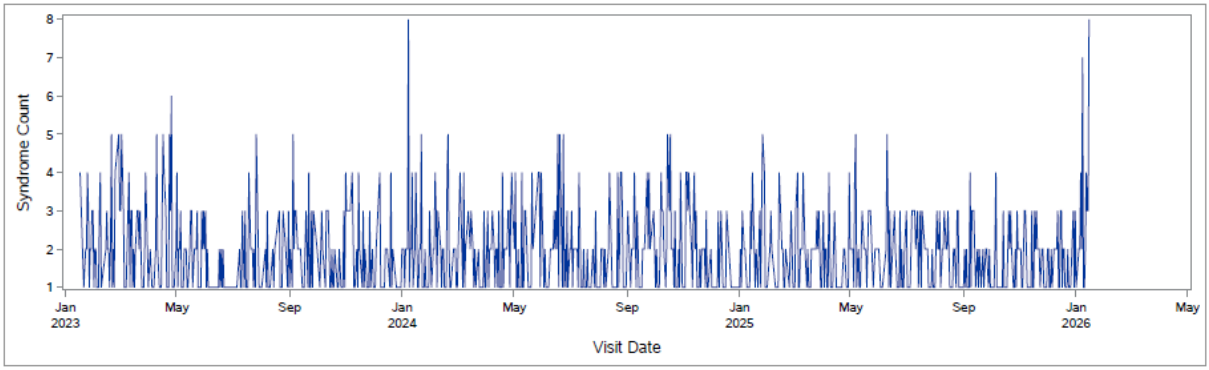
Visit Date	HOSPITAL_NAME	Syndrome	Syndrome Count
01/15/26	Example Hospital Name	SUICIDE-RELATED	8
01/14/26	Example Hospital Name	SUICIDE-RELATED	3
01/13/26	Example Hospital Name	SUICIDE-RELATED	3
01/12/26	Example Hospital Name	SUICIDE-RELATED	4
01/11/26	Example Hospital Name	SUICIDE-RELATED	2
01/09/26	Example Hospital Name	SUICIDE-RELATED	1
01/08/26	Example Hospital Name	SUICIDE-RELATED	7
01/07/26	Example Hospital Name	SUICIDE-RELATED	2

Table 3: 10-day syndrome counts:: all examples used in this document are simulated for learning purposes.

Short-term and Long-term Graphs for Alerted SUICIDE-RELATED Syndrome



Graph 1: short-term graph of suicidal related counts: all examples used in this document are simulated for learning purposes.



Graph 2: long-term graph of suicidal related counts: all examples used in this document are simulated for learning purposes.

The example provided in Tables (2 and 3) and Graphs (1 and 2) represent a simulated signal alert, generated on Jan 15, 2026, when the daily suicidal-related visits were significantly higher than the expected baseline.

The long-term graph (Graph 2) shows that the generated signal represents an "equal to historically high" value, meaning it is equal to the highest peak previously detected in January 2024.

The case listings presented in (Table 2) provide detailed information on each visit. Medical terminologies were used, such as SH (self-harm) and Hx (history). Reviewing these cases allows for better understanding of the contextual factors, including contributing factors (e.g., school bullying), vulnerable population, demographic patterns, and age groups presented.

SECTION 3: READING A SATSCAN "CLUSTER" ALERT

SatScan "cluster" alerts are based on both patient residential location and patient emergency department visit time. The cluster detection parameters are set to identify any grouping of suicidal-related cases that are significantly larger than expected in a maximum geographic radius of 20 km (12.4 miles) and a maximum time span of 21 days. Each cluster alert is accompanied by an individual case listing report, like signal "CuSum" alert reports. SatScan case listings include hospital name and county, emergency department visit date, syndrome, age, sex, zip codes, patient chief complaint and diagnostic code, clinical impression, and triage note.

