New York State Report on

Mortality after Acute Myocardial Infarction

(Heart Attack)

2019

NEW YORK STATE | Department of Health

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Introduction

Heart disease is the leading cause of death in New York State (NYS).[1] Some patients with severe heart disease experience an Acute Myocardial Infarction (AMI), commonly referred to as a heart attack. A heart attack consists of permanent damage to the heart muscle (death of heart tissue) resulting from a reduction in blood flow to the heart. A frequent consequence of this damage is death within a short period of time. This report marks the second time that NYS is releasing information on risk-adjusted mortality outcomes for AMI patients at hospitals across the state.

This report builds upon the initial AMI report, released in 2018, and New York State Department of Health's long history of data-driven quality improvement activities for cardiac procedures. It is consistent with the Department of Health's mission to protect, improve and promote the health, productivity and well-being of all New Yorkers. For thirty years, a cardiac profile system for cardiac surgery and percutaneous coronary intervention (PCI) has been maintained by the Department of Health. Outcome reports for hospitals and physicians performing these procedures have been publicly available since 1989 for coronary artery bypass surgery, since 1996 for PCI and since 1998 for valve surgery. The Department of Health's outcome reports for cardiac procedures and AMI can be found here: https://www.health.ny.gov/statistics/diseases/cardiovascular/.

Assessing outcomes for all AMI patients, some of whom are not treated with PCI or cardiac surgery, is an important addition to the long-standing reports on cardiac procedures. One reason is that providing hospitals with meaningful information about outcomes for these patients allows for a broad-based review of potential areas for improvement. Expanding the focus to include patients who do not receive cardiac procedures may prompt some facilities to examine their treatment and transfer patterns to determine if a cardiac procedure, particularly PCI, is being made available to all patients who are likely to benefit from it. Some cardiologists and other clinicians have suggested that outcome reports like this one are an important component of a comprehensive evaluation of cardiac care.

Like the reports on cardiac procedures, these analyses have been conducted under the guidance of the New York State Cardiac Advisory Committee, a group of independent practicing cardiac surgeons, cardiologists and other professionals in related fields.

Purpose of this Report

The purpose of this report is to provide useful information to hospitals to support their ongoing quality improvement efforts surrounding AMI care and to help them identify areas where new or enhanced initiatives may be beneficial. The report includes patients of all ages, and includes all public and private payers. Also, it is intended to provide valuable information to the public about the quality of AMI care provided by New York State hospitals. Optimal treatment of AMI patients typically involves an integrated system of care which may include multiple hospitals as well as pre-hospital emergency medical services. Public availability of these data enables meaningful evaluation and improvements across and within systems of care.

Because it is a relatively common condition associated with substantial mortality and has a rich evidence base to support quality improvement initiatives, multiple government agencies and professional societies have focused on outcomes for AMI. The information in this report is intended to complement data that is available in other reports. In particular, the Centers for Medicare & Medicaid Services (CMS) provides data to hospitals[2] and the public concerning 30-day mortality for AMI.[3]

There are several important differences between this report and the CMS report. The CMS evaluation does not include patients under age 65 or Medicare patients in Medicare Advantage plans, and together these two groups comprise a substantial proportion of all AMI patients. This NYS report includes patients age 18 and older and does not limit by payer. Furthermore, this report adjusts mortality with the aid of important clinical variables (heart rate, blood pressure) not available to CMS. Finally, this report compares New York hospitals' performance with other New York hospitals rather than the entire country.

Identifying AMI Cases and Assessing Hospital Performance

Data Sources

The primary data source for this report is the Statewide Planning and Research Cooperative System (SPARCS). SPARCS is a comprehensive all-payer data reporting system established in 1979 as a result of cooperation between the healthcare industry and government. SPARCS collects patient level detail on patient characteristics, diagnoses and treatments, services, and charges for each hospital inpatient stay and outpatient visit.[4] In 2007, SPARCS was expanded to include three clinical data elements for AMI patients: systolic blood pressure, diastolic blood pressure, and heart rate. These have been shown to be independent predictors of short-term mortality for AMI patients in earlier studies, and subsequent analyses of New York data confirmed their importance. SPARCS data for 2019 discharges were linked to the New York State Vital Statistics to identify mortality within 30 days of admission for AMI cases.

Identifying AMI Cases for Analysis

All cases identified as an AMI in this report had a principal diagnosis of Acute MI in SPARCS. This report, like the CMS report, includes information about patients with two kinds of AMI:

ST Segment Elevation Myocardial Infarction (STEMI) and Non-ST Segment Elevation Myocardial Infarction (NSTEMI). It is important to distinguish between these two types of AMI because they have different treatment protocols and levels of risk (STEMI is higher risk). Appendix 1 contains more details on the diagnoses used in this report to identify AMI.

Some records with an AMI diagnosis needed to be excluded from analysis for a variety of reasons. The features that caused cases to be excluded are listed below:

- Age less than 18 years at the time of admission.
- Discharge status indicates the patient left against medical advice or discontinued care.
- STEMI patients who did not receive a PCI or coronary artery graft surgery and were discharged alive the same day as admission or the next day to a destination other than an acute care facility. This is a change from the 2015 report in which all cases discharged alive the same day as admission or the next day to a destination other than an acute care facility were excluded. At the time of the first report, it was believed that these cases likely represented errors in diagnosis reporting. This exclusion criterion aligned with methods used in the CMS report. Further review of the data and input from CAC and NYS providers has revealed that the original exclusion criterion was too broad.
- Patient residence is not in NYS (because of inability to track mortality status after discharge).
- For patients with two separate AMI admissions who died within 30 days of both admissions, only the first was analyzed and all later records were excluded.

Transfer Patients

Some AMI patients are treated in more than one hospital in a continuous episode of care. When patients are transfered between hospitals, it is necessary to combine records from multiple hospitals into a single record for analysis so that the outcome can be attributed to just one hospital. This allows for an unduplicated count of cases and a meaningful statewide mortality rate.

In this report, cases are assigned to the first hospital that treated the patient (whether as an inpatient or in the Emergency Department). Transfers occur most commonly when a patient is treated first at a hospital that does not have PCI on site and is transferred to a hospital that can provide that procedure. Attributing the case to the first hospital, and not the one that provided additional care, recognizes that optimal treatment for AMI patients presenting to a hospital without PCI onsite often requires transfer to another hospital. This incentivizes hospitals to make appropriate transfers and diminishes any disincentive for the PCI hospital to accept AMI transfers.

Two exceptions to this rule are when the first hospital only has an emergency department and no inpatients, and when the first hospital has no emergency department. Neither of these types of hospitals appears in the report, and the patients transferred from them are attributed to the receiving hospital.

Appendix 2 further describes the identification and analysis of AMI cases including case attribution strategy in less common transfer patterns, situations where the sending and receiving hospital are not in agreement on the principal diagnosis of AMI, and the process for matching records for patients treated at more than one hospital.

Outcome

The outcome of interest in this report is risk-adjusted mortality status 30 days after initial admission or emergency department encounter. All deaths that occur inside or outside the hospital but within 30 days of admission are counted as deaths in the report. Those who expire during the same hospital stay but more than 30 days after admission are not counted as a mortality.

Accounting for Differences in Patient Risk

There are many patient characteristics that influence outcomes after AMI. These include age, the presence of other conditions, the area of the heart affected by the AMI, and hemodynamic state when arriving at the hospital. Appendix 3 describes the methods used to adjust for differences in patient characteristics and presents the significant risk factors for 30-day mortality for NYS AMI patients in 2019.

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[1] NYS Vital Statistics (https://www.health.ny.gov/statistics/leadingcauses_death)

[2] www.qualitynet.org

[3] www.medicare.gov/hospitalcompare

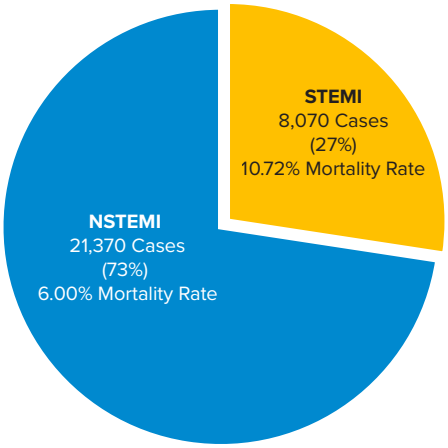
[4] www.health.ny.gov/statistics/sparcs

Acute Myocardial Infarction in NYS: Statewide Results

In 2019 there were 29,440 AMI patients discharged from 192 acute care hospitals. The overall observed 30-day mortality rate for these patients was 7.30%.

