



Scoring Methodology

FALL 2017

CONTENTS

What is the Hospital Safety Grade? 4

 Eligible Hospitals..... 4

 Measures 5

Measure Descriptions 9

 Process/Structural Measures..... 9

 Computerized Physician Order Entry (CPOE)..... 9

 ICU Physician Staffing (IPS) 9

 NQF Safe Practice scores 10

 Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Linear Mean Scores..... 10

 Outcome Measures 11

 Hospital-acquired infections..... 11

 Other HealthCare-Associated Infections 11

 Hospital-Acquired Condition (HAC) Rates 12

 AHRQ Patient Safety Indicator (PSI) Rates..... 12

Using Secondary Data Sources 13

 Computerized Physician Order Entry (CPOE)..... 13

 ICU Physician Staffing (IPS) 13

LEAPFROG
HOSPITAL
 SAFETY GRADE

Hospital-Acquired and Healthcare-Associated Infections	14
Weighting individual Measures	16
Evidence.....	16
Opportunity	16
Impact	16
Fall 2017 Standard Measure Weights.....	18
Scoring Methodology	19
Calculating Z-Scores.....	19
A Note About Negative Z-Scores	20
A Note about Extreme Values	21
Dealing With Missing Data.....	21
Calculating Weighted Measure Scores	22
Additional Scoring Information	23
Terms Used In Scoring And Public Reporting	23
Shared Medicare Provider Numbers	23
Updates To Data Used In The Leapfrog Hospital Safety Grade	24
Data From The Leapfrog Hospital Survey	24
How Hospitals Can Review Leapfrog Hospital Survey Results Prior To The Data Snapshot Date.....	24

LEAPFROG
HOSPITAL
SAFETY GRADE

Data From The AHA Annual Survey Or HIT Supplement..... 25

 How Hospitals Can Review AHA Survey and HIT Supplement Submissions Prior to the Data Snapshot Date 25

Data From The Centers For Medicare & Medicaid Services (CMS) 26

 How Hospitals Can Review CMS Data Prior to the Data Snapshot Date 26

Data from the Maryland Health Care Commission (MHCC) 26

 How Hospitals Can Review MHCC Data Prior to the Data Snapshot Date..... 27

How To Participate in the Leapfrog Hospital Survey 28

Leapfrog Hospital Safety Grade Help Desk 28

WHAT IS THE LEAPFROG HOSPITAL SAFETY GRADE?

The Leapfrog Hospital Safety Grade indicates how safe general acute-care hospitals are for patients. The Safety Grade includes data that patient safety experts use to compare hospitals. Publicly available data from the Centers for Medicare & Medicaid Services (CMS), the Leapfrog Hospital Survey, and secondary data sources such as the American Hospital Association's Annual Survey and HIT Supplement are weighted and then combined to produce a single, consumer-friendly composite score that is published as an A, B, C, D or F letter grade.

With the Leapfrog Hospital Safety Grade, The Leapfrog Group aims to educate and encourage consumers to consider safety when selecting a hospital for themselves or their families. In addition, we believe the grade will foster strong market incentives for hospitals to make safety a priority. Leapfrog Hospital Safety Grades are publicly reported at www.HospitalSafetyGrade.org.

ELIGIBLE HOSPITALS

The Leapfrog Group calculates a Safety Grade for approximately 2,600 general, acute-care hospitals for which there is sufficient publicly available data. Because publicly available data is limited for a variety of reasons, Leapfrog is not able to calculate a Safety Grade for every hospital in the U.S.

The Leapfrog Group is not able to calculate a Leapfrog Hospital Safety Grade for the following types of hospitals due to missing data:

- Critical access hospitals (CAH)
- Long-term care and rehabilitation facilities
- Mental health facilities
- Federal hospitals (e.g., Veterans Affairs, Indian Health Services, etc.)
- Specialty hospitals, including surgical centers and cancer hospitals
- Free-standing pediatric hospitals
- Hospitals in U.S. territories
- Hospitals that are missing data for **more than six (6)** process/structural measures or **more than five (5)** outcome measures

For the first time since the launch of the Leapfrog Hospital Safety Grade in June 2012, Leapfrog will publicly report Hospital Safety Grades for general, acute care hospitals in Maryland. Leapfrog has not been able to calculate Hospital Safety Grades for hospitals in the state of Maryland due to a federal waiver that exempts hospitals in Maryland from participating in the CMS Inpatient Quality Reporting Program. The Maryland Health Care Commission has agreed to generate the calculations for the Hospital-Acquired Condition measures and PSI measures used in the Hospital Safety Grade, and provide Leapfrog with the following data:

LEAPFROG HOSPITAL SAFETY GRADE

- The three HAC measures used in the Leapfrog Hospital Safety Grade:
 - Foreign Object Retained
 - Air Embolism
 - Falls and Trauma
- The seven PSI measures used in the Leapfrog Hospital Safety Grade:
 - PSI 3 Pressure Ulcer
 - PSI 4 Death among Surgical Patients with Serious Treatable Conditions
 - PSI 6 Iatrogenic Pneumothorax
 - PSI 11 Postoperative Respiratory Failure
 - PSI 12 Perioperative Pulmonary Embolism or Deep Vein Thrombosis
 - PSI 14 Postoperative Wound Dehiscence
 - PSI 15 Accidental Puncture of Laceration

The Maryland Health Services Cost Review Commission (HSCRC) Hospital Inpatient Discharge Data set for Medicare Fee-for-Service patients was used to generate all results. The data collection periods used to calculate the HAC rates are consistent with the data collection periods used by CMS for all hospitals. The data collection periods used to calculate the PSI rates have been modified to account for the date in which Maryland hospitals began to record present-on-admission (i.e. the data collection period for all PPS participating hospitals is 24 months, the data collection period for Maryland hospitals is 21 months).

MEASURES

The Leapfrog Hospital Safety Grade utilizes 27 national performance measures of patient safety that are collected and publicly reported by The Leapfrog Group and the Centers for Medicare & Medicaid Services (CMS) to produce a single composite score that