

**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**

2018

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Table of Contents

Introduction.....	5
The New York State Sepsis Care Improvement Initiative.....	6
Data Collection.....	6
Patient Population.....	6
Data Source and Data Submission.....	7
Quality Measures.....	7
Statewide Incidence and Trends.....	9
Early Intervention Bundles.....	11
Outcome Measures.....	18
Hospital Performance.....	20
Performance Data – Adults.....	23
Performance Data – Pediatrics.....	35
Hospital Performance Over Time.....	37
Risk Adjusted Mortality.....	40
Risk Adjusted Mortality Performance Over Time.....	49
Relationship Between Process Measures on Risk Adjusted Mortality.....	50
New York State Quality Improvement Efforts.....	51
Sepsis Advisory Group.....	51
IPRO, Implementation Business Partner.....	52
Krasnoff Quality Management Institute.....	52
Partnership for Patients (P4P).....	52
New York State Hospitals.....	52
The Rory Staunton Foundation.....	53
Support for Research.....	53
Next Steps.....	54
Definitions of Key Terms.....	54
Technical Appendix A.....	56
Technical Appendix B.....	59
Technical Appendix C.....	64

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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. A continuum of severity from sepsis to severe sepsis and septic shock exists. Since 2014, the New York State (NYS) Sepsis Care Improvement Initiative has been a resource for quality improvement in sepsis care with the goal to improve early detection of severe sepsis and septic shock, initiate timely interventions, and reduce overall mortality. 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.

This report builds upon the NYS Department of Health's (the Department) long history of data-driven quality improvement activities. It is consistent with the Department's mission to protect and promote the health of New Yorkers through prevention, science, and the assurance of quality health care delivery. The Department is pleased to present this fourth annual public report of updated data from the NYS Sepsis Care Improvement Initiative. This report contains results from 2018 for hospitals' use of sepsis protocols to identify and treat adults and children with severe sepsis and septic shock. The report details data collection on adult and pediatric cases of severe sepsis and septic shock, 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 NYS hospitals and clinicians, over the past five years, to measure and improve care and outcomes for individuals with this common, complex, and lethal condition.

Special Note About the 2018 Report and Future Reports

The annual 'New York State Report on Sepsis Care Improvement Initiative: Hospital Quality Performance' is typically drafted and posted publicly by the Department approximately one year after the close of the final quarter in a year and upon the completion of an extensive data cleaning, audit and follow-up process with hospitals, and the development of a risk-adjusted mortality model for the year. The authors of this report joined efforts to respond to the COVID-19 Pandemic in early 2020 and this report is uncharacteristically late as a result. The Department strives to provide data and feedback to NYS hospitals through this report in a way that is timely and actionable for the purpose of improving sepsis care in NYS. To that end, the Department will make every effort to deliver timely reports for future years, including a combined 2019-2020 report and a new report for Sepsis/Covid-19 Digitalized data collection beginning in 2021.

Purpose of this Report

The purpose of this public report is to provide actionable information to hospitals to support their ongoing quality improvement efforts; to inform new initiatives surrounding sepsis care; and to educate patients and caregivers as 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. 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 NYS Sepsis

Care Improvement Initiative. While the Department is optimistic about this improvement and about the future of sepsis care in NYS, there is still additional room for improvement. This report aims to highlight the areas for improvement to assist hospitals and clinicians in focusing their efforts.

The New York State Sepsis Care Improvement Initiative

The NYS Sepsis Care Improvement Initiative began in 2014 with a goal to reduce sepsis-related mortality in NYS. The initiative, by amendment of Title 10 of the NYS Codes, Rules and Regulations (Sections 405.2 and 405.4), requires each acute care hospital in NYS that provides care to patients with sepsis to develop and implement evidence-informed sepsis protocols, which describe their approach to both early recognition and treatment of sepsis patients. In addition, hospitals are required to report data on all diagnosed cases of severe sepsis or septic shock, regardless of billing code designation, to the Department. Cases diagnosed as sepsis but that do not meet criteria for severe sepsis or septic shock are not submitted. These data are used to evaluate each hospital's performance on key process measures of early treatment and outcomes measures (i.e., risk-adjusted mortality rates). The Department uses clinical information submitted by each hospital 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.

Data Collection

Patient Population

For the purpose of data collection in the NYS Sepsis Care Improvement Initiative, sepsis is defined as a life-threatening medical emergency that requires early recognition and intervention. Sepsis means confirmed or suspected infection accompanied by two systemic inflammatory response syndrome (SIRS) criteria; severe sepsis shall mean sepsis complicated by organ dysfunction[s]; and for adults, septic shock shall mean sepsis-induced hypotension persisting despite adequate IV fluid resuscitation and/or evidence of tissue hypo perfusion. This is based on the current nationally recognized Sepsis-2 definition. In 2016, a task force convened by national societies including the Society of Critical Care Medicine (SCCM) and the European Society of Intensive Care Medicine (ESICM) proposed a new definition of sepsis, termed Sepsis-3. The Department consulted with the NYS Sepsis Advisory Group and decided that due to the complexity of the method, the lack of requisite data for many patients at presentation, and concerns that it may result in later identification of patients who might have sepsis, that the Sepsis-3 definition is impractical for the purpose of identification and data collection in the NYS Sepsis Care Improvement Initiative. Therefore, the Department has decided to continue use of the Sepsis-2 definition in the NYS Sepsis Care Improvement Initiative.

This report presents hospital-reported data for adult and pediatric patients with a diagnosis of severe sepsis or septic shock evaluated at NYS hospitals from the first quarter (Q1) of 2015 through the fourth quarter (Q4) of 2018. However, in this report, the terms 'sepsis' and 'severe sepsis or septic shock' are used interchangeably to refer to these patients. Patient cohorts within this broader population 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 are 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 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 2018, 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. Thirty (30) 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 aged younger than 18 years. Data in this report are presented through 2018 to align with risk-adjusted mortality data, which are available for calendar year 2018.

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

Data Source and Data Submission

The primary data source for this report is the Sepsis Clinical Database (SCD). The SCD is comprised of demographic and clinical data abstracted from the hospital medical record by hospital staff. These abstracted data are submitted electronically to a secure web portal hosted by Island Peer Review Organization (IPRO), the Medicaid 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 accuracy.

Quality Measures

Quality measures including process and outcome measures are calculated for reporting both statewide rates and trends and hospital-specific rates and trends. The Adult NYS 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 NYS 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.

The 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 a diagnosis of severe sepsis or septic shock. Explicit criteria for severe sepsis presentation and septic shock presentation are defined in a publicly available data dictionary. These criteria include a combination of infection, signs of 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.

For the 30 hospitals that opted to sample in 2018, adult measure performance is calculated using a representative 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. More information on sampling and how the adult measures are calculated for these hospitals can be found in Appendix A.

Two mortality outcome measures are presented in the 2018 report. Statewide trends over time for both the adult and pediatric populations are presented using crude in-hospital mortality, consistent with previous reports. Mortality in this measure includes all cases of severe sepsis or septic shock who expired in the hospital, regardless of length of stay. In contrast, risk-adjusted mortality utilizes 30-day post-presentation mortality. This measure includes all severe sepsis patient deaths that occurred within 30 days of the presentation of severe sepsis, including patients who were discharged alive from the hospital but expired within 30 days of presentation and excluding patients who died in the hospital but expired more than 30 days post presentation. More information regarding the risk adjustment methodology can be found in Appendix B.

Limitations

There are some limitations to the data presented in this report. The data in this report reflect 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. The start time in the prior reports, which was the time of initiation of the hospital's protocol, may not be aligned with the start time 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.

Statewide Incidence and Trends

Statewide rates and rate trends are reported using data for all patients diagnosed with severe sepsis or septic shock. The denominator for population rates uses 2015-2018 Claritas small-area NYS population data. Only NYS residents are included in calculating population rates.

Tables 1 and 2 display calendar year incidence rates of severe sepsis or septic shock for adult (age ≥ 18) and pediatric (age < 18) patients by age and sex. In 2018, there were approximately 417 sepsis cases per 100,000 adults and about 14 sepsis cases per 100,000 children. Among adults, males had a higher incidence of sepsis compared to females (461 vs. 377 cases per 100,000). Sepsis incidence among adults generally increased with age, with adults age 80 and older having the highest incidence of sepsis (about 2,500 sepsis cases per 100,000). Among children, females had higher incidence of sepsis compared to males (15 vs. 13 cases per 100,000). Sepsis incidence was highest among infants under one year (36 cases per 100,000) and lowest among children ages 6-11 (8 cases per 100,000).

Table 1. Adult Severe Sepsis or Septic Shock Cases by Sex and Age, 2018

Characteristic	Level	Cases (N)	Cases (%)	Cases per 100,000
Sex	Female	30,653	47%	377.0
	Male	34,500	53%	461.2
Age Group	18-29	1,676	3%	50.5
	30-39	2,294	4%	85.7
	40-49	3,670	6%	146.7
	50-59	8,370	13%	306.6
	60-69	13,552	21%	592.7
	70-79	15,481	24%	1192.9
	80+	20,110	31%	2505.9
Total	Total Adults	65,153	100%	417.3

Table 2. Pediatric Severe Sepsis or Septic Shock Cases by Sex and Age, 2018

Characteristic	Level	Cases (N)	Cases (%)	Cases per 100,000
Sex	Female	298	52%	14.6
	Male	272	48%	12.7
Age	< 1 year	82	14%	35.8
	1-2	110	19%	23.6
	3-5	80	14%	11.4
	6-11	116	20%	8.4
	12-17	182	32%	13.0
	Total	Total Children	570	100%

Figures 1 and 2 show trends in overall incidence of severe sepsis and septic shock by quarter from Q1 2016- Q4 2018 for adult and pediatric patients. The population denominator used for each quarter is the calendar year population for that year and quarterly rates presented here are not comparable to the yearly rates presented above. Among adults, sepsis incidence has increased from about 93 cases per 100,000 at the beginning of 2016 to 107 cases per 100,000 at the end of 2018; though this increase may be due to better detection or better reporting rather than a true increase in incidence. There is also a seasonal pattern to sepsis cases, such that highest incidence of sepsis incidence occurs in the first quarter (January to March) of each year. Among children, sepsis cases have decreased from 4.7 cases per 100,000 at the beginning of 2016 to 4.1 cases at the end of 2018.

Figure 1. Adult Sepsis Cases per 100,000 by Quarter 2016-18

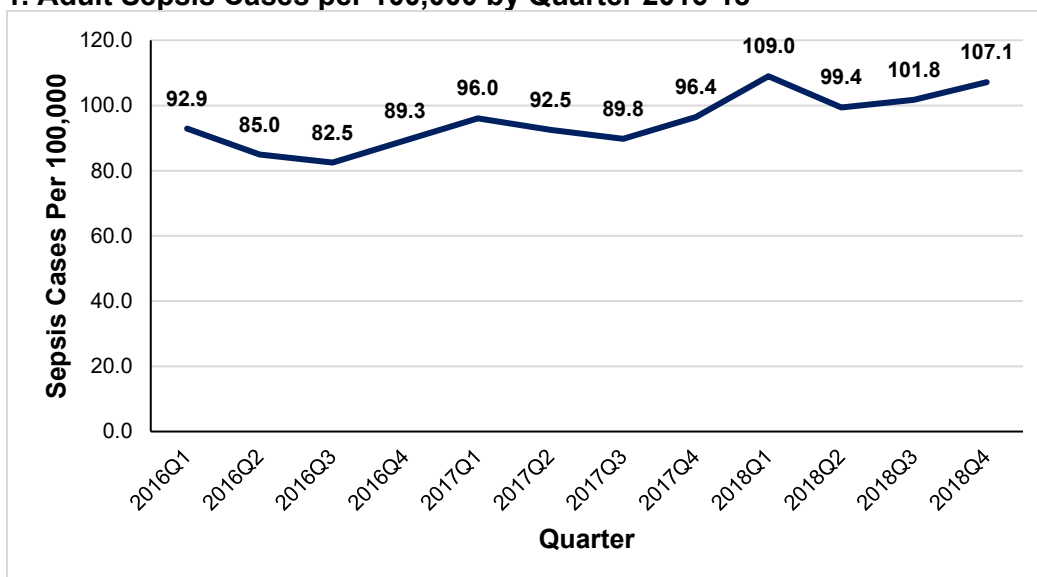
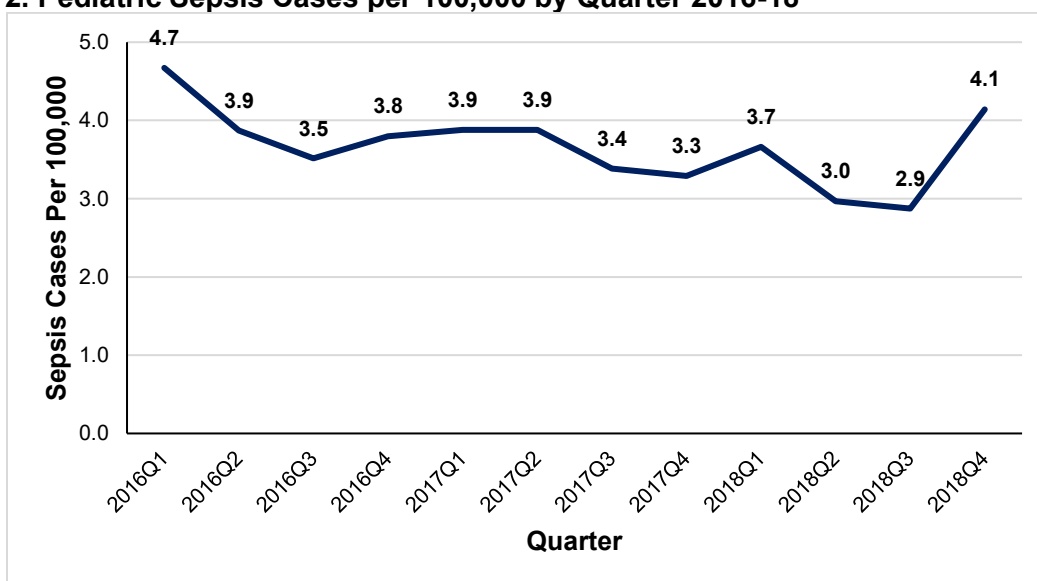


Figure 2. Pediatric Sepsis Cases per 100,000 by Quarter 2016-18



Statewide Trends

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

Adult Specific Measure Descriptions:

- **Adult Early Intervention Bundle:** The percentage of adult patients with severe sepsis or septic shock who received blood cultures and lactate measurement within three (3) hours of start time and broad-spectrum antibiotics up to 24 hours before and within three (3) hours of start time. Start time 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 three (3) hours of start time
 - **Individual Bundle Component Rates:**
 - **Timely Antibiotics:** The percentage of adult patients with severe sepsis or septic shock who received broad spectrum antibiotics within three (3) hours of severe sepsis start time and up to 24 hours before start time.
- **Adult Composite Bundle:** The percentage of adult patients with septic shock who received all the recommended interventions in the six-hour early management composite bundle, including interventions in the three-hour early management bundle within three hours of severe sepsis presentation, a repeat lactate level within six hours of severe sepsis start time if initial lactate level is elevated, resuscitation with crystalloid fluids within three hours of septic shock start time, fluid status assessment within six hours of septic shock start time, and vasopressor therapy within six hours of septic shock start time 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 six hours of start time.

Outcome Measure:

- **Adult In-Hospital Mortality:** The percentage of adult patients with severe sepsis or septic shock with in-hospital mortality.

Pediatric Specific Measures Descriptions:

Pediatric Early Intervention Bundle: The percentage of pediatric patients with severe sepsis or septic shock who received all the recommended early interventions within one (1) hour of severe sepsis or septic shock start time. This measure is not calculated for patients who were excluded from the hospital's protocol or from specific care interventions, or who died within one (1) hour of start time.

- **Individual Bundle Components:** The percentage of pediatric patients with severe sepsis or septic shock who received antibiotics within one (1) hour of severe sepsis presentation and not more than 24 hours prior to presentation (start time).

Outcome Measure:

- **Pediatric In-Hospital Mortality:** The percentage of pediatric patients with severe sepsis or septic shock with in-hospital mortality.