Because there are important differences in treatment protocols and expected outcomes for STEMI and NSTEMI patients, it is useful to look at outcomes separately for these groups. Figure 1 shows that of all the AMI patients included in this report, 8,070 (27%) were classified as STEMI and 21,370 (73%) were classified as NSTEMI. The overall observed mortality rates for these two groups were 10.72% and 6.00%, respectively.

Figure 1.
Number and Type of Acute MI Patients in NYS, 2019

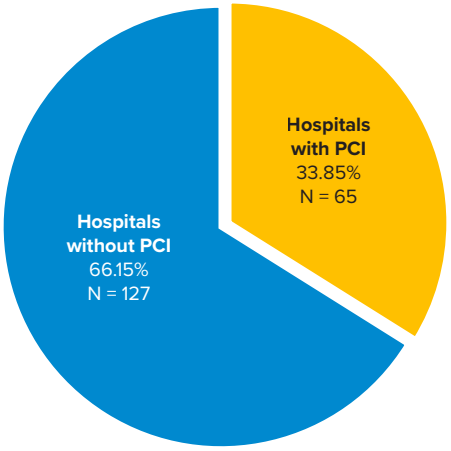


All AMI: 29,440 Cases
7.30% Mortality Rate

Many patients with an AMI are treated at more than one hospital because not all hospitals are able to perform diagnostic catheterization (an invasive test of the heart that can look for damage caused by the MI) or provide advanced services like PCI and cardiac surgery. Hospitals that can provide these services tend to be larger hospitals that have more experience and resources to care for acutely ill cardiac patients. This report distinguishes between PCI and non-PCI centers because PCI is an important treatment for AMI and because all PCI hospitals are able to perform diagnostic catheterization.

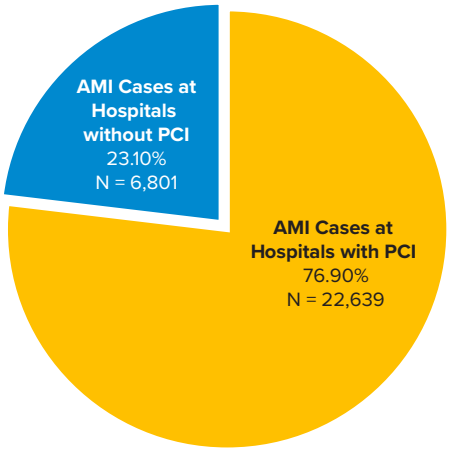
As seen in Figure 2, only 65 hospitals with AMI patients (34%) were approved to perform PCI in 2019. However, as indicated in Figure 3, 77% of all AMI patients are treated at PCI hospitals (including patients arriving directly at a PCI hospital and those transfered to a PCI hospital). Among all AMI patients presenting to a Non-PCI hospital, 77% were transferred to a PCI hospital (the percent transferred was 93% and 72% for STEMI and NSTEMI, respectively).

Figure 2. Number of Hospitals Treating AMI Patients with and without PCI On-site



Hospitals in NYS with AMI Cases in 2019 N = 192

Figure 3. Number of 2019 AMI Cases at Centers with and without PCI On-site



Acute Myocardial Infarction in NYS: Hospital Results

As described in detail in Appendix 3, the expected mortality rate is a measure of severity of illness of a hospital's patients, where a rate higher than the statewide average mortality rate indicates that a hospital's case mix is of higher risk than the statewide mix. A lower expected mortality rate indicates the hospital's patients are of lower risk than the statewide patients overall. The risk-adjusted mortality rate is an estimate of what a hospital's mortality rate would have been if its case mix had been identical to the statewide mix. Consequently, a risk-adjusted mortality rate statistically significantly higher than the statewide mortality rate indicates a performance that is worse than the state as a whole. Likewise, a risk-adjusted mortality rate that is statistically significantly lower than the statewide rate means that the hospital's results are better than the state as a whole.

Table 1 provides the following information for All AMI Cases, STEMI Cases and NSTEMI for each hospital in New York with an AMI volume greater than 25:

- type of hospital (P = provides PCI; N = does not provide PCI)
- number of AMI cases,
- number of 30-day mortalities,
- observed mortality rate (OMR),
- expected mortality rate (EMR),
- risk-adjusted mortality rate (RAMR)
- 95% confidence interval for the RAMR
- A flag to indicate if the hospital's RAMR is statistically different than the NYS rate

For reference and benchmarking purposes, the number of cases and mortality rate for NYS are also provided. There is no expected or risk-adjusted mortality rate for NYS. The NYS observed mortality rate is the basis of comparison for each hospital mortality rate.

These analyses show that for all AMI cases, eleven hospitals had risk-adjusted mortality rates that were significantly higher than expected given their patient mix. These hospitals are Alice Hyde Medical Center in Malone, Arnot Ogden Medical Center in Elmira, Bertrand Chaffee Hospital in Springfield, Chenango Memorial Hospital in Norwich, Claxton Hepburn Medical Center in Ogdensburg, F.F. Thompson Hospital in Canandaigua, Flushing Hospital Medical Center, Mount St. Mary's Hospital and Health Center in Lewiston, Rome Memorial Hospital, St. Elizabeth's Medical Center in Utica, and Wyoming County Community Hospital in Warsaw. Six hospitals had mortality rates that were significantly lower than expected (fewer deaths than expected based on their case-mix). These hospitals are Maimonides Medical Center in Brooklyn, Mercy Medical Center in Rockville Centre, Mount Sinai Beth Israel in Manhattan, New York Presbyterian Hospital-New York Weill Cornell Center in Manhattan, NYU Hospital Center in Manhattan, and NYU Lutheran Medical Center in Brooklyn.

For treatment of STEMI patients, two hospitals (Alice Hyde Medical Center in Malone and St. Joseph's Hospital in Bethpage) had mortality rates significantly higher than expected (more deaths than expected) and one hospital (Staten Island University Hospital - North) had a mortality rate significantly lower than expected.

For treatment of NSTEMI patients, eight hospitals (Alice Hyde Medical Center in Malone, Arnot Ogden Medical Center in Elmira, Chenango Memorial Hospital in Norwich, Claxton Hepburn Medical Center in Ogdensburg, Flushing Hospital Medical Center, Mount St. Mary's Hospital and Health Center in Lewiston, St. Elizabeth's Medical Center in Utica, and Wyoming County Community Hospital in Warsaw) had mortality rates significantly higher than expected and four hospitals (Maimonides Medical Center in Brooklyn, Mercy Medical Center in Rockville Centre, Mount Sinai Beth Israel in Manhattan, and NYU Lutheran Medical Center in Brooklyn) had mortality rates significantly lower than expected.

Figures 4 – 6 provide a visual display of the RAMRs presented in Table 1 for All AMI, STEMI and NSTEMI, respectively. Each graph shows the spread of the hospital RAMRs and confidence intervals as compared to the statewide mortality rate, which is represented by the red vertical line. For each hospital, the diamond shape represents the RAMR and the horizontal line represents the confidence interval, or potential statistical error, for the RAMR. For any hospital where the line crosses the state average line, the RAMR is not statistically different from the state as a whole. Hospitals that are statistical outliers have lines (confidence intervals) that are either entirely above or entirely below the marker for the statewide rate. These hospitals are color coded with blue lines and diamonds indicating lower than expected mortality rates and red lines and diamonds indicating higher than expected mortality rates. A gray horizontal line that extends far above and/or below the statewide average indicates that a hospital has a wide confidence interval. This is common when the hospital has a very small number of cases. It does not necessarily mean that the risk-adjusted mortality rate is very high or very low.

