

**New York State Report on Sepsis
Care Improvement Initiative:
Hospital Quality Performance**

**Office of the Medical Director
Office of Quality and Patient Safety**
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**Department
of Health**

2017

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Introduction

Sepsis is a life-threatening condition that requires early detection and timely, appropriate interventions to improve the chances of survival and optimize outcomes for patients of all ages. Since 2014, the New York State Sepsis Care Improvement Initiative has been a resource for quality improvement in sepsis care with the goal to improve early detection, timely interventions and reduce overall mortality.

The New York State Department of Health (the Department) is pleased to present this third annual public report of updated data from the New York State Sepsis Care Improvement Initiative. This report contains 2017 results for hospitals' use of sepsis protocols to identify and treat adults and children with sepsis, hospitals' adherence to time-dependent key interventions to treat sepsis, and risk adjusted mortality rates (for adults) for each reporting hospital in New York State (NYS). The report details sepsis data collection on adult and pediatric cases, the sepsis quality measures and outcomes on which hospitals are compared, statewide trends for key quality measures and outcomes, and key ongoing collaborations between the Department and external partners. The report represents considerable efforts by New York State hospitals and clinicians, over the past four years, to measure and improve care for individuals with this common, complex, and lethal condition.

Sepsis is defined as a clinical syndrome in which patients have an infection that is accompanied by an extreme systemic response. For purposes of the Department's 2017 data collection and measurement, sepsis of sufficient severity that the function of major organ systems in the body (such as heart, kidney, brain and others) is impaired is referred to as 'severe sepsis'. Patients with severe sepsis who have inadequate tissue perfusion and/or low blood pressure that does not respond to treatment with adequate fluid replacement are considered to be in septic shock. Severe sepsis and septic shock impact approximately 50,000 patients in NYS each year, and on average almost 30% of patients died from this syndrome prior to the implementation of this initiative. In addition, many more may experience lifelong impairments because of the broad impact that sepsis may have on organ and tissue function. In this report, the term 'sepsis' will be used to indicate severe sepsis and septic shock.

The combination of early detection of sepsis and timely, appropriate interventions can significantly improve the chances of survival for patients with all types of sepsis. This public report is one part of a statewide initiative to reduce the impact of this deadly condition by improving early detection and intervention for patients with sepsis, focused on the deadliest forms – severe sepsis and septic shock. This third annual public report highlights some important and promising results, including a decrease in overall mortality. While the number of pediatric deaths was small and therefore trends were difficult to interpret, pediatric sepsis care processes have improved. The overall observed decrease in adult mortality and concomitant improvement in processes of care measures demonstrates continued improvement in sepsis care across the state since implementation of the New York Sepsis Care Improvement Initiative. The Department is optimistic about this improvement and about the future of sepsis care in New York State.

The New York State Sepsis Initiative

Beginning in 2014, each acute care hospital in New York State (NYS) that provides care to patients with sepsis was required by amendment of Title 10 of the New York State Codes, Rules and Regulations (Sections 405.2 and 405.4) to develop and implement evidence-informed sepsis protocols, which describe their approach to both early recognition and treatment of sepsis patients. In addition, hospitals were required to report data to the Department beginning in 2014 that are used to calculate each hospital's performance on key measures of early treatment and protocol use. Hospitals were also required to submit clinical information for each patient with sepsis to allow the Department to develop a methodology to evaluate 'risk adjusted' mortality rates (RAMR) for each hospital. Risk adjustment takes into consideration the different mix of characteristics and comorbid conditions, including sepsis severity, of patients cared for within each hospital and permits comparison of hospital performance.

CMS Sepsis core measure alignment:

This report reflects changes in data collection that were initiated in 2017, most importantly alignment with the Centers for Medicare and Medicaid Services (CMS) core measure for the management of sepsis: SEP-1. The alignment with the CMS SEP-1 measure was intended to reduce measure abstraction burden for hospitals and to minimize the confusion resulting from discrepancy between NYS and CMS sepsis measures, both of which are reported by hospitals in NYS. The alignment with the CMS measure resulted in the redefinition of the start time, or time zero, for measurement of care processes. Time zero was changed in 2017 from protocol initiation to the time of severe sepsis or septic shock presentation, which is clinically relevant and comparable across facilities.

Process measure improvement:

Sepsis care processes reflected by the 3-hour bundle for adults and 1-hour bundle for pediatric patients continued to improve in 2017. Early broad-spectrum antibiotic administration, a component of both bundles, is a critical early treatment for patients with severe sepsis or septic shock¹. In this report, the rate of timely antibiotic administration (within 3 hours of presentation for adults and within 1 hour of presentation for children) is presented. Notably, there was marked improvement in timely antibiotics for both adults and pediatric patients in 2017.

Additional sepsis advisory workgroups:

During 2017, two important subgroups of the sepsis advisory workgroup were convened. The Pediatric Sepsis Advisory Workgroup was convened to refine and clarify pediatric sepsis definitions in the context of the American College of Critical Care Medicine Clinical Practice Guidelines for Hemodynamic Support of Pediatric and Neonatal Septic Shock, released in 2016. The second workgroup, the Sepsis Data Subgroup, was convened to make recommendations to the Department related to research requests, internal research topics and publicly available data through the NYS open data initiative. Both workgroups continue to work independently on critical issues with the Sepsis Advisory Group as the overarching group that continues to assist the state with input on all other sepsis related matters. Additional information on Sepsis Advisory Group activities can be found in the NYS Quality Improvement Efforts section.

¹ Seymour, C., Gesten F, Prescott H, et.al: Time to Treatment and Mortality during Mandated Emergency Care for Sepsis, N Engl J Med 2017; 376:2235-2244, June 8, 2017

Update of Sepsis regulations:

In 2018, the Department proposed amendments to 10 NYCRR Part 405.4, subparagraph (a). While data collection for 2017 was not impacted, the changes were made based on evolving evidence. Moreover, new language was added to clarify that sepsis definitions used in regulation are for the purposes of hospital data collection and reporting and are not intended to direct clinical care. A final change was made to no longer require hospitals to submit protocols to the Department each time they are updated, though protocols must still be maintained at every hospital and regularly updated based on newly emerging evidence. The amended regulation became effective on November 14th, 2018.

Data Collection

Patient Population

This report presents hospital-reported data for adult and pediatric patients with a diagnosis of severe sepsis or septic shock seen at the facility from the second quarter (Q2) of 2014 through the fourth quarter (Q4) of 2017. Patient populations differ across various sections and measures in this report. These differences reflect the Department's intent to understand care for all patients with sepsis while also conducting fair comparisons of hospitals' care processes and outcomes. In the first section, aggregate data from all reporting hospitals is used to present statewide trends and includes all patients diagnosed with severe sepsis or septic shock, with limited exceptions, regardless of whether the patient presented with severe sepsis or septic shock is in the emergency department or an inpatient unit. The next section describes hospital-specific data, which includes all patients for measures that are relevant to all hospitals, while other measure populations are limited to patients who are not transferred. These differences are fully described in each section.

In 2017, high-volume hospitals with large numbers of sepsis patients had the option of reporting on a representative random sample of 400 sepsis patients for the calendar year, rather than reporting on their entire population of sepsis patients. Twenty-two (22) hospitals opted to report a sample of patients. For these hospitals, the selected sample was compared to the eligible population with regard to key patient characteristics, and results demonstrated that the sample did not differ significantly from the hospital's whole eligible population (see appendix on details about sampling).

In this report, adult patients are defined as those age 18 years or older and pediatric patients are those age younger than 18 years. Data in this report are presented through 2017 to align with risk-adjusted mortality data, which are available for calendar year 2017.

The sepsis population excludes those patients with advance directives that precluded implementing sepsis care interventions, patients who refuse sepsis care interventions, and neonates who were not discharged from the neonatal intensive care unit (NICU).

Data Source and Data Submission

The hospital data evaluated in the New York State Sepsis Care Improvement Initiative are abstracted from hospital medical records by hospital staff. These collected data are submitted electronically to a secure web portal hosted by IPRO, the External Quality Review Organization for New York State, for validation. IPRO conducts an independent audit of a sample of medical

records for each hospital to ensure data integrity and accuracy².

Quality Measures

Quality measures are calculated for reporting statewide rates and trends of quality sepsis care processes, and an additional set of quality measures is calculated for hospital-specific rates and trends. The Adult New York State sepsis process of care measures were developed using a National Quality Forum (NQF) measure for guidance: NQF #500 Severe Sepsis and Septic Shock: Management Bundle. The Pediatric New York State sepsis process of care measures are aligned with Surviving Sepsis Campaign International Guidelines for Management of Severe Sepsis and Septic Shock 2012. These measures, reported as statewide and hospital-specific rates, reflect several key processes of care that can increase the probability of surviving an episode of sepsis. In-hospital mortality is an important outcome measure and is included in this report.

With the 2017 alignment with CMS SEP-1, time zero (start time) for care process measures is the time at which patients presented with severe sepsis or septic shock. Presentation is defined as the time at which all criteria for severe sepsis or septic shock were met, or a clinician documented severe sepsis or septic shock. Explicit criteria for severe sepsis presentation and septic shock presentation were defined in 2017. These criteria include a combination of infection, signs of Systemic Inflammatory Response Syndrome (SIRS), and organ dysfunction for severe sepsis. Septic shock was defined as severe sepsis plus persistent hypotension and/or inadequate tissue perfusion as evidenced by elevated lactate level. The time zero in previous reports, which was the time of initiation of the hospital's protocol, may not be aligned with time zero in this report, which is the time of severe sepsis and septic shock presentation. This difference should be considered in interpreting year over year comparisons.

The alignment also resulted in changes to data elements that may have impacted measurement of timely interventions. The changes more closely reflect the availability of data to inform interventions in clinical practice. For example, the time of lactate level collected was changed to time of lactate level reported, since this is the time that the level would be known to the clinician. A major change in the 2017 was the introduction of the CMS multi-component variable, Repeat Volume Status and Tissue Perfusion Assessment, as part of the Composite Early Intervention Bundle.

For hospitals that opted to sample in 2017, adult measure performance is calculated using this random sample of cases and serves as an estimate of actual performance. For all remaining hospitals, and all pediatric measures, the actual observed performance is reported. Cases from participating hospitals are sampled to be representative of the entire severe sepsis population of the hospital and of sufficient volume to accurately estimate measure performance with a high degree of confidence. More information on sampling and how the adult measures are calculated for these hospitals can be found in Appendix A.

² There are some limitations to the data presented in this report. The data in this report reflects medical record documentation, and it is possible that elements of care were provided but not documented. It is also possible that some patient characteristics that were not collected, such as uncommon comorbid conditions, are not reflected in the measures but may have impacted outcomes.

Statewide Trends

Statewide rates and trends are reported using data for all patients diagnosed with severe sepsis or septic shock, with measure-specific exclusions as noted below. The measures calculated using aggregate data from all hospitals for statewide reporting are briefly summarized below.

- The percentage of adult patients with severe sepsis or septic shock who received all the recommended early interventions in the 3-hour early management bundle within three (3) hours of time zero, which for this measure is the date and time of presentation of severe sepsis. This measure is not calculated for patients who were excluded from the hospital's protocol or from specific care interventions, or who died within 3 hours of time zero.
 - The percentage of patients with severe sepsis or septic shock who received within 3 hours of presentation:
 - Blood cultures
 - Broad spectrum antibiotics
 - Lactate level measurement
 - The percentage of adult patients with severe sepsis or septic shock who received broad spectrum antibiotics within 3 hours of severe sepsis presentation.
- The percentage of adult patients with septic shock who received all the recommended interventions in the 6-hour early management composite bundle, including interventions in the 3-hour early management bundle within 3 hours of severe sepsis presentation, a repeat lactate level within 6 hours of severe sepsis presentation if initial lactate level is elevated, resuscitation with crystalloid fluids within 3 hours of septic shock presentation, fluid status assessment within 6 hours of septic shock presentation, and vasopressor therapy within 6 hours of septic shock presentation if persistent hypotension after fluid resuscitation is present. This measure is not calculated for patients who were excluded from the hospital's protocol or from specific care interventions, or who died within 6 hours of time zero.
- The percentage of pediatric patients with severe sepsis or septic shock who received all the recommended early interventions within one (1) hour of presentation of severe sepsis or septic shock. This measure is not calculated for patients who were excluded from the hospital's protocol or from specific care interventions, or who died within 1 hour of time zero.
- The percentage of pediatric patients with severe sepsis or septic shock who received antibiotics within 1 hour of severe sepsis presentation (time zero).
- The percentage of adult and pediatric patients with severe sepsis or septic shock with in-hospital mortality.

Figures 2-5 depict trend analyses based on aggregated data submitted by hospitals from Second Quarter (Q2) 2014 through Fourth Quarter (Q4) 2017. For the measures with specified

time parameters in the trend graphs for this section (Figures 2-5) , 'time zero' is defined as the presentation time of severe sepsis (Figures 1, 3-5) or septic shock (Figures 2) for calendar year (CY) 2017, while in previous years, time zero was defined as the date and time when each hospital determined that its protocol had been initiated for each patient. Although initiation of a hospital's sepsis protocol would likely coincide with the presentation of sepsis, the potential difference is a limitation and should be considered in interpretation of measure rate trends.

Early Intervention Bundles

Timely intervention for severe sepsis and septic shock is critical. Current guidelines recommend timely collection of blood cultures and lactate level and early administration of antibiotics for patients with severe sepsis or septic shock. Delay in bundle completion and delay in the intervention of antibiotic administration for sepsis have been associated with a higher risk of mortality¹. Repeat lactate levels, fluids and vasopressors for blood pressure support are recommended for a subset of patients with certain manifestations of severe sepsis or septic shock.

Figure 1 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom all the recommended early interventions in the 3-hour early management bundle were administered within the recommended timeframe. These interventions include measurement of lactate level, blood culture collection prior to antibiotics, and antibiotic administration. Patients who died within three hours of time zero and those with clinical contraindications to any of the recommended interventions are excluded from this measure bundle. At the onset of the initiative, 41.5% of eligible patients with severe sepsis or septic shock received all three interventions within the recommended timeframe, while by Q4 2017 the percentage increased to 66.1%.

Figure 1. Adult Early Intervention (3-Hour Early Management Bundle): Quarter Two, 2014 through Quarter Four, 2017*

(*) excludes patients with clinical contraindications for protocol interventions or who died within three hours

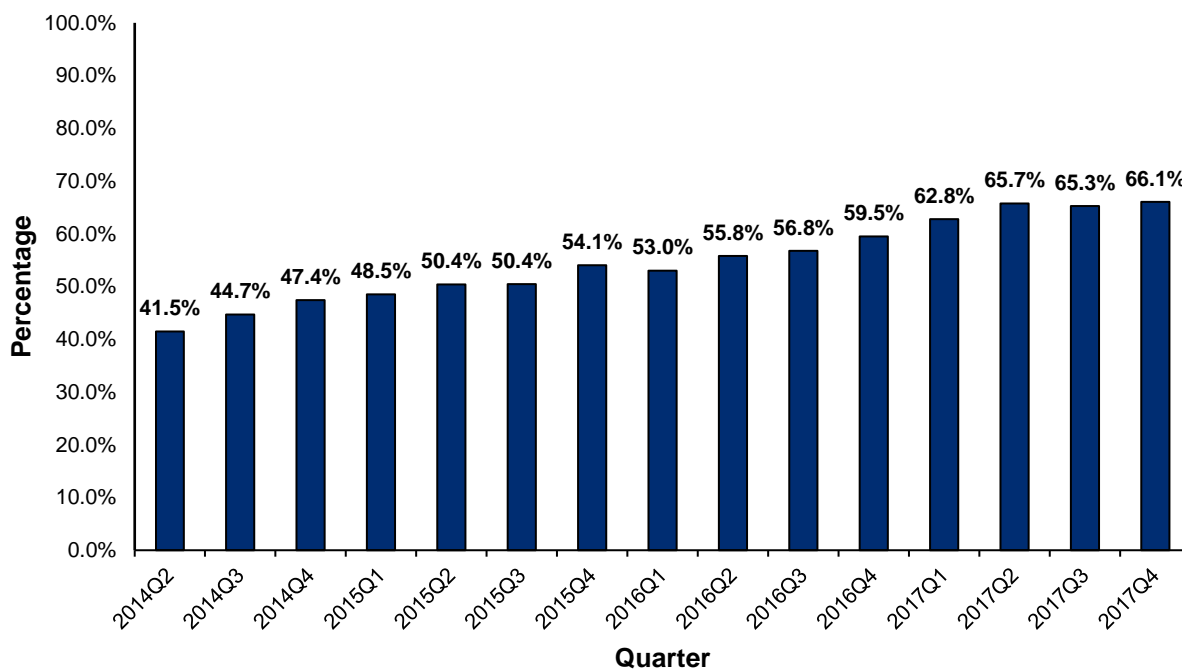


Figure 2 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom all the recommended early interventions in the composite early management bundle were administered within the recommended timeframe. It should be noted that the variable Repeat Volume Status and Tissue Perfusion Reassessment was included in the Composite Early Management Bundle for the first time in 2017. The addition of this variable appeared to suppress the Composite Bundle rates in 2017, and trends should therefore be interpreted with caution.