Early Intervention Bundle Results:

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 antibiotic administration for sepsis have been associated with a higher risk of mortality. 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.

Figures 3-6 depict trend analyses based on aggregated data submitted by hospitals from First Quarter (Q1) 2015 through Fourth Quarter (Q4) 2018. For the measures with specified time parameters in the trend graphs for this section (Figures 3-7), 'start time' is defined as the presentation time of severe sepsis (Figures 3, 5-7) or septic shock (Figures 4) for calendar year (CY) 2017 and 2018, while in previous years, start time 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. Beginning in 2017, statewide measures for adults are weighted by total adult case volume within sampling hospitals.

Figure 3 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom all the recommended early interventions in the three-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 start time and those with clinical contraindications to any of the recommended interventions are excluded from this measure bundle. At the onset of the initiative, 48.5% of eligible patients with severe sepsis or septic shock received all three interventions within the recommended timeframe, while by Q4 2018 the percentage increased to 71.4%.

Figure 3. Adult Early Intervention (3-Hour Early Management Bundle): Quarter One, 2015 through Quarter Four, 2018*

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

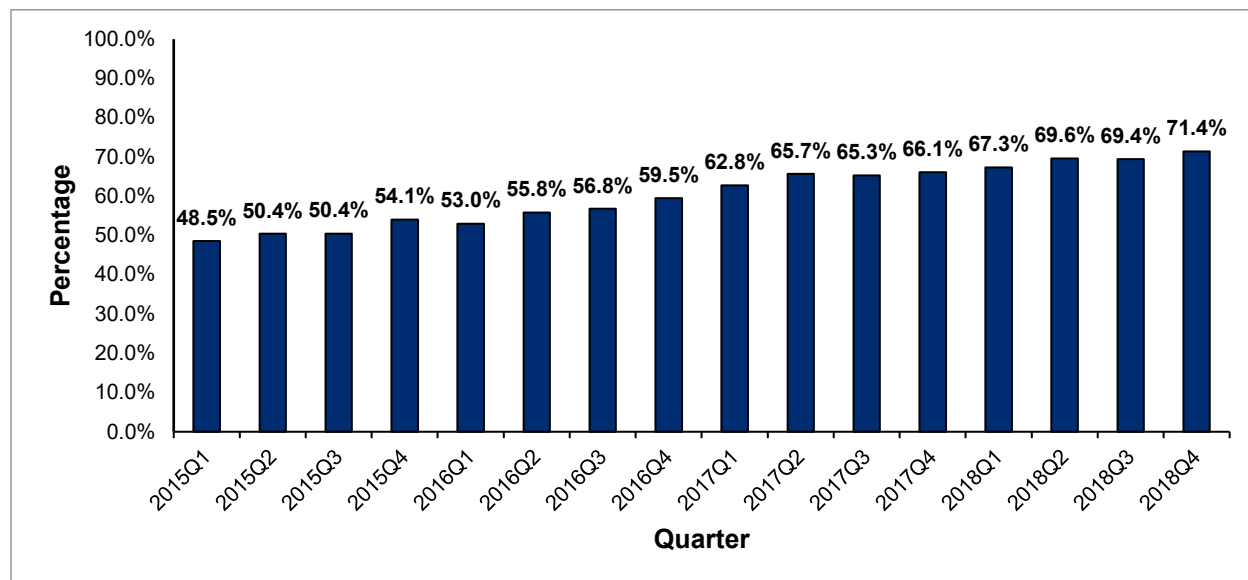


Figure 4 shows the percentage of adult patients (age ≥ 18) with severe sepsis or septic shock for whom all the recommended early interventions in the composite early management bundle were administered within the recommended timeframe. It should be noted that the variable Repeat Volume Status and Tissue 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 4. Adult Early Intervention (Composite Early Management Bundle): Quarter One, 2015 through Quarter Four, 2018*

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

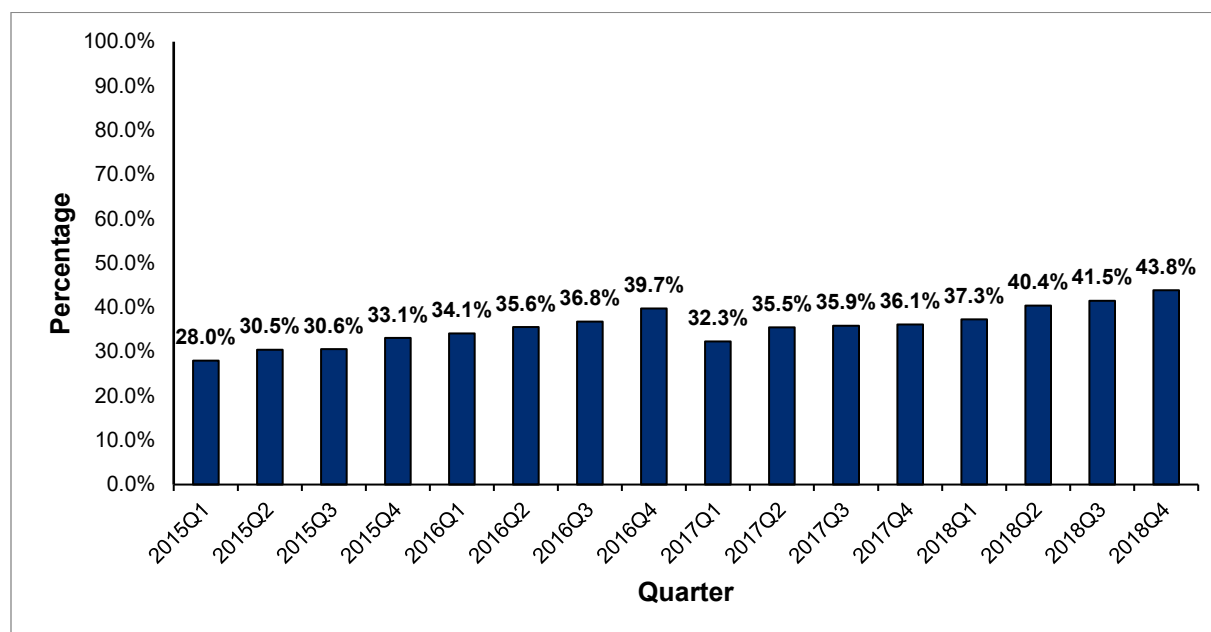
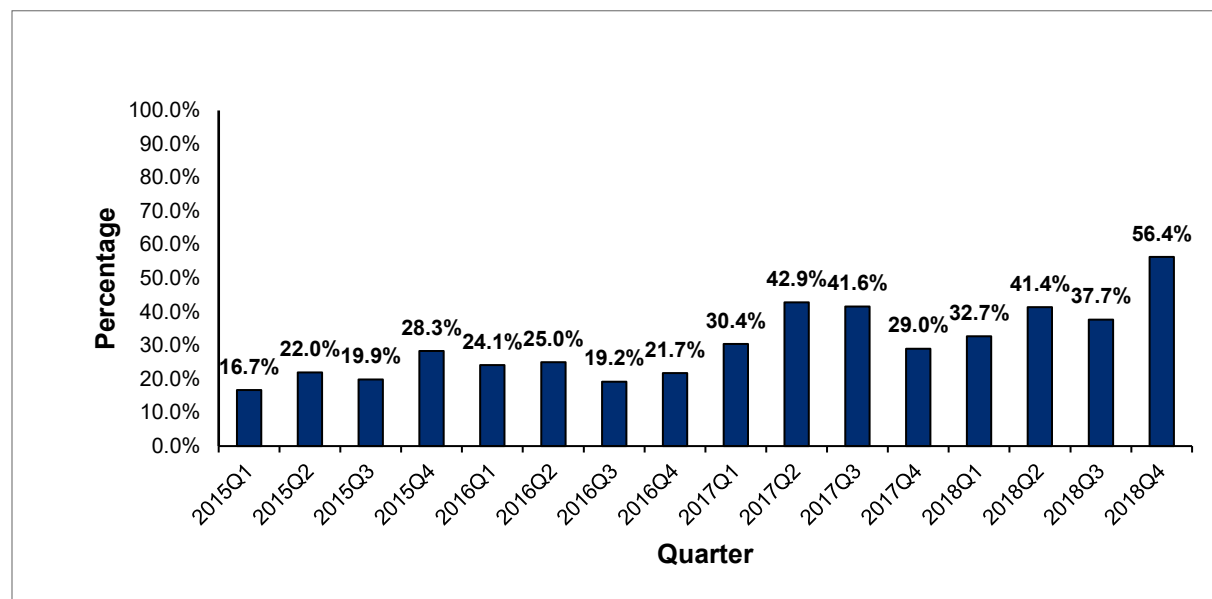


Figure 5 shows the percentage of pediatric patients (age < 18) with severe sepsis or septic shock who received all interventions in the early management bundle within one hour.

Figure 5. Pediatric Early Intervention (1-Hour Early Management Bundle): Quarter One, 2015 through Quarter Four, 2018*

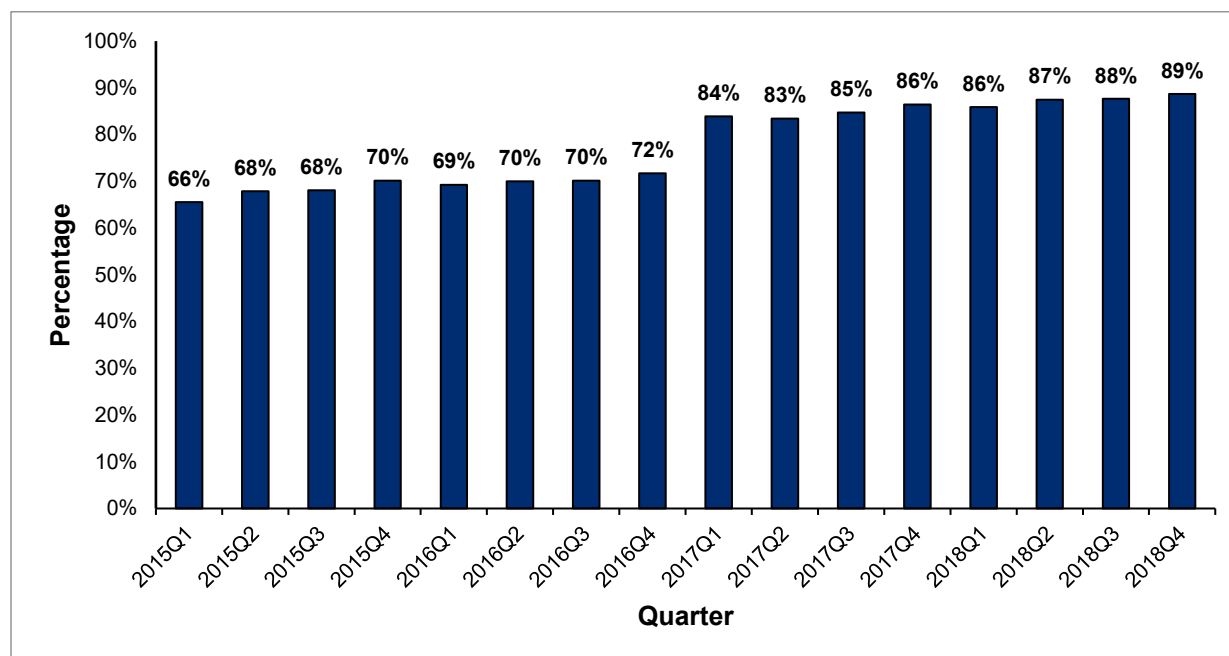
(*) excludes patients with clinical contraindications for protocol interventions or who died within one hour



The percentage of adult patients (age ≥ 18) with severe sepsis or septic shock that received broad spectrum antibiotics is presented in Figure 6 independently from the bundle results.

Figure 6. Adult Early Intervention (Timely Administration of Broad-Spectrum Antibiotics): Quarter One, 2015 through Quarter Four, 2018*

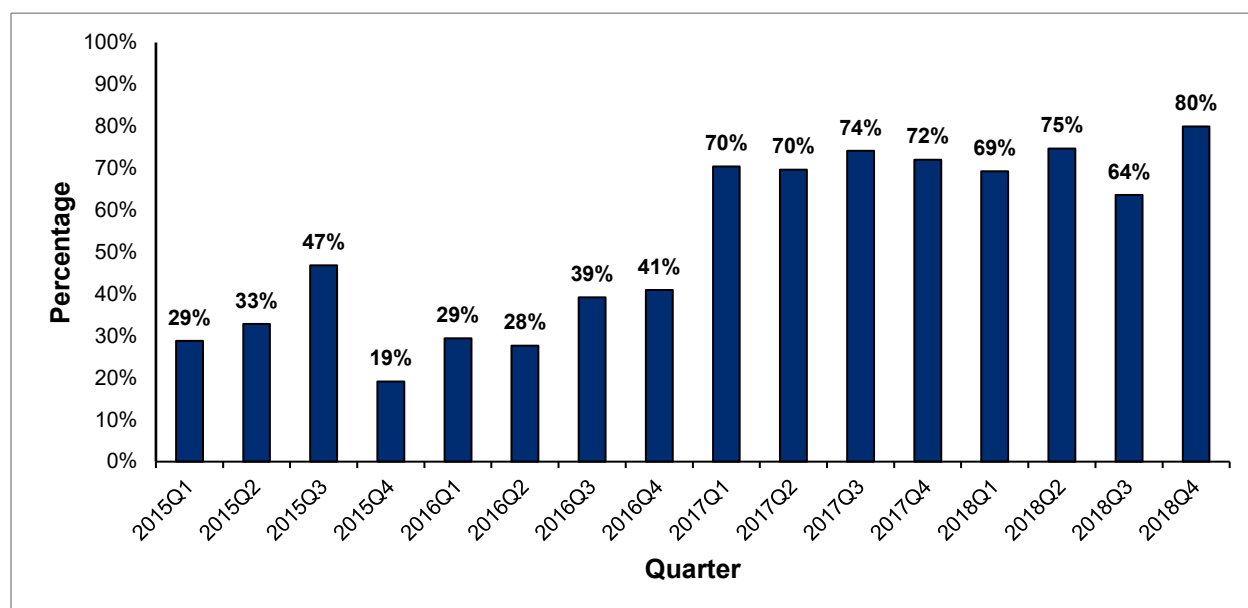
(*) excludes patients with clinical contraindications for protocol interventions or who died within three hours



The percentage of pediatric patients (age < 18) with severe sepsis or septic shock that received broad spectrum antibiotics is presented in Figure 7 independently from the bundle results.

Figure 7. Pediatric Early Intervention (Timely Administration of Broad-Spectrum Antibiotics): Quarter One, 2015 through Quarter Four, 2018*

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



In-Hospital Mortality

To evaluate the impact of the NYS 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 8 and 9. All patients with severe sepsis or septic shock submitted to the Department are included in the mortality calculation and, beginning in 2017, statewide in-hospital mortality for adults is weighted by total adult case volume within sampling hospitals. Figure 8 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 2018, from 32% in Q1 2015 to 23.5% in Q4 2018.