SatScan cluster reports are run weekly and are sent out as needed if a cluster is detected. All reports will be reviewed by the Electronic Syndromic Surveillance System staff before dissemination to remove patient identifiable information. This statistical surveillance method has not been made available on the Electronic Syndromic Surveillance System portable, as patient location combined with other information might be used to identify a patient for certain low count syndromes

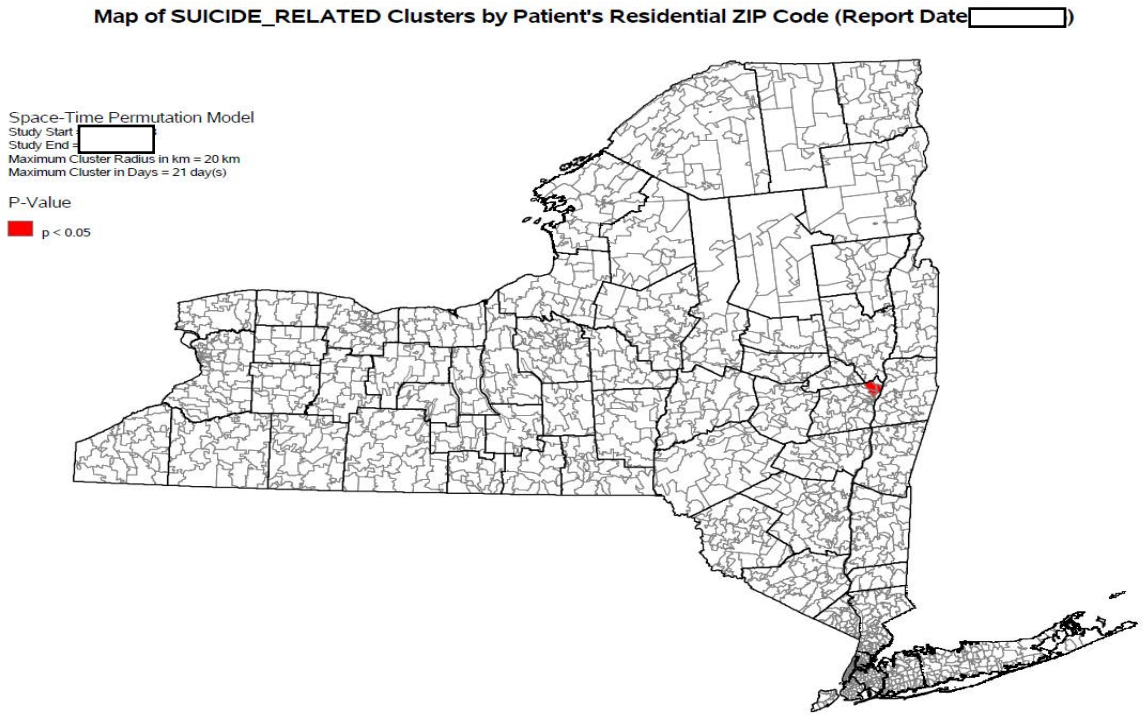


Image 2: Map of suicidal-related clusters generated by SatScan alert: all examples used in this document are simulated for learning purposes.

Cluster	P_value	Recurrence Interval (days)	Latitude	Longitude	Radius (km)	Start_Date	End_Date	ZIP_Code	Observed_#	Expected_#
1	0.0130	77	42.7355	-73.7176	5.31	2024/9/10	2024/9/20	Zip1	8	5
								Zip2	7	5
								Zip3	3	2
								Zip4	2	1

Total ZIP Codes =4

Total Observed Cases= 20

Total Expected Cases = 13

Table 4: Spatial and temporal parameters of the detected cluster: all examples used in this document are simulated for learning purposes.

1	2	3	4	5	6	7	8	9	10	11
Hospital County	Hospital Name	Visit Date/Time	Syndrome	Age	Sex	Zip Code	Chief Complaints	Diagnostic Codes	Clinical Impression	Triage Notes
Example County	Example Hospital	12Jan26:04:37:00	SUICIDA-RELATED	15	Male	Example	#mental health # suicide	R45.851		Pt (patient) told mom she is suicidal
Example County	Example Hospital	12Jan26:01:12:00	SUICIDA-RELATED	55	Female	Example	# Drug overdose # patient took large numbers of hypertension pills in attempt to end life	T46.5X2 # T14.91		

Table 5: Case listings of the detected cluster in SatSan alert: all examples used in this document are simulated for learning purpos

The example presented on (Image 2, Table 4 and Table 5) shows a SatScan simulated signal alert example. The red area on the map (Image 2) represents the detected cluster. Based on the summary table (Table 4), the cluster spans over four zip codes and lasted 11 days. The case listings provided in (Table 5) show additional information on each visit involved in the cluster.