Figure 2. Adult Early Intervention (Composite Early Management Bundle): Quarter Two, 2014 through Quarter Four, 2017*

(*) excludes patients with clinical contraindications for protocol interventions or who died within six hours

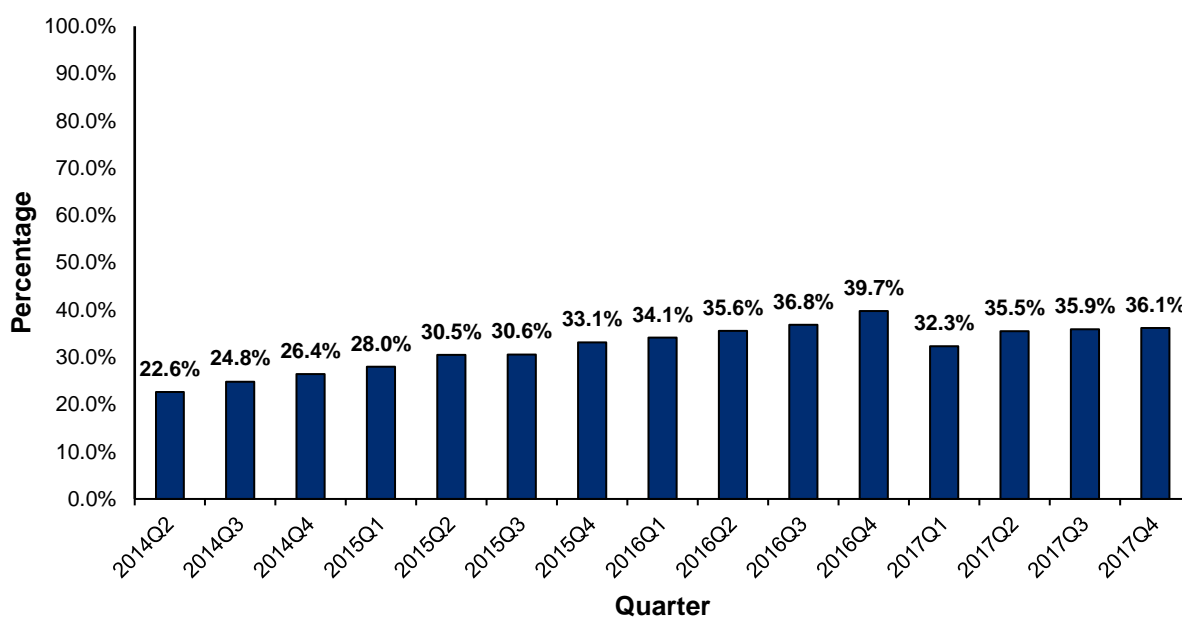
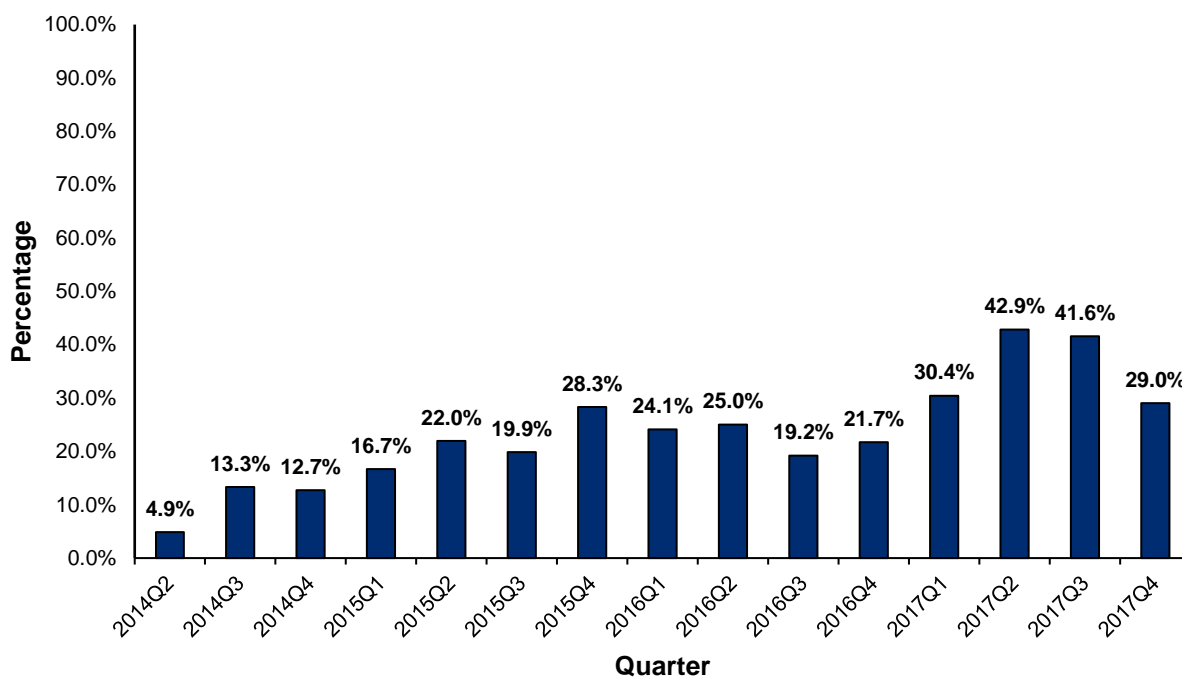


Figure 3 shows the percentage of pediatric patients (age < 18) with severe sepsis or septic shock who received all interventions in the early management bundle within one hour.

Figure 3. Pediatric Early Intervention (1-Hour Early Management Bundle): Quarter Two, 2014 through Quarter Four, 2017*

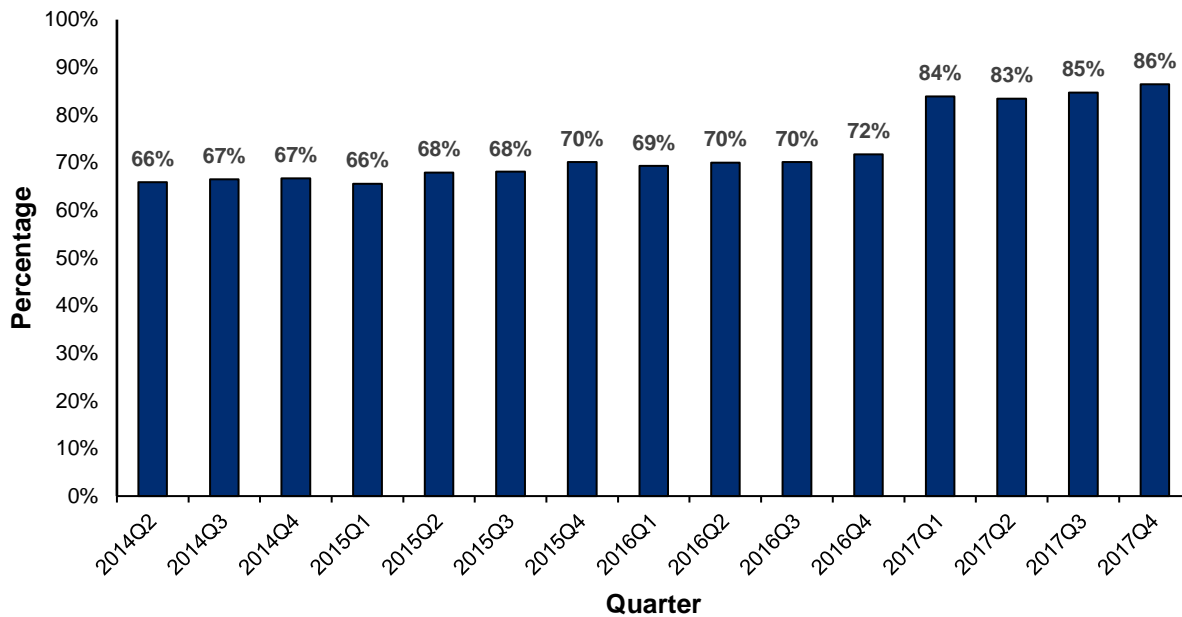
(*) excludes patients with clinical contraindications for protocol interventions or who died within one hour



The percentage of adult patients (age ≥ 18) with severe sepsis or septic shock that received broad spectrum antibiotics is presented in Figure 4 independently from the bundle results.

**Figure 4. Adult Early Intervention (Timely Administration of Broad-Spectrum Antibiotics):
Quarter Two, 2014 through Quarter Four, 2017***

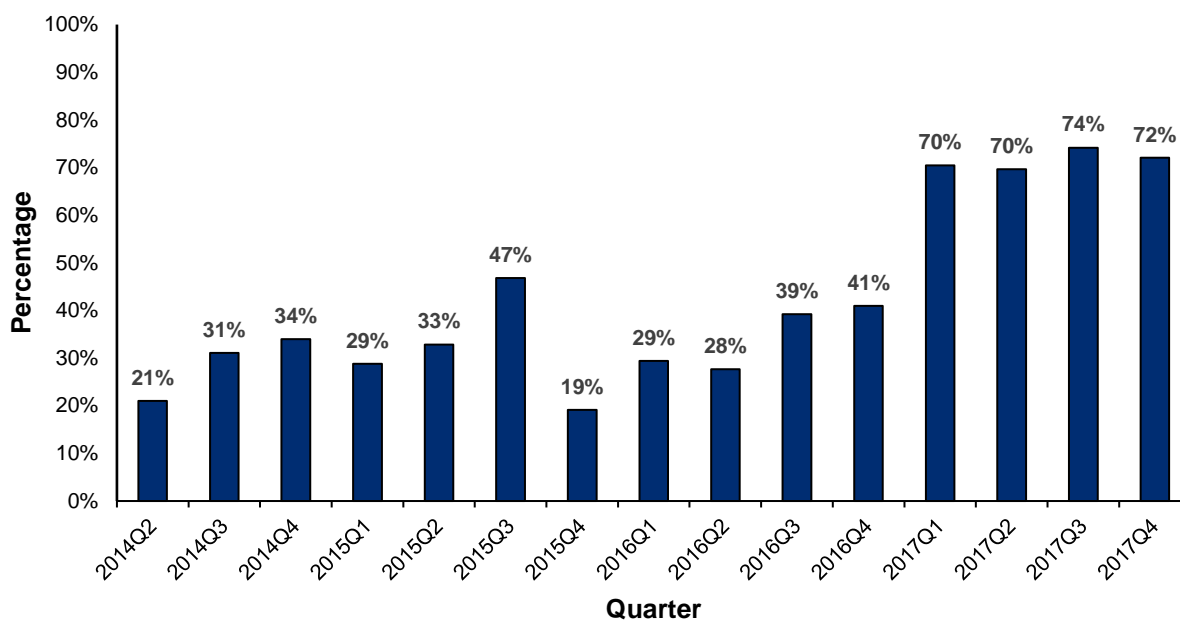
(*) excludes patients with clinical contraindications for protocol interventions or who died within three hours



The percentage of pediatric patients (age < 18) with severe sepsis or septic shock that received broad spectrum antibiotics is presented in Figure 5 independently from the bundle results.

Figure 5. Pediatric Early Intervention (Timely Administration of Broad-Spectrum Antibiotics): Quarter Two, 2014 through Quarter Four, 2017*

(*) excludes patients with clinical contraindications for protocol interventions or who died within one hour



Outcome Measures

To evaluate the impact of the New York State Sepsis Care Improvement Initiative on the outcomes of patients with severe sepsis and septic shock, the percentage of sepsis patients with in-hospital mortality is calculated. Trends in overall mortality from severe sepsis or septic shock are presented in Figures 6 and 7. All patients with severe sepsis or septic shock are included in the mortality calculation. Figure 6 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock who died during their hospital stay. The overall mortality continued to decrease in 2017, from 30.2% in Q2 2014 to 24.4% in Q4 2017.

Figure 6. Adult In-Hospital Mortality: Quarter Two, 2014 through Quarter Four, 2017

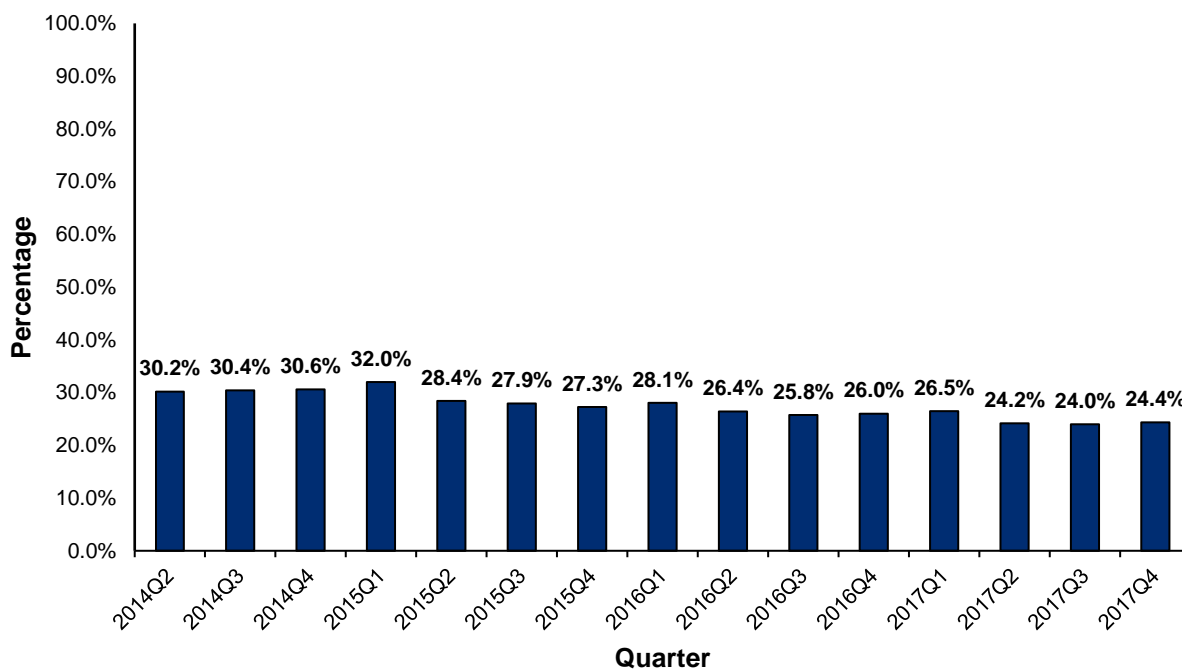
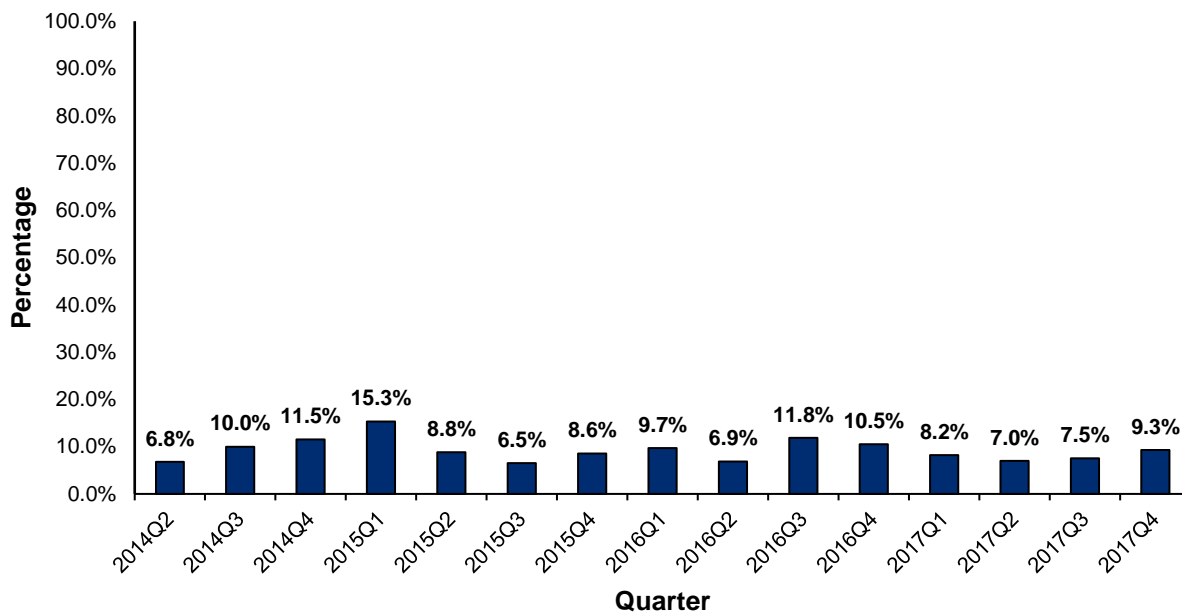


Figure 7 shows the percentage of pediatric patients with severe sepsis or septic shock (age < 18) who died during their hospital stay. The percentages of mortality for pediatric patients fluctuated across quarters, with mortality of 9.3% reported in Q4 2017. Mortality ranged from a low of 6.5% reported in Q3 2015 to the highest percentage of 15.3% reported in Q1 2015. Again, the fluctuation in percentages is likely influenced by the low volume of pediatric cases in each quarter.