Figure 8. Adult In-Hospital Mortality: Quarter One, 2015 through Quarter Four, 2018

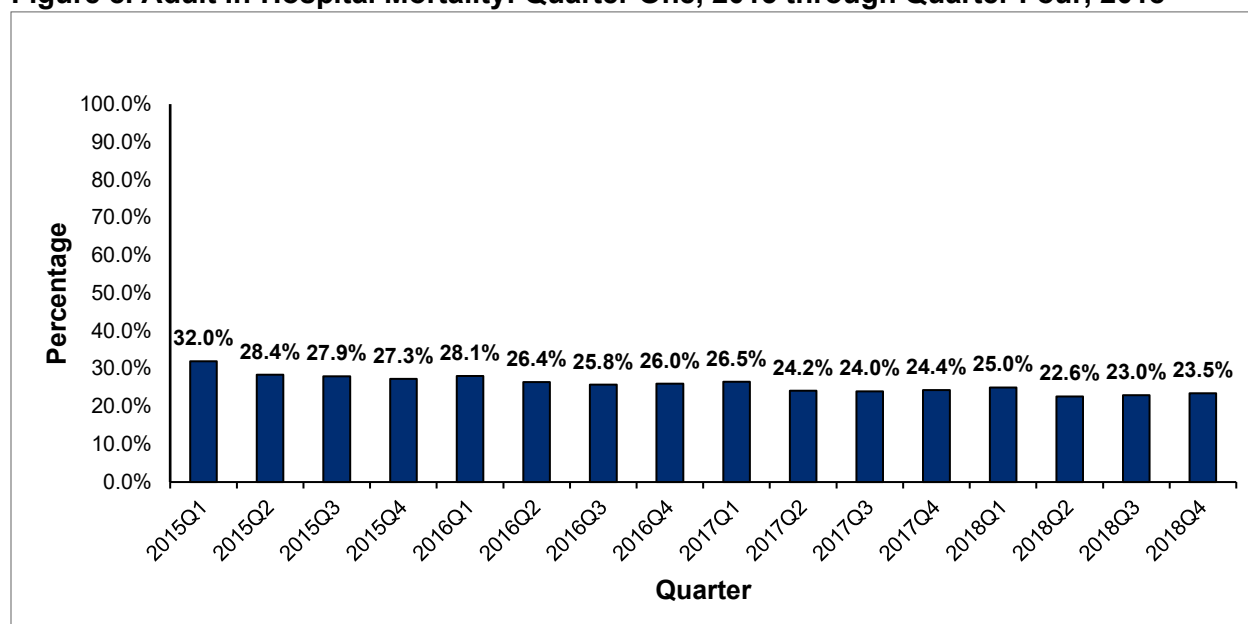
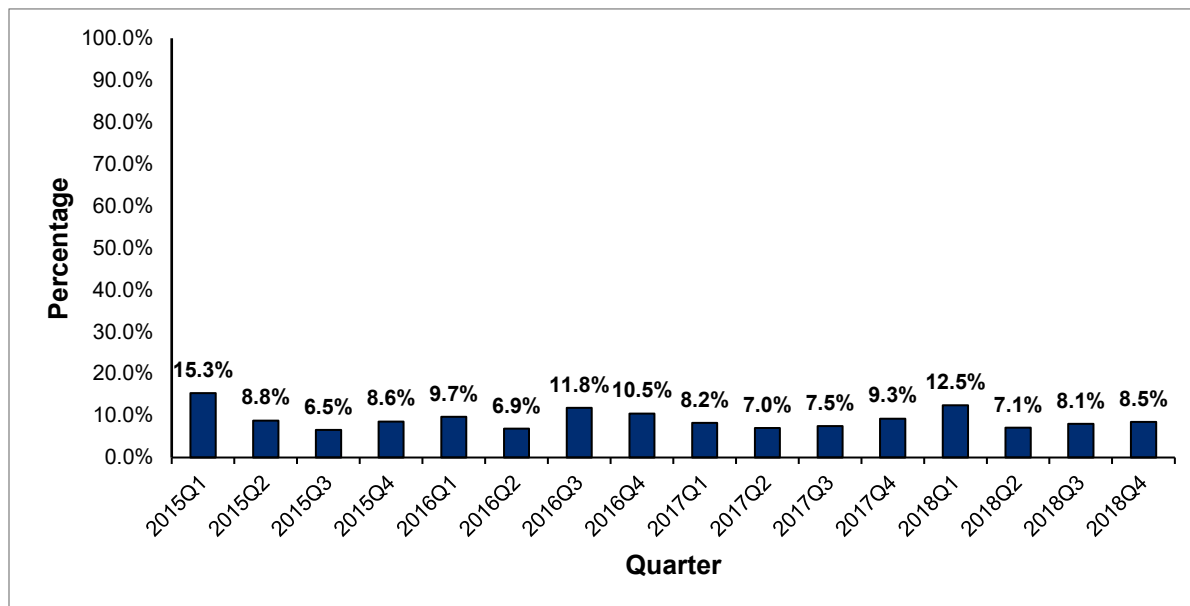


Figure 9 shows the percentage of pediatric patients with severe sepsis or septic shock (age < 18) who died during their hospital stay. The percentages of mortality for pediatric patients fluctuated across quarters, with mortality of 8.5% reported in Q4 2018. In-hospital mortality ranged from a low of 6.5% reported in Q3 2015 to the highest percentage of 15.3% reported in Q1 2015. The fluctuation in percentages is likely influenced by the low volume of pediatric cases in each quarter. The number of pediatric cases per quarter in 2018 ranged from a low of 124 in Q3 2018 to a high of 176 in Q4 2018.

Figure 9. Pediatric In-Hospital Mortality: Quarter One, 2015 through Quarter Four, 2018



Hospital Performance

The hospital-specific measures are described below. Process of care measures that are presented for hospital performance comparison include all patients with severe sepsis or septic shock 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 additionally excluded, since they have received care at more than one hospital.

Hospital Specific Measure Descriptions:

- **Adult Broad-Spectrum Antibiotic Administration:** The percentage of adult patients with severe sepsis or septic shock who receive broad spectrum antibiotics within three hours of presentation and up to 24 hours before presentation, a critical early intervention, is presented independent of early management bundle completion.
- **Adult Early Intervention Bundle:** The percentage of adult patients with severe sepsis or septic shock who received all the recommended early interventions in the three-hour early management bundle within three (3) hours of severe sepsis presentation. The three-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 Composite 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 six-hour early management bundle for which they were eligible within three hours of severe sepsis presentation (repeat lactate level) or within six hours of septic shock presentation (all other six-hour bundle elements). The six-hour bundle includes the interventions in the three-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 one hour of presentation and up to 24 hours before presentation, a critical early intervention, is presented independent of early management bundle completion.
- **Pediatric Early Intervention Bundle:** The percentage of pediatric patients with sepsis treated 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 one-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.

Hospital Performance Data – Adults

Hospital-reported data were used to calculate the hospital-specific performance measures described above. Hospitals with 10 or fewer sepsis cases are not included in hospital comparisons in this report. Table 3 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 3 shows the quintiles, category assignment, and the range of percentages represented in each category for adult timely administration of broad-spectrum antibiotics, three-hour bundle, and six-hour bundle.

Table 3. Category Assignment for the Adult Sepsis Performance Measures, 2018

Quintile	Category (Performance Level)	Summary Table Symbol	Ranking Percentiles	Timely Antibiotics (%)	3-Hour Bundle (%)	Composite Bundle (%)
Quintile 5	Highest	●	80 th – 100 th	93.31 - 97.70	79.61 - 91.60	55.01 - 81.80
Quintile 4	High	● Best	60 th – 80 th	90.11 - 93.30	74.41 - 79.60	45.71 - 55.00
Quintile 3	Middle	○	40 th – 60 th	87.71 - 90.10	70.51 - 74.40	35.81 - 45.70
Quintile 2	Low	○ Worst	20 th – 40 th	84.31 - 87.70	62.81 - 70.50	27.01 - 35.80
Quintile 1	Lowest	●	0 th – 20 th	64.30 - 84.30	29.00 - 62.80	0.00 - 27.00

Hospitals’ performance on adult timely administration of broad-spectrum antibiotics, three-hour, and six-hour bundle measures are presented in Table 4. 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 2018.

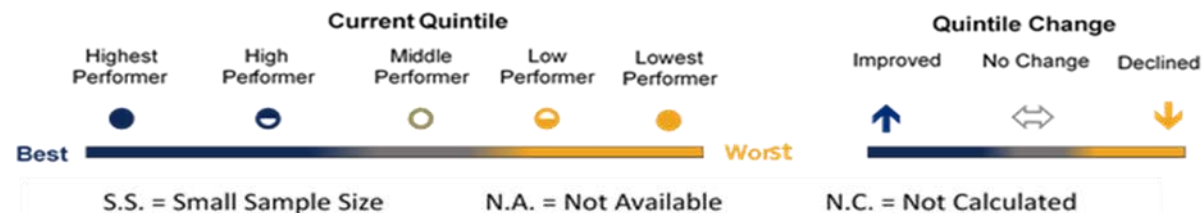
For hospitals that participated in sampling for 2018, the measure result reported here is an estimate drawn from a representative subset of their sepsis population. The 95% confidence intervals associated with these estimates appear in Appendix A. Since actual observed counts of measure numerators and denominators are unknown among sampling hospitals, statewide measure volume is not reported. Cells containing an S.H. indicate hospitals that participated in sampling for 2018.

In addition to the hospital’s performance level by quintile, the change in the hospital’s performance level between 2017 and 2018 is presented, reflecting whether the hospitals’ performance category improved, declined or remained unchanged. The cells that contain an S.S. indicate that the data were suppressed due to low counts (fewer than 10 sepsis cases). 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

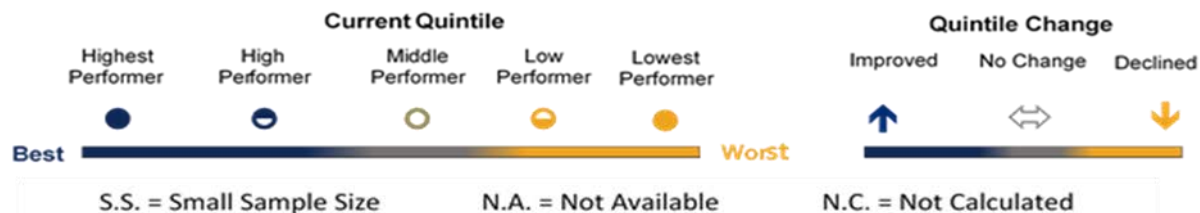
cells that contain an N.A. indicate that a measure result was not available for that hospital in at least one of the years compared.

Table 4. Adult Sepsis Measure Summary Report by Hospital, 2018

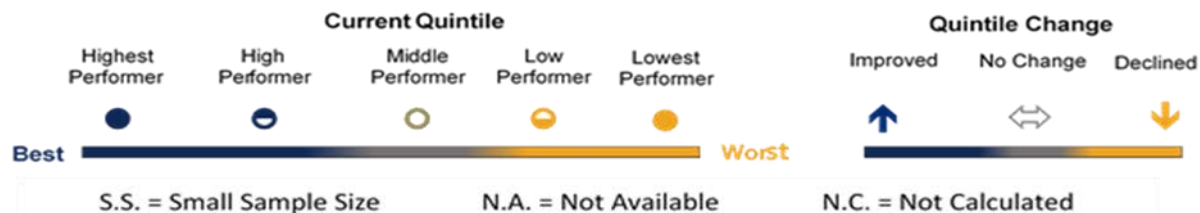
PFI/Facility name	Timely Administration of Broad-Spectrum Antibiotics				3-Hour Bundle				Composite Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2017	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2017	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2017
(0324) Adirondack Medical Center-Saranac Lake Site	35	80	●	↓	35	51.4	●	↓	34	26.5	●	↔
(0001) Albany Medical Center Hospital	S.H	74.5	●	↔	S.H	33.4	●	↔	S.H	5.1	●	↔
(0004) Albany Memorial Hospital	96	87.5	○	↑	96	67.7	○	↑	93	57	●	↑
(0325) Alice Hyde Medical Center	52	86.5	○	↓	52	51.9	●	↓	51	27.5	○	↓
(0116) Arnot Ogden Medical Center	275	86.2	○	↔	275	74.9	●	↑	268	31.3	○	↑
(0085) Auburn Community Hospital	195	88.7	○	↑	195	62.1	●	↔	192	41.1	○	↑
(0739) Aurelia Osborn Fox Memorial Hospital	81	95.1	●	↑	81	81.5	●	↑	80	36.3	○	↓
(1438) Bellevue Hospital Center	375	91.5	●	↓	375	73.9	○	↔	371	47.7	●	↔
(0708) Bon Secours Community Hospital	113	94.7	●	↔	113	85.8	●	↔	111	55	●	↓
(1178) Bronx-Lebanon Hospital Center-Concourse Division	S.H	91.4	●	↔	S.H	74.5	●	↑	S.H	58.2	●	↑
(1286) Brookdale Hospital Medical Center	143	67.1	●	↔	143	42	●	↔	142	12	●	↔
(0885) Brookhaven Memorial Hospital Medical Center Inc	S.H	96.8	●	↔	S.H	76.8	●	↓	S.H	64.7	●	↔
(1288) Brooklyn Hospital Center - Downtown Campus	527	85.6	○	↔	527	65.3	○	↓	522	33	○	↓
(0098) Brooks Memorial Hospital	88	94.3	●	↔	88	80.7	●	↔	86	58.1	●	↔



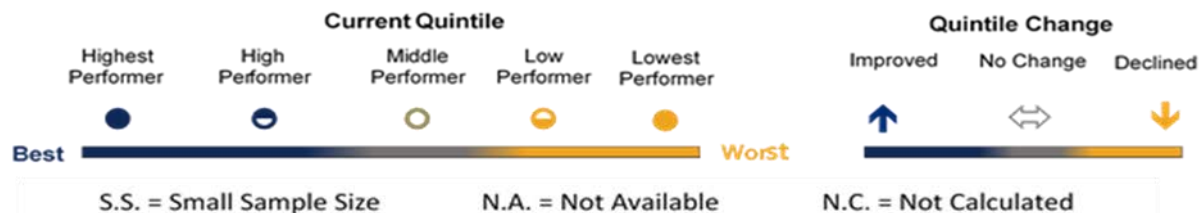
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(0207) Buffalo General Medical Center	692	72	●	↔	692	60.3	●	↔	681	31.4	●	↔
(0815) Canton-Potsdam Hospital	71	95.8	●	↑	71	74.6	●	↑	71	40.8	○	↓
(0379) Carthage Area Hospital Inc	65	67.7	●	N.A.	65	52.3	●	N.A.	65	7.7	●	N.A.
(0971) Catskill Regional Medical Center	96	91.7	●	↑	96	71.9	○	↔	96	27.1	●	↔
(0977) Cayuga Medical Center at Ithaca	326	84.7	●	↔	326	57.4	●	↔	323	31.6	●	↓
(0135) Champlain Valley Physicians Hospital Medical Center	246	91.9	●	↔	246	76.4	●	↑	242	30.6	●	↓
(0128) Chenango Memorial Hospital Inc	21	85.7	●	↑	21	76.2	●	N.A.	21	61.9	●	N.A.
(0798) Claxton-Hepburn Medical Center	86	89.5	○	↓	86	80.2	●	↑	86	53.5	●	↑
(0676) Clifton Springs Hospital and Clinic	18	88.9	○	↓	18	61.1	●	↓	18	27.8	●	↓
(0146) Columbia Memorial Hospital	16	93.8	●	↔	16	81.3	●	↔	16	25	●	↔
(1294) Coney Island Hospital	420	86	●	↓	420	58.3	●	↔	413	12.3	●	↓
(0866) Corning Hospital	74	81.1	●	↔	74	70.3	●	↔	74	27	●	↓
(0158) Cortland Regional Medical Center Inc	300	92.7	●	↑	300	79.7	●	↑	298	62.1	●	↑



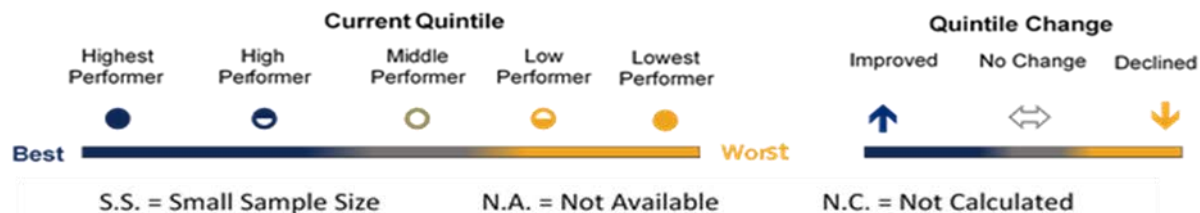
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(0636) Crouse Hospital	217	91.2			217	69.1			214	32.2		
(0891) Eastern Long Island Hospital	36	97.2			36	83.3			36	33.3		
(0565) Eastern Niagara Hospital - Lockport Division	11	72.7			11	54.5			11	0		
(0829) Ellis Hospital	322	83.2			322	65.2			316	43		
(1626) Elmhurst Hospital Center	S.H	86.7			S.H	66.6			S.H	31.5		
(0210) Erie County Medical Center	177	80.2			177	58.2			177	28.2		
(0678) F F Thompson Hospital	171	84.2			171	67.8			168	34.5		
(0599) Faxton-St Luke's Healthcare St Luke's Division	286	91.6			286	73.8			281	21		
(1628) Flushing Hospital Medical Center	250	90.8			250	73.6			248	33.1		
(1638) Forest Hills Hospital	S.H	84.3			S.H	68.2			S.H	29.6		
(0518) Franklin Hospital	265	89.1			265	72.5			259	37.1		
(0671) Geneva General Hospital	69	82.6			69	62.3			67	25.4		
(0490) Glen Cove Hospital	245	95.9			245	84.5			237	61.2		