SECTION 4: CONSIDERATIONS WHEN RESPONDING TO AN ALERT

- Conduct an assessment to determine the context, severity, and urgency of each alert, and activate the appropriate crisis response protocol as needed,
- Initiate timely coordination with the identified emergency department facility to validate findings,
- Notify and partner with local agencies and local community organizations,
- Monitor patterns and trends across multiple resources such as law enforcement, Emergency Medical Services, and other public health and public safety partners
- Utilize collaboration with other programs such as peer programs,
- Ensure suicide resources are updated and accessible to high-risk areas or "hotspots"

SECTION 5: CONTACT INFORMATION

- Questions about suicide syndrome or response: suicideprevention@health.ny.gov
- Questions about syndromic surveillance or CuSum/SatScan alerts: syndsurv@health.ny.gov

SECTION 6: LIST OF ABBREVIATIONS

- ESSS: Electronic Syndromic Surveillance System
- HCS: Health Commerce System
- CUSUM: Cumulative SUM
- SatScan: Space and Time Scan Statistics
- ICD-10: stands for International Classification of Diseases, Tenth Revision, a medical coding system published by the World Health Organization.
- MHE: Mental Health Evaluation; an abbreviation used frequently in the chief compliant (hospital emergency language)
- SI: suicide Ideation; an abbreviation used frequently in the chief compliant (hospital emergency language)
- SH: suicide harm; an abbreviation used frequently in the chief compliant (hospital emergency language)
- SA: suicide attempt; an abbreviation used frequently in the chief compliant (hospital emergency language)
- PT: patient; an abbreviation used frequently in the chief compliant (hospital emergency language)

SECTION 7: APPENDIX

- Information about the **Electronic Syndromic Surveillance System** can be found: HERE
- Request access to the Electronic Syndromic Surveillance System in the **Health Commerce System** (HERE): you can access the Electronic Syndromic Surveillance System dashboard to monitor trend, user training video, current syndrome definitions used by the Electronic Syndromic Surveillance System, and information about C1 and C2 used in CUSUM signals.
- More information on Suicide and Self-Harm Injuries in New York State can be found HERE: including crisis support, ways to take actions, collaboration and communication, data sources, and other related topics.
- Suicide Prevention Resource Guide for Communities and Coalitions can be found HERE .
- Suicide, Self-Inflicted Injury and Drug Overdose Data Resources and Tools HERE .
- Suicide Prevention Resource Guide for Public Health and Service Providers HERE .
- A list of participating emergency department facilities in New York State Department of Health Electronic Syndromic Surveillance System is provided on the next page.

I. PARTICIPATING EMERGENCY DEPARTMENT FACILITIES

Regions may be defined differently by other programs. ***Updated: March 11, 2020***