Figure 7. Pediatric In-Hospital Mortality: Quarter Two, 2014 through Quarter Four, 2017



Hospital Performance

The hospital-specific measures are described below. For processes of care measures that are presented for hospital performance comparison, all patients with severe sepsis or septic shock are included in the measures, except for those excluded from protocols for clinical contraindications or other valid reasons. For hospital-specific processes of care measures transferred patients are excluded, since they have received care at more than one hospital.

The hospital-specific measures include the following:






- **Adult Broad-Spectrum Antibiotic Administration:** The percentage of adult patients with severe sepsis or septic shock who receive broad spectrum antibiotics within 3 hours of presentation, a critical early intervention, is presented independent of early management bundle completion.
- **Adult 3-Hour Bundle:** The percentage of adult patients with severe sepsis or septic shock who received all the recommended early interventions in the 3-hour early management bundle within three (3) hours of severe sepsis presentation. The 3-hour bundle includes measurement of a blood lactate level, collection of blood cultures and administration of broad-spectrum antibiotics. Patients with clinical exclusions for any of the interventions and patients who have been transferred from or to another acute care hospital are excluded from this measure.
- **Adult 6-Hour Bundle:** The percentage of adult patients with septic shock treated with the hospital's sepsis protocol who received all the recommended early interventions in the 6-hour early management bundle for which they were eligible within 3 hours of severe sepsis presentation (repeat lactate level) or within 6 hours of septic shock presentation (all other 6-hour bundle elements). The 6-hour bundle includes the interventions in the 3-hour bundle plus fluid administration, fluid status assessment, vasopressors and remeasurement of lactate for eligible patients. Patients with clinical contraindications to any of the interventions and patients who have been transferred from or to another acute care hospital are excluded from this measure.
- **Pediatric Broad-Spectrum Antibiotic Administration:** The percentage of pediatric patients with severe sepsis or septic shock who received broad spectrum antibiotics within 1 hour of presentation, a critical early intervention, is presented independent of early management bundle completion.
- **Pediatric 1-Hour Bundle:** The percentage of pediatric patients with sepsis treated in the emergency room with the hospital's sepsis protocol who received all the recommended pediatric early interventions within one (1) hour of presentation of severe sepsis or septic shock. The pediatric 1-hour bundle includes blood culture collection, antibiotic administration and fluid administration. Patients with clinical exclusions and patients who have been transferred from or to another acute care hospital are excluded from this measure.

Performance Data – Adults

Hospital-reported data was used to calculate the hospital-specific performance measures described above. Hospitals with ten (10) or fewer sepsis cases are not included in hospital comparisons in this report. Table 1 shows how hospitals were categorized and ranked according to performance on the measures. After calculating the performance measures for each hospital, the data for each individual measure were ordered from the lowest percentage to

the highest percentage achieved and divided into quintiles. Each hospital was assigned to a “performance level” category based on the quintile into which their percentage fell for a given measure. Those hospitals ranked in quintile 1 are the lowest performers and those hospitals ranked in quintile 5 are the highest performers. Table 1 shows the quintiles, category assignment, and the range of percentages represented in each category for adult timely administration of broad-spectrum antibiotics, 3-hour bundle, and 6-hour bundle.

Table 1. Category Assignment for the Adult Sepsis Performance Measures, 2017

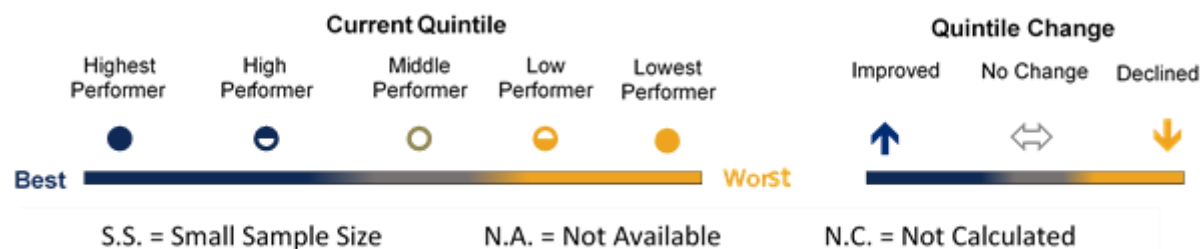
Quintile	Category (Performance Level)	Summary Table Symbol	Ranking Percentiles	Timely Antibiotics (%)	3-Hour Bundle (%)	Composite Bundle (%)
Quintile 5	Highest	 Best	80 th – 100 th	92.91 - 98.70	78.71 - 91.40	50.61 - 80.80
Quintile 4	High	 ↑	60 th – 80 th	89.51 - 92.90	72.11 - 78.70	39.41 - 50.60
Quintile 3	Middle	 ↓	40 th – 60 th	86.31 - 89.50	65.61 - 72.10	29.81 - 39.40
Quintile 2	Low	 Worst	20 th – 40 th	79.61 - 86.30	59.51 - 65.60	20.71 - 29.80
Quintile 1	Lowest		0 th – 20 th	41.10 - 79.60	9.60 - 59.50	5.30 - 20.70

Hospitals’ performance on adult timely administration of broad-spectrum antibiotics, 3-hour, and 6-hour bundle measures are presented in Table 3. The interventions within these measures collectively have been demonstrated to help direct appropriate care. This measure is only reported for those hospitals with greater than 10 adult sepsis cases in 2017. For hospitals that participated in sampling for 2017, the measure result reported here is an estimate drawn from a representative subset of their sepsis population. The 95% confidence intervals associated with these estimates appear in Appendix A. Since actual observed counts of measure numerators and denominators are unknown among sampling hospitals, statewide measure volume is not reported.

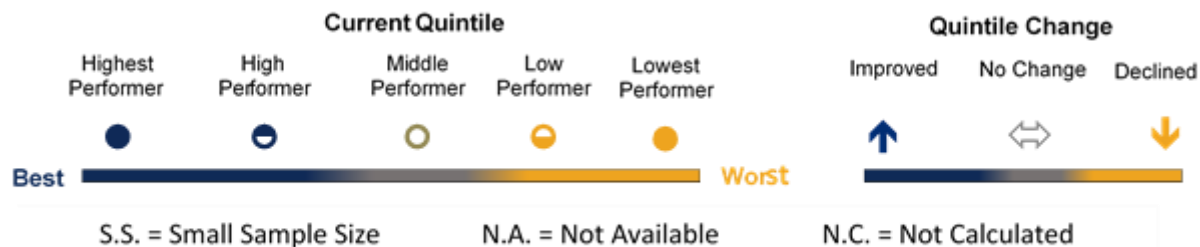
In addition to the hospital’s performance level by quintile, the change in the hospital’s performance level between 2016 and 2017 is presented, reflecting whether the hospitals’ performance category improved, declined or remained unchanged. The cells that contain an S.S. indicate that the data was suppressed due to low counts. The cells that contain an N.C. indicate that the measure was not calculated because the hospital did not have any patients that satisfied the criteria for inclusion in the measure. The cells that contain an N.A. indicate that a measure result was not available for that hospital in at least one of the years compared.

Table 2. Adult Sepsis Measure Summary Report by Hospital, 2017

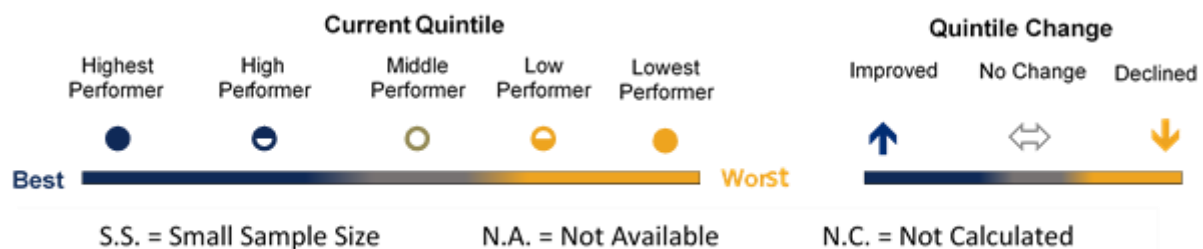
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Adirondack Medical Center-Lake Placid Site	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Adirondack Medical Center-Saranac Lake Site	29	89.7	●	↓	29	65.5	○	N.A.	28	7.1	●	N.A.
Albany Medical Center Hospital	499	68.1	●	↔	499	36.1	●	↔	495	8.7	●	↔
Albany Memorial Hospital	59	78.0	●	↓	59	57.6	●	↓	58	31.0	○	↔
Alice Hyde Medical Center	28	96.4	●	↔	28	71.4	○	↓	28	53.6	●	↑
Arnot Ogden Medical Center	165	84.2	○	↔	165	63.0	○	↔	163	6.1	●	↔
Auburn Community Hospital	93	73.1	●	↔	93	44.1	●	↔	87	21.8	○	↓
Aurelia Osborn Fox Memorial Hospital	45	86.7	○	↔	45	75.6	●	↑	45	42.2	●	↑
Bellevue Hospital Center	397	92.9	●	↑	397	70.5	○	↓	392	42.6	●	↓
Bertrand Chaffee Hospital	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Bon Secours Community Hospital	137	94.2	●	↑	137	86.9	●	↑	132	56.8	●	↑
Bronx-Lebanon Hospital Center - Concourse Division	594	90.9	●	↑	594	71.7	○	↑	582	42.4	●	↑
Brookdale Hospital Medical Center	73	41.1	●	↔	73	23.3	●	↔	73	5.5	●	↔
Brookhaven Memorial Hospital Medical Center Inc	512	95.1	●	↑	512	83.8	●	↑	507	66.3	●	↔
Brooklyn Hospital Center - Downtown Campus	536	85.6	○	↓	536	67.4	○	↑	530	33.6	○	↓
Brooks Memorial Hospital	88	93.2	●	↑	88	80.7	●	↑	88	51.1	●	↑



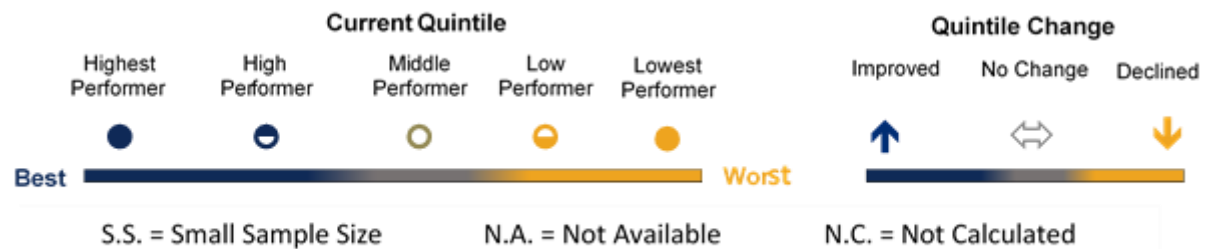
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Degraff Memorial Hospital	40	65.0	●	↔	40	52.5	●	↓	39	30.8	○	↑
Delaware Valley Hospital Inc	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.
Eastern Long Island Hospital	45	95.6	●	↑	45	86.7	●	↑	45	40.0	●	↑
Eastern Niagara Hospital - Lockport Division	16	62.5	●	↓	16	56.3	●	N.A.	15	26.7	●	N.A.
Elizabethtown Community Hospital	16	75.0	●	↓	16	75.0	●	↓	15	40.0	●	↔
Ellenville Regional Hospital	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.
Ellis Hospital	306	87.3	○	↑	306	69.9	○	↑	303	51.8	●	↑
Elmhurst Hospital Center	654	87.6	○	↑	654	66.8	○	↑	652	37.6	○	↑
Erie County Medical Center	150	76.7	●	↔	150	60.0	●	↑	147	29.3	●	↔
F F Thompson Hospital	128	78.1	●	↓	128	65.6	●	↔	126	14.3	●	↓
Faxton-St Lukes Healthcare St Lukes Division	304	85.2	●	↓	304	62.8	●	↓	299	21.7	●	↔
Flushing Hospital Medical Center	260	91.5	●	↔	260	73.1	●	↔	260	35.4	○	↔
Forest Hills Hospital	362	85.6	●	↓	362	64.9	●	↓	355	19.7	●	↓
Franklin Hospital	174	83.3	●	↓	174	65.5	●	↓	171	15.8	●	↓
Geneva General Hospital	104	89.4	○	↓	104	77.9	●	↔	103	28.2	●	↓
Glen Cove Hospital	149	94.6	●	↔	149	79.9	●	↑	147	42.9	●	↓
Glens Falls Hospital	192	92.7	●	↑	192	70.8	○	↔	192	35.4	○	↔
Good Samaritan Hospital Medical Center	1,092	87.7	○	↓	1,092	73.8	●	↔	1,089	51.8	●	↔



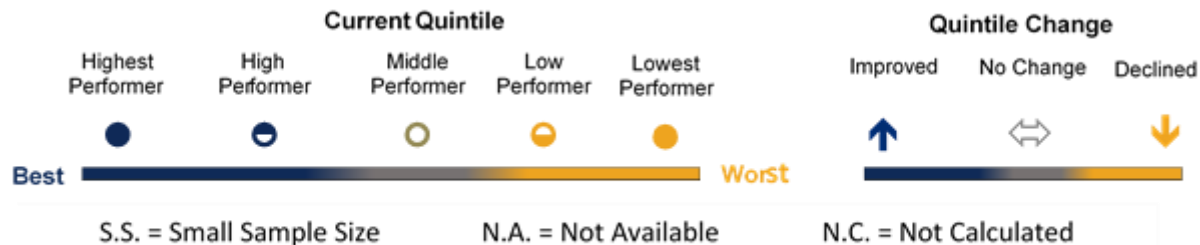
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Mercy Medical Center	268	96.6	●	↔	268	91.4	●	↔	265	80.8	●	↔
Metropolitan Hospital Center	73	89.0	○	↑	73	67.1	○	↑	73	21.9	○	↑
Millard Fillmore Suburban Hospital	438	78.8	●	↔	438	61.4	○	↔	432	27.8	○	↔
Montefiore Med Center - Jack D Weiler Hosp of A Einstein College Div	1,053	51.9	●	↔	1,053	11.8	●	↔	1,048	8.2	●	↔
Montefiore Medical Center - Henry & Lucy Moses Div	864	46.3	●	↓	864	9.6	●	↔	863	6.7	●	↔
Montefiore Medical Center-Wakefield Hospital	458	57.0	●	↔	458	11.6	●	↓	458	9.6	●	↔
Montefiore Mount Vernon Hospital	40	75.0	●	↓	40	55.0	●	↔	40	40.0	●	↑
Montefiore New Rochelle Hospital	148	78.4	●	↓	148	60.8	○	↔	143	14.0	●	↓
Moses-Ludington Hospital	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Mount Sinai Beth Israel	683	88.9	○	↓	683	73.9	●	↑	667	49.3	●	↔
Mount Sinai Beth Israel Brooklyn	149	97.3	●	↑	149	85.9	●	↔	147	50.3	●	↓
Mount Sinai Hospital	1,342	91.7	●	↑	1,342	65.4	○	↑	1,325	29.1	○	↔
Mount Sinai Hospital - Mount Sinai Hospital of Queens	348	94.5	●	↑	348	71.0	○	↑	343	41.1	●	↑
Mount Sinai Roosevelt	727	88.4	○	↑	727	75.7	●	↑	723	53.8	●	↑
Mount Sinai St. Lukes	1,016	89.6	●	↑	1,016	78.1	●	↑	1,007	57.0	●	↔
Mount St Marys Hospital and Health Center	289	85.8	○	↓	289	69.6	○	↓	287	55.1	●	↑