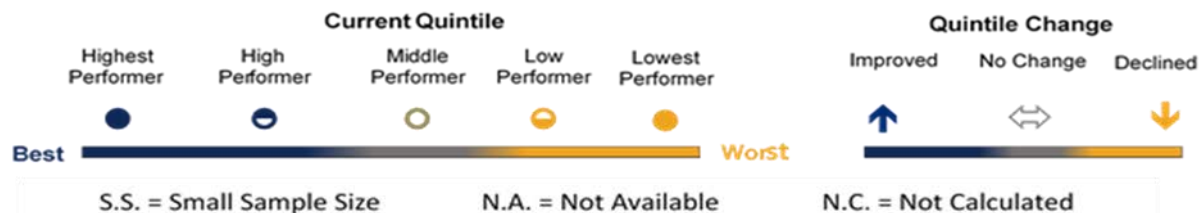
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(1005) Glens Falls Hospital	332	87			332	70.5			329	39.5		
(0925) Good Samaritan Hospital Medical Center	S.H	87.7			S.H	75.5			S.H	60.8		
(0779) Good Samaritan Hospital of Suffern	366	92.1			366	75.4			361	28.3		
(1445) Harlem Hospital Center	172	83.1			172	76.7			165	40.6		
(0990) HealthAlliance Hospital Broadway Campus	230	95.2			230	84.3			228	45.6		
(0409) Highland Hospital	S.H	90.3			S.H	75.2			S.H	40.2		
(1039) Hudson Valley Hospital Center	507	91.9			507	76.9			501	58.5		
(0913) Huntington Hospital	484	92.8			484	80			476	54		
(1309) Interfaith Medical Center	95	91.6			95	78.9			95	51.6		
(1165) Jacobi Medical Center	383	95.3			383	78.9			375	48.8		
(1629) Jamaica Hospital Medical Center	377	91.2			377	70.8			366	35.2		
(0895) John T Mather Memorial Hospital of Port Jefferson New York Inc	438	88.4			438	71			429	49.7		
(0267) Kenmore Mercy Hospital	332	91			332	72.3			327	51.4		
(1301) Kings County Hospital Center	276	82.6			276	64.5			270	22.2		



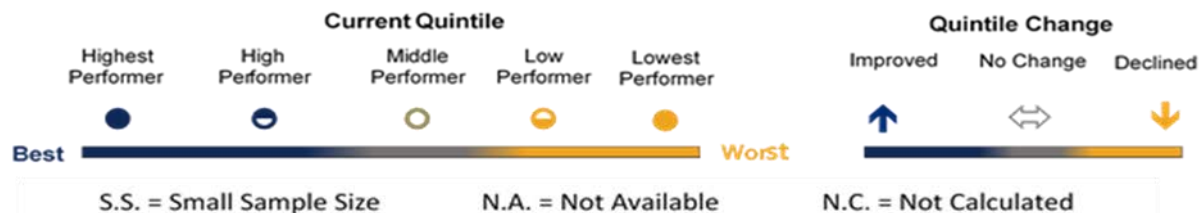
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(1315) Kingsbrook Jewish Medical Center	312	88.5	○	↔	312	74	○	↔	303	40.6	○	↑
(1122) Lawrence Hospital Center	346	87.9	○	↔	346	73.7	○	↓	338	41.4	○	↓
(1450) Lenox Hill Hospital	S.H	89.7	○	↓	S.H	66.5	●	↔	S.H	47.8	●	↔
(0383) Lewis County General Hospital	39	87.2	●	↓	39	71.8	○	↓	39	53.8	●	↔
(1172) Lincoln Medical & Mental Health Center	396	94.9	●	↑	396	65.4	●	↑	395	22.5	●	↔
(0362) Little Falls Hospital	23	87	●	↔	23	69.6	●	↓	21	47.6	●	↓
(1630) Long Island Jewish Medical Center	S.H	84.5	●	↔	S.H	64.7	●	↓	S.H	20.9	●	↓
(1305) Maimonides Medical Center	611	93	●	↔	611	76.8	●	↓	610	37	○	↔
(0746) Mary Imogene Bassett Hospital	111	88.3	○	↔	111	70.3	●	↓	109	35.8	●	↓
(0804) Massena Memorial Hospital	20	95	●	↑	20	70	●	↑	19	47.4	●	↑
(0039) Memorial Hosp of Wm F & Gertrude F Jones A/K/A Jones Memorial Hosp	30	96.7	●	↑	30	83.3	●	↔	30	56.7	●	↑
(1453) Memorial Hospital for Cancer and Allied Diseases	467	92.3	●	↑	467	70.7	○	↑	455	38.9	○	↑
(0213) Mercy Hospital	S.H	86.4	●	↑	S.H	71.1	○	↑	S.H	41.6	○	↔



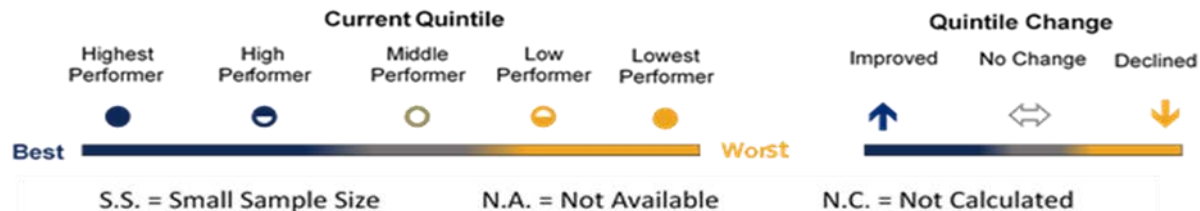
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(0513) Mercy Medical Center	269	96.3	●	↔	269	87.4	●	↔	264	71.2	●	↔
(1454) Metropolitan Hospital Center	82	85.4	○	↓	82	70.7	○	↔	82	32.9	○	↔
(3067) Millard Fillmore Suburban Hospital	414	76.1	●	↔	414	58.7	●	↓	407	24.6	●	↓
(3058) Montefiore Med Center - Jack D Weiler Hosp of Einstein College Division	943	71.2	●	↔	943	31.3	●	↔	941	11.6	●	↔
(1169) Montefiore Medical Center - Henry & Lucy Moses Division	860	72.7	●	↔	860	29	●	↔	856	10.9	●	↔
(1168) Montefiore Medical Center-Wakefield Hospital	363	75.2	●	↔	363	37.5	●	↔	360	17.8	●	↔
(1061) Montefiore Mount Vernon Hospital	35	82.9	●	↔	35	62.9	○	↑	35	31.4	○	↓
(1072) Montefiore New Rochelle Hospital	166	87.3	○	↑	166	77.1	●	↑	162	46.9	●	↑
(1439) Mount Sinai Beth Israel	S.H	90.2	○	↑	S.H	74.2	○	↓	S.H	49.6	○	↔
(1324) Mount Sinai Beth Israel Brooklyn	219	92.7	●	↓	219	74	○	↓	212	43.4	○	↓
(1456) Mount Sinai Hospital	S.H	88.2	○	↓	S.H	62.6	●	↓	S.H	29.5	○	↔
(1639) Mount Sinai Hospital - Mount Sinai Hospital of Queens	284	93	●	↓	284	72.5	○	↔	279	41.6	○	↓
(1466) Mount Sinai Roosevelt	S.H	88.5	○	↔	S.H	73.9	○	↓	S.H	43.5	○	↓
(1469) Mount Sinai St. Luke's	S.H	87.8	○	↓	S.H	66.4	○	↓	S.H	39.6	○	↓



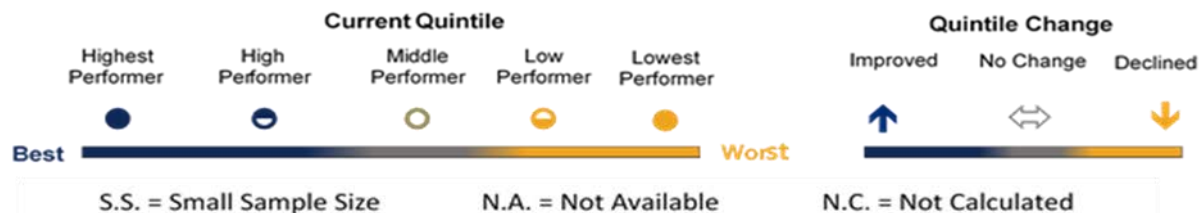
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(0583) Mount St Mary's Hospital and Health Center	278	89.9	○	↑	278	73	○	↔	276	55.8	●	↔
(0528) Nassau University Medical Center	341	84.8	○	↓	341	62.8	●	↓	326	29.4	○	↔
(0330) Nathan Littauer Hospital	139	96.4	●	↑	139	87.8	●	↑	137	48.9	○	↑
(1293) New York Community Hospital of Brooklyn, Inc	284	94	●	↔	284	80.6	●	↔	281	63.3	●	↔
(1637) New York Hospital Medical Center of Queens	S.H	80.6	●	↔	S.H	63.4	○	↑	S.H	43.9	○	↑
(1306) New York Methodist Hospital	84	85.7	○	↔	84	69	○	↓	80	35	○	↓
(3975) New York Presbyterian Hospital - Allen Hospital	170	92.4	○	↑	170	82.9	●	↑	153	32.7	○	↓
(1464) New York Presbyterian Hospital - Columbia Presbyterian Center	S.H	87.9	○	↑	S.H	71.5	○	↔	S.H	32.7	○	↓
(1458) New York Presbyterian Hospital - New York Weill Cornell Center	S.H	93.8	●	↑	S.H	78.7	○	↑	S.H	40.7	○	↔
(1437) New York-Presbyterian/Lower Manhattan Hospital	157	93.6	●	↑	157	75.8	○	↔	139	30.9	○	↓
(1028) Newark-Wayne Community Hospital	121	80.2	●	↔	121	57.9	●	↔	120	20.8	●	↓
(0574) Niagara Falls Memorial Medical Center	81	90.1	○	↔	81	85.2	●	↔	78	56.4	●	↔
(0393) Nicholas H Noyes Memorial Hospital	94	80.9	●	↓	94	61.7	●	↓	93	36.6	○	↑



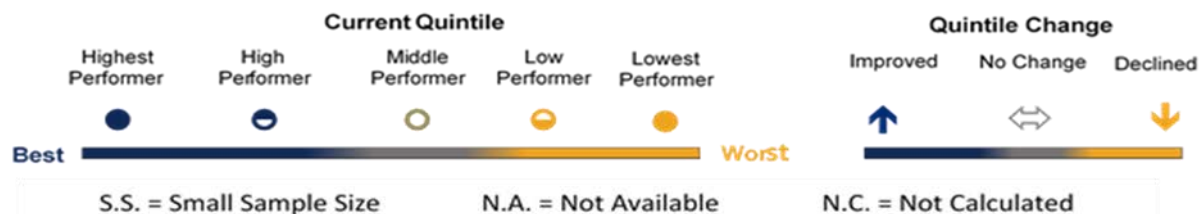
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(1186) North Central Bronx Hospital	90	93.3	●	↔	90	77.8	●	↓	90	50	●	↔
(0541) North Shore University Hospital	1,067	84.7	○	↔	1,067	64.8	○	↑	1,042	24.1	●	↔
(0192) Northern Dutchess Hospital	65	90.8	●	↓	65	73.8	○	↓	64	51.6	●	↓
(1117) Northern Westchester Hospital	251	94.8	●	↑	251	79.3	●	↔	243	56.8	●	↔
(0776) Nyack Hospital	374	88	○	↓	374	74.6	●	↓	370	47	●	↔
(1304) NYU Langone-Brooklyn	S.H	97.1	●	↔	S.H	90.9	●	↔	S.H	81.8	●	↔
(1463) NYU Langone Hospitals	S.H	97.3	●	↔	S.H	88.3	●	↔	S.H	72.8	●	↔
(0511) NYU Winthrop Hospital	S.H	91.7	●	↑	S.H	80.7	●	↑	S.H	59.5	●	↑
(0066) Olean General Hospital	366	74.9	●	↔	366	58.2	●	↔	364	20.3	●	↓
(0397) Oneida Healthcare	41	87.8	○	↓	41	73.2	○	↓	40	57.5	●	↑
(0699) Orange Regional Medical Ctr-Goshen Campus	S.H	85.5	○	↓	S.H	73.8	○	↓	S.H	42.9	○	↓
(0727) Oswego Hospital	217	84.3	○	↓	217	73.7	○	↓	214	57.5	●	↔
(0043) Our Lady of Lourdes Memorial Hospital Inc	128	93.8	●	↔	128	72.7	○	↓	125	33.6	○	↓
(0938) Peconic Bay Medical Center	169	81.1	●	↓	169	55.6	●	↔	166	17.5	●	↓
(1129) Phelps Memorial Hospital Assn	294	95.6	●	↔	294	77.6	●	↑	289	67.5	●	↔
(0552) Plainview Hospital	279	88.9	○	↔	279	73.5	○	↑	273	37.7	○	↑
(0752) Putnam Hospital Center	352	94.6	●	↔	352	84.7	●	↑	350	69.1	●	↔



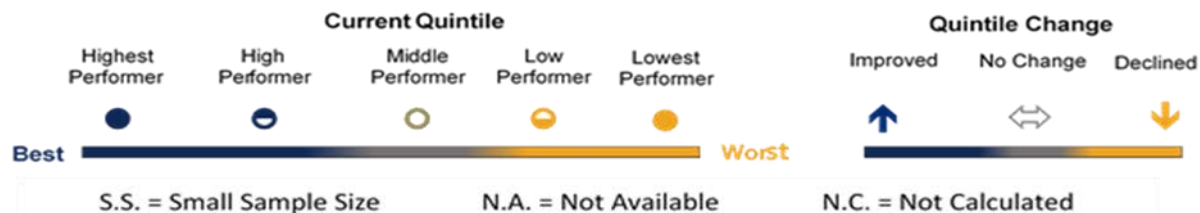
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(1633) Queens Hospital Center	562	89.3	○	↔	562	75.6	●	↑	553	33.3	●	↑
(1738) Richmond University Medical Center	408	88.2	○	↑	408	53.4	●	↔	403	22.8	●	↔
(0411) Rochester General Hospital	S.H	80.8	●	↔	S.H	61.8	●	↓	S.H	26.9	●	↓
(0589) Rome Memorial Hospital, Inc	130	90	○	↑	130	83.8	●	↑	129	50.4	●	↑
(0216) Roswell Park Cancer Institute	56	64.3	●	↔	56	41.1	●	↔	56	12.5	●	↔
(0756) Samaritan Hospital	223	93.3	●	↔	223	76.2	●	↓	220	61.8	●	↑
(0367) Samaritan Medical Center	208	87	●	↓	208	73.6	○	↓	207	44.4	○	↔
(0818) Saratoga Hospital	414	92.8	●	↓	414	78.7	●	↔	410	62.4	●	↑
(1176) SBH Health System	218	79.4	●	↓	218	49.5	●	↔	217	12.4	●	↓
(0218) Sisters of Charity Hospital	149	89.9	○	↑	149	74.5	●	↑	148	50.7	●	↑
(0292) Sisters of Charity Hospital - St Joseph Campus	69	88.4	○	↑	69	73.9	○	↔	67	35.8	●	↓
(1097) SJRH - Andrus Pavilion	205	86.8	●	↔	205	67.3	●	↔	197	33.5	●	↓
(0527) South Nassau Communities Hospital	S.H	85.3	●	↓	S.H	75.3	●	↔	S.H	52.5	●	↑