Table 1
Acute Myocardial Infarction in NYS: Hospital Results

Hospital Observed, Expected and Risk-Adjusted 30-Day Mortality Rates for All AMI, STEMI and NSTEMI in NYS, 2019

		All Cases						STEMI Cases		NSTEMI Cases	
Hospital	**Type†**	**Cases**	**Deaths**	**OMR**	**EMR**	**RAMR**	**95% CI for RAMR**	**Cases**	**RAMR**	**Cases**	**RAMR**
New York State		**29440**	**2148**	**7.30**				**8070**	**10.72††**	**21370**	**6.00††**
Western NY											
Bertrand Chaffee Hospital	N	40	6	15.00	4.75	23.02*	(8.41, 50.11)	14	33.21	26	19.67
Brooks Memorial Hospital	N	61	5	8.20	9.24	6.47	(2.09, 15.10)	26	9.13	35	5.68
Buffalo General Medical Center	P	861	51	5.92	7.00	6.17	(4.60, 8.12)	313	9.97	548	4.50
Eastern Niagara Hospital - Lockport Division	N	141	10	7.09	6.35	8.14	(3.90, 14.98)	27	19.64	114	5.32
Erie County Medical Center	N	26	0	0.00	4.76	0.00	(0.00, 21.64)	4	0.00	22	0.00
Kenmore Mercy Hospital	N	163	15	9.20	8.38	8.01	(4.48, 13.21)	43	22.69	120	3.83
Medina Memorial Hospital	N	60	5	8.33	5.04	12.07	(3.89, 28.17)	12	8.56	48	13.58
Mercy Hospital of Buffalo	P	596	55	9.23	8.44	7.97	(6.01, 10.38)	192	10.20	404	7.28
Millard Fillmore Suburban Hospital	N	67	11	16.42	18.21	6.58	(3.28, 11.77)	4	5.55	63	5.85
Mount St Marys Hospital and Health Center	N	74	8	10.81	4.11	19.19*	(8.26, 37.82)	12	23.97	62	16.20*
Niagara Falls Memorial Medical Center	P	124	12	9.68	6.38	11.06	(5.71, 19.32)	42	13.27	82	10.25
Olean General Hospital	P	149	13	8.72	6.46	9.85	(5.24, 16.85)	46	8.08	103	9.47
Sisters of Charity Hospital	N	79	5	6.33	8.57	5.39	(1.74, 12.57)	16	0.00	63	5.18
Sisters of Charity Hospital - St Joseph Campus	N	85	9	10.59	5.59	13.82	(6.31, 26.23)	26	19.02	59	11.77
United Memorial Medical Center North Street Campus	N	102	10	9.80	6.30	11.35	(5.43, 20.87)	16	29.78	86	7.86
Woman's Christian Association	N	150	14	9.33	7.51	9.07	(4.95, 15.21)	29	5.82	121	9.50
Wyoming County Community Hospital	N	71	7	9.86	3.42	21.06*	(8.44, 43.40)	13	14.07	58	21.66*
Finger Lakes											
Arnot Ogden Medical Center	P	260	34	13.08	7.21	13.22*	(9.16, 18.48)	59	17.69	201	11.35*
Corning Hospital	N	103	8	7.77	3.72	15.24	(6.56, 30.03)	21	33.85	82	10.42
F F Thompson Hospital	N	137	14	10.22	5.56	13.41*	(7.33, 22.51)	37	18.66	100	11.39
Geneva General Hospital	N	72	5	6.94	5.42	9.35	(3.01, 21.82)	15	13.29	57	7.87
Highland Hospital	N	97	6	6.19	5.25	8.60	(3.14, 18.72)	19	15.37	78	6.01
Ira Davenport Memorial Hospital Inc	N	44	1	2.27	2.88	5.77	(0.08, 32.09)	7	0.00	37	7.53
Newark-Wayne Community Hospital	N	73	6	8.22	5.53	10.85	(3.96, 23.61)	11	0.00	62	9.95
Nicholas H Noyes Memorial Hospital	N	55	2	3.64	3.61	7.35	(0.83, 26.54)	19	0.00	36	13.03
Rochester General Hospital	P	643	39	6.07	7.55	5.86	(4.17, 8.02)	164	7.53	479	5.20
Schuyler Hospital	N	38	2	5.26	3.23	11.89	(1.34, 42.93)	12	0.00	26	14.78

		All Cases						STEMI Cases		NSTEMI Cases	
Hospital	**Type†**	**Cases**	**Deaths**	**OMR**	**EMR**	**RAMR**	**95% CI for RAMR**	**Cases**	**RAMR**	**Cases**	**RAMR**
Soldiers and Sailors Memorial Hospital of Yates County Inc	N	31	3	9.68	7.66	9.22	(1.85, 26.94)	13	12.26	18	9.59
St James Mercy Hospital	N	42	1	2.38	3.10	5.61	(0.07, 31.19)	10	0.00	32	7.61
Strong Memorial Hospital	P	620	47	7.58	6.64	8.33	(6.12, 11.08)	267	12.67	353	6.36
The Unity Hospital of Rochester	P	290	23	7.93	7.48	7.74	(4.90, 11.61)	79	12.46	211	5.96
Central NY											
Auburn Community Hospital	N	26	2	7.69	11.58	4.85	(0.54, 17.49)	6	0.00	20	4.95
Canton-Potsdam Hospital	N	102	11	10.78	5.78	13.62	(6.79, 24.37)	18	17.82	84	11.75
Cayuga Medical Center at Ithaca	P	37	6	16.22	11.30	10.47	(3.82, 22.79)	14	16.35	23	8.13
Claxton-Hepburn Medical Center	N	99	11	11.11	4.51	17.98*	(8.97, 32.18)	27	18.96	72	19.09*
Cortland Regional Medical Center Inc	N	89	4	4.49	3.85	8.53	(2.29, 21.83)	19	9.66	70	7.78
Crouse Hospital	P	197	11	5.58	6.42	6.35	(3.16, 11.36)	76	9.71	121	4.98
Faxton-St Lukes Healthcare St Lukes Division	N	46	8	17.39	8.68	14.62	(6.30, 28.81)	13	26.26	33	10.18
Lewis County General Hospital	N	36	2	5.56	5.28	7.67	(0.86, 27.70)	8	11.81	28	6.04
Little Falls Hospital	N	33	0	0.00	2.51	0.00	(0.00, 32.26)	14	0.00	19	0.00
Massena Memorial Hospital	N	48	5	10.42	7.22	10.52	(3.39, 24.55)	10	41.80	38	6.10
Oneida Healthcare	N	43	4	9.30	5.20	13.05	(3.51, 33.42)	24	14.05	19	16.92
Oswego Hospital	N	95	6	6.32	4.56	10.12	(3.69, 22.02)	17	25.57	78	6.88
River Hospital, Inc.	N	35	0	0.00	3.26	0.00	(0.00, 23.46)	6	0.00	29	0.00
Rome Memorial Hospital, Inc	N	69	9	13.04	4.88	19.50*	(8.90, 37.02)	22	30.70	47	15.53
Samaritan Medical Center	N	137	14	10.22	7.01	10.64	(5.81, 17.85)	34	19.22	103	8.14
St Elizabeth Medical Center	P	437	39	8.92	5.84	11.15*	(7.93, 15.24)	158	12.48	279	11.12*
St Josephs Hospital Health Center	P	828	49	5.92	6.27	6.89	(5.10, 9.11)	255	8.64	573	6.50
University Hospital SUNY Health Science Center	P	173	15	8.67	7.27	8.71	(4.87, 14.36)	62	13.16	111	6.78
NY-Penn											
Chenango Memorial Hospital Inc	N	39	5	12.82	4.07	22.99*	(7.41, 53.64)	6	0.00	33	24.65*
Our Lady of Lourdes Memorial Hospital Inc	N	146	17	11.64	8.08	10.51	(6.12, 16.83)	24	13.60	122	8.81
United Health Services Hospitals Inc. - Wilson Medical Center	P	413	30	7.26	7.52	7.05	(4.75, 10.06)	125	8.23	288	6.81
Northeastern NY											
Adirondack Medical Center-Saranac Lake Site	N	31	3	9.68	5.58	12.66	(2.54, 36.99)	8	0.00	23	11.58
Albany Medical Center Hospital	P	390	26	6.67	6.27	7.76	(5.07, 11.37)	136	13.14	254	5.11
Albany Memorial Hospital	N	52	2	3.85	3.42	8.21	(0.92, 29.64)	15	25.70	37	4.41
Alice Hyde Medical Center	N	72	11	15.28	3.97	28.05	(13.98, 50.20)	22	55.59*	50	21.04*
Aurelia Osborn Fox Memorial Hospital	N	67	6	8.96	4.16	15.72	(5.74, 34.22)	19	23.21	48	12.90
Columbia Memorial Hospital	N	65	6	9.23	4.14	16.25	(5.93, 35.37)	16	37.98	49	11.28