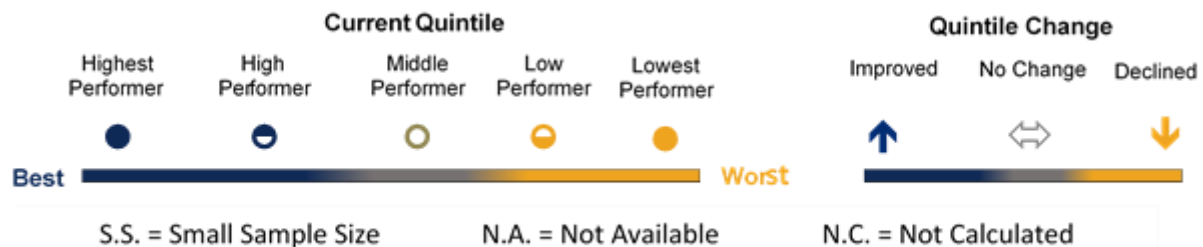
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Nassau University Medical Center	394	88.8	○	↓	394	64.0	○	↓	381	24.9	○	↓
Nathan Littauer Hospital	134	83.6	○	↓	134	67.2	○	↓	130	33.1	○	↓
New York Community Hospital of Brooklyn, Inc	211	94.8	●	↔	211	85.8	●	↔	207	62.3	●	↔
New York Hospital Medical Center of Queens	2,000	74.7	●	↔	2,000	46.7	●	↔	1,930	20.2	●	↔
New York Methodist Hospital	118	85.6	○	↑	118	70.3	○	↑	114	49.1	○	↑
New York Presbyterian Hospital - Allen Hospital	170	87.1	○	↑	170	76.5	○	↑	146	32.9	○	↑
New York Presbyterian Hospital - Columbia Presbyterian Center	555	85.6	○	↑	555	69.7	○	↑	517	36.0	○	↑
New York Presbyterian Hospital - New York Weill Cornell Center	423	92.2	○	↑	423	65.2	○	↔	399	33.8	○	↑
New York-Presbyterian/Lower Manhattan Hospital	163	91.4	○	↑	163	75.5	○	↑	151	35.8	○	↓
Newark-Wayne Community Hospital	100	79.0	●	↓	100	59.0	●	↓	99	23.2	○	↓
Niagara Falls Memorial Medical Center	69	92.8	○	↑	69	84.1	●	↑	67	56.7	●	↑
Nicholas H Noyes Memorial Hospital	14	85.7	○	N.A.	14	71.4	○	N.A.	14	28.6	○	N.A.
North Central Bronx Hospital	50	94.0	●	↑	50	88.0	●	↑	50	46.0	○	↑
North Shore University Hospital	930	82.8	○	↓	930	59.5	●	↔	924	20.3	●	↓
Northern Dutchess Hospital	56	98.2	●	↔	56	80.4	●	↑	54	55.6	●	↔



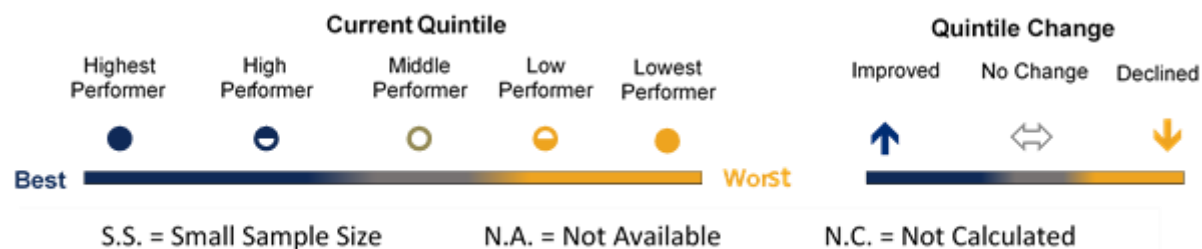
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Northern Westchester Hospital	216	91.2	⊖	↓	216	78.7	⊖	↓	212	56.1	●	↔
Nyack Hospital	313	92.7	⊖	↑	313	80.5	●	↑	309	44.0	⊖	↔
NYU Hospital for Joint Diseases	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
NYU Hospitals Center	384	98.7	●	↔	384	90.6	●	↔	367	54.8	●	↔
OConnor Hospital	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.
Olean General Hospital	290	72.4	●	↔	290	57.6	●	↔	286	29.0	⊖	↔
Oneida Healthcare	37	94.6	●	↑	37	81.1	●	↑	35	28.6	⊖	↑
Orange Regional Medical Ctr-Goshen Campus	657	86.8	○	↓	657	73.1	⊖	↔	652	40.8	⊖	↑
Oswego Hospital	294	90.8	⊖	↔	294	75.2	⊖	↔	293	59.0	●	↔
Our Lady of Lourdes Memorial Hospital Inc	173	94.2	●	↑	173	79.2	●	↑	171	40.9	⊖	↑
Peconic Bay Medical Center	125	83.2	⊖	↓	125	57.6	●	↓	119	23.5	⊖	↔
Phelps Memorial Hospital Assn	252	94.0	●	↔	252	67.1	○	↓	249	54.2	●	↔
Plainview Hospital	228	89.0	○	↓	228	57.5	●	↓	224	20.1	●	↓
Putnam Hospital Center	315	93.7	●	↔	315	77.8	⊖	↓	313	62.3	●	↔
Queens Hospital Center	425	89.2	○	↑	425	68.2	○	↑	416	19.7	●	↓
Richmond University Medical Center	421	78.1	●	↓	421	43.7	●	↓	414	5.6	●	↔
River Hospital, Inc.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Rochester General Hospital	970	77.6	●	↓	970	60.2	⊖	↓	961	23.0	⊖	↓



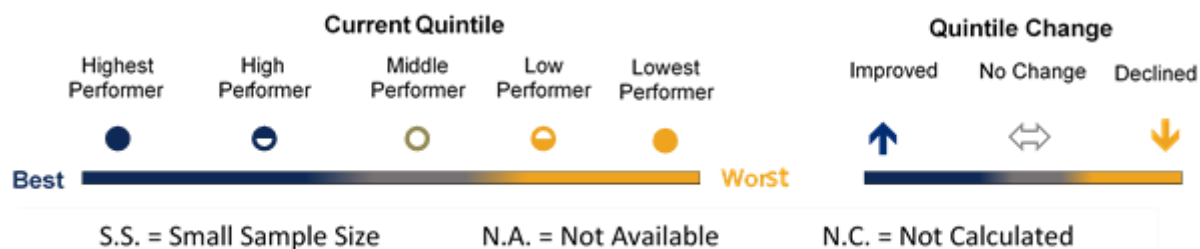
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Rome Memorial Hospital, Inc	139	81.3	○	↑	139	69.8	○	↑	138	31.9	○	↑
Roswell Park Cancer Institute	71	62.0	●	N.A.	71	26.8	●	N.A.	71	11.3	●	N.A.
Samaritan Hospital	131	93.9	●	↑	131	85.5	●	↔	131	40.5	●	↓
Samaritan Medical Center	103	97.1	●	↑	103	75.7	●	↑	99	39.4	○	↑
Saratoga Hospital	307	95.8	●	↔	307	78.2	●	↓	301	45.5	●	↓
SBH Health System	320	80.6	○	↔	320	57.2	●	↔	320	22.5	○	↑
Schuyler Hospital	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Sisters of Charity Hospital	134	79.1	●	↓	134	61.9	○	↓	132	39.4	○	↑
Sisters of Charity Hospital - St Joseph Campus	54	79.6	○	↓	54	70.4	○	↓	54	46.3	●	↑
SJRH - Andrus Pavilion	254	81.5	○	↓	254	60.6	○	↓	252	32.1	○	↔
SJRH - Dobbs Ferry Pavilion	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Soldiers and Sailors Memorial Hospital of Yates County Inc	15	93.3	●	↔	15	80.0	●	N.A.	15	33.3	○	N.A.
South Nassau Communities Hospital	482	88.0	○	↔	482	75.5	●	↔	459	22.9	○	↓
Southampton Hospital	88	92.0	●	↑	88	80.7	●	↑	85	36.5	○	↓
Southside Hospital	230	90.0	●	↑	230	69.6	○	↔	227	30.4	○	↑
St Anthony Community Hospital	55	94.5	●	↑	55	81.8	●	↑	54	42.6	●	↑
St Catherine of Siena Hospital	741	94.6	●	↔	741	90.7	●	↔	716	78.6	●	↔
St Charles Hospital	251	93.2	●	↑	251	88.0	●	↑	251	72.5	●	↔



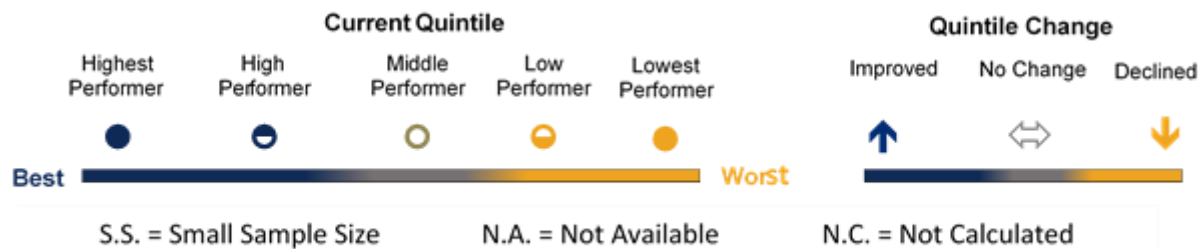
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
St Elizabeth Medical Center	183	86.3	○	↑	183	59.6	○	↑	182	17.6	●	↔
St Francis Hospital	389	90.5	●	↑	389	79.7	●	↑	384	53.4	●	↑
St Francis Hospital - Poughkeepsie	70	90.0	●	↔	70	62.9	○	↓	70	54.3	●	↑
St James Mercy Hospital	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
St Johns Episcopal Hospital So Shore	336	84.8	○	↓	336	63.1	○	↓	332	18.7	●	↓
St Josephs Hospital	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
St Josephs Hospital Health Center	496	89.5	●	↑	496	62.5	○	↔	481	22.2	○	↓
St Josephs Medical Center	95	94.7	●	↑	95	86.3	●	↑	92	71.7	●	↑
St Lukes Cornwall Hospital/Newburgh	183	95.6	●	↔	183	84.7	●	↔	178	53.4	●	↔
St Peters Hospital	544	79.2	●	↓	544	54.0	●	↓	536	20.5	●	↓
St Joseph Hospital	345	88.7	○	↔	345	75.7	●	↔	341	58.4	●	↔
St Marys Healthcare	77	92.2	●	↑	77	83.1	●	↑	77	18.2	●	↓
St Marys Hospital	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.
Staten Island University Hosp-North	713	70.8	●	↓	713	25.2	●	↔	708	9.6	●	↓
Staten Island University Hosp-South	132	72.0	●	↓	132	39.4	●	↓	131	5.3	●	↓
Strong Memorial Hospital	748	86.2	○	↑	748	72.1	○	↑	724	47.9	●	↑
Syosset Hospital	68	91.2	●	↓	68	67.6	○	↓	67	34.3	○	↓
The Unity Hospital of Rochester	336	81.8	○	↓	336	63.1	○	↓	333	30.3	○	↑



Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Tri Town Regional Healthcare	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.
United Health Services Hospitals Inc. - Binghamton General Hospital	69	87.0	○	↑	69	75.4	●	↑	69	56.5	●	↑
United Health Services Hospitals Inc. - Wilson Medical Center	367	86.4	○	↓	367	73.3	●	↔	365	52.1	●	↑
United Memorial Medical Center North Street Campus	116	87.9	○	↔	116	65.5	●	↓	115	39.1	○	↓
University Hospital	821	85.4	●	↔	821	73.1	●	↑	808	47.8	●	↑
University Hospital of Brooklyn	246	85.4	●	↑	246	54.5	●	↔	243	18.5	●	↔
University Hospital SUNY Health Science Center	375	87.5	○	↓	375	60.5	●	↓	369	25.2	●	↓
Upstate University Hospital at Community General	100	90.0	●	↓	100	65.0	●	↓	99	31.3	○	↓
Vassar Brothers Medical Center	779	87.8	○	↓	779	74.1	●	↓	773	52.3	●	↔
Westchester Medical Center	127	85.8	●	↓	127	67.7	○	↔	123	34.1	○	↔
Westfield Memorial Hospital Inc	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.	N.C.	N.C.	N.C.	N.A.
White Plains Hospital Center	326	82.2	●	↔	326	66.6	○	↑	320	32.8	○	↑
Winthrop-University Hospital	860	88.5	○	↑	860	74.4	●	↑	842	45.2	●	↔
Womans Christian Association	117	82.9	●	↓	117	55.6	●	↓	113	16.8	●	↓
Women and Children's Hospital of Buffalo	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.	S.S.	S.S.	S.S.	N.A.
Woodhull Medical & Mental Health Center	271	88.2	○	↑	271	66.4	○	↑	271	38.4	○	↔



Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Wyckoff Heights Medical Center	194	94.8	●	↑	194	77.3	⊖	↑	191	28.3	⊖	↑
Wyoming County Community Hospital	16	68.8	●	↓	16	62.5	⊖	↓	16	18.8	●	↓
Statewide		84.7				65.0				35.0		



Performance Data – Pediatrics

Table 3 shows the quintiles, category assignment, and the percentages assigned to each category for the two pediatric measures – timely administration of broad-spectrum antibiotics and the 1-hour bundle. Risk adjusted mortality rates were not calculated for the pediatric population due to the significantly smaller volume of cases for each hospital compared to adult cases and the current lack of a standardized, validated risk adjustment model for the pediatric sepsis population.

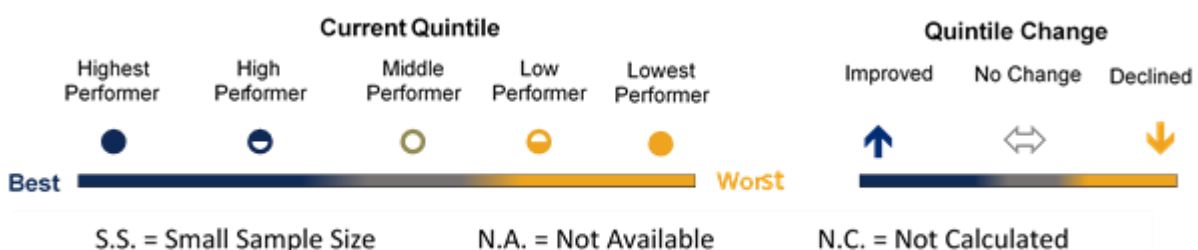
Table 3. Category Assignment for the Pediatric Sepsis Performance Measures

Quintile	Category (Performance Level)	Summary Table Symbol	Percentiles Included	Timely Antibiotics (%)	1-Hour Bundle (%)
Quintile 5	Highest	● Best	80 th – 100 th	87.51 - 100.0	62.51 - 64.30
Quintile 4	High	⊖ ↑	60 th – 80 th	82.61 - 87.50	50.01 - 62.50
Quintile 3	Middle	○	40 th – 60 th	78.91 - 82.60	39.11 - 50.00
Quintile 2	Low	⊖ ↓	20 th – 40 th	58.81 - 78.90	23.81 - 39.10
Quintile 1	Lowest	● Worst	0 th – 20 th	9.50 - 58.80	0.00 - 23.80

Table 4 shows the percentage of pediatric patients (age <18) with severe sepsis or septic shock who received all interventions in the early management bundle within one hour and who received timely administration of broad-spectrum antibiotics within one hour, regardless of other interventions received. For pediatric patients, these timely interventions include blood cultures, antibiotics and the administration of 20 cc/kg of crystalloid fluid. Pediatric patients who died within one hour of time zero or who have clinical contraindications to any of the interventions are excluded from both the bundle and antibiotic administration measure. Only hospitals with greater than ten cases reported in at least one of the measure denominators are reported here.