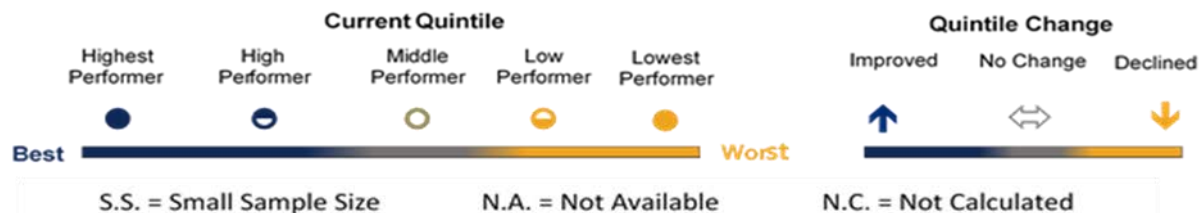
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(0889) Southampton Hospital	137	86.1			137	79.6			137	47.4		
(0924) Southside Hospital	311	90			311	72			302	40.7		
(0704) St Anthony Community Hospital	43	97.7			43	86			43	48.8		
(0943) St Catherine of Siena Hospital	S.H	95.2			S.H	91.6			S.H	80.8		
(0896) St Charles Hospital	256	91.8			256	83.6			254	72.8		
(0598) St Elizabeth Medical Center	204	90.7			204	68.6			202	21.8		
(0563) St Francis Hospital	377	89.9			377	79			368	52.4		
(0180) St Francis Hospital – Poughkeepsie	76	96.1			76	86.8			75	72		
(0870) St James Mercy Hospital	12	91.7			12	83.3		N.A.	12	25		N.A.
(1635) St John’s Episcopal Hospital So Shore	298	85.9			298	59.7			293	22.9		
(0630) St Joseph’s Hospital Health Center	S.H	85.2			S.H	66.7			S.H	33.9		
(1098) St Joseph’s Medical Center	143	93			143	83.2			141	70.9		
(0694) St Luke’s Cornwall Hospital/Newburgh	188	94.7			188	88.8			181	67.4		
(0005) St Peter’s Hospital	S.H	88.6			S.H	62.9			S.H	40.4		



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(0551) St. Joseph Hospital	S.H	93.3	●	↑	S.H	79.8	●	↑	S.H	60.3	●	↔
(0484) St. Mary's Healthcare	114	86.8	○	↓	114	72.8	○	↓	114	29.8	○	↑
(1740) Staten Island University Hosp-North	S.H	83.6	●	↔	S.H	50.1	●	↔	S.H	18.8	●	↔
(1737) Staten Island University Hosp-South	S.H	88.8	○	↑	S.H	46.1	●	↔	S.H	16.1	●	↔
(0413) Strong Memorial Hospital	S.H	94.2	●	↑	S.H	82.5	●	↑	S.H	42.7	○	↓
(0550) Syosset Hospital	95	87.4	○	↓	95	74.7	●	↑	93	41.9	○	↔
(0471) The Unity Hospital of Rochester	456	79.6	●	↓	456	65.8	○	↔	451	26.8	●	↓
(0042) United Health Services Hospitals Inc. - Binghamton General Hospital	61	78.7	●	↓	61	65.6	○	↓	61	54.1	●	↓
(0058) United Health Services Hospitals Inc. - Wilson Medical Center	398	89.4	○	↔	398	75.4	●	↔	395	49.6	●	↓
(0339) United Memorial Medical Center North Street Campus	113	92.9	●	↑	113	76.1	●	↑	112	50.9	●	↑
(0245) University Hospital	S.H	89	○	↑	S.H	74.1	○	↓	S.H	47.5	●	↔
(1320) University Hospital of Brooklyn	191	88	○	↑	191	69.1	○	↑	189	37	○	↑
(0635) University Hospital SUNY Health Science Center	400	85	○	↓	400	62.5	●	↓	394	27.7	○	↔



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(0628) Upstate University Hospital at Community General	81	85.2			81	67.9			80	36.3		
(0181) Vassar Brothers Medical Center	S.H	89.6			S.H	76.9			S.H	57.9		
(1139) Westchester Medical Center	217	89.9			217	69.1			215	49.3		
(1045) White Plains Hospital Center	351	85.2			351	67			341	45.7		
(0103) Woman's Christian Association	112	77.7			112	62.5			107	17.8		
(1692) Woodhull Medical & Mental Health Center	270	91.9			270	74.4			269	47.2		
(1318) Wyckoff Heights Medical Center	194	91.2			194	80.9			191	51.3		
(1153) Wyoming County Community Hospital	20	85			20	70			20	50		



Hospital Performance Data – Pediatrics

Table 5 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 one-hour bundle.

Table 5. Category Assignment for the Pediatric Sepsis Performance Measures






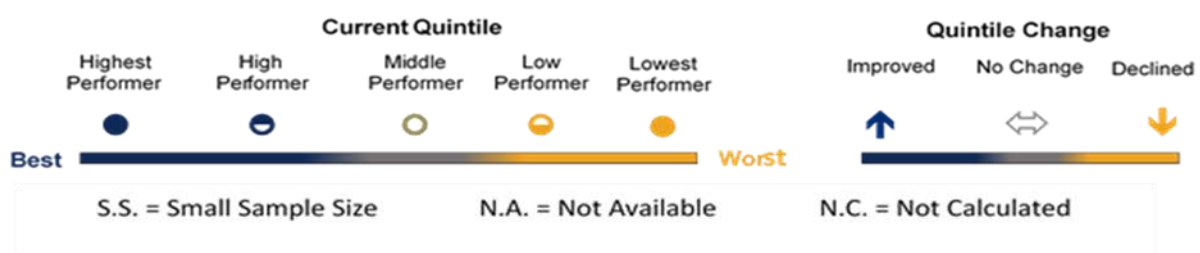
Quintile	Category (Performance Level)	Summary Table Symbol	Percentiles Included	Timely Antibiotics (%)	1-Hour Bundle (%)
Quintile 5	Highest	 Best	80 th – 100 th	80.81 - 87.500	48.61 - 71.40
Quintile 4	High	 ↑	60 th – 80 th	78.61 - 80.80	47.61 - 48.60
Quintile 3	Middle		40 th – 60 th	73.01 - 78.60	44.41 - 47.60
Quintile 2	Low	 ↓ Worst	20 th – 40 th	57.91 - 73.00	28.61 - 44.40
Quintile 1	Lowest		0 th – 20 th	56.30 - 57.90	12.50 - 28.60

Table 6 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 start time 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 10 cases reported in at least one of the measure denominators are reported here.

Table 6. Pediatric Sepsis Measure Summary Report by Hospital, 2018

PFI/Facility Name	Timely Administration of Broad-Spectrum Antibiotics				1-Hour Bundle			
	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2017	Number of Cases (N)	Met Measure (%)	Current Quintile	Quintile Change from CY2017
(0001) Albany Medical Center Hospital	14	78.6			14	28.6		
(1178) Bronx-Lebanon Hospital Center - Concourse Division	21	61.9			21	47.6		
(1301) Kings County Hospital Center	13	76.9			13	30.8		
(3376) Long Island Jewish Schneider Children's Hospital Division	21	57.1			21	47.6		
(1305) Maimonides Medical Center	19	57.9			19	47.4		N.A.
(1453) Memorial Hospital for Cancer and Allied Diseases	18	83.3			18	44.4		
(1169) Montefiore Medical Center - Henry & Lucy Moses Division	32	56.3			32	12.5		
(1464) New York Presbyterian Hospital - Columbia Presbyterian Center	52	80.8			52	48.1		
(0511) NYU Winthrop Hospital	16	87.5			16	68.8		N.A.
(0413) Strong Memorial Hospital	37	73			37	48.6		
(0245) University Hospital	14	78.6			14	71.4		
(1139) Westchester Medical Center	13	69.2			13	15.4		N.A.
(0208) Women and Children's Hospital of Buffalo	36	80.6			36	38.9		
Statewide	375	72.5			375	42.7		

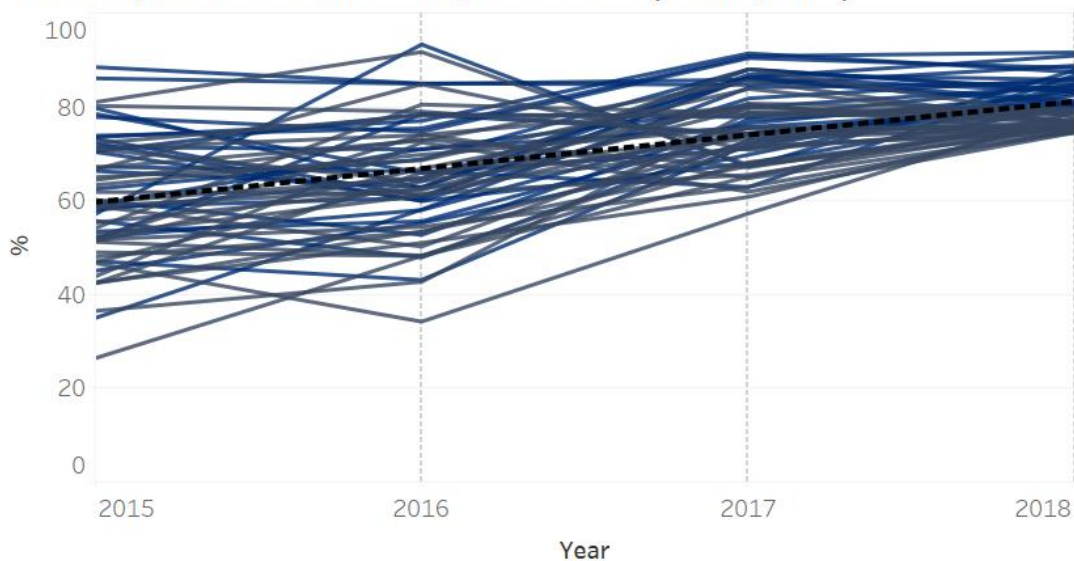


Hospital Performance Over Time

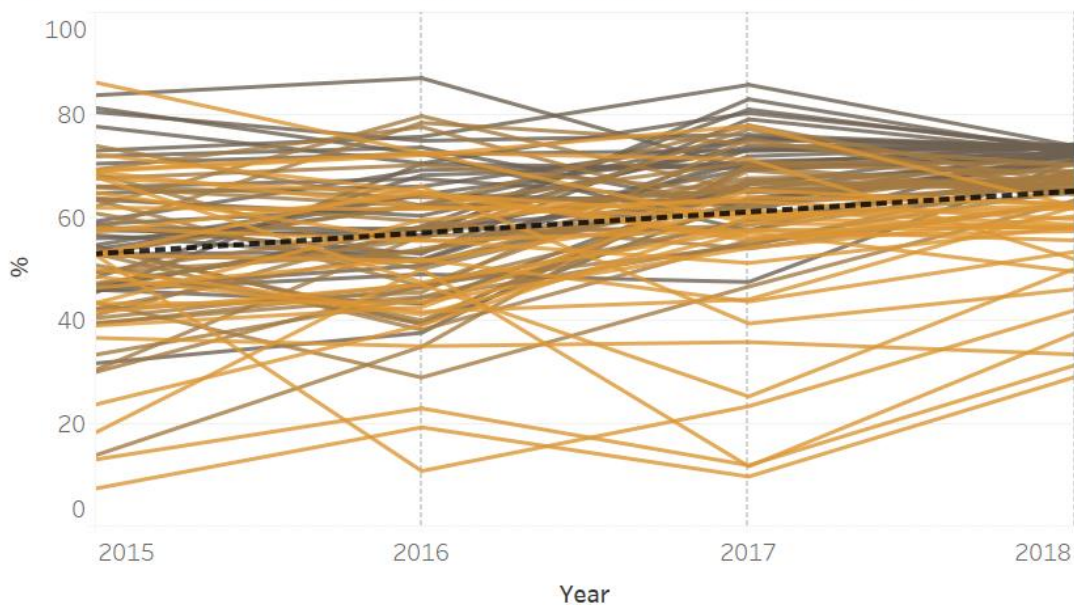
Data from the years 2015 to 2018 allows us to look at hospital performance over time. Figure 10 is a depiction of hospital performance data from 2015 to 2018, charting hospitals' adult three-hour bundle performance, measured as the percentage of adult patients who received all the recommended early interventions within three hours of severe sepsis presentation. Each line represents one hospital and the color of the line represents its three-hour bundle performance quintile in 2018. Hospitals in the top two quintiles are shown in the top half of the figure while hospitals in the bottom three quintiles are shown in the bottom half of the figure. In general, hospitals have improved their three-hour bundle performance across time, and the rate of increase was greater among hospitals in the top two quintiles compared to the bottom three quintiles.

Figure 10. Percent of Adult Patients Receiving 3-Hour Bundle by Hospital, 2015-18¹

2018 Hospital Performance: Top 2 Quintiles (58 hospitals)



2018 Hospital Performance: Bottom 3 Quintiles (86 hospitals)



3 Hr Bundle Performance Quintile 2018
 ■ 1 Lowest ■ 2 ■ 3 ■ 4 ■ 5 Highest

¹Each line represents one hospital; 144 hospitals included.

Table 7 summarizes how NYS hospitals' performance changed from 2017 to 2018 among the inpatient adult (age ≥ 18) and pediatric (age < 18) sepsis care quality measures: three-hour bundle, composite bundle, and one-hour bundle. Facilities in the 'Higher Measure Result' category had a higher absolute measure result in 2018 relative to 2017, while facilities in the 'Lower Measure Result' category had a lower absolute measure result in 2018. Only facilities with a calculated measure result in both 2017 and 2018 are included in this table. Table 7 demonstrates that while many facilities did not change in relative measure performance as measured by quintiles in Tables 4 and 6, virtually no facilities maintain the same absolute measure of performance from 2017 to 2018. However, these results should be interpreted with caution, as measure results are sensitive to specification changes and other methodological factors. More information on hospital measure performance over time can be found in Appendix C.

Table 7. Facility Changes in Sepsis Process Measures from 2017 to 2018

Measure Change	3-Hour Bundle (Adult)		Composite Bundle (Adult)		1-Hour Bundle (Pediatric)	
	Hospitals (N)	Hospitals (%)	Hospitals (N)	Hospitals (%)	Hospitals (N)	Hospitals (%)
Higher Measure Result	100	64.1	107	68.59	6	60
Same Measure Result	1	0.64	0	0	0	0
Lower Measure Result	55	35.26	49	31.41	4	40
Total	156	100	156	100	10	100

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 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. For 2018, our mortality outcome includes all patients who died within 30 days following the presentation of severe sepsis. More detail regarding the risk adjustment methodology can be found in Technical Appendix B.

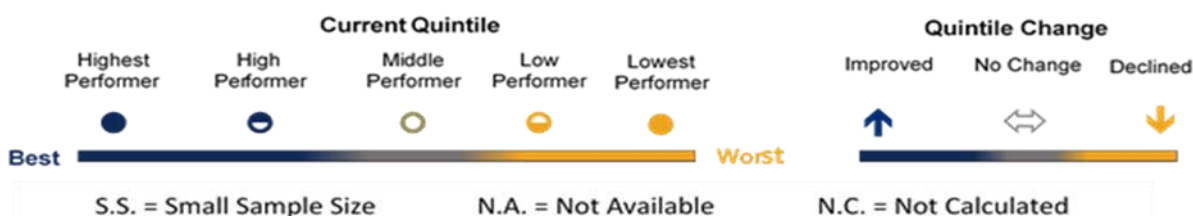
Pediatric risk-adjusted sepsis mortality rates were not calculated due to the significantly smaller volume of cases for each hospital compared to adult cases and the current lack of a standardized, validated risk adjustment model for the pediatric sepsis population.

Adult risk-adjusted sepsis mortality rates for each hospital are presented in Table 8. All adult patients with severe sepsis or septic shock submitted to the Department are included in the risk-adjusted mortality measure, except for those who are transfer patients, those who were admitted from hospice, those who have advance 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.