		All Cases						STEMI Cases		NSTEMI Cases	
Hospital	**Type†**	**Cases**	**Deaths**	**OMR**	**EMR**	**RAMR**	**95% CI for RAMR**	**Cases**	**RAMR**	**Cases**	**RAMR**
Ellis Hospital	P	451	31	6.87	8.34	6.01	(4.08, 8.53)	130	9.40	321	4.71
Glens Falls Hospital	P	234	20	8.55	7.71	8.08	(4.94, 12.48)	83	5.47	151	9.40
Mary Imogene Bassett Hospital	P	218	18	8.26	6.73	8.95	(5.30, 14.14)	72	7.04	146	11.05
Nathan Littauer Hospital	N	63	2	3.17	5.53	4.19	(0.47, 15.14)	21	7.34	42	2.97
Samaritan Hospital	P	115	14	12.17	8.44	10.52	(5.75, 17.66)	22	9.27	93	9.74
Saratoga Hospital	P	224	20	8.93	7.98	8.17	(4.99, 12.61)	80	14.24	144	5.20
St Peters Hospital	P	443	39	8.80	7.36	8.73	(6.21, 11.94)	104	14.58	339	6.68
St. Mary's Healthcare	N	95	9	9.47	8.22	8.41	(3.84, 15.96)	26	11.29	69	7.11
The University of Vermont Health Network - Champlain Valley Physicians	P	192	11	5.73	5.31	7.88	(3.93, 14.10)	39	15.50	153	4.97
Mid-Hudson											
Bon Secours Community Hospital	N	58	2	3.45	5.61	4.49	(0.50, 16.20)	10	10.06	48	2.75
Catskill Regional Medical Center	N	104	7	6.73	5.34	9.20	(3.69, 18.96)	25	15.30	79	7.23
Good Samaritan Hospital of Suffern	P	342	19	5.56	5.18	7.82	(4.70, 12.21)	88	12.36	254	6.12
HealthAlliance Hospital Broadway Campus	N	59	5	8.47	6.71	9.22	(2.97, 21.52)	8	0.00	51	9.20
Montefiore Mount Vernon Hospital	N	38	2	5.26	6.63	5.79	(0.65, 20.92)	6	0.00	32	5.01
Montefiore New Rochelle Hospital	N	75	6	8.00	7.33	7.96	(2.91, 17.33)	12	33.07	63	1.55
New York-Presbyterian/Lawrence Hospital	P	166	11	6.63	7.84	6.17	(3.08, 11.04)	26	8.51	140	5.15
NewYork-Presbyterian/Hudson Valley Hospital	N	153	10	6.54	4.66	10.22	(4.89, 18.80)	30	17.90	123	7.87
Northern Dutchess Hospital	N	76	2	2.63	5.07	3.78	(0.43, 13.67)	15	13.33	61	1.97
Northern Westchester Hospital	N	96	8	8.33	7.00	8.68	(3.74, 17.11)	20	31.73	76	4.47
Nyack Hospital	N	91	7	7.69	7.94	7.07	(2.83, 14.57)	37	11.28	54	4.86
Orange Regional Medical Center	P	455	23	5.05	7.40	4.99	(3.16, 7.48)	127	7.83	328	3.94
Phelps Memorial Hospital Assn	N	79	10	12.66	9.31	9.92	(4.75, 18.24)	16	14.27	63	8.24
Putnam Hospital Center	N	109	8	7.34	8.15	6.57	(2.83, 12.95)	25	8.21	84	5.75
St Anthony Community Hospital	N	37	2	5.41	4.81	8.20	(0.92, 29.62)	10	18.86	27	4.96
St Joseph's Medical Center	N	31	3	9.68	8.30	8.50	(1.71, 24.85)	15	5.15	16	24.42
St Luke's Cornwall Hospital/Newburgh	P	250	18	7.20	7.80	6.73	(3.99, 10.64)	69	9.53	181	5.67
Vassar Brothers Medical Center	P	606	43	7.10	7.15	7.24	(5.24, 9.75)	146	10.55	460	5.98
Westchester Medical Center	P	286	18	6.29	7.10	6.47	(3.83, 10.23)	108	8.60	178	5.95
White Plains Hospital Center	P	257	22	8.56	9.06	6.89	(4.32, 10.43)	64	7.37	193	6.37

		All Cases						STEMI Cases		NSTEMI Cases	
Hospital	**Type†**	**Cases**	**Deaths**	**OMR**	**EMR**	**RAMR**	**95% CI for RAMR**	**Cases**	**RAMR**	**Cases**	**RAMR**
New York City - The Bronx											
Bronx-Lebanon Hospital Center - Concourse Division	P	265	14	5.28	7.08	5.45	(2.98, 9.14)	79	8.88	186	3.81
Jacobi Medical Center	N	53	2	3.77	8.08	3.41	(0.38, 12.30)	7	12.60	46	1.75
Lincoln Medical & Mental Health Center	N	53	5	9.43	4.90	14.04	(4.52, 32.77)	8	9.18	45	16.78
Montefiore Med Center - Jack D Weiler Hosp of A Einstein College Div	P	395	31	7.85	8.34	6.87	(4.67, 9.75)	166	8.66	229	6.69
Montefiore Medical Center - Henry & Lucy Moses Div	P	440	29	6.59	7.52	6.39	(4.28, 9.18)	182	8.85	258	5.63
Montefiore Medical Center-Wakefield Hospital	N	33	4	12.12	13.83	6.40	(1.72, 16.37)	0	NA	33	5.26
SBH Health System	P	134	10	7.46	10.87	5.01	(2.40, 9.21)	48	6.91	86	4.31
New York City - Brooklyn											
Brookdale Hospital Medical Center	P	242	31	12.81	8.91	10.50	(7.13, 14.90)	85	17.55	157	7.85
Brooklyn Hospital Center - Downtown Campus	P	163	19	11.66	8.42	10.10	(6.08, 15.77)	24	23.10	139	7.97
Kings County Hospital Center	N	70	1	1.43	4.47	2.33	(0.03, 12.97)	2	0.00	68	1.96
Kingsbrook Jewish Medical Center	N	84	6	7.14	7.32	7.12	(2.60, 15.50)	1	0.00	83	5.87
Maimonides Medical Center	P	806	49	6.08	8.40	5.28**	(3.91, 6.98)	223	10.56	583	3.63**
Mount Sinai Brooklyn	N	81	6	7.41	14.01	3.86	(1.41, 8.40)	8	5.94	73	3.10
NYU Lutheran Medical Center	P	267	13	4.87	9.67	3.67**	(1.95, 6.28)	94	6.28	173	2.47**
New York Community Hospital of Brooklyn, Inc	N	45	4	8.89	9.63	6.74	(1.81, 17.25)	14	25.85	31	0.00
New York Methodist Hospital	P	362	29	8.01	8.41	6.95	(4.65, 9.98)	61	14.50	301	4.61
University Hospital of Brooklyn	P	128	10	7.81	5.87	9.71	(4.65, 17.87)	53	18.90	75	2.50
Wyckoff Heights Medical Center	N	174	9	5.17	4.02	9.39	(4.29, 17.84)	15	19.01	159	7.17
New York City - Manhattan											
Bellevue Hospital Center	P	191	11	5.76	5.98	7.02	(3.50, 12.57)	55	9.87	136	6.11
Lenox Hill Hospital	P	332	18	5.42	6.48	6.11	(3.62, 9.65)	76	8.00	256	5.45
Metropolitan Hospital Center	N	33	3	9.09	4.32	15.36	(3.09, 44.89)	1	0.00	32	12.83
Mount Sinai Beth Israel	P	327	15	4.59	7.69	4.35**	(2.43, 7.18)	95	8.60	232	2.58**
Mount Sinai Hospital	P	527	27	5.12	7.12	5.25	(3.46, 7.64)	118	7.66	409	4.35
Mount Sinai St. Luke's	P	370	20	5.41	6.86	5.75	(3.51, 8.88)	92	11.34	278	3.21
NYU Hospitals Center	P	365	11	3.01	5.57	3.95**	(1.97, 7.06)	85	5.54	280	3.34
New York Presbyterian Hospital - Allen Hospital	N	40	6	15.00	12.05	9.08	(3.32, 19.76)	1	14.00	39	7.40
New York Presbyterian Hospital - Columbia Presbyterian Center	P	488	38	7.79	8.77	6.48	(4.59, 8.90)	150	9.98	338	5.02
New York Presbyterian Hospital - New York Weill Cornell Center	P	405	23	5.68	8.87	4.67**	(2.96, 7.01)	100	5.67	305	4.33