Table 4. Pediatric Sepsis Measure Summary Report by Hospital

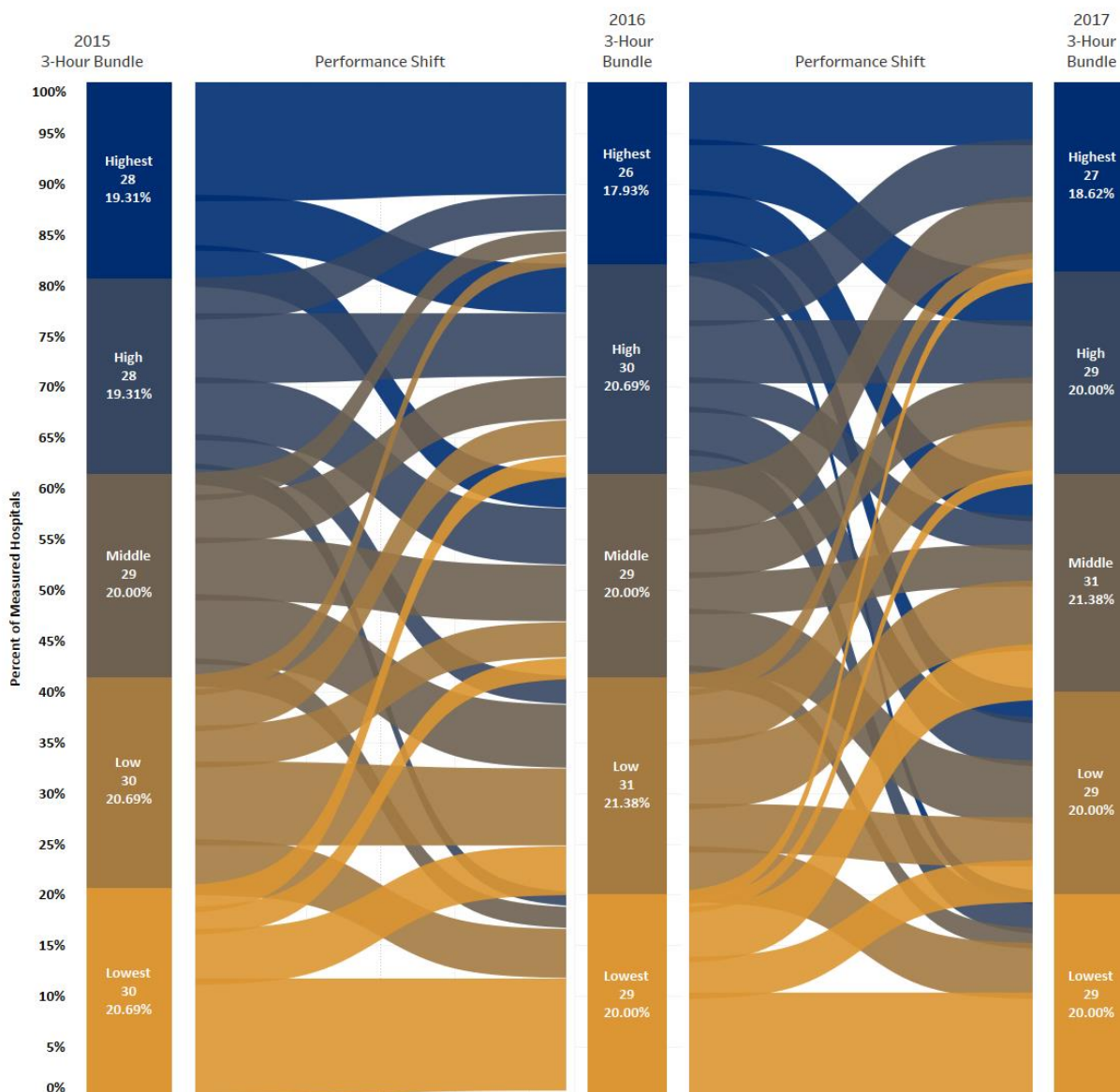
Facility Name	Timely Administration of Broad-Spectrum Antibiotics				1-Hour Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2016
Strong Memorial Hospital	16	50.0	●	↔	16	31.3	○	↓
Montefiore Medical Center - Henry & Lucy Moses Div	42	9.5	●	N.A.	42	0.0	●	N.A.
University Hospital SUNY Health Science Center	12	66.7	○	N.A.	12	50.0	○	N.A.
Bronx-Lebanon Hospital Center - Concourse Division	16	68.8	○	↑	16	62.5	○	N.A.
Albany Medical Center Hospital	17	58.8	○	↓	17	11.8	●	N.A.
Memorial Hospital for Cancer and Allied Diseases	21	81.0	○	N.A.	21	23.8	●	N.A.
Women and Children's Hospital of Buffalo	71	78.9	○	↑	71	43.7	○	↑
University Hospital	14	85.7	○	↓	14	64.3	●	↔
Long Island Jewish Schneiders Children's Hospital Division	23	82.6	○	↑	23	39.1	○	↑
New York Presbyterian Hospital - Columbia Presbyterian Center	41	85.4	○	↓	41	56.1	○	↑
New York Presbyterian Hospital - New York Weill Cornell Center	11	90.9	●	↑	11	63.6	●	N.A.
Kings County Hospital Center	12	100.0	●	N.A.	12	33.3	○	N.A.
NYU Hospitals Center	16	87.5	●	N.A.	16	56.3	○	N.A.
Statewide	409	71.4			409	35.9		



Hospital Performance Over Time

Data from the years 2015 - 2017 allows us to look at hospital performance over time. Figure 8 is a depiction of hospital performance data from 2015 to 2017, charting the year over year movement of hospital adult 3-hour bundle performance, represented by yearly quintiles. Each arm in this chart represents the movement of hospitals within and across quintiles of bundle performance from year to year. The size of each arm in this chart is proportional to the number of hospitals represented by that movement.

Figure 8. Adult Sepsis 3-Hour Bundle Performance Quintile Trends: 2015 through 2017



Risk Adjusted Mortality

Hospital performance on management of sepsis is a key factor that directly relates to patient outcomes. The use of sepsis protocols and measures of protocol adherence are important to patients because of their impact on improvement in the probability of survival. It is difficult, however, to compare outcomes among hospitals when assessing performance, because different hospitals treat different types of patients. Hospitals with sicker patients may have higher rates of mortality than other hospitals.

In order to more fairly compare hospitals on the critical outcome of survival, risk adjustment was used to account for differences in the characteristics of the hospitals' populations of sepsis patients, since patient characteristics can impact the risk of dying from sepsis. Risk adjustment takes into account accompanying chronic illnesses that can complicate treatment and outcomes for patients with sepsis, patient demographic factors such as age, and the severity of sepsis for each patient. It should be noted that there may be risk factors, such as some medical comorbidities and social determinants of health, that were not accounted for in this risk adjustment model but may have impacted the risk adjusted rates. The risk-adjusted mortality rate (RAMR) represents the best estimate, after accounting for these available factors, of what the hospital's mortality rate would have been if the hospital had a mix of patients identical to the statewide mix. Risk adjusted mortality describes the 'risk adjusted' percentage of all patients with sepsis at each hospital who expired as an outcome of that hospital stay. For 2017, patients who were discharged to hospice were included as outcomes to calculate the risk adjustment model³. More detail regarding the risk adjustment methodology can be found in Technical Appendix B.

Adult risk-adjusted sepsis mortality rates for each hospital is presented in Table 4. All adult patients with severe sepsis or septic shock are included in the risk-adjusted mortality measure, except for those who are transfer patients, those who were admitted from hospice, those who have advanced directives that restricted the use of any protocol interventions, or those who refused any of the protocol interventions. Hospitals with significantly lower observed mortality rates than expected based on their patient population's characteristics are identified as high performers, while hospitals with significantly higher observed mortality rates than expected are identified as low performers.

The number of patients that each hospital discharged to hospice is also presented in Table 4. The numbers indicate that most hospitals discharge some patients to hospice, though the proportion of patients discharged to hospice varies among hospitals.

Hospitals' change in RAMR performance status relative to the previous year is presented in Table 5 as well. This change does not necessarily indicate an increase or decrease in RAMR, but rather represents hospital movement between the high, middle, and low performance statuses across years and should be interpreted with caution given the differences in RAMR methodology between the two years. In particular for 2017, with the addition of hospice to the mortality outcome while calculating the model, risk-adjusted rates should not be directly compared to previous years. Risk-adjusted rates will appear higher in 2017 due to this expansion of the mortality outcome; however, hospitals' performance relative to the statewide

³While hospice care is appropriate for many patients, these patients typically are eligible for hospice due to a terminal illness and a prognosis of 6 months or less survival. <https://www.nhpco.org/hospice-eligibility-requirements>

population as indicated by their performance status has a comparable denotation to previous years.

Since actual observed counts of measure numerators and denominators are unknown among sampling hospitals, statewide measure volume is not reported.

Table 5. Adult Sepsis Risk Adjusted Mortality Rate (RAMR) Summary Report by Hospital

Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
Adirondack Medical Center-Lake Placid Site	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Adirondack Medical Center-Saranac Lake Site	29	8	0	25.97	◇	↔
Albany Medical Center Hospital	244	67	8	24.30	◇	↔
Albany Memorial Hospital	65	13	6	21.09	◇	↔
Alice Hyde Medical Center	28	4	0	14.73	◇	↔
Arnot Ogden Medical Center	167	49	2	27.03	◇	↓
Auburn Community Hospital	93	38	0	39.66	◆	↔
Aurelia Osborn Fox Memorial Hospital	46	11	2	23.02	◇	↔
Bellevue Hospital Center	419	65	6	19.24	◆	↔
Bertrand Chaffee Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Bon Secours Community Hospital	140	16	5	13.72	◆	↑
Bronx-Lebanon Hospital Center - Concourse Division	744	196	54	27.08	◇	↔
Brookdale Hospital Medical Center	73	25	2	24.24	◇	↔
Brookhaven Memorial Hospital Medical Center Inc	378	91	4	21.24	◆	↑
Brooklyn Hospital Center - Downtown Campus	539	149	59	21.52	◆	↔
Brooks Memorial Hospital	91	20	0	25.10	◇	↔
Buffalo General Medical Center	601	275	21	38.11	◆	↔
Canton-Potsdam Hospital	56	16	3	32.28	◇	↔
Carthage Area Hospital Inc	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Catskill Regional Medical Center	115	28	4	25.27	◇	↑
Cayuga Medical Center at Ithaca	303	49	9	20.71	◆	↑
Champlain Valley Physicians Hospital Medical Center	255	69	1	20.88	◆	↔
Chenango Memorial Hospital Inc	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Claxton-Hepburn Medical Center	30	12	0	40.63	◇	↔
Clifton Springs Hospital and Clinic	34	6	1	21.14	◇	↔
Cobleskill Regional Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.



Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
Columbia Memorial Hospital	36	16	3	37.01	◇	↔
Community Memorial Hospital Inc	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Coney Island Hospital	384	105	9	26.27	◇	↔
Corning Hospital	80	22	2	25.76	◇	↔
Cortland Regional Medical Center Inc	212	35	2	18.70	◆	↑
Crouse Hospital	224	59	1	29.22	◇	↑
Degraff Memorial Hospital	41	13	2	36.74	◇	↓
Eastern Long Island Hospital	46	6	1	13.16	◆	↑
Eastern Niagara Hospital - Lockport Division	16	9	0	41.45	◇	N.A.
Elizabethtown Community Hospital	16	0	0	0.00	◆	↑
Ellis Hospital	310	104	16	29.80	◇	↔
Elmhurst Hospital Center	379	101	12	26.69	◇	↔
Erie County Medical Center	185	56	1	29.85	◇	↔
F F Thompson Hospital	128	37	11	30.39	◇	↔
Faxton-St Lukes Healthcare St Lukes Division	310	114	4	29.01	◇	↑
Flushing Hospital Medical Center	264	145	34	39.37	◆	↔
Forest Hills Hospital	354	127	27	29.51	◇	↔
Franklin Hospital	184	78	11	33.64	◇	↔
Geneva General Hospital	105	36	6	31.33	◇	↔
Glen Cove Hospital	165	37	17	23.12	◇	↔
Glens Falls Hospital	201	51	1	25.75	◇	↓
Good Samaritan Hospital Medical Center	360	104	22	30.60	◇	↔
Good Samaritan Hospital of Suffern	373	120	20	27.17	◇	↓
Gouverneur Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Harlem Hospital Center	175	65	3	31.97	◇	↔
HealthAlliance Hospital Broadway Campus	183	41	1	21.68	◆	↔
HealthAlliance Hospital Marys Avenue Campus	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Highland Hospital	402	103	30	25.37	◇	↔



Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
Hospital for Special Surgery	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Hudson Valley Hospital Center	489	120	16	24.38	◆	↑
Huntington Hospital	391	104	35	26.10	◇	↓
Interfaith Medical Center	97	34	3	24.42	◇	↔
Ira Davenport Memorial Hospital Inc	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Jacobi Medical Center	323	113	13	24.71	◆	↑
Jamaica Hospital Medical Center	385	196	45	40.69	◆	↓
John T Mather Memorial Hospital of Port Jefferson New York Inc	343	90	15	20.60	◆	↔
Kenmore Mercy Hospital	258	83	11	34.37	◇	↓
Kings County Hospital Center	239	102	7	33.55	◇	↑
Kingsbrook Jewish Medical Center	279	119	0	25.38	◇	↓
Lawrence Hospital Center	338	81	33	23.29	◆	↑
Lenox Hill Hospital	636	144	34	22.06	◆	↔
Lewis County General Hospital	14	4	1	28.33	◇	↔
Lincoln Medical & Mental Health Center	303	91	8	25.04	◇	↔
Little Falls Hospital	40	3	0	10.57	◆	↑
Long Island Jewish Medical Center	550	142	41	28.41	◇	↔
Long Island Jewish Schneiders Children's Hospital Division	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Lutheran Medical Center	270	118	45	32.55	◇	↔
Maimonides Medical Center	631	165	26	21.15	◆	↔
Margaretville Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Mary Imogene Bassett Hospital	116	35	7	28.52	◇	↔
Massena Memorial Hospital	34	4	1	14.42	◇	↔
Medina Memorial Health Care System	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Memorial Hosp of Wm F & Gertrude F Jones A/K/A Jones Memorial Hosp	27	8	0	26.27	◇	↔
Memorial Hospital for Cancer and Allied Diseases	468	217	23	29.27	◇	↓
Mercy Hospital	335	110	19	34.90	◆	↓
Mercy Medical Center	282	90	17	27.30	◇	↔



Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
Metropolitan Hospital Center	72	26	5	29.91	◇	↔
Millard Fillmore Suburban Hospital	464	159	29	31.87	◇	↔
Montefiore Med Center - Jack D Weiler Hosp of A Einstein College Div	1,055	374	66	37.44	◆	↓
Montefiore Medical Center - Henry & Lucy Moses Div	864	349	45	42.78	◆	↔
Montefiore Medical Center- Wakefield Hospital	458	161	24	35.80	◆	↓
Montefiore Mount Vernon Hospital	48	11	0	30.28	◇	↓
Montefiore New Rochelle Hospital	157	68	5	32.70	◇	↑
Moses-Ludington Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Mount Sinai Beth Israel	695	174	63	24.97	◆	↔
Mount Sinai Beth Israel Brooklyn	150	71	12	29.91	◇	↔
Mount Sinai Hospital	325	103	24	25.35	◇	↓
Mount Sinai Hospital - Mount Sinai Hospital of Queens	347	111	28	27.01	◇	↔
Mount Sinai Roosevelt	385	62	35	18.56	◆	↔
Mount Sinai St. Lukes	382	80	29	19.94	◆	↔
Mount St Marys Hospital and Health Center	299	65	25	25.92	◇	↔
Nassau University Medical Center	416	141	12	29.47	◇	↑
Nathan Littauer Hospital	137	25	3	21.55	◇	↔
New York Community Hospital of Brooklyn, Inc	214	66	5	25.51	◇	↔
New York Hospital Medical Center of Queens	338	72	16	20.98	◆	↔
New York Methodist Hospital	113	25	6	16.77	◆	↔
New York Presbyterian Hospital - Allen Hospital	168	58	2	27.50	◇	↔
New York Presbyterian Hospital - Columbia Presbyterian Center	271	94	9	30.66	◇	↔
New York Presbyterian Hospital - New York Weill Cornell Center	293	106	9	32.39	◇	↔
New York-Presbyterian/Lower Manhattan Hospital	178	51	4	26.37	◇	↔
Newark-Wayne Community Hospital	102	23	8	25.62	◇	↔
Niagara Falls Memorial Medical Center	71	13	2	19.02	◇	↔