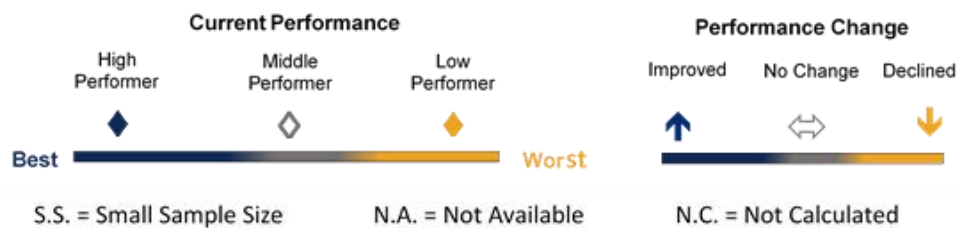
Hospitals' change in RAMR performance status relative to the previous year is presented in Table 8 as well. This change does not necessarily indicate an increase or decrease in RAMR, but rather represents hospital movement between the high, middle, and low performance statuses across years and should be interpreted with caution given the differences in RAMR methodology between the two years.

Table 8. Adult Sepsis Risk Adjusted Mortality Rate (RAMR) Summary Report by Hospital, 2018

PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(0324) Adirondack Medical Center-Saranac Lake Site	35	13	30.94	◇	↔
(0001) Albany Medical Center Hospital	231	73	27.58	◇	↔
(0004) Albany Memorial Hospital	97	16	23.25	◇	↔
(0325) Alice Hyde Medical Center	53	13	27.00	◇	↔
(0116) Arnot Ogden Medical Center	286	67	26.00	◇	↔
(0085) Auburn Community Hospital	198	57	29.57	◇	↑
(0739) Aurelia Osborn Fox Memorial Hospital	80	14	17.61	◇	↔
(1438) Bellevue Hospital Center	374	71	25.20	◇	↓
(0708) Bon Secours Community Hospital	113	17	18.06	◇	↓
(1178) Bronx-Lebanon Hospital Center - Concourse Division	346	75	26.60	◇	↔
(1286) Brookdale Hospital Medical Center	143	55	32.81	◇	↔
(0885) Brookhaven Memorial Hospital Medical Center Inc	379	91	19.86	◆	↔
(1288) Brooklyn Hospital Center - Downtown Campus	426	142	27.96	◇	↓
(0098) Brooks Memorial Hospital	74	11	19.49	◇	↔
(0207) Buffalo General Medical Center	720	259	33.38	◆	↔
(0815) Canton-Potsdam Hospital	73	17	27.58	◇	↔
(0379) Carthage Area Hospital Inc	55	4	9.79	◆	N.C.
(0971) Catskill Regional Medical Center	43	12	25.56	◇	↔
(0977) Cayuga Medical Center at Ithaca	277	32	16.32	◆	↔
(0135) Champlain Valley Physicians Hospital Medical Center	125	37	24.38	◇	↓
(0128) Chenango Memorial Hospital Inc	19	9	39.54	◇	↔
(0798) Claxton-Hepburn Medical Center	85	12	15.98	◆	↑
(0676) Clifton Springs Hospital and Clinic	16	5	31.48	◇	↔



PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(0851) Cobleskill Regional Hospital	S.S.	S.S.	S.S.	S.S.	N.A.
(0146) Columbia Memorial Hospital	17	9	46.86	◆	↓
(0401) Community Memorial Hospital Inc	S.S.	S.S.	S.S.	S.S.	N.A.
(1294) Coney Island Hospital	400	146	23.84	◆	↑
(0866) Corning Hospital	71	29	37.82	◆	↓
(0158) Cortland Regional Medical Center Inc	295	30	11.58	◆	↔
(0636) Crouse Hospital	193	66	32.11	◇	↔
(0581) Degraff Memorial Hospital	S.S.	S.S.	S.S.	S.S.	N.A.
(0891) Eastern Long Island Hospital	28	6	18.52	◇	↓
(0565) Eastern Niagara Hospital - Lockport Division	11	8	47.63	◆	↓
(0303) Elizabethtown Community Hospital	S.S.	S.S.	S.S.	S.S.	N.A.
(0829) Ellis Hospital	329	101	28.04	◇	↔
(1626) Elmhurst Hospital Center	367	85	22.57	◆	↑
(0210) Erie County Medical Center	145	38	23.44	◇	↔
(0678) F F Thompson Hospital	169	32	17.99	◆	↑
(0599) Faxton-St Lukes Healthcare St Lukes Division	283	106	27.72	◇	↔
(1628) Flushing Hospital Medical Center	220	97	29.82	◇	↑
(1638) Forest Hills Hospital	333	110	27.47	◇	↔
(0518) Franklin Hospital	253	81	26.79	◇	↔
(0671) Geneva General Hospital	75	25	38.97	◆	↓
(0490) Glen Cove Hospital	230	46	20.57	◆	↑
(1005) Glens Falls Hospital	315	84	28.59	◇	↔
(0925) Good Samaritan Hospital Medical Center	372	96	27.70	◇	↔
(0779) Good Samaritan Hospital of Suffern	390	143	26.72	◇	↔
(0812) Gouverneur Hospital	S.S.	S.S.	S.S.	S.S.	N.A.



PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(1445) Harlem Hospital Center	157	34	22.26	◇	↔
(0990) HealthAlliance Hospital Broadway Campus	229	58	24.43	◇	↓
(0409) Highland Hospital	333	84	24.06	◇	↔
(1447) Hospital for Special Surgery	S.S.	S.S.	S.S.	S.S.	N.A.
(1039) Hudson Valley Hospital Center	512	130	23.26	◆	↔
(0913) Huntington Hospital	466	101	21.08	◆	↑
(1309) Interfaith Medical Center	68	1	1.42	◆	↑
(0873) Ira Davenport Memorial Hospital Inc	S.S.	S.S.	S.S.	S.S.	N.A.
(1165) Jacobi Medical Center	412	111	19.41	◆	↔
(1629) Jamaica Hospital Medical Center	341	143	29.01	◇	↑
(0895) John T Mather Memorial Hospital of Port Jefferson New York Inc	430	103	24.66	◇	↓
(0267) Kenmore Mercy Hospital	339	103	31.73	◇	↔
(1301) Kings County Hospital Center	276	93	30.86	◇	↔
(1315) Kingsbrook Jewish Medical Center	311	124	22.97	◆	↑
(1122) Lawrence Hospital Center	328	78	22.76	◇	↓
(1450) Lenox Hill Hospital	338	76	23.12	◇	↓
(0383) Lewis County General Hospital	38	10	35.18	◇	↔
(1172) Lincoln Medical & Mental Health Center	368	91	26.46	◇	↔
(0362) Little Falls Hospital	22	3	13.81	◇	↓
(1630) Long Island Jewish Medical Center	348	87	25.09	◇	↔
(3376) Long Island Jewish Schneiders Children's Hospital Division	S.S.	S.S.	S.S.	S.S.	N.A.
(1305) Maimonides Medical Center	618	163	23.02	◆	↔
(0746) Mary Imogene Bassett Hospital	111	36	29.16	◇	↔
(0718) Medina Memorial Health Care System	S.S.	S.S.	S.S.	S.S.	N.A.



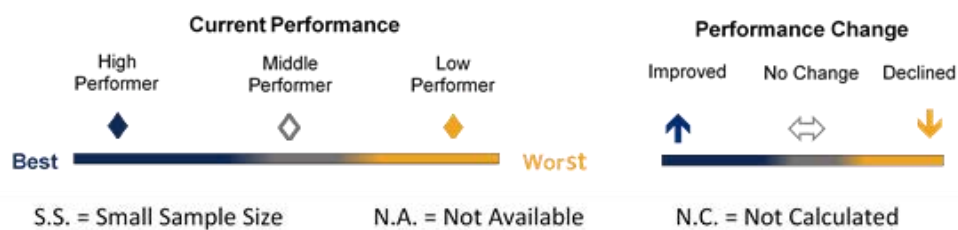
PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(0039) Memorial Hosp of Wm F & Gertrude F Jones A/K/A Jones Memorial Hosp	14	1	6.41	◇	↔
(1453) Memorial Hospital for Cancer and Allied Diseases	439	157	24.45	◇	↔
(0213) Mercy Hospital	342	117	34.16	◆	↔
(0513) Mercy Medical Center	282	98	31.18	◇	↔
(1454) Metropolitan Hospital Center	70	14	20.79	◇	↔
(3067) Millard Fillmore Suburban Hospital	429	164	37.23	◆	↓
(3058) Montefiore Med Center - Jack D Weiler Hosp of A Einstein College Div	869	288	32.88	◆	↔
(1168) Montefiore Medical Center-Wakefield Hospital	317	89	29.00	◇	↑
(1169) Montefiore Medical Center - Henry & Lucy Moses Div	761	238	34.23	◆	↔
(1061) Montefiore Mount Vernon Hospital	41	13	22.31	◇	↔
(1072) Montefiore New Rochelle Hospital	176	75	27.07	◇	↔
(0309) Moses-Ludington Hospital	S.S.	S.S.	S.S.	S.S.	N.A.
(1439) Mount Sinai Beth Israel	338	73	22.00	◆	↔
(1324) Mount Sinai Beth Israel Brooklyn	230	79	27.31	◇	↔
(1456) Mount Sinai Hospital	299	68	21.35	◆	↑
(1639) Mount Sinai Hospital - Mount Sinai Hospital of Queens	288	93	32.15	◆	↓
(1466) Mount Sinai Roosevelt	370	65	18.70	◆	↔
(1469) Mount Sinai St. Lukes	357	81	20.96	◆	↔
(0583) Mount St Marys Hospital and Health Center	275	66	27.28	◇	↔
(0528) Nassau University Medical Center	326	101	27.55	◇	↔
(0330) Nathan Littauer Hospital	139	35	26.66	◇	↔
(1437) New York-Presbyterian/Lower Manhattan Hospital	156	43	27.86	◇	↔



PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(1293) New York Community Hospital of Brooklyn, Inc	280	86	25.54	◇	↔
(1637) New York Hospital Medical Center of Queens	294	59	18.56	◆	↔
(1306) New York Methodist Hospital	83	30	28.96	◇	↓
(3975) New York Presbyterian Hospital - Allen Hospital	179	65	24.80	◇	↔
(1464) New York Presbyterian Hospital - Columbia Presbyterian Center	259	74	26.28	◇	↔
(1458) New York Presbyterian Hospital - New York Weill Cornell Center	247	92	31.22	◇	↔
(1028) Newark-Wayne Community Hospital	116	27	24.93	◇	↔
(0574) Niagara Falls Memorial Medical Center	83	28	31.12	◇	↔
(0393) Nicholas H Noyes Memorial Hospital	98	15	16.39	◆	↑
(1186) North Central Bronx Hospital	92	8	14.93	◇	↔
(0541) North Shore University Hospital	1067	277	23.62	◆	↑
(0192) Northern Dutchess Hospital	64	20	35.46	◇	↔
(1117) Northern Westchester Hospital	255	42	20.85	◇	↓
(0776) Nyack Hospital	364	115	26.73	◇	↓
(1304) NYU Langone-Brooklyn	342	75	22.13	◆	↑
(1463) NYU Langone Hospitals	337	76	21.17	◆	↔
(1446) NYU Langone Orthopedic Hospital	S.S.	S.S.	S.S.	S.S.	N.A.
(0511) NYU Winthrop Hospital	365	96	29.22	◇	↓
(0066) Olean General Hospital	372	95	25.39	◇	↔
(0397) Oneida Healthcare	41	14	33.65	◇	↔
(0699) Orange Regional Medical Ctr-Goshen Campus	206	51	26.24	◇	↔
(0727) Oswego Hospital	211	34	20.34	◇	↓
(0043) Our Lady of Lourdes Memorial Hospital Inc	104	30	26.78	◇	↔
(0938) Peconic Bay Medical Center	172	74	38.26	◆	↓



PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(1129) Phelps Memorial Hospital Assn	304	53	18.14	◆	↔
(0552) Plainview Hospital	270	72	24.77	◇	↔
(0752) Putnam Hospital Center	346	57	19.16	◆	↔
(1633) Queens Hospital Center	566	112	20.77	◆	↔
(1738) Richmond University Medical Center	410	163	27.18	◇	↑
(0377) River Hospital, Inc.	S.S.	S.S.	S.S.	S.S.	N.A.
(0411) Rochester General Hospital	321	94	32.43	◆	↓
(0589) Rome Memorial Hospital, Inc	136	39	24.80	◇	↓
(0216) Roswell Park Cancer Institute	51	13	34.18	◇	↔
(0756) Samaritan Hospital	245	78	25.43	◇	↔
(0367) Samaritan Medical Center	204	33	16.37	◆	↑
(0818) Saratoga Hospital	407	99	29.23	◇	↔
(1176) SBH Health System	171	54	26.55	◇	↓
(0218) Sisters of Charity Hospital	149	47	31.95	◇	↔
(0292) Sisters of Charity Hospital - St Joseph Campus	69	30	43.63	◆	↓
(1097) SJRH - Andrus Pavilion	200	60	24.64	◇	↓
(1124) SJRH - Dobbs Ferry Pavilion	S.S.	S.S.	S.S.	S.S.	N.A.
(0527) South Nassau Communities Hospital	359	126	28.56	◇	↔
(0889) Southampton Hospital	131	32	21.42	◇	↔
(0924) Southside Hospital	296	104	30.27	◇	↔
(0704) St Anthony Community Hospital	46	12	26.16	◇	↔
(0943) St Catherine of Siena Hospital	355	79	20.83	◆	↔
(0896) St Charles Hospital	291	52	25.43	◇	↔
(0598) St Elizabeth Medical Center	210	70	31.07	◇	↑
(0563) St Francis Hospital	450	162	27.72	◇	↔

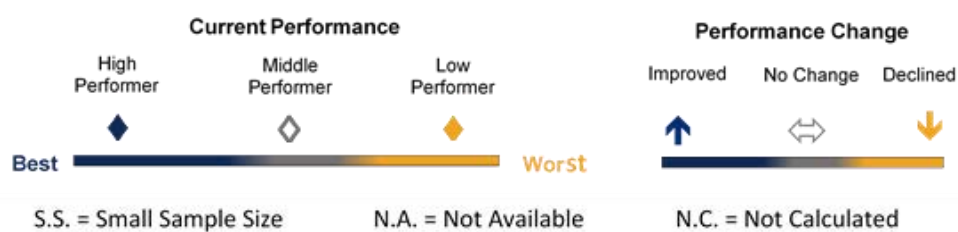


PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(0180) St Francis Hospital - Poughkeepsie	56	0	0.00	◆	↑
(0870) St James Mercy Hospital	11	2	26.16	◇	↔
(1635) St John's Episcopal Hospital So Shore	288	132	29.47	◇	↔
(0118) St Joseph's Hospital	S.S.	S.S.	S.S.	S.S.	N.A.
(0630) St Joseph's Hospital Health Center	349	101	23.58	◇	↔
(1098) St Joseph's Medical Center	143	44	23.52	◇	↔
(0694) St Luke's Cornwall Hospital/Newburgh	198	66	24.80	◇	↔
(0005) St Peter's Hospital	341	83	23.91	◇	↔
(0551) St. Joseph Hospital	412	106	23.59	◇	↔
(0484) St. Mary's Healthcare	122	25	17.36	◆	↔
(1740) Staten Island University Hosp-North	386	108	24.65	◇	↔
(1737) Staten Island University Hosp-South	172	43	27.20	◇	↔
(0413) Strong Memorial Hospital	286	57	18.57	◆	↑
(0550) Syosset Hospital	90	39	29.97	◇	↔
(0471) The Unity Hospital of Rochester	441	130	31.66	◆	↓
(0042) United Health Services Hospitals Inc. - Binghamton General Hospital	59	11	23.93	◇	↓
(0058) United Health Services Hospitals Inc. - Wilson Medical Center	383	98	29.13	◇	↔
(0339) United Memorial Medical Center North Street Campus	115	29	27.73	◇	↓
(0245) University Hospital	280	74	26.87	◇	↓
(1320) University Hospital of Brooklyn	160	58	28.91	◇	↔
(0635) University Hospital SUNY Health Science Center	413	128	29.52	◇	↔
(0628) Upstate University Hospital at Community General	71	18	24.13	◇	↔
(0181) Vassar Brothers Medical Center	356	104	27.39	◇	↓



PFI/Facility Name	Number of Cases (N)	Number of Outcomes (N)	RAMR	High/Low Performer	Performance Change from CY2017
(1139) Westchester Medical Center	282	70	25.97	◇	↑
(1045) White Plains Hospital Center	336	109	28.75	◇	↑
(0103) Woman's Christian Association	109	37	34.53	◇	↔
(0208) Women and Children's Hospital Of Buffalo	S.S.	S.S.	S.S.	S.S.	N.A.
(1692) Woodhull Medical & Mental Health Center	259	67	27.93	◇	↔
(1318) Wyckoff Heights Medical Center	198	65	30.67	◇	↑
(1153) Wyoming County Community Hospital	16	4	21.79	◇	↓
Statewide ¹			27.00		.