		All Cases						STEMI Cases		NSTEMI Cases	
Hospital	**Type†**	**Cases**	**Deaths**	**OMR**	**EMR**	**RAMR**	**95% CI for RAMR**	**Cases**	**RAMR**	**Cases**	**RAMR**
New York City - Queens											
Elmhurst Hospital Center	P	56	1	1.79	4.25	3.07	(0.04, 17.07)	11	11.32	45	0.00
Flushing Hospital Medical Center	N	100	17	17.00	8.68	14.29*	(8.32, 22.89)	10	8.11	90	13.06*
Forest Hills Hospital	N	115	12	10.43	6.56	11.61	(5.99, 20.28)	23	17.60	92	9.41
Jamaica Hospital Medical Center	P	546	51	9.34	9.18	7.42	(5.53, 9.76)	153	7.77	393	7.21
Long Island Jewish Medical Center	P	412	22	5.34	5.97	6.52	(4.09, 9.88)	83	7.99	329	5.92
Mount Sinai Hospital - Mount Sinai Hospital of Queens	N	99	14	14.14	10.61	9.72	(5.31, 16.31)	4	9.95	95	8.28
NewYork-Presbyterian/Queens	P	398	29	7.29	9.16	5.80	(3.88, 8.33)	158	8.39	240	4.87
Queens Hospital Center	N	51	3	5.88	2.58	16.66	(3.35, 48.68)	18	35.74	33	8.41
St Johns Episcopal Hospital So Shore	N	27	3	11.11	7.64	10.61	(2.13, 31.01)	0	NA	27	8.73
New York City - Staten Island											
Richmond University Medical Center	P	189	11	5.82	9.40	4.52	(2.25, 8.08)	52	8.48	137	2.95
Staten Island University Hosp-North	P	391	20	5.12	6.71	5.56	(3.40, 8.59)	124	4.49**	267	6.30
Nassau-Suffolk											
Brookhaven Memorial Hospital Medical Center Inc	P	281	19	6.76	8.32	5.93	(3.57, 9.26)	81	11.14	200	4.08
Franklin Hospital	N	172	13	7.56	5.64	9.78	(5.20, 16.73)	28	24.65	144	6.38
Glen Cove Hospital	N	68	8	11.76	10.27	8.36	(3.60, 16.47)	11	14.56	57	6.29
Good Samaritan Hospital Medical Center	P	476	50	10.50	8.00	9.58	(7.11, 12.63)	121	12.49	355	8.33
Huntington Hospital	P	289	20	6.92	9.41	5.36	(3.27, 8.28)	80	11.26	209	3.23
John T Mather Memorial Hospital of Port Jefferson New York Inc	N	174	15	8.62	7.39	8.51	(4.76, 14.03)	45	18.94	129	5.04
Mercy Medical Center	N	130	3	2.31	7.35	2.29**	(0.46, 6.69)	21	5.26	109	1.60**
Nassau University Medical Center	N	93	5	5.38	5.64	6.95	(2.24, 16.22)	3	0.00	90	5.89
North Shore University Hospital	P	700	40	5.71	6.58	6.33	(4.52, 8.62)	188	8.07	512	5.74
Peconic Bay Medical Center	P	132	11	8.33	7.84	7.75	(3.87, 13.88)	52	16.06	80	2.76
Plainview Hospital	N	132	7	5.30	8.58	4.51	(1.81, 9.30)	30	14.41	102	2.16
South Nassau Communities Hospital	P	397	29	7.30	8.05	6.62	(4.43, 9.51)	129	11.47	268	4.85
Southampton Hospital	P	61	4	6.56	5.41	8.84	(2.38, 22.64)	16	11.57	45	7.59
Southside Hospital	P	239	19	7.95	9.88	5.87	(3.53, 9.16)	85	11.28	154	2.91
St Catherine of Siena Hospital	P	152	11	7.24	8.59	6.15	(3.06, 11.00)	38	8.27	114	5.24
St Charles Hospital	N	43	1	2.33	6.98	2.43	(0.03, 13.52)	3	0.00	40	2.10
St Francis Hospital	P	540	34	6.30	7.40	6.20	(4.30, 8.67)	95	10.16	445	4.80
St. Joseph Hospital	N	191	20	10.47	6.72	11.37	(6.94, 17.56)	33	40.27*	158	7.11
University Hospital	P	562	36	6.41	7.81	5.98	(4.19, 8.28)	137	6.25	425	5.70
Winthrop-University Hospital	P	354	27	7.63	7.58	7.34	(4.84, 10.68)	127	13.26	227	4.59

		All Cases						STEMI Cases		NSTEMI Cases	
Hospital	**Type†**	**Cases**	**Deaths**	**OMR**	**EMR**	**RAMR**	**95% CI for RAMR**	**Cases**	**RAMR**	**Cases**	**RAMR**
Other 46 hospitals with <25 AMI patients		**435**	**30**	**6.90**				**112**	**12.50††**	**323**	**4.95††**
New York State		**29440**	**2148**	**7.30**				**8070**	**10.72††**	**21370**	**6.00††**

* Risk-adjusted mortality rate significantly higher than statewide rate based on 95 percent confidence interval.

** Risk-adjusted mortality rate significantly lower than statewide rate based on 95 percent confidence interval.

† Type: N = Non-PCI Hospital; P = PCI Hospital.

†† Observed mortality rates, instead of RAMRs, are presented here.