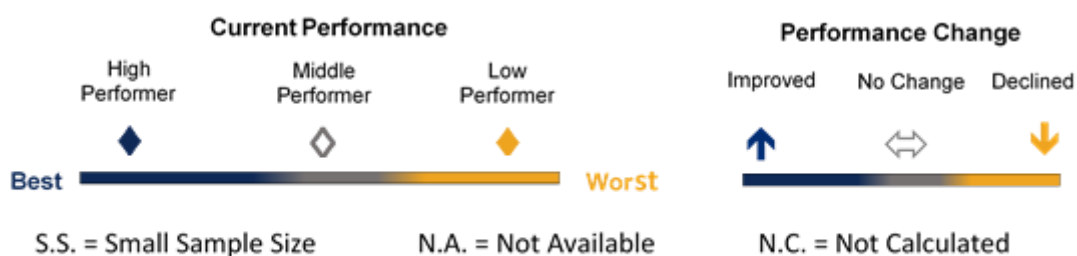
Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
Nicholas H Noyes Memorial Hospital	15	3	0	19.69	◇	↔
North Central Bronx Hospital	55	7	1	15.36	◇	↔
North Shore University Hospital	942	313	30	29.29	◇	↔
Northern Dutchess Hospital	58	19	3	30.66	◇	↔
Northern Westchester Hospital	232	39	10	18.30	◆	↑
Nyack Hospital	315	88	19	22.40	◆	↔
NYU Hospital for Joint Diseases	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
NYU Hospitals Center	365	120	50	23.68	◆	↔
OConnor Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Olean General Hospital	293	63	4	23.90	◇	↓
Oneida Healthcare	38	8	1	22.11	◇	↔
Orange Regional Medical Ctr-Goshen Campus	657	166	34	26.63	◇	↔
Oswego Hospital	295	28	0	12.06	◆	↔
Our Lady of Lourdes Memorial Hospital Inc	173	54	7	35.07	◇	↑
Peconic Bay Medical Center	130	35	4	23.66	◇	↔
Phelps Memorial Hospital Assn	292	57	11	21.57	◆	↔
Plainview Hospital	226	70	15	27.43	◇	↔
Putnam Hospital Center	321	46	19	16.61	◆	↑
Queens Hospital Center	443	110	7	23.60	◆	↑
Richmond University Medical Center	428	181	9	34.05	◇	↓
River Hospital, Inc.	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Rochester General Hospital	351	82	33	25.46	◇	↓
Rome Memorial Hospital, Inc	141	25	2	18.22	◆	↑
Roswell Park Cancer Institute	76	25	5	27.79	◇	↓
Samaritan Hospital	146	38	9	23.84	◇	↔
Samaritan Medical Center	107	29	6	22.97	◇	↓
Saratoga Hospital	319	94	16	29.75	◇	↔
SBH Health System	323	75	5	21.03	◆	↑
Schuyler Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.



Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
Sisters of Charity Hospital	137	42	11	29.60	◇	↓
Sisters of Charity Hospital - St Joseph Campus	59	24	2	39.10	◇	↓
SJRH - Andrus Pavilion	268	68	8	23.60	◆	↑
SJRH - Dobbs Ferry Pavillion	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Soldiers and Sailors Memorial Hospital of Yates County Inc	15	2	0	16.42	◇	N.A.
South Nassau Communities Hospital	371	159	16	30.88	◇	↔
Southampton Hospital	91	31	5	29.47	◇	↔
Southside Hospital	256	89	12	30.66	◇	↔
St Anthony Community Hospital	59	18	2	28.87	◇	↔
St Catherine of Siena Hospital	369	78	23	22.52	◆	↔
St Charles Hospital	267	43	9	25.09	◇	↓
St Elizabeth Medical Center	198	81	3	36.03	◆	↔
St Francis Hospital	437	168	35	30.07	◇	↔
St Francis Hospital - Poughkeepsie	75	20	1	29.36	◇	↔
St James Mercy Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
St Johns Episcopal Hospital So Shore	319	132	7	32.20	◇	↑
St Josephs Hospital	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
St Josephs Hospital Health Center	348	110	4	27.94	◇	↓
St Josephs Medical Center	108	32	3	24.25	◇	↔
St Lukes Cornwall Hospital/Newburgh	206	69	7	26.97	◇	↔
St Peters Hospital	559	190	78	30.07	◇	↓
St Joseph Hospital	369	99	29	25.32	◇	↔
St Marys Healthcare	77	16	0	17.11	◆	↑
Staten Island University Hosp-North	715	220	6	28.92	◇	↑
Staten Island University Hosp-South	133	31	1	23.93	◇	↑
Strong Memorial Hospital	229	50	4	23.29	◇	↔
Syosset Hospital	69	21	4	26.19	◇	↔
The Unity Hospital of Rochester	333	79	34	27.93	◇	↓



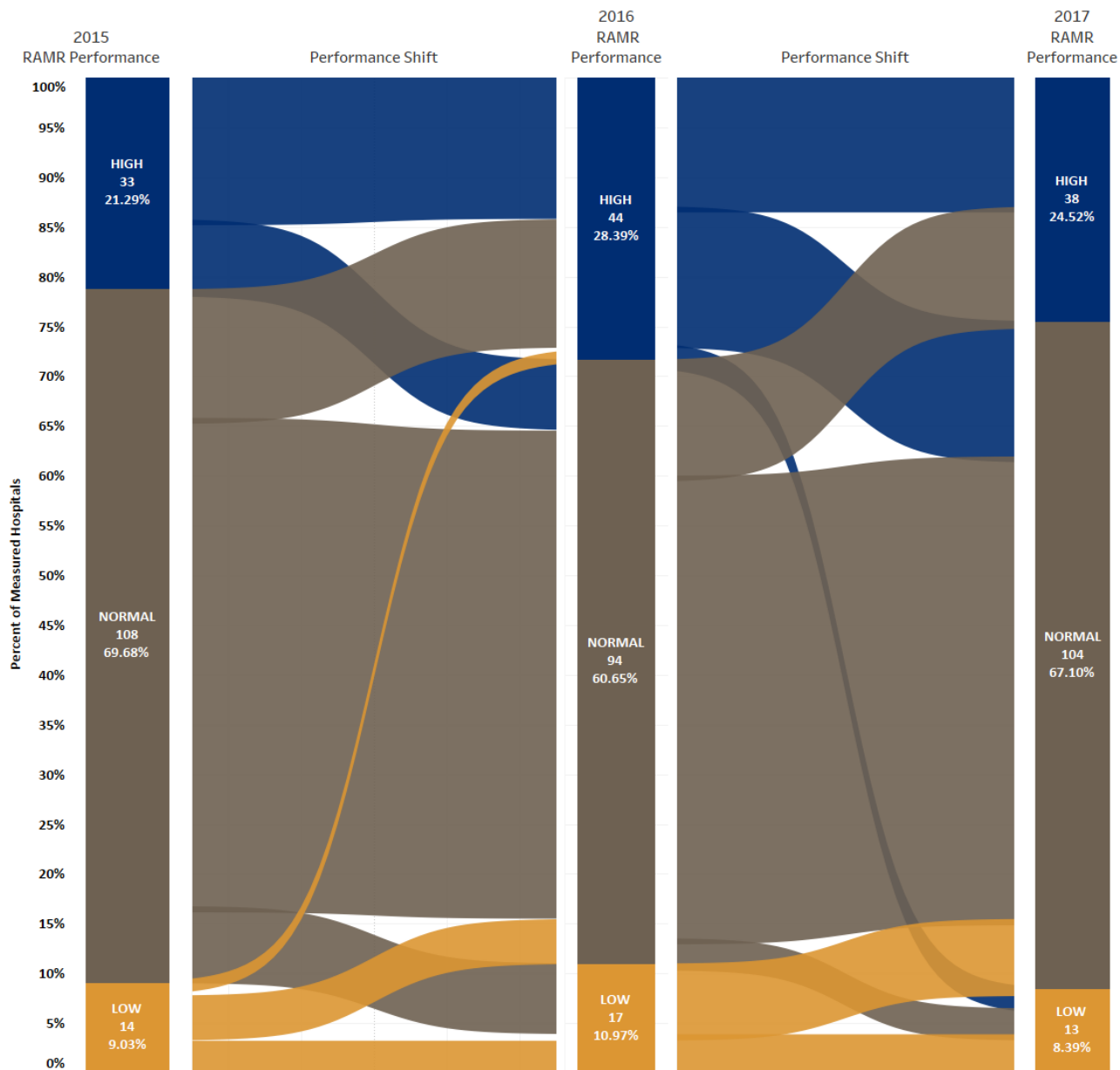
Facility Name	Number of Cases (N)	Number of Outcomes (N)	Discharged to Hospice (N)	RAMR	High/Low Performer	Performance Change from CY2016
United Health Services Hospitals Inc. - Binghamton General Hospital	70	5	1	9.64	◆	↑
United Health Services Hospitals Inc. - Wilson Medical Center	379	80	17	25.32	◇	↔
United Memorial Medical Center North Street Campus	116	19	1	17.42	◆	↑
University Hospital	331	72	21	22.20	◆	↔
University Hospital of Brooklyn	243	88	2	29.83	◇	↔
University Hospital SUNY Health Science Center	435	145	11	31.83	◇	↑
Upstate University Hospital at Community General	107	21	2	20.72	◇	↔
Vassar Brothers Medical Center	354	68	15	19.71	◆	↔
Westchester Medical Center	162	73	1	40.49	◆	↔
White Plains Hospital Center	349	116	43	33.96	◆	↓
Winthrop-University Hospital	920	210	66	24.38	◆	↔
Womans Christian Association	117	27	2	25.99	◇	↓
Women and Childrens Hospital of Buffalo	S.S.	S.S.	S.S.	S.S.	S.S.	N.A.
Woodhull Medical & Mental Health Center	277	103	5	32.49	◇	↔
Wyckoff Heights Medical Center	219	96	19	36.42	◆	↓
Wyoming County Community Hospital	17	1	0	6.09	◆	↑
Statewide				28.75		



Risk Adjusted Mortality Performance Over Time

Figure 9 charts the year over year movement of hospital RAMR performance, represented by hospitals' RAMR performance status. Each arm in this chart represents the movement of hospitals within and across performance statuses from year to year. The size of each arm in this chart is proportional to the number of hospitals represented by that movement.

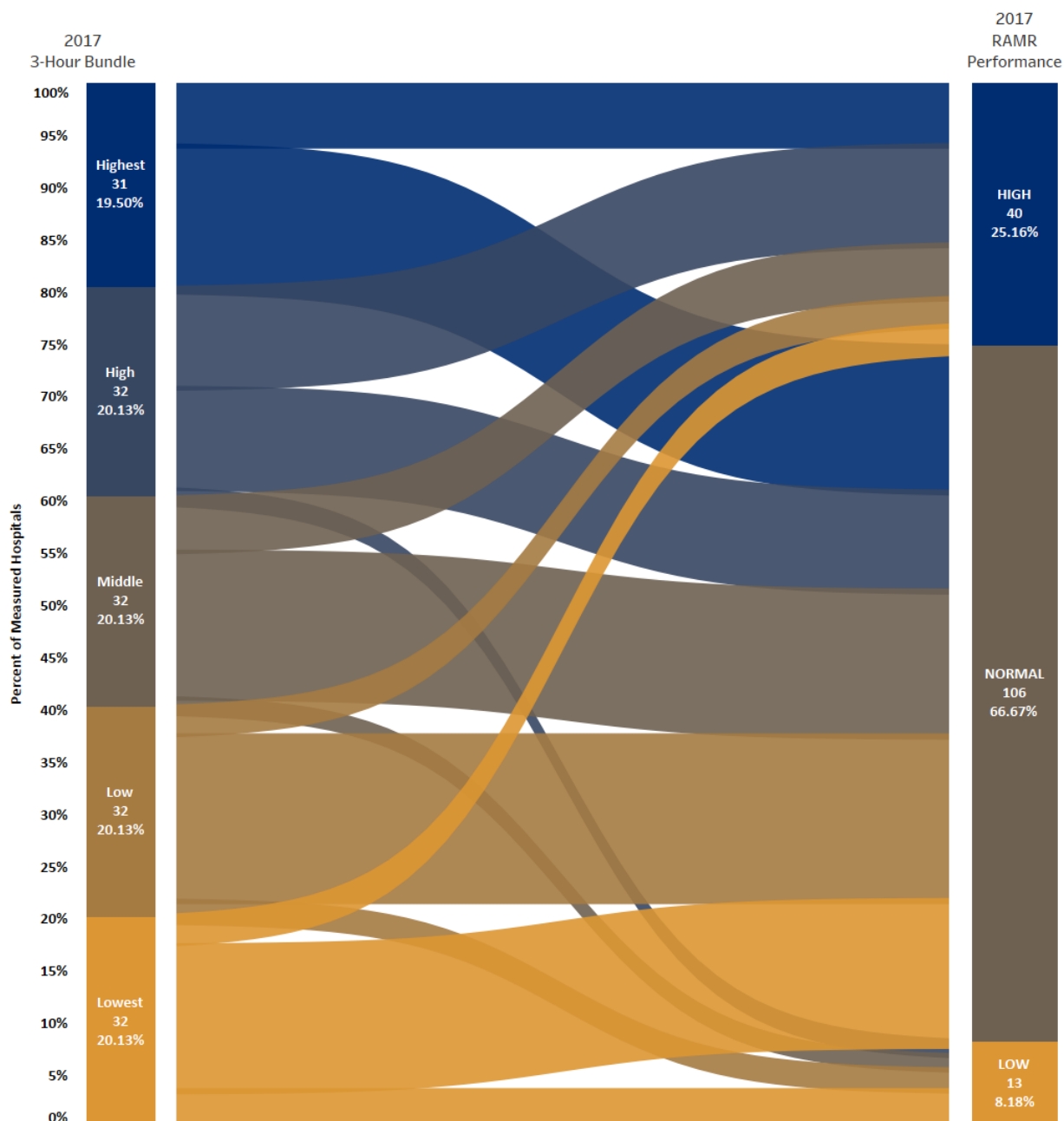
Figure 9. Adult Sepsis Risk Adjusted Mortality Performance Trends: 2015 through 2017



Relationship Between Process Measures on Risk Adjusted Mortality

One of the questions of measuring the sepsis care process is if improving on a process measure is associated with improvement of the outcome. Figure 10 charts the relationship between hospital adult 3-hour bundle performance, by quintile of performance, and RAMR performance, by RAMR performance status, in 2017. Each arm in this chart represents a combination of 3-hour bundle and RAMR performance at the same hospital in 2017, while the size of each arm in this chart is proportional to the number of hospitals represented by that combination.

Figure 10. Adult Sepsis 3-Hour Bundle Performance and Risk Adjusted Mortality Rate



New York State Quality Improvement Efforts

The development and implementation of the New York State Sepsis Care Improvement Initiative are the result of ongoing Department collaboration with federal, state, private initiatives and hospital partners to improve sepsis awareness, advance sepsis care, and to make maximal use of the data collected from hospitals to better understand which clinical practices are influencing survival and other important outcomes for patients. Several of these collaborations to improve sepsis care are described below.

Sepsis Advisory Group

The Department convenes a group of clinicians from across New York State that assisted with the development and implementation of the initiative since 2013. This diverse expert group includes both adult and pediatric specialists who treat patients with sepsis. The advisory group has provided key input into the structure of on-going quarterly performance reports presented to each hospital on their protocol use, protocol adherence, and mortality results compared to statewide averages as well as trended over time. These interim feedback performance reports have provided information for hospitals to target implementation of the improvements we have seen over time.

In addition to providing input in the refinement of our data collection and measurement process, the Sepsis Advisory Group advises the department on new developments and interventions for patients with sepsis, including treatments and processes of care delivery, that show promise for improving outcomes for patients with sepsis throughout New York State. With the completion of the third quality reporting cycle for hospitals, the advisory group will focus increasingly on data evaluation for identifying and disseminating promising clinical interventions and system improvements from those hospitals with exceptional results.