¹Statewide numerator and denominator are not presented as the statewide rate is weighted based on sampling hospitals reported total cases.



Risk Adjusted Mortality Performance Over Time

Figure 11 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 11. Adult Sepsis Risk Adjusted Mortality Performance Trends: 2016 through 2018

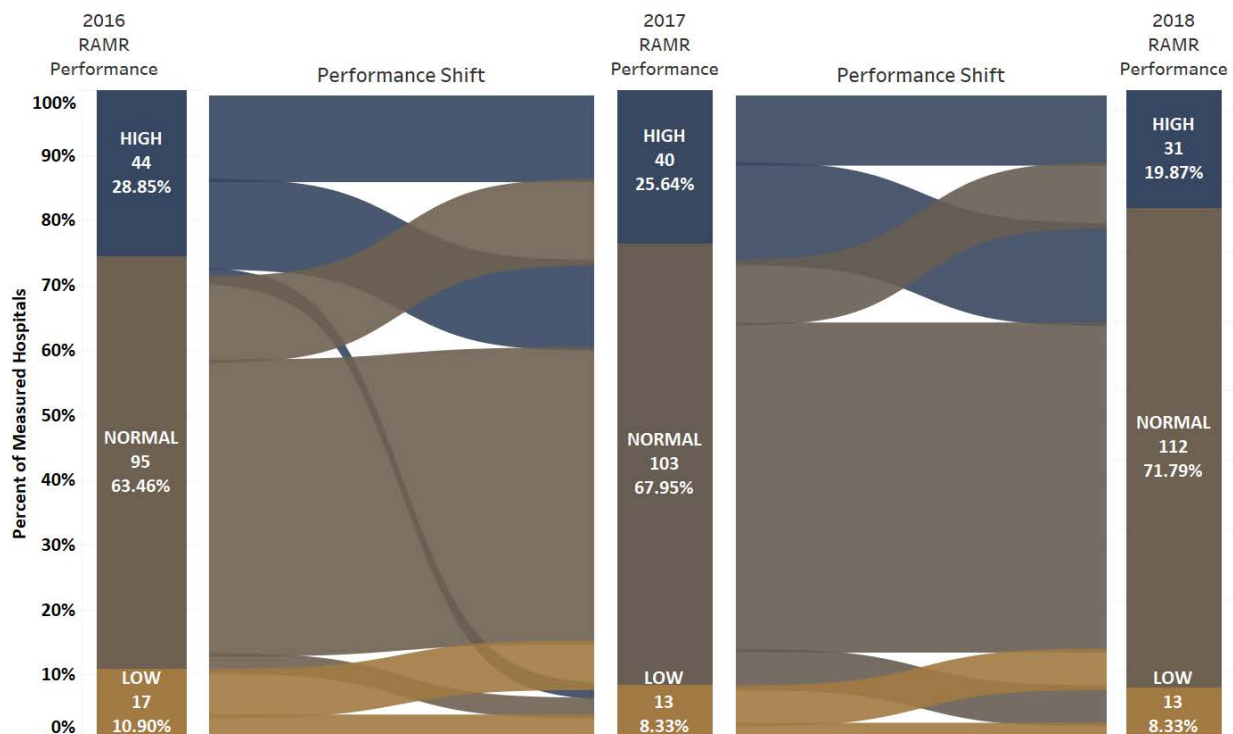
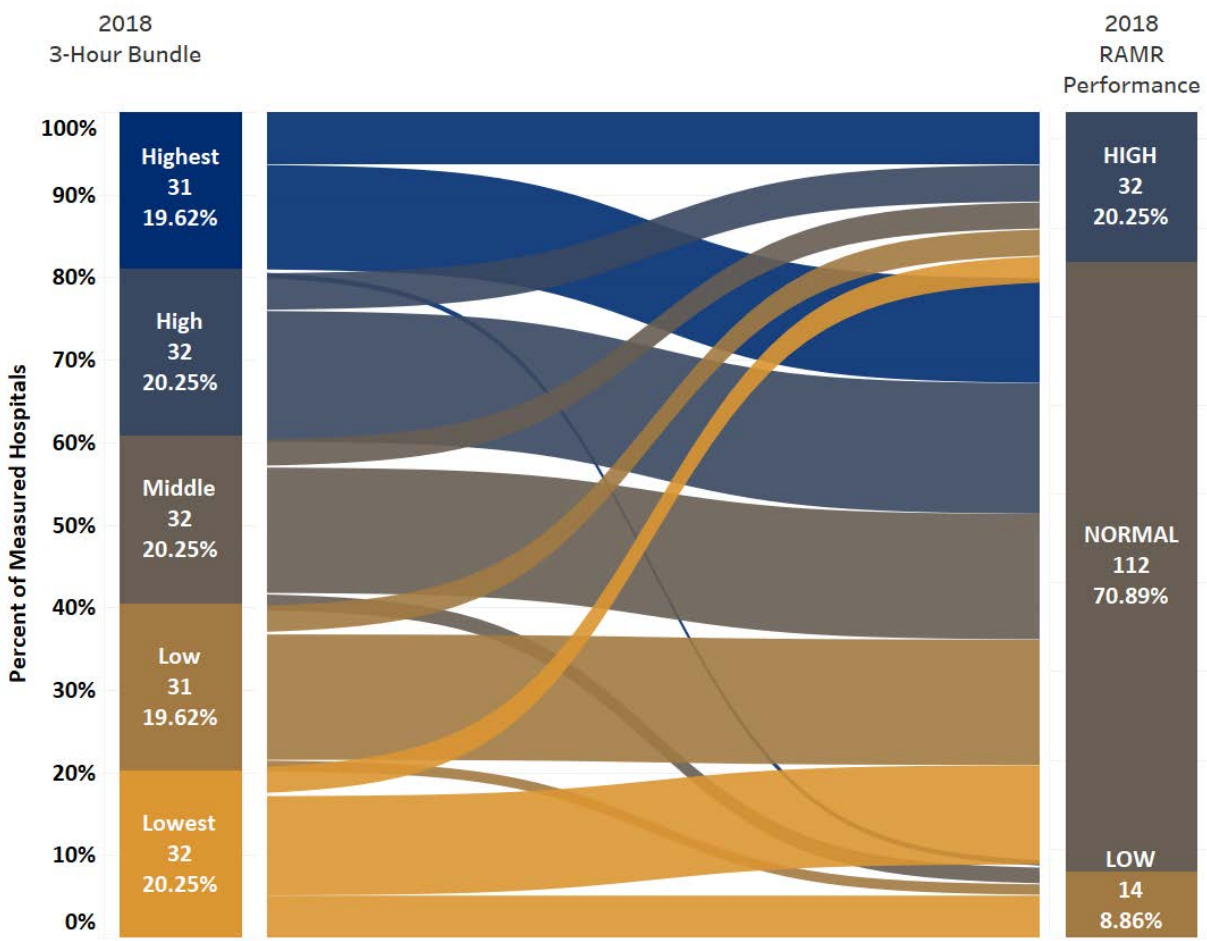


Figure 12. Adult Sepsis 3-Hour Bundle Performance and Risk Adjusted Mortality Rate



New York State Quality Improvement Efforts

The development and implementation of the NYS 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 NYS who 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 NYS. 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.

Pediatric Sepsis Advisory Group

The Pediatric Sepsis Advisory Group, 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 Pediatric Sepsis Advisory Group was instrumental in contributing to the development of a dedicated Pediatric Data Dictionary as the Department determined the need to devote a data dictionary each to the adult and pediatric population.

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.

Data Optimization Subcommittee

The data optimization subcommittee, which is also comprised of clinicians, statisticians and experts in clinical measurement, met on three separate occasions to identify ways to improve sepsis data collection from hospitals while reducing burden on hospitals. This subcommittee identified several challenges and offered proposals to address those challenges. The proposals highlighted by the subcommittee continue to be explored within the Department.

CMS Alignment Subcommittee

The Department formed a Centers for Medicare and Medicaid Services (CMS) Alignment Subcommittee to discuss the challenges surrounding a possible CMS/Department data reporting alignment to support efforts to reduce hospital reporting burden. The subcommittee ultimately identified operational, contractual, and data challenges related to CMS alignment. The subcommittee determined that a proposed alignment is not currently feasible; however, much of what was learned from the efforts of the subcommittee will continue to be used in other similar efforts from the Department to manage hospital reporting burden.

IPRO, Implementation Business Partner

IPRO 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.

Krasnoff Quality Management Institute

The Krasnoff Quality Management Institute (KQMI) partnered with the Department and IPRO to develop and pilot a new, interactive Tableau-based quarterly sepsis dashboard report to allow hospitals enhanced insight into their clinical sepsis data. After a collaborative development process, KQMI piloted the new dashboard within Northwell Hospitals for additional refinement. The Department subsequently enrolled 33 additional hospitals across the State in a voluntary pilot to solicit additional feedback for improvement of the dashboard with the goal of making the new report format available to all hospitals in NYS.

Partnership for Patients (P4P)

The New York State Partnership for Patients (NYSPFP), a collaboration of the Healthcare Association of New York State (HANYS) and the Greater New York Hospital Association (GNYHA), continues to support NYS hospitals to achieve the CMS goal of reducing hospital-acquired conditions by 20%. NYSPFP's sepsis initiative aims to help hospitals improve their sepsis care processes and outcomes by supporting front-line staff adherence to their protocols.

In 2019, NYSPFP's customized hospital support included several approaches. A small cohort of hospitals, identified by analyzing Area Deprivation Index (ADI) data and Department sepsis data, participated in a rapid cycle improvement program aimed to improve sepsis bundle compliance adherence and reduce disparities. Rural and critical access hospitals (CAH) focused on sepsis improvement efforts with the support of a dedicated NYSPFP project manager who provided coaching and technical assistance to meet the unique needs and challenges of these small hospitals. Additionally, statewide programming was provided which focused on early identification of sepsis patients and sustaining best practices.

New York State Hospitals

In 2018, 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 of

reporting, and other issues were discussed. These efforts continued throughout 2019 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.

The Rory Staunton Foundation

Several private foundations, including the Rory Staunton Foundation, have provided support and assistance in raising public awareness regarding sepsis, which has amplified the work of the initiative in NYS. 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 2019, the Rory Staunton Foundation for Sepsis Prevention was awarded a major federal contract intended to better understand and combat maternal sepsis, a leading cause of pregnancy-related and postpartum deaths in the United States. Despite being the world's richest country, the United States has the highest rate of maternal mortality in the developed world. The maternal sepsis initiative will be funded in part by the Biomedical Advanced Research and Development Authority (BARDA) Division of Research, Innovation, and Ventures (DRIVE), part of the United States Department of Health and Human Services (HHS) Office of the Assistant Secretary for Preparedness and Response.

Through the initiative, the risk factors associated with maternal sepsis will be identified and analyzed, including the demographic characteristics, co-morbidities, and obstetric procedures that may place some women at higher risk of developing the condition. A comprehensive dataset will be produced at the conclusion of the 18-month contract, which can be used to inform public policies and improve delivery of care to new and expectant parents. A limited, deidentified dataset will also be made publicly available as part of this initiative.

Additionally, the Rory Staunton Foundation will engage a multisector coalition of state and federal organizations invested in reducing maternal mortality rates. A series of audience-specific tools and materials designed to educate maternal care providers, patients, policymakers, and other key stakeholders will be developed and disseminated.

The Foundation will be joined in this endeavor by the Department's Office of Quality and Patient Safety and Northwell Health System's Department of Obstetrics and Gynecology.

Data 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 Department's website at the following link: https://www.health.ny.gov/diseases/conditions/sepsis/docs/external_dua.pdf.

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;
- continue to align measure specifications and data element definitions where possible with CMS for severe sepsis and septic shock to reduce hospital burden;
- 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; and
- continue work with the Pediatric Sepsis Advisory Group 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;
- continue to provide a mechanism for sharing of best practices among hospitals for early identification of sepsis patients and ensuring timely, appropriate treatment;
- continue to explore the potential for new outcomes-focused measures that can drive quality improvement; and
- continue to conduct research and collaborate with leading organizations to better understand and inform the public about the early detection and management of sepsis for all populations, including those impacted by maternal sepsis.

Alignment with Current Guidelines

The Department will continue to work with the Sepsis Advisory Group and Pediatric Sepsis Advisory Group 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 hypotension persisting despite adequate IV fluid resuscitation or severe sepsis and evidence of tissue hypoperfusion.

- 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.
- Start Time - the start time for reported bundle measures. For aggregated data and hospital specific measures, start time 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.
- 3-hour bundle (adult) - composite measure for patients with severe sepsis or septic shock that includes receipt of measurement of blood lactate level, blood culture collection prior to antibiotics, and broad-spectrum antibiotic administration within three hours or up to 24 hours before “start time” for patients with severe sepsis and septic shock. Patients who were excluded from the hospital’s protocol or from specific care interventions, or who died within 3 hours of start time are excluded from this measure.
- 6-hour bundle (adult) - composite measure that includes receipt of the 3-hour bundle within three hours of severe sepsis presentation, a repeat lactate level within 6 hours of severe sepsis start time if initial lactate level is elevated, resuscitation with crystalloid fluids within 3 hours of septic shock start time, fluid status assessment within 6 hours of septic shock start time, and vasopressor therapy within 6 hours of septic shock start time if persistent hypotension after fluid resuscitation is present. This measure represents the percentage of patients with septic shock (a subset of all patients) that received all of the 3-hour bundle interventions as well as the additional interventions described in this section. Patients who were excluded from the hospital’s protocol or from specific care interventions, or who died within 6 hours of start time are excluded from this measure.
- 1-hour bundle (pediatric) - composite measure for pediatric patients with severe sepsis or septic shock that includes receipt of parenteral fluids, blood cultures, and antibiotics within one hour of their presentation. Patients who were excluded from the hospital’s protocol or from specific care interventions, or who died within 1 hour of start time are excluded from this measure.