Figure 4

Hospital Risk-Adjusted 30-Day Mortality Rates for All AMI

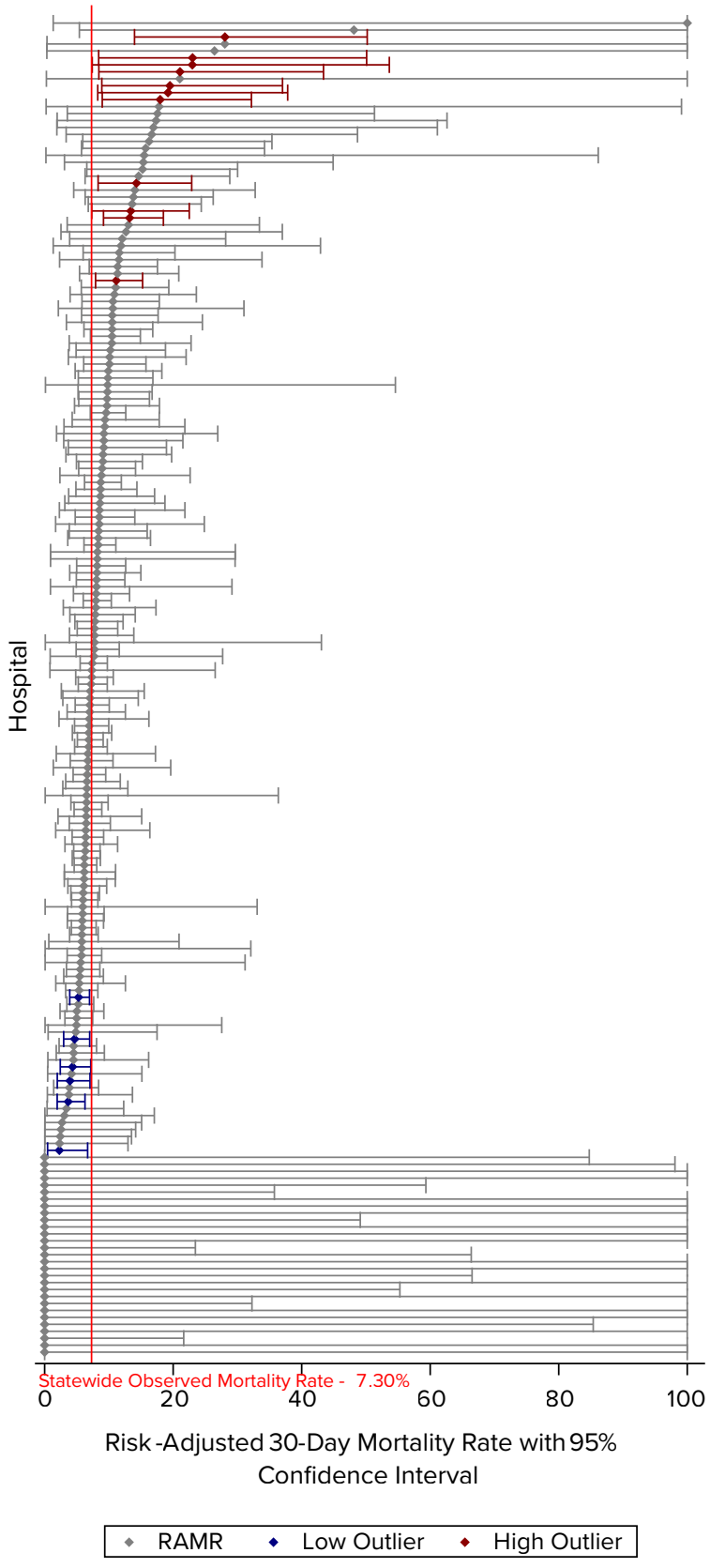


Figure 5
Hospital Risk-Adjusted 30-Day Mortality Rates for STEMI

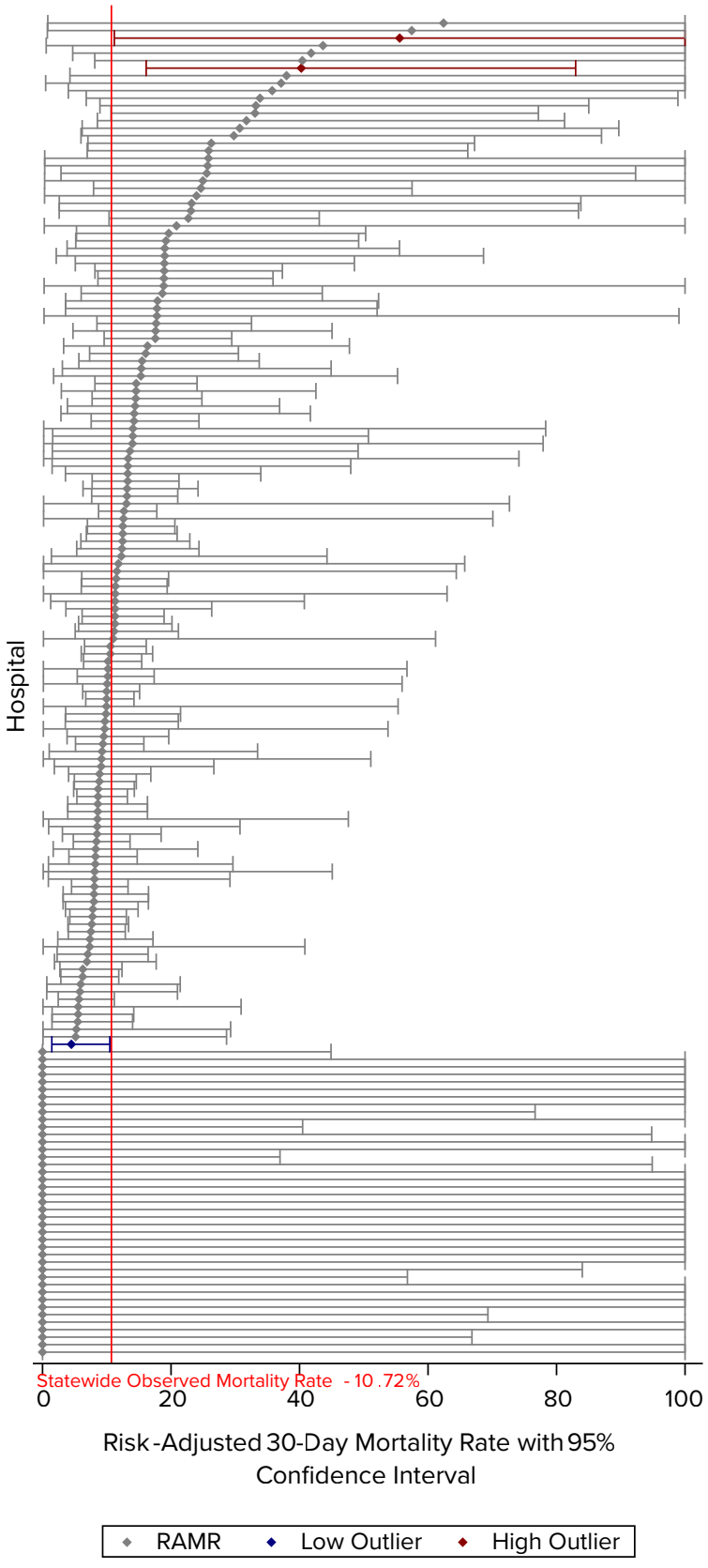
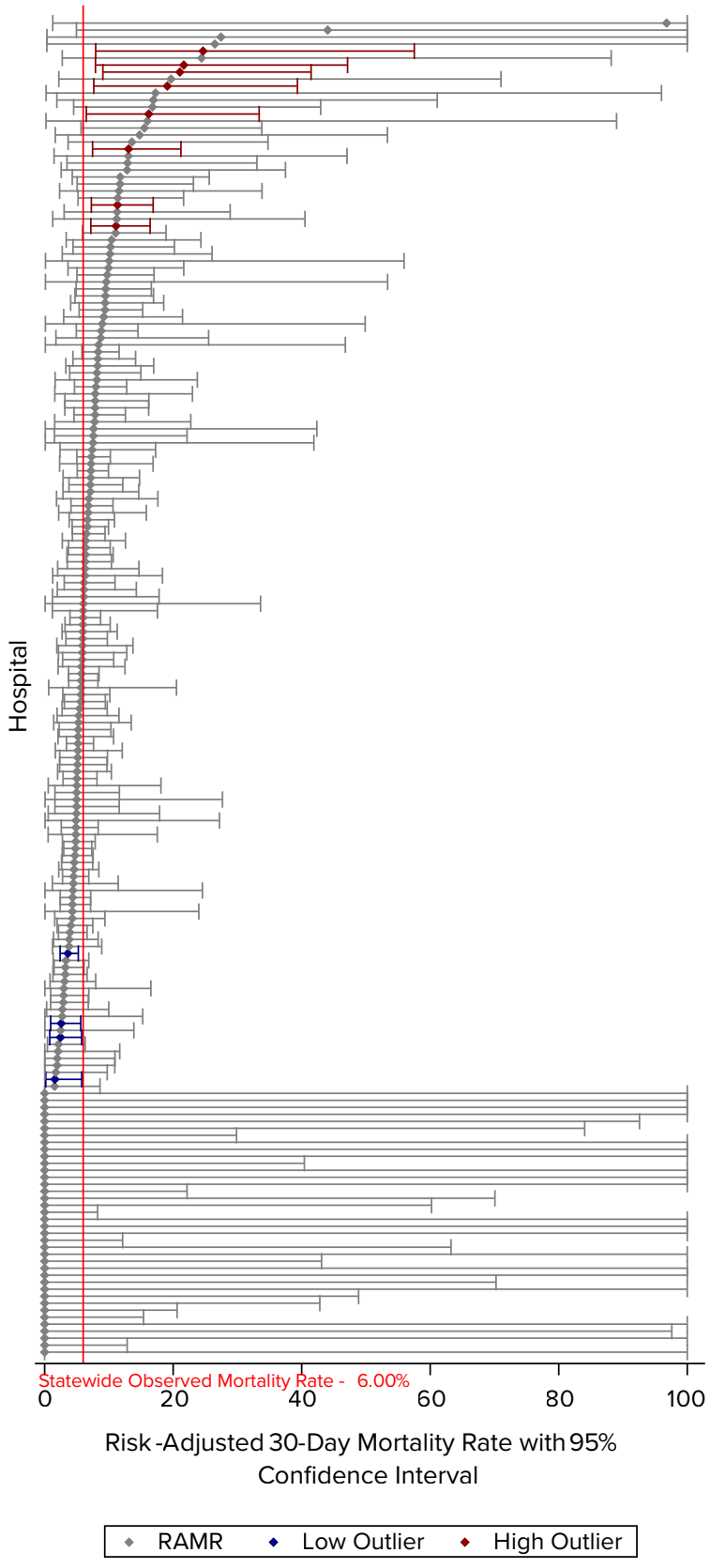