Region	County	EDPFI	Facility Name	Region	County	EDPFI	Facility Name
Buffalo	Allegany	0039	JONES MEMORIAL HOSPITAL	**Hudson Valley**	Putnam	0752	PUTNAM HOSPITAL CENTER
	Cattaraugus	0066	OLEAN GENERAL HOSPITAL		Rockland	0776	NYACK HOSPITAL
	Chautauqua	0098	BROOKS MEMORIAL HOSPITAL			0779	GOOD SAMARITAN HOSPITAL (SUFFERN)
		0111	WESTFIELD MEMORIAL HOSPITAL		Sullivan	0968	CATSKILL REGIONAL MEDICAL CENTER (G HERMANN SITE)
		0103	WOMANS CHRISTIAN ASSOCIATION HOSPITAL			0971	CATSKILL REGIONAL MEDICAL CENTER
	Erie	0207	BUFFALO GENERAL MEDICAL CENTER		Ulster	0989	BENEDICTINE HOSPITAL
		0292	ST JOSEPH HOSPITAL OF CHEEKTOWAGA			1002	ELLENVILLE REGIONAL HOSPITAL
		3067	MILLARD FILLMORE SUBURBAN HOSPITAL		Westchester	1061	MOUNT VERNON HOSPITAL
		0218	SISTERS OF CHARITY HOSPITAL			1129	PHELPS MEMORIAL HOSPITAL
		0267	KENMORE MERCY HOSPITAL			1117	NORTHERN WESTCHESTER HOSPITAL
		0213	BUFFALO MERCY			1098	ST JOSEPHS MEDICAL CENTER (YONKERS)
		0210	ERIE COUNTY MEDICAL CENTER			1097	ST JOHNS RIVERSIDE HOSPITAL (ST JOHNS)
		0280	BERTRAND CHAFFEE HOSPITAL			1072	SOUND SHORE MEDICAL CENTER OF WESTCHESTER
		0208	JOHN R. OISHEI CHILDRENS HOSPITAL			1124	ST JOHNS RIVERSIDE HOSPITAL (DOBBS FERRY)
		5780	MERCY AMBULATORY CARE CENTER			1139	WESTCHESTER MEDICAL CENTER
	Genesee	0339	UNITED MEMORIAL MED CTR (NORTH ST)			1122	LAWRENCE HOSPITAL
	Niagara	4486	LOCKPORT MEMORIAL HOSPITAL			1039	HUDSON VALLEY HOSPITAL CENTER
		0581	DEGRAFF MEMORIAL HOSPITAL			1045	WHITE PLAINS HOSPITAL CENTER
		0574	NIAGARA FALLS MEMORIAL MEDICAL CENTER	**Long Island**	Nassau	0552	PLAINVIEW HOSPITAL
		0583	MOUNT ST MARYS HOSPITAL AND HEALTH CENTER			0563	ST FRANCIS HOSPITAL (ROSLYN)
	Orleans	0718	MEDINA MEMORIAL HOSPITAL			0513	MERCY MEDICAL CENTER (ROCKVILLE CTR)
	Wyoming	1153	WYOMING COUNTY COMMUNITY HOSPITAL			9691	LONG BEACH MEDICAL CENTER
Capital District	Albany	0005	ST PETERS HOSPITAL			0490	NORTH SHORE UNIVERSITY HOSPITAL AT GLEN COVE
		0004	ALBANY MEMORIAL HOSPITAL			0518	LONG ISLAND JEWISH VALLEY STREAM
		0001	ALBANY MEDICAL CENTER			0511	WINTHROP UNIVERSITY HOSPITAL
	Columbia	0146	COLUMBIA MEMORIAL HOSPITAL			0551	ST JOSEPH HOSPITAL
	Delaware	0174	DELAWARE VALLEY HOSPITAL			0541	NSUH-Manhasset
		0165	OCONNOR HOSPITAL			0528	NASSAU UNIVERSITY MEDICAL CENTER
		0170	MARGARETVILLE MEMORIAL HOSPITAL			0550	NSUH-Syosset
		8554	TRI TOWN REGIONAL HEALTHCARE			0527	SOUTH NASSAU COMMUNITIES' HOSPITAL
	Fulton	0330	NATHAN LITTAUER HOSPITAL		Suffolk	0896	ST CHARLES HOSPITAL
	Montgomery	0484	ST MARYS HEALTHCARE (AMSTERDAM)			0943	ST CATHERINE OF SIENA HOSPITAL
	Otsego	0746	MARY IMOGENE BASSETT HOSPITAL			0938	PECONIC BAY MEDICAL CENTER
		0739	AURELIA OSBORN FOX MEMORIAL HOSPITAL			0885	BROOKHAVEN MEMORIAL HOSPITAL MEDICAL CENTER
	Rensselaer	0756	SAMARITAN HOSPITAL			0895	JOHN T. MATHER MEMORIAL HOSPITAL
	Saratoga	0818	SARATOGA HOSPITAL			0913	HUNTINGTON HOSPITAL
	Schenectady	0829	ELLIS HOSPITAL			0245	SUNY HOSPITAL AT STONY BROOK
	Schoharie	0851	BASSETT HOSPITAL OF SCHOHARIE COUNTY			0925	GOOD SAMARITAN HOSPITAL (W ISLIP)
	Warren	1005	GLENS FALLS HOSPITAL			0889	SOUTHAMPTON HOSPITAL
Central	Broome	0042	UHS - BINGHAMTON GENERAL HOSPITAL			0891	EASTERN LONG ISLAND HOSPITAL
		0043	OUR LADY OF LOURDES MEMORIAL HOSPITAL			0924	SOUTH SHORE UNIVERSITY HOSPITAL
		0058	UHS - WILSON MEDICAL CENTER	**Northeast**	Clinton	0135	CHAMPLAIN VALLEY PHYSICIANS HOSPITAL MEDICAL CENTER
	Cayuga	0085	AUBURN MEMORIAL HOSPITAL		Essex	0303	ELIZABETHTOWN COMMUNITY HOSPITAL
	Chenango	0128	CHENANGO MEMORIAL HOSPITAL		Franklin	0325	ALICE HYDE MEDICAL CENTER
	Cortland	0158	CORTLAND MEMORIAL HOSPITAL			0324	ADIRONDACK MEDICAL CENTER (SARANAC LAKE)
	Herkimer	0362	LITTLE FALLS HOSPITAL		St. Lawrence	0804	MASSENA MEMORIAL HOSPITAL
	Jefferson	0367	SAMARITAN MEDICAL CENTER (WATERTOWN)			0812	GOUVERNEUR HOSPITAL