Pediatrics Sepsis Subcommittee

The Pediatric Sepsis Advisory Workgroup, comprised of pediatric critical care experts, developed revised definitions for pediatric severe sepsis and septic shock, which provided clarity to ensure reliable data abstraction and comparable eligible populations reported by each hospital. The revised definitions were developed in the context of updated guidance from the American College of Critical Care Medicine Clinical Practice Parameters for Hemodynamic Support of Pediatric and Neonatal Septic Shock published in 2017⁴.

Data Subcommittee

The data subcommittee, which includes clinicians, statisticians and experts in clinical measurement, provided feedback and comments on questions related to data collection and offered expert opinions on the risk adjustment model for this report. The data subcommittee also helped the Department determine which data variables to release on Open Data NY for public use, and its members began reviewing proposals for research on the data collected through this initiative, which was made possible by a newly released data use agreement (DUA) for requesting Sepsis Clinical Data. Additionally, the data subgroup assisted the Department in reviewing the results of a transfer data

⁴ Davis A, Carcillo, J, Aneja, R, et.al.: American College of Critical Care Medicine Clinical Practice Parameters for Hemodynamic Support of Pediatric and Neonatal Septic Shock, Critical Care Medicine: June 2017 - Volume 45 - Issue 6 - p 1061–1093,

analysis and supported the Department's continued efforts to align with CMS on data collection.

I PRO, Implementation Business Partner

I PRO (formerly Island Peer Review Organization) assisted the Department throughout the initiative, including the review of hospital sepsis protocols, development of the data dictionary, feedback reports, validation and analyses. Key activities included the streamlining of electronic data collection, ensuring data integrity, customizing reports, providing webinars, and helpdesk support to hospitals.

Partnership for Patients (P4P)

The New York State Partnership for Patients (NYSPFP), one of 16 Hospital Improvement Innovation Networks (HIIN) nationally, continues to support New York State hospitals in a variety of quality and safety initiatives to achieve The Center for Medicare and Medicaid Services' (CMS) goal of reducing hospital acquired conditions by 20%. The Healthcare Association of New York State (HANY) and the Greater New York Hospital Association (GNYHA) continue to work in collaboration with the participating hospitals and the Department in making sepsis care one of the priorities for this improvement work. The Department shares sepsis data for NYSPFP participating hospitals to inform customized quality improvement efforts for each hospital.

NYSPFP's sepsis initiative aims to help hospitals improve sepsis care processes by supporting front line staff adherence to their protocols. Programming for sepsis is focused on evidence based best practice and immersing topics and is designed and delivered by clinical experts. Hospital have the opportunity to participate in webinars, regional forums, and in-person conferences which provide education and the opportunity to share best practices among hospitals. A webinar, *Improving Bundle Compliance through Coordinated Sepsis Care*, focused on the sepsis coordinator role in hospitals. This webinar was in direct response to hospitals' requests for additional information on the implementation of this role. NYSPFP additionally held two webinars focused on sepsis readmissions that explored the causes of sepsis readmissions and interventions and strategies to prevent these readmissions. Hospitals also had the opportunity to participate in two regional interactive forums, focused on fluid administration, where current evidence was shared, and hospitals were able to share best practices and challenges in meeting the sepsis fluid administration requirements. In addition to educational programming, project managers, assigned to each hospital, are available to provide coaching and technical support specific to each hospital. Technical support has included redesign of sepsis protocols and work flows, process mapping current state to identify bottlenecks and development of PDSAs to improve their processes, and development of handoff tools.

NYSPFP is proud of the improvements that hospitals have made. NYSPFP participating hospitals have demonstrated improved compliance in both the 3-hour and 6-hour bundles and have achieved an overall 26% decrease in mortality rates. NYSPFP will continue to support hospitals' ongoing sepsis improvement efforts to further these achievements.

Home Care Association of New York State Sepsis Screening and Intervention Initiative: "Stop Sepsis at Home NY"

In 2017 the Home Care Association of New York State (HCA), in conjunction with core partners I PRO, Sepsis Alliance, and the Rory Staunton Foundation for Sepsis Prevention, launched the

nation's first initiative for screening and intervention for sepsis through the statewide home health care system. This initiative includes a series of in-depth statewide training sessions for home care clinicians, direct-care workers, and agency leaders on the use of the HCA Sepsis Screening Tool, which is an assessment instrument comprised of a screening tool instrument, an algorithm, a standard protocol, and patient education zone tool.

Implementation of HCA's Sepsis Initiative has led to the training and adoption of the HCA Sepsis Tool by home care agencies serving 55 of NY's 62 counties. Further efforts are underway to encourage all home care providers in NYS to adopt the Tool as a basic standard of practice and to encourage managed care plans to adopt the Tool as part of their Value Based initiatives with network providers. HCA's Sepsis Initiative is additionally accompanied by a data analysis component, where providers compile and analyze risk factor and findings information from application of the Sepsis Tool. Results from the analysis will be used to contribute to evaluation, improved practices, collaborative work with clinical partners and the state's epidemiological analyses.

Participating Hospitals

In 2017, the Department surveyed participating hospitals and convened meetings of staff involved in sepsis reporting to identify challenges and best practices, quality improvement initiatives and hospitals' data needs. The Department obtained information from a statewide hospital survey and from continuous in-person meetings where data abstraction, burden on reporting and other issues were discussed. These efforts continued throughout 2018 and gave the Department valuable insight into the continued improvements to data definitions and specifications and planning for data sharing with hospitals to facilitate future quality improvement initiatives.

Private Foundations

Several private foundations have provided support and assistance in raising public awareness regarding sepsis which has amplified the work of the initiative in New York State. The mission of the Rory Staunton Foundation is to reduce the catastrophic impact of sepsis through education, awareness, and improved sepsis policies in hospitals and other medical environments. It has been instrumental in advocating for the existing regulations ('Rory's Regulations') in New York and now, in other states as well, which provide for the rapid diagnosis and treatment of sepsis.

In 2018, there were many programs and events initiated to fight against sepsis. For example, at the 2018 World Sepsis Congress, experts presented on the process of adopting mandatory sepsis protocols. At the Women in Government Annual Conference in Washington D.C. attended by legislative leaders from across the country, Orlaith Staunton advocated for the inclusion of comprehensive sepsis education in all states speaking to Rory's Law in New York State which makes sepsis education available to all students. In October, the Fifth National Forum on Sepsis took place, co-sponsored by the New York State Department of Health. Hugely successful, the Forum brought together leaders from CDC, CMS, American Pediatric Association, New York State, BARDA and leading academic institutions to report on new research and the impact of public policies and foster agreement that accelerated action to address the sepsis crisis was vital.

Further, many programs were implemented to promote awareness and to educate children and families on the knowledge needed to prevent and seek early treatment for signs of sepsis.

Other organizations, such as the Sepsis Alliance, have also played an important national role in bringing attention and focus to sepsis care.

Support for Research

The Department has continued to support research related to the early detection and treatment of sepsis. The Department recognizes the value of the data collected through the Sepsis Care Improvement Initiative and has developed a process for researchers interested in requesting data for research purposes. To facilitate the process, a Sepsis Clinical Data, Data Use Agreement is now available on the New York State Department of Health webpage at the following link: https://www.health.ny.gov/diseases/conditions/sepsis/docs/external_dua.pdf.

International Support for Sepsis

In 2017, the World Health Organization (WHO) recognized sepsis as a global health priority and adopted a resolution on improving the prevention, diagnosis, and management of sepsis. The resolution calls for health workers to increase awareness of sepsis by using the term "sepsis" in communications with patients, relatives, and other parties because greater awareness is a crucial step in reducing the global burden of sepsis. The resolution also calls for clear treatment guidelines and performance targets tailored to local environments. The resolution, with its implicit recognition of sepsis as a major threat to patient safety and global health, has the potential to save millions of lives around the world.

Next Steps

The Department plans to continue working with partners to improve identification and care of sepsis patients to optimize outcomes.

Data Collection Improvement and Alignment

The Department will continue to work with CMS and hospitals to refine the sepsis data dictionary to ensure complete and accurate data collection. The Department will finalize measure specifications and data element definitions to align the New York State initiative where possible with the Center for Medicare and Medicaid Services (CMS) severe sepsis and septic shock measure (SEP-1) to reduce hospital burden. The Department will develop methodology for linking and reporting episodes of care for patients who are transferred between acute care facilities, and for reporting patients who are transferred to hospice following an episode of sepsis. The Department will continue work with the Pediatric Sepsis Advisory Workgroup to refine pediatric data definitions.

Facilitation of Quality Improvement

The Department will investigate ways to share data with hospitals that can be used to identify opportunities for improvement and to identify high-risk populations that can benefit from targeted interventions. The Department will continue to provide a mechanism for sharing of best

practices among hospitals for early identification of sepsis patients and ensuring timely, appropriate treatment.

Alignment with Current Guidelines

The Department will continue to work with the Sepsis Advisory Group and Pediatric Sepsis Advisory Workgroup to monitor the evolving evidence and guidelines for identification and management of sepsis and to ensure that data collection and reports align with the latest evidence.

Definitions of Key Terms

- Sepsis - a clinical syndrome in which patients have an infection that is accompanied by an extreme systemic response to the infection.
- Severe sepsis (adult) - proven or suspected infection, two or more manifestations of systemic inflammatory response to infection, and organ dysfunction.
- Severe sepsis (pediatric) - proven or suspected infection, abnormal temperature or white blood cell count and one other manifestation of systemic inflammatory response to infection, and organ dysfunction.
- Septic shock (adult) - severe sepsis and persistent hypotension (low blood pressure) after fluid administration or severe sepsis and evidence of low perfusion (initial lactate level greater than or equal to 4).
- Septic shock (pediatric) - sepsis and cardiovascular organ dysfunction despite 20cc/kg of crystalloid fluid administration.
- Protocol initiation - patients in each hospital who received care consistent with the initiation of their formal protocol, excluding those cases with identified (and justified) clinical or advanced directive exceptions.
- Time zero - the start time for reported bundle measures. For aggregated data and hospital specific measures, time zero is defined as the time that the patient presented with severe sepsis or septic shock, either by meeting all defining criteria or documentation of the condition by a clinician., time zero is the time that.
- 3-hour bundle (adult) - composite measure that includes receipt of measurement of blood lactate level, blood culture collection prior to antibiotics, and broad-spectrum antibiotic administration within three hours of “time zero” for patients with severe sepsis and septic shock. Patients with clinical exclusions for any of the interventions and patients who have been transferred from or to another acute care hospital are excluded from this measure.
- 6-hour bundle (adult) - composite measure that includes receipt of the 3-hour bundle interventions plus three additional interventions for patients with septic shock: supporting blood pressure and organ function with both fluids and other medications if needed (vasopressors), as well as re-measuring blood lactate levels when the initial lactate level is elevated. This measure represents the percentage of patients with septic shock (a subset of all patients) that received all of the three-hour bundle interventions as well as the three additional interventions described in this section. Patients with clinical contraindications to any of the interventions and patients who have been transferred from or to another acute care hospital are excluded from this measure.
- 1-hour bundle (pediatric) - composite measure for pediatric patients with sepsis that includes receipt of parenteral fluids, blood cultures, and antibiotics within one hour of their presentation. Patients with clinical exclusions and patients who have been transferred from or to another acute care hospital are excluded from this measure.

Technical Appendix A: Adult Sepsis Sampling Hospitals

Beginning in 2017, the NYSDOH began to accept submission of a random sample of adult sepsis cases from high volume hospitals to fulfill reporting requirements regarding sepsis data collection. Pediatric sepsis cases are not eligible for sampling. A high-volume hospital is defined as one which submitted more than 400 cases to the sepsis clinical database for calendar year of data submission two years prior to the current year. Hospitals that meet this case volume requirement have the option to opt-in to a sampling approach to submit a complete list of adult sepsis cases for sample selection on a monthly or quarterly basis. A random sample of all adult cases are then selected for full data abstraction and submission to the NYSDOH, for a total of 400 adult cases submitted to the sepsis clinical database by each participating hospital.

For sampling hospitals, measure performance is calculated based on each hospital's performance in their representative sample of cases. This result is then weighted by calculating the estimated numerator and denominator on a quarterly basis from the sample performance and the number of cases in each quarter the hospital would have reported had it not sampled, based on the full adult case list submitted for sampling. Measure performance for sampling hospitals then is presented as an estimate based on a representative sample of cases rather than observed performance, and therefore carries a level of uncertainty in the accuracy of this estimate. This uncertainty is represented in this appendix by 95% Confidence Intervals; representing the highest and lowest bounds between which we would expect the point estimate to lie in 95% of random samples of the adult sepsis cases for each sampling hospital.

Measure estimates and 95% confidence intervals for all 22 hospitals that participated in sampling for CY2017 data submission are presented in Table A1. The denominator of the measure represents the number of cases estimated to be in the denominator of the measure based on the full adult case list submitted for sampling, and thus will be larger than the total number of cases submitted to the clinical data portal.

Table A1. Adult Sepsis Measure Summary Report For Sampling Hospitals

Facility Name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	95% CI Lower Bound (%)	95% CI Upper Bound (%)	Number of Cases (N)	Met Measure (%)	95% CI Lower Bound (%)	95% CI Upper Bound (%)	Number of Cases (N)	Met Measure (%)	95% CI Lower Bound (%)	95% CI Upper Bound (%)
Albany Medical Center Hospital	499	68.1	67.6	68.7	499	36.1	35.5	36.6	495	8.7	8.4	9.0
Brookhaven Memorial Hospital Medical Center Inc	512	95.1	95.0	95.2	512	83.8	83.6	84.0	507	66.3	66.0	66.5
Elmhurst Hospital Center	654	87.6	87.4	87.8	654	66.8	66.5	67.1	652	37.6	37.2	37.9
Forest Hills Hospital	362	85.6	85.6	85.7	362	64.9	64.8	65.0	355	19.7	19.6	19.8
Good Samaritan Hospital Medical Center	1,092	87.7	87.4	88.0	1,092	73.8	73.4	74.2	1,089	51.8	51.3	52.3
Lutheran Medical Center	248	96.4	96.3	96.4	248	86.3	86.2	86.3	242	57.4	57.4	57.5
Mercy Hospital	565	77.3	77.0	77.7	565	63.4	63.0	63.7	552	38.6	38.2	39.0
Mount Sinai Hospital	1,342	91.7	91.3	92.0	1,342	65.4	64.9	66.0	1,325	29.1	28.6	29.6
Mount Sinai Roosevelt	727	88.4	88.2	88.7	727	75.7	75.3	76.0	723	53.8	53.4	54.2
Mount Sinai St. Lukes	1,016	89.6	89.3	89.8	1,016	78.1	77.7	78.4	1,007	57.0	56.6	57.4
New York Hospital Medical Center of Queens	2,000	74.7	74.2	75.2	2,000	46.7	46.1	47.2	1,930	20.2	19.7	20.6
New York Presbyterian Hospital - Columbia Presbyterian Center	555	85.6	85.1	86.1	555	69.7	69.1	70.4	517	36.0	35.3	36.7
New York Presbyterian Hospital - New York Weill Cornell Center	423	92.2	91.9	92.5	423	65.2	64.7	65.8	399	33.8	33.2	34.4
NYU Hospitals Center	384	98.7	98.6	98.8	384	90.6	90.4	90.9	367	54.8	54.3	55.2
Rochester General Hospital	970	77.6	77.2	78.0	970	60.2	59.8	60.7	961	23.0	22.6	23.4
South Nassau Communities Hospital	482	88.0	87.8	88.2	482	75.5	75.2	75.8	459	22.9	22.6	23.2
St Catherine of Siena Hospital	741	94.6	94.4	94.8	741	90.7	90.5	90.9	716	78.6	78.3	79.0
St Johns Episcopal Hospital So Shore	336	84.8	84.7	84.9	336	63.1	62.9	63.3	332	18.7	18.5	18.8
St Josephs Hospital Health Center	496	89.5	89.3	89.8	496	62.5	62.1	62.9	481	22.2	21.9	22.6
Strong Memorial Hospital	748	86.2	85.6	86.8	748	72.1	71.3	72.9	724	47.9	47.0	48.8
University Hospital	821	85.4	85.0	85.7	821	73.1	72.6	73.5	808	47.8	47.3	48.3
Vassar Brothers Medical Center	779	87.8	87.5	88.1	779	74.1	73.7	74.5	773	52.3	51.8	52.7
Statewide		84.7	84.4	85.0		65.0	64.5	65.4		35.0	34.5	35.4

Technical Appendix B: Risk Adjustment Methodology

The objective of the risk adjustment process is to assess hospital performance in preventing severe sepsis related mortality after accounting for differences in patient case mix among hospitals. The 2017 risk adjusted mortality outcome includes discharge to hospice along with in-hospital death. For the purposes of this section 'mortality' will be used to describe this combined outcome. In the first part of the risk adjustment process, a mortality model estimates the probability of in-hospital mortality for each patient with severe sepsis. This estimate is based on patient demographic, comorbidity, and severity of illness characteristics. Multivariable logistic regression was used to determine which variables are important and accurate in estimating the probability of mortality for each patient. Table B1 contains the patient demographic, comorbidity and severity of illness variables included in this analysis.