Technical Appendix A: Adult Sepsis Sampling Hospitals

Beginning in 2017, the Department 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 send a complete list of adult sepsis cases for sample selection on a monthly or quarterly basis. A random sample of these cases within each hospital are then selected by the Department and returned to the hospital for full data abstraction and submission, for a total of 400 adult cases submitted to the sepsis clinical database by each sampling 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 30 hospitals that participated in sampling for CY2018 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

PFI/ 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 (%)
(0001) Albany Medical Center Hospital	443	74.5	74.0	75.0	443	33.4	32.8	34.0	435	5.1	4.8	5.3
(1178) Bronx-Lebanon Hospital Center - Concourse Division	651	91.4	91.1	91.7	651	74.5	74.0	75.0	641	58.2	57.6	58.8
(0885) Brookhaven Memorial Hospital Medical Center Inc	436	96.8	96.7	96.9	436	76.8	76.6	77.0	428	64.7	64.5	65.0
(1626) Elmhurst Hospital Center	542	86.7	86.5	86.9	542	66.6	66.3	66.9	542	31.5	31.2	31.9
(1638) Forest Hills Hospital	381	84.3	84.2	84.3	381	68.2	68.1	68.4	372	29.6	29.4	29.7
(0925) Good Samaritan Hospital Medical Center	1,093	87.7	87.4	88.1	1,093	75.5	75.0	75.9	1,087	60.8	60.3	61.3
(0409) Highland Hospital	524	90.3	90.0	90.5	524	75.2	74.9	75.5	513	40.2	39.8	40.5
(1450) Lenox Hill Hospital	662	89.7	89.5	90.0	662	66.5	66.1	66.9	651	47.8	47.4	48.2
(1630) Long Island Jewish Medical Center	685	84.5	84.2	84.8	685	64.7	64.3	65.0	685	20.9	20.6	21.2
(0213) Mercy Hospital	588	86.4	86.1	86.7	588	71.1	70.7	71.4	579	41.6	41.2	42.0
(1439) Mount Sinai Beth Israel	613	90.2	90.0	90.5	613	74.2	73.9	74.6	587	49.6	49.1	50.0
(1456) Mount Sinai Hospital	1,197	88.2	87.7	88.7	1,197	62.6	61.8	63.3	1,191	29.5	28.8	30.2
(1466) Mount Sinai Roosevelt	590	88.5	88.3	88.7	590	73.9	73.6	74.2	584	43.5	43.2	43.8
(1469) Mount Sinai St. Luke's	980	87.8	87.5	88.0	980	66.4	66.0	66.8	969	39.6	39.2	40.0
(1637) New York Hospital Medical Center of Queens	1,917	80.6	80.2	81.0	1,917	63.4	62.9	63.9	1,834	43.9	43.4	44.4
(1464) New York Presbyterian Hospital - Columbia Presbyterian Center	555	87.9	87.4	88.4	555	71.5	70.8	72.2	520	32.7	31.9	33.4
(1458) New York Presbyterian Hospital - New York Weill Cornell Center	403	93.8	93.5	94.1	403	78.7	78.1	79.2	376	40.7	40.0	41.1
(1304) NYU Langone-Brooklyn	417	97.1	97.0	97.2	417	90.9	90.7	91.0	412	81.8	81.6	82.0
(1463) NYU Langone Hospitals	588	97.3	97.1	97.4	588	88.3	87.9	88.6	585	72.8	72.4	73.3
(0511) NYU Winthrop Hospital	976	91.7	91.5	91.9	976	80.7	80.4	81.1	960	59.5	59.0	59.9

PFI/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 (%)
(0699) Orange Regional Medical Ctr-Goshen Campus	774	85.5	85.2	85.8	774	73.8	73.4	74.1	765	42.9	42.5	43.3
(0411) Rochester General Hospital	756	80.8	80.4	81.2	756	61.8	61.3	62.2	756	26.9	26.4	27.3
(0527) South Nassau Communities Hospital	837	85.3	85.0	85.6	837	75.3	74.9	75.7	807	52.5	52.1	53.0
(0943) St Catherine of Siena Hospital	809	95.2	95.0	95.4	809	91.6	91.4	91.8	788	80.8	80.5	81.2
(0630) St Joseph's Hospital Health Center	574	85.2	84.9	85.5	574	66.7	66.4	67.1	566	33.9	33.5	34.3
(0005) St Peter's Hospital	728	88.6	88.3	88.9	728	62.9	62.5	63.3	712	40.4	40.0	40.9
(1740) Staten Island University Hosp-North	685	83.6	83.4	83.9	685	50.1	49.7	50.4	676	18.8	18.5	19.1
(0413) Strong Memorial Hospital	1,194	94.2	93.9	94.6	1,194	82.5	82.0	83.0	1,178	42.7	42.0	43.4
(0245) University Hospital	882	89.0	88.7	89.3	882	74.1	73.7	74.6	855	47.5	47.0	48.0
(0181) Vassar Brothers Medical Center	758	89.6	89.3	89.8	758	76.9	76.6	77.3	744	57.9	57.5	58.4
Statewide		87.53	87.20	87.77		69.54	69.09	69.87		41.11	40.39	41.23

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 2018 risk-adjusted mortality outcome includes all severe sepsis patient deaths that occurred within 30 days of the presentation of severe sepsis, including patients who were discharged alive from the hospital but expired within 30 days of presentation. Measurement of this outcome is facilitated by a match of sepsis clinical data to NYS vital statistics. For the purposes of this section, 'mortality' will be used to describe this outcome. In the first part of the risk adjustment process, a mortality model estimates the probability of 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 2018. 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 advance 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 2018 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 mortality is calculated for every patient from that hospital using the logistic regression model. These probabilities are summed over all the patients treated 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 among patients treated 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 they had a case mix that was identical to the average case mix across all hospitals in the state. 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 health care. While these data are 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. Variability in the measured outcome may also be considered a limitation of this model. In the 2018 methodology, patients discharged alive from the hospital who expire within 30 days of presentation are included in the outcome, which may include patients who expired for reasons unrelated to sepsis. However, the 30-day post-presentation mortality approach is expected to be a more realistic representation of sepsis mortality compared to using discharge status and this benefit outweighs potential error associated with this outcome methodology.

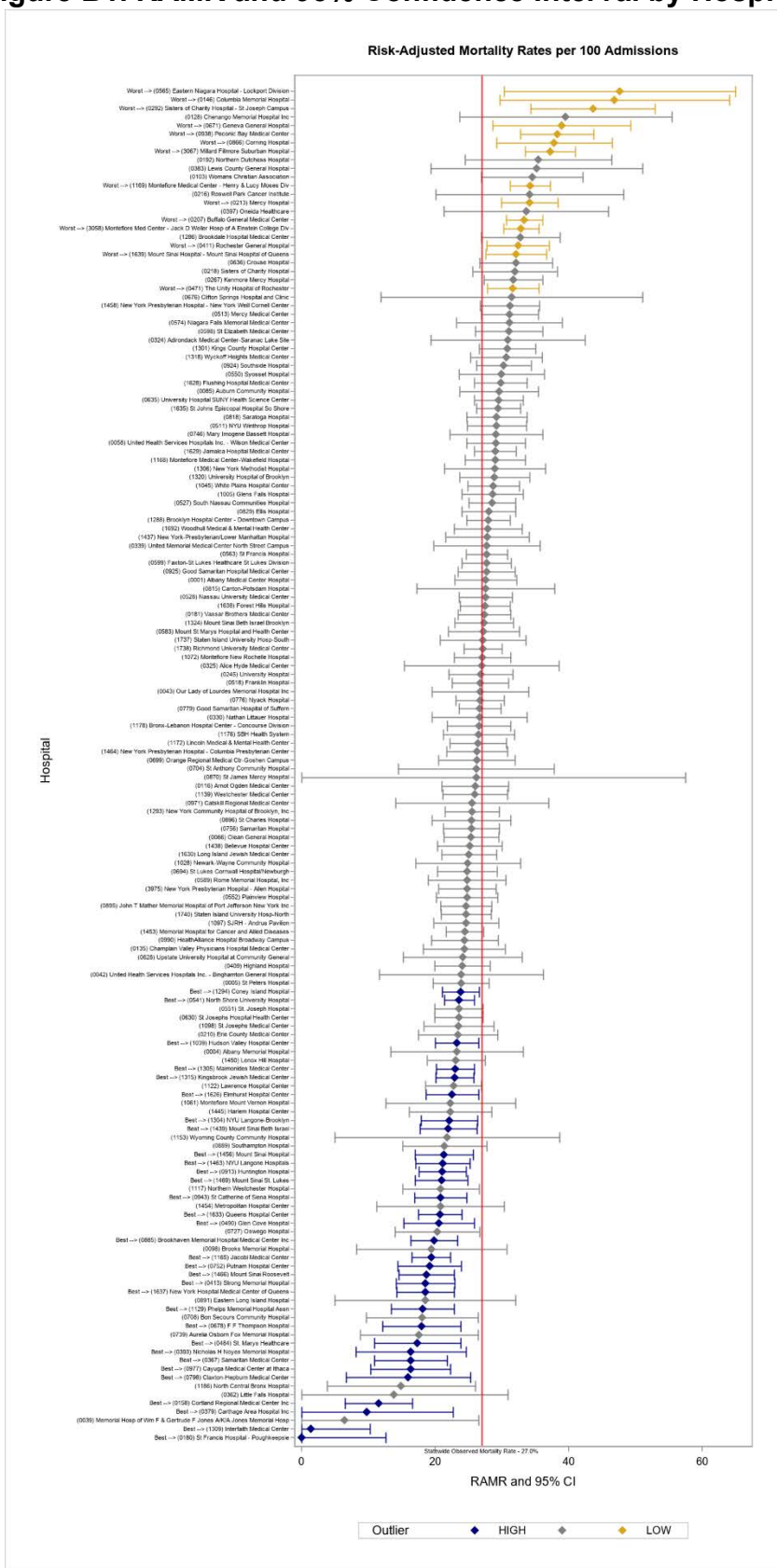
Table B1. Variables in the Risk-Adjusted Mortality Rate (RAMR) model

Main Effects or Interactions	Level of Effects	%	Coef.	Odds Ratio (95% CI)	p-value
Intercept			-6.12		<.001
Sex - Main Effect	Male	52.6%		Reference category	
	Female	47.4%	0.09	1.09 (1.04-1.16)	0.001
Race/Ethnicity- Main Effect	White, Non-Hispanic	61.4%		Reference category	
	Black, Non-Hispanic	15.9%	-0.07	0.93 (0.86-1.00)	0.062
	Hispanic	11.3%	-0.14	0.87 (0.79-0.95)	0.003
	Other, Non-Hispanic	9.6%	-0.16	0.86 (0.78-0.94)	0.002
	Other/Unknown Ethnicity	1.9%	0.08	1.09 (0.89-1.33)	0.400
Source of Admission- Main Effect	Non-Health Facility, POA	76.0%		Reference category	
	Clinic	3.1%	-0.34		0.081
	SNF/ICF	19.4%	0.81		<.001
	Another Health Care Facility	0.8%	-0.44		0.143
	Between Unit Transfer	0.3%	0.31		0.535
	Other	0.4%	-0.92		0.164
Platelet Count- Main Effect	No	76.8%		Reference category	
	Yes	23.2%	0.36	1.44 (1.35-1.53)	<.001
Altered Mental Status- Main Effect	No	59.0%		Reference category	
	Yes	41.0%	0.52	1.67 (1.58-1.77)	<.001
Lower Respiratory Infection- Main Effect	No	54.4%		Reference category	
	Yes	45.6%	0.35		<.001
Septic Shock Present- Main Effect	Severe Sepsis	56.8%		Reference category	
	Septic Shock	43.2%	0.37	1.45 (1.37-1.54)	<.001
Site of Infection - Main Effect	Skin	8.2%		Reference category	
	Urinary	23.3%	-0.38	0.69 (0.61-0.78)	<.001
	Respiratory	42.3%	0.15	1.17 (1.03-1.32)	0.015
	Gastrointestinal	10.8%	0.15	1.16 (1.01-1.33)	0.031
	Central Nervous System	0.5%	0.26	1.30 (0.85-1.98)	0.222
	Other/Unknown	15.0%	0.28	1.32 (1.17-1.50)	<.001
Mechanical Ventilation Prior to Presentation of Severe Sepsis - Main Effect	No	86.0%		Reference category	
	Yes	14.0%	0.45		<.001
Chronic Respiratory Failure- Main Effect	No	91.9%		Reference category	
	Yes	8.1%	-0.31	0.73 (0.66-0.81)	<.001
Metastatic Cancer- Main Effect	No	90.8%		Reference category	
	Yes	9.2%	2.19		<.001
Lymphoma Leukemia Multiple Myeloma - Main Effect	No	95.5%		Reference category	
	Yes	4.5%	0.16	1.18 (1.04-1.34)	0.012
Immune Modifying Medications - Main Effect	No	83.2%		Reference category	
	Yes	16.8%	-0.35	0.71 (0.65-0.77)	<.001
Chronic Liver Disease - Main Effect	No	94.7%		Reference category	
	Yes	5.3%	0.26	1.30 (1.15-1.47)	<.001
Diabetes - Main Effect	No	62.9%		Reference category	
	Yes	37.1%	-1.11		<.001
Age - Main Effect			0.05		<.001
Lactate - Main Effect			0.15	1.16 (1.15-1.17)	<.001
Comorbidity Count (square root) - Main Effect			1.43		<.001
	No, Yes	49.7%			

Main Effects or Interactions	Level of Effects	%	Coef.	Odds Ratio (95% CI)	p-value
Lower Respiratory Infection * Mechanical Ventilation Prior to Presentation of Severe Sepsis	No, No	4.7%			
	Yes, No	36.3%			
	Yes, Yes	9.3%	-0.39		<.001
Age * Metastatic Cancer			-0.02		<.001
Age * Comorbidity Count			-0.01		<.001
Comorbidity Count * Diabetes	Yes		0.44		<.001
Comorbidity Count * Source of Admission	Clinic		0.31		0.024
	SNF/ICF		-0.19		<.001
	Another Health Care Facility		0.54		0.023
	Between Unit Transfer		0.34		0.367
	Other		0.24		0.627

c statistic: 0.7820

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 NYS between 2015 and 2018.

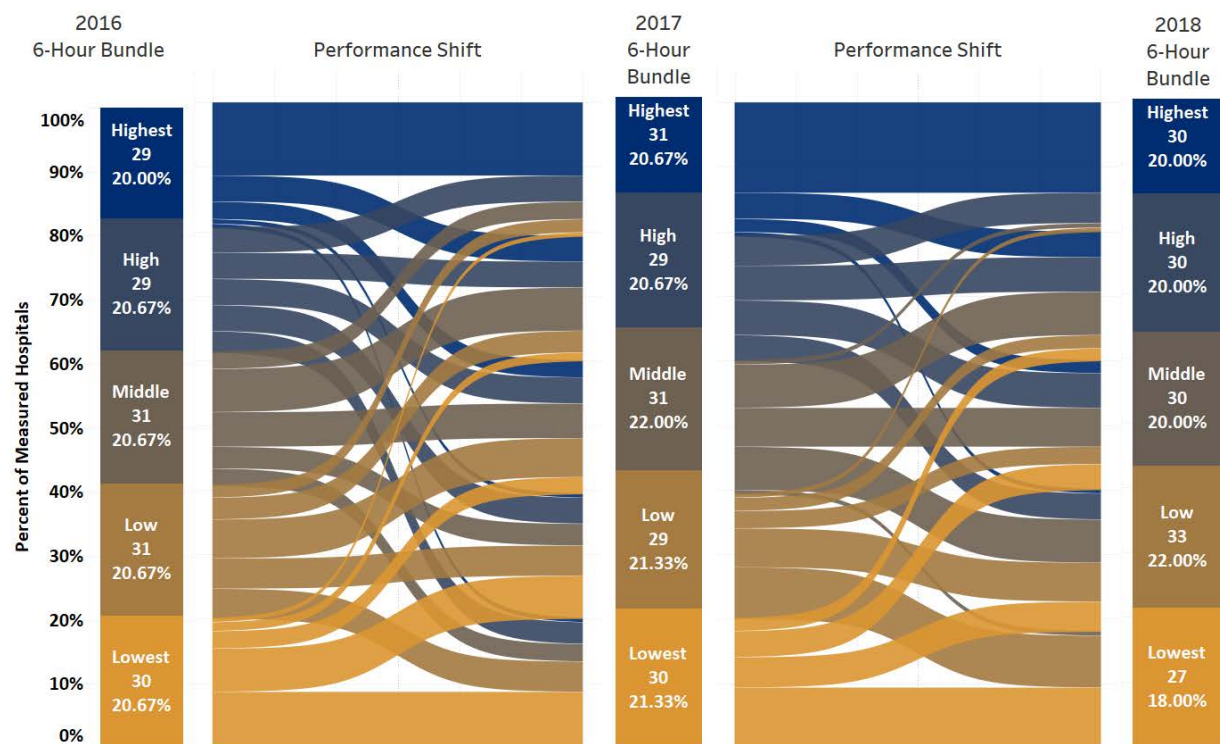
Table C1 contains statewide sepsis care compliance and outcome measure results for adults (age ≥ 18) and compliance measure results for pediatric (age < 18) sepsis patients in NYS from 2015 to 2018. This table includes the statewide crude in-hospital death rates per 100 sepsis patients along with the three-hour bundle, and composite bundle quality measures for adults, and presents the one-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.

Figure C1 charts the year over year movement of relative hospital composite (six-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 (CY) Comparison

Year	Crude Death Rate (Adult)	3-Hour Bundle Completion (Adult)	Composite Bundle Completion (Adult)	1-Hour Bundle Completion (Pediatric)
2018	23.41	69.54	41.11	42.67
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
Difference (CY17-CY18)	-0.29	4.56	6.15	6.73

Figure C1. Adult Sepsis 6-Hour Bundle Performance Trends: 2016 through 2018



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