Central	Jefferson	0379	CARTHAGE AREA HOSPITAL	**Northeast**	St. Lawrence	0815	CANTON-POTSDAM HOSPITAL
						0817	CLIFTON-FINE HOSPITAL
		0377	RIVER HOSPITAL			0798	CLAXTON HEPBURN MEDICAL CENTER
	Lewis	0383	LEWIS COUNTY GENERAL HOSPITAL	**Rochester**	Chemung	0116	ARNOT OGDEN MEDICAL CENTER
	Madison	0397	ONEIDA HEALTHCARE		Livingston	0393	NICHOLAS H NOYES MEMORIAL HOSPITAL
		0401	COMMUNITY MEMORIAL HOSPITAL (HAMILTON)		Monroe	0413	STRONG MEMORIAL HOSPITAL
						0409	HIGHLAND HOSPITAL
	Oneida	0589	ROME MEMORIAL HOSPITAL			0471	THE UNITY HOSPITAL OF ROCHESTER
		0599	WYNN HOSPITAL			0411	ROCHESTER GENERAL HOSPITAL
	Onondaga	0630	ST JOSEPHS HOSPITAL (SYRACUSE)		Ontario	0671	GENEVA GENERAL HOSPITAL
		0636	CROUSE HOSPITAL			0676	CLIFTON SPRINGS HOSPITAL AND CLINIC
						0678	FREDERICK FERRIS THOMPSON HOSPITAL
					Schuyler	0858	SCHUYLER HOSPITAL
					Steuben	0866	CORNING HOSPITAL
	Onondaga	0628	UPSTATE UNIVERSITY HOSPITAL AT COMMUNITY GENERAL			0870	ST JAMES MERCY HOSPITAL
		0635	UNIVERSITY HOSPITAL SUNY HEALTH SCIENCE CENTER			0873	IRA DAVENPORT MEMORIAL HOSPITAL
	Oswego	0727	OSWEGO HOSPITAL		Wayne	1028	NEWARK-WAYNE COMMUNITY HOSPITAL
	Tompkins	0977	CAYUGA MEDICAL CENTER AT ITHACA		Yates	1158	SOLDIERS AND SAILORS' MEMORIAL HOSPITAL
Hudson Valley	Dutchess	0192	NORTHERN DUTCHESS HOSPITAL				
		0180	MID-HUDSON VALLEY DIVISION OF WESTCHESTER MEDICAL CENTER				
		0181	VASSAR BROTHERS HOSPITAL				
	Orange	0699	ORANGE REGIONAL MEDICAL CENTER				
		0694	ST LUKES CORNWALL HOSPITAL AT NEWBURGH				
		0704	ST ANTHONY COMMUNITY HOSPITAL				
		0708	BON SECOURS COMMUNITY HOSPITAL				