The risk adjusted model in this report makes use of the most recent complete and audited data from four quarters of patient data submission in 2017. All patients who were discharged and transferred from one hospital to another or who were admitted from hospice care were excluded from model development and the application of the model to each hospital's result. Patients with advanced care directives in place prior to the episode of sepsis, who declined sepsis protocol interventions, or who refused sepsis protocol interventions at the time of presentation, were removed from the data set. Patients admitted more than once in 2017 for sepsis are represented only once for purposes of development of the risk adjusted model (using their last admission only); for purposes of evaluating each hospital's performance, each admission is included.

To assess hospital performance, the probability of hospital mortality is calculated for every patient from that hospital using the logistic regression model. These probabilities are summed over all the patients at that hospital to calculate the expected number of deaths for that hospital. The actual number of deaths is determined for all patients in that hospital as well. The 'standardized' mortality ratio (SMR) is calculated by dividing the observed by the expected number of deaths in each hospital. The SMR was then multiplied by the statewide mortality rate to obtain a risk adjusted mortality rate (RAMR) and a 95% confidence interval for the RAMR. The RAMR provides the best estimate of what each hospital's mortality rate would have been if the state had a case mix that was identical to the hospital. If the confidence interval for a hospital's RAMR is entirely below the statewide rate, the hospital performed significantly better than the state average. If the hospital's confidence interval was entirely above the statewide rate the hospital performed significantly worse than the statewide rate. Figure B1 contains a plot showing the RAMR and confidence interval for each hospital. The highest performing hospitals are displayed in blue and the lowest performing hospitals are displayed in gold.

There are limitations associated with the risk adjusted mortality model. These are largely related to factors associated with sepsis mortality that are not currently collected in the sepsis clinical database, and therefore not included in the risk adjustment model. These include significant comorbidities associated with sepsis mortality, including cardiac arrest and burns, as well as social determinates of health, including socio-economic status and access to healthcare. While this data is not currently collected in the sepsis clinical database, an effort to identify and capture more of the relevant covariates is underway and should improve the performance of the risk adjustment model. Variation in outcome may also be considered a limitation of this model.

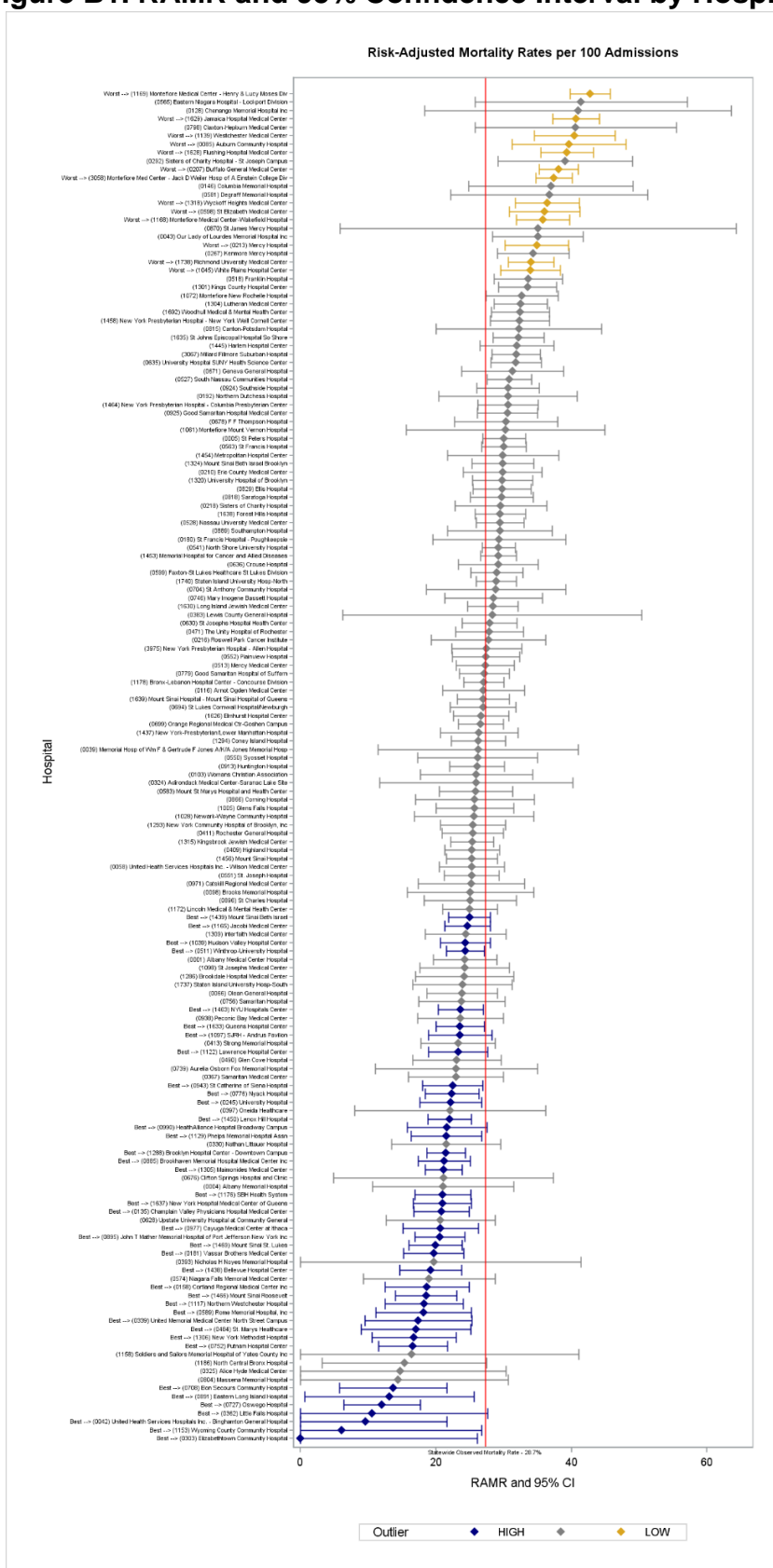
While in-hospital mortality and discharges to hospice care as indicated by discharge status is believed to more accurately represent those patients who will expire after an episode of severe sepsis, it is possible that some of these patients may survive beyond what is expected and expire due to entirely unrelated reasons. Future efforts examining historical sepsis data may be able to address this limitation using vital statistics death records matched to severe sepsis clinical data; however, this data is not logistically available for the most recent years of sepsis data used for risk adjustment model development.

Table B1. Variables in the Risk Adjusted Mortality Rate (RAMR) model

Main Effects or Interactions	Level of Effects	%	β	Adjusted OR	p-value
Intercept			-8.234	0.00	<0.0001
Source of Admission - Main Effect	Non-Health Facility, POA	74.6	- Reference -		
	SNF/ICF	20.7	0.446	1.56	<0.0001
	Clinic	2.8	0.090	1.09	0.2549
	Between Unit Transfer	0.2	0.094	1.10	0.7315
	Other	1.7	0.498	1.65	<0.0001
Race/Ethnicity - Main Effect	White, Non-Hispanic	57.1	- Reference -		
	Black, Non-Hispanic	15.0	0.237	1.27	<0.0001
	Hispanic	11.2	0.104	1.11	0.0160
	Other, Non-Hispanic	7.6	-0.070	0.93	0.1615
	Other/Unknown Ethnicity	9.0	0.077	1.08	0.0933
Septic Shock - Main Effect	Severe Sepsis	55.9	- Reference -		
	Septic Shock	44.1	0.162	1.18	<0.0001
Thrombocytopenia - Main Effect	No	74.6	- Reference -		
	Yes	25.4	0.374	1.45	<0.0001
Prior MV	No	85.6	- Reference -		
	Yes	14.4	0.814		<0.0001
Site of Infection	Urinary	23.7	- Reference -		
	Respiratory	41.8	0.767		<0.0001
	Gastrointestinal	11.3	0.624		<0.0001
	Skin	8.0	0.456		<0.0001
	Central Nervous System	0.5	0.069		0.7657
	Other	6.3	0.657		<0.0001
	Unknown	8.4	0.801		<0.0001
Site of Infection*Prior MV	Central Nervous System		0.716		0.1691
	Gastrointestinal		-0.114		0.4357
	Other		-0.002		0.9909
	Respiratory		-0.393		0.0002
	Skin		-0.091		0.6442
	Unknown		0.030		0.8424
Chronic Liver Disease - Main Effect	No	94.1	- Reference -		
	Yes	5.9	0.535	1.71	<0.0001
Congestive Heart Failure - Main Effect	No	77.3	- Reference -		
	Yes	22.7	0.175	1.19	<0.0001
Diabetes - Main Effect	No	63.9	- Reference -		
	Yes	36.1	-0.372	0.69	<0.0001
Metastatic Cancer	No	90.3	- Reference -		
	Yes	9.7	3.751		<0.0001
First Serum Lactate Level (mmol/L)			0.131	1.14	<0.0001
Square Root of Age (Years)			0.639		<0.0001
Square Root of Comorbidity Count			1.487		<0.0001
Square Root of Age (Years)*Metastatic Cancer			-0.352		<0.0001
Square Root of Age (Years)*Square Root of Comorbidity Count			-0.121		<0.0001

c-statistic: 0.753589

Figure B1. RAMR and 95% Confidence Interval by Hospital



Technical Appendix C: Comparisons Over Time

The following tables and figures show statewide comparisons of performance and outcome measures for inpatient sepsis care for New York State between CY2015 and CY2017.

Table C1 contains statewide sepsis care compliance and outcome measure results for adults (age ≥ 18) and compliance measure results for pediatric (age < 18) sepsis patients in New York State from 2015 to 2017. This table includes the statewide crude in-hospital death rates per 100 sepsis patients along with the 3-hour bundle, and composite bundle quality measures for adults, and presents the 1-hour bundle sepsis care measure for pediatric patients. Patient eligibility and completion criteria for each measure follows the guidelines in place for each individual calendar year. All eligible cases are included in the calculation of the statewide measure results, regardless of the number of cases at the individual hospital where the patient was seen.

Table C2 summarizes how New York State hospitals' performance changed from 2016 to 2017 among the following inpatient adult (age ≥ 18) and pediatric (age < 18) sepsis care quality measures: crude in-hospital death rates per 100 adult sepsis patients, 3-hour bundle, composite bundle, and 1-hour bundle. Facilities in the 'Improved Performance' category had a higher measure result in 2017 relative to 2016, while facilities in the 'Declined Performance' category had a lower measure result in 2017. Only facilities with a calculated measure result in both 2016 and 2017 are included in this table.

Figure C1 charts the year over year movement of relative hospital composite (6-hour) bundle performance, represented by yearly quintiles. Each arm in this chart represents the movement of hospitals within and across quintiles of bundle performance from year to year. The size of each arm in this chart is proportional to the number of hospitals represented by that movement.

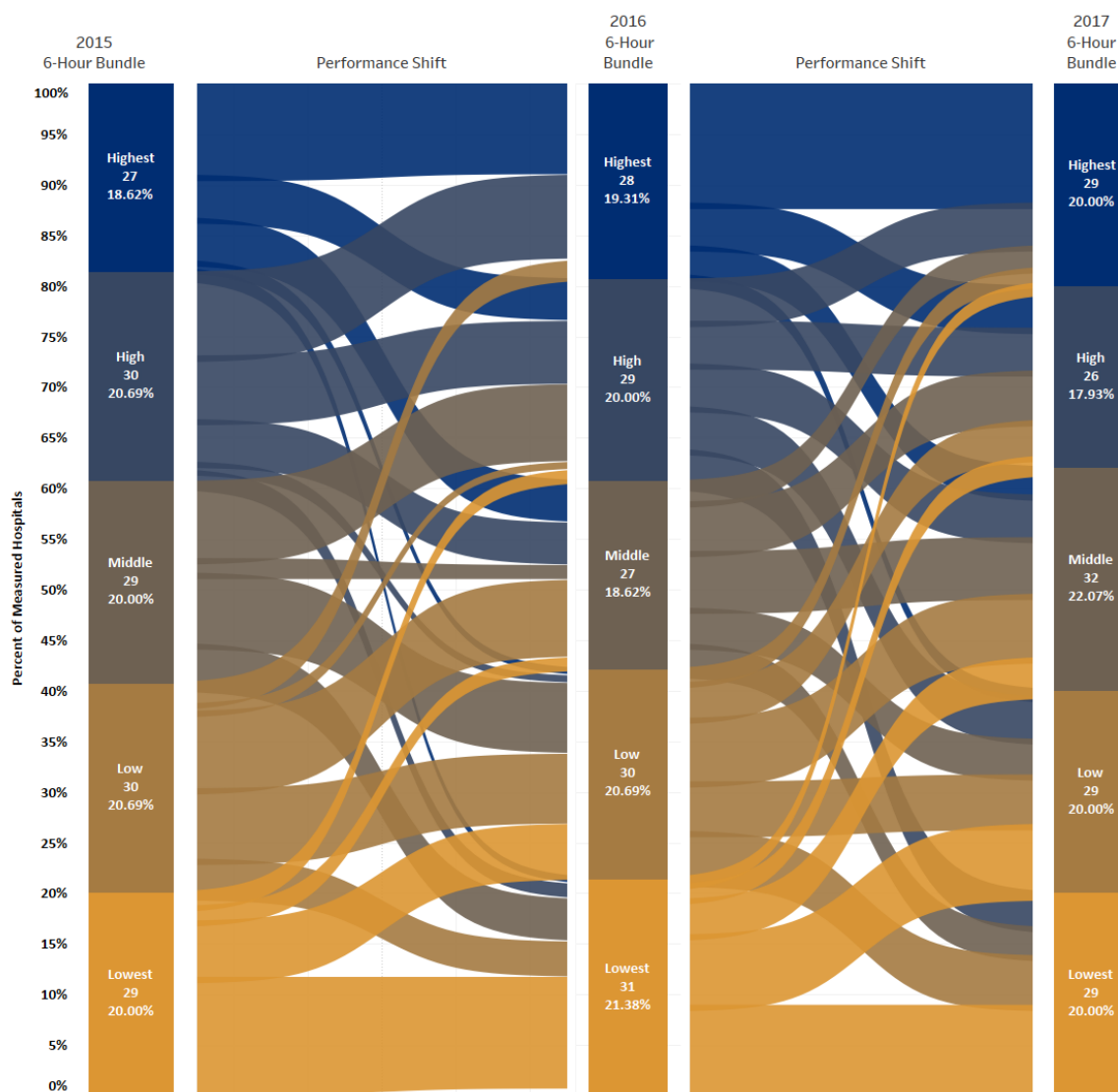
Table C1. Adult Sepsis Compliance and Outcome Measures and Pediatric Sepsis Compliance Measures Calendar Year Comparison

Year	Crude Death Rate (Adult)	3-Hour Bundle Completion (Adult)	Composite Bundle Completion (Adult)	1-Hour Bundle Completion (Pediatric)
2017	23.70	64.97	34.96	35.94
2016	25.45	56.88	36.38	8.16
2015	27.33	54.07	31.53	7.88
Difference (CY16-CY15)	-1.88	2.81	4.85	0.28
Difference (CY17-CY16)	-1.75	8.09	-1.42	27.78

Table C2. Facility Changes in Sepsis Performance Measures from 2016 to 2017

Performance Change	Crude Death Rate (Adult)		3-Hour Bundle (Adult)		Composite Bundle (Adult)		1-Hour Bundle (Pediatric)	
	Hospitals (N)	Hospitals (%)	Hospitals (N)	Hospitals (%)	Hospitals (N)	Hospitals (%)	Hospitals (N)	Hospitals (%)
Improved Performance	92	58.60	111	73.03	80	52.63	5	100.00
Same Performance	0	0.00	0	0.00	1	0.66	0	0.00
Declined Performance	65	41.40	41	26.97	71	46.71	0	0.00
Total	157	100.00	152	100.00	152	100.00	5	100.00

Figure C1. Adult Sepsis 6-Hour Bundle Performance Trends: 2015 through 2017



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