Figure 6

Hospital Risk-Adjusted 30-Day Mortality Rates for NSTEMI



Summary

This is the second public AMI report issued in New York State. We are hopeful that in conjunction with detailed supporting information about processes of care and patient characteristics that will be sent to hospitals, it will continue to serve as an opportunity for hospitals and coordinated systems of care (emergency medical services, hospitals without PCI, hospitals with PCI) to improve quality of care and outcomes.

We are also hopeful that it will prove valuable to prospective patients by providing them information about the nature of care for AMI patients and the outcomes for these patients across the state. Through the dissemination of the report to providers and the public, the Department is striving to meet its mission of assuring the highest quality of health care delivery.

Appendix 1 – Principal Diagnosis of AMI

SPARCS defines the Principal Diagnosis as: "the condition established after study to be chiefly responsible for occasioning the patient's visit for care. ...[t]he Principal Diagnosis represents the reason for the patient's care, it may not necessarily be the diagnosis which represents the greatest length of stay, the greatest consumption of resources, or the most life-threatening condition."[5]

The list that follows details the diagnosis codes that were included in analysis if reported as the Principal Diagnosis. The list contains codes for International Classification of Diseases 10th revision (ICD-10).

STEMI vs. NSTEMI

The diagnosis code I21.4 refers to a Non-ST Segment Elevation MI (NSTEMI). All other codes are classified as STEMI.

ICD-10-CM
Principal Diagnosis Codes for AMI Patients Included in Analysis.

ICD-10-CM Codes	Description
I21.01	ST elevation (STEMI) myocardial infarction involving left main coronary artery
I21.02	ST elevation (STEMI) myocardial infarction involving left anterior descending coronary artery
I21.09	ST elevation (STEMI) myocardial infarction involving other coronary artery of anterior wall
I21.11	ST elevation (STEMI) myocardial infarction involving right coronary artery
I21.19	ST elevation (STEMI) myocardial infarction involving other coronary artery of inferior wall
I21.21	ST elevation (STEMI) myocardial infarction involving left circumflex coronary artery
I21.29	ST elevation (STEMI) myocardial infarction involving other sites
I21.3	ST elevation (STEMI) myocardial infarction of unspecified site
I21.4	Non-ST elevation (NSTEMI) myocardial infarction
I21.9	Acute myocardial infarction, unspecified

[5] SPARCS X12-837 Input Data Specifications (http://www.health.ny.gov/statistics/sparcs/sysdoc/input5010.pdf

Appendix 2
Technical Details for Construction of AMI Study Population

1. SPARCS Inpatient, Emergency Department and Ambulatory Surgery Records with a Principal Diagnosis of AMI (see Appendix 1) at acute care hospitals with inpatient beds and an Emergency Department were considered for analysis.
2. Records for the same patient in the same episode of care at different hospitals were matched to consolidate transfers into a single record for each patient's episode of care using the following rules.
   a. For patients transferred from either an acute care hospital's inpatient facility or its emergency department to a second hospital, the patient outcome is attributed to the first hospital, and that patient is not reported for the second hospital.
   b. All "transfer out" records must have a disposition code of "02 - Discharged/ transferred to a Short-Term General Hospital for Inpatient Care" for two records to match.
   c. Patients transferred from free-standing emergency department or from a hospital with no emergency department (e.g. a cancer specialty hospital) to a second hospital are attributed to the second hospital.
   d. There must be no more than 1 day between the discharge date of the first record and the admission date of the second record.
   e. Patient identifiers, including complete or partial match on SPARCS Unique Personal Identifier (first 2 and last 2 letters of the last name, first 2 letters of the first name, and last 4 digits of Social Security Number), gender, date of birth, race, ethnicity, and patient address (including ZIP code) were used to identify patients with multiple records.
3. To be included in analysis, all linked patient records (i.e., records for patients treated at multiple hospitals combined as described above) must include
   a. an Inpatient or Ambulatory Surgery record

      OR

   b. consist of only an Emergency Department record with a disposition code "02- Discharged/transferred to a Short-Term General Hospital for Inpatient Care" that could not be linked to any inpatient record. This accounts for hospitals that transfer patients from their Emergency Department to an out-of-state PCI center by allowing those cases to remain in the analysis.
4. In some cases, there was disagreement on the linked records concerning the principal diagnosis of AMI. If the record had a primary diagnosis of AMI on any segments of the episode of care occurring at a PCI center then it was treated as an AMI case. If the record had no segments at a PCI center then all segments must have the principal diagnosis of AMI; otherwise the case was excluded.
5. Comorbidities from linked records were used in analysis if present on any segment. Clinical data (heart rate and blood pressure) were taken from the first segment if present on the file and otherwise taken from the second segment. Demographic characteristics (age, sex, race/ethnicity, primary payer) were taken from the first segment in the episode of care.

6. Location of infarction, based on diagnosis code for the AMI, is used in the risk-adjustment model as well as in the categorization of cases as STEMI or NSTEMI. When a record contains two segments for a single episode of care and both segments indicate an AMI but have a discrepancy on the specific diagnosis code used, the diagnosis code for analysis is selected according to the following strategy:
   - First: If the patient underwent PCI or CABG, the diagnosis code from the hospital that performed that procedure is used.
   - Second: If there was no PCI or CABG performed, the diagnosis code from the hospital capable of performing PCI is used.
   - Third: If the segment contains no episodes of care from a hospital capable of performing PCI, then the diagnosis from the second hospital is used.

The strategy for selecting diagnosis codes when there are three segments in the episode of care is similar and gives preference to the last segment that includes a PCI or CABG procedure or that occurred at a center with PCI capability or the last segment if there were no segments from PCI capable hospitals.

Appendix 3
Risk Adjustment Methodology and Significant Predictors of 30-day Mortality for AMI discharges

Logistic regression analysis was used to weight patient risk factors in such a way to predict the chance each patient will have of dying given his or her specific characteristics. The mortality rate for each hospital is also predicted using the statistical model. This is accomplished by adding the predicted probabilities of death for each of the hospital's patients and dividing by the number of patients. The predicted probability of death for each patient is derived from the statistical model in Table 3.1. The resulting rate is an estimate of what the hospital's mortality rate would have been if the hospital's performance was identical to the state performance. The percentage is called the predicted or expected mortality rate (EMR). A hospital's EMR is contrasted with its observed mortality rate (OMR), which is the number of patients who died divided by the total number of patients.

The risk-adjusted mortality rate (RAMR) represents the best estimate, based on the associated statistical model, of what the hospital's mortality rate would have been if the hospital had a mix of patients identical to the statewide mix. Thus, the RAMR has, to the extent possible, ironed out differences among hospitals in patient severity of illness. The RAMR is calculated as follows:

$$RAMR=(OMR/EMR\times NYS\ Rate)\times 100$$

There is no Statewide EMR or RAMR, because the statewide data is not risk-adjusted since it comprises the entire population of interest. The Statewide OMR (number of total cases divided by number of total deaths) serves as the basis for comparison for each hospital's EMR and RAMR.

If the RAMR is significantly lower than the statewide mortality rate, the hospital has a better performance than the state as a whole; if the RAMR is significantly higher than the statewide mortality rate, the hospital has a worse performance than the state as a whole. To prevent misinterpretation of differences caused by chance variation, expected ranges (confidence intervals) are included in the reported results. Hospitals with significantly higher rates than expected after adjusting for risk are those with confidence intervals entirely above the statewide rate. Hospitals with significantly lower rates than expected, given the severity of illness of their patients, have confidence intervals entirely below the statewide rate.

The significant risk factors for 30-day mortality for AMI in 2019 are presented in Table 3.1. Roughly speaking, the odds ratio for a risk factor represents the number of times more likely to die within 30 days a patient with that risk factor is than a patient without the risk factor, all other risk factors being the same. For example, the odds ratio for the risk factor Previous Hospitalization within 12 months is 1.25. This means that a patient who has an inpatient record in a NYS hospital in the 365 days prior to admission is approximately 1.25 times as likely to die within 30 days as a patient who has all the other significant risk factors the same but who has not had a previous hospitalization within 12 months.

In this model, there are seven categories for Age (18-44, 45-54, 55-64, 65-74, 75-84, 85-94 and 95 or more years old). The first category (ages 18-44) is the reference category, which means the odds ratio for all other age groups are relative to patients aged 18-44. For example, a patient aged 75 to 84 years old is approximately 4.13 times as likely to die within 30 days of their AMI admission as a patient under age 45, if all the other significant risk factors are the same.

The first of the clinical risk factors is AMI location. This is based on the primary diagnosis code and is described in Appendix 1. There are six categories for MI location in this model. The reference category is Non-ST-elevation Myocardial Infarction (121.4). This group represented 72.59% of all analyzed MI cases and had the lowest odds of 30-day mortality. The risk for patients with all other types of MI are compared to the otherwise identical patients with a NSTEMI.

Heart rate is defined as the patient heart rate in beats per minutes (bpm) taken at the first patient contact after arrival. In this model, it is divided into five categories (≤ 54 bpm, 55-74 bpm, 75-94 bpm, 95-114 bpm, ≥115 bpm). The reference category is 55-74 bpm. Patients with a heart rate below 55 bpm or above 74 bpm are at a statistically significantly increased risk of mortality than otherwise identical patients whose heart rate is between 55 and 74 bpm upon arrival.

Mean Arterial Pressure is calculated as: 2/3 DBP+1/3 SBP where DBP is the Diastolic Blood Pressure on Arrival in mmHg and SBP is the Systolic Blood Pressure on arrival in mmHg. Patients with a Mean Arterial Pressure less than 105 mmHg are at increased risk of 30-day mortality after AMI admission.

The comorbidities present in the model are based on diagnoses reported in the patient record for any segment of the AMI episode of care. They are organized into Condition Categories (CCs) which are used to group similar diagnoses together in meaningful ways for analysis. Kidney Disease is arranged in a hierarchy with two levels. Patients who meet the criteria for both levels are classified according to the more severe condition category (listed first in the table) and are not included in both levels for risk-adjustment.

For many conditions, the diagnosis was only counted as a comorbidity if it was flagged as “Present on Admission” in the SPARCS record. This helps assure that conditions that developed in the hospital after the AMI or resulting from the AMI are not considered as a risk factor in the analysis. Some conditions, for example Cancer, were deemed to be unlikely to develop during the AMI hospitalization and thus were counted as a comorbidity even if “Present on Admission” was not indicated.

Table 3.1
Multivariable Risk Factor Equation for 30-Day Mortality after AMI in NYS, 2019 discharges.

		Logistic Regression		
Risk Factors	**Prevalence (%)**	**Coefficient**	**P-value**	**Odds Ratio**
Demographic				
Patient Age (year)				
18-44	4.76	— Reference —		1.00
45-54	12.77	0.15	0.5220	1.16
55-64	25.01	0.47	0.0289	1.60
65-74	24.70	0.98	<.0001	2.66
75-84	20.00	1.42	<.0001	4.13
85-94	11.17	2.19	<.0001	8.94
≥95	1.59	2.45	<.0001	11.63
Patient History				
Previous 12-month Hospitalization	29.15	0.23	<.0001	1.25
Clinical Risk Factors				
AMI Location				
I21.0x ST elevation (STEMI) myocardial infarction of anterior wall	9.43	0.92	<.0001	2.50
I21.1x ST elevation (STEMI) myocardial infarction of inferior wall	11.89	0.75	<.0001	2.12
I21.2x ST elevation (STEMI) myocardial infarction of other sites	1.99	1.02	<.0001	2.77
I21.3 ST elevation (STEMI) myocardial infarction of unspecified site	3.59	1.25	<.0001	3.50
I21.4 Non-ST elevation (NSTEMI) myocardial infarction	72.59	— Reference —		1.00
I21.9 Acute myocardial infarction, unspecified	0.51	1.77	<.0001	5.89
Heart Rate (bpm)				
≤54	3.96	0.31	0.0174	1.37
55-74	35.81	— Reference —		1.00
75-94	36.80	0.15	0.0243	1.16
95-114	17.01	0.60	<.0001	1.82
≥115	6.42	0.76	<.0001	2.13
Mean Arterial Pressure (mmHg)				
≤64	2.02	1.24	<.0001	3.44
65-84	17.37	0.66	<.0001	1.93
85-94	18.28	0.37	<.0001	1.45
95-104	20.46	0.22	0.0052	1.24
≥105	41.88	— Reference —		1.00

		Logistic Regression		
Risk Factors	**Prevalence (%)**	**Coefficient**	**P-value**	**Odds Ratio**
Comorbidities (indenting indicates hierarchical order)				
Metastatic Cancer and Acute Leukemia (CC8)	1.01	1.53	<.0001	4.64
Lung, Upper Digestive Tract, and Other Severe Cancers (CC9)	1.12	1.32	<.0001	3.73
Protein-Calorie Malnutrition (CC21*)	3.20	0.88	<.0001	2.42
End-Stage Liver Disease (CC27)	0.36	1.67	<.0001	5.34
Severe Hematological Disorders (CC46), Coagulation Defects and Other Specified Hematological Disorders (CC48)	5.26	0.97	<.0001	2.64
Dementia, With (CC51) or Without Complication (CC52)	5.62	1.20	<.0001	3.32
Quadriplegia (CC70)	0.27	1.85	<.0001	6.35
Coma, Brain Compression/Anoxic Damage (CC80*)	1.16	2.50	<.0001	12.17
Respirator Dependence/ Tracheostomy Status (CC82*), Respiratory Arrest (CC83*), and Cardio-Respiratory Failure and Shock (CC84*)	11.99	1.77	<.0001	5.86
Congestive Heart Failure (CC85*)	35.18	0.58	<.0001	1.79
Specified Heart Arrhythmias (CC96*)	18.75	0.63	<.0001	1.88
Dialysis Status (CC134), Acute Renal Failure (CC135*), and Chronic Kidney Disease, Stage 5 (CC136)	17.59	1.03	<.0001	2.81
Chronic Kidney Disease, Severe (Stage 4) (CC137), Moderate (Stage 3) (CC138), Mild or Unspecified (Stages 1-2 or Unspecified) (CC139), Unspecified Renal Failure (CC140*), and Nephritis (CC141)	10.73	0.69	<.0001	1.99
Amputation Status, Lower Limb/ Amputation Complications (CC189*)	1.40	1.07	<.0001	2.90
Square of Total Number of Comorbidities		-0.10	<.0001	0.91

Intercept = -5.87

C Statistic = 0.862

* indicates these comorbidities were used only if they were present on admission (POA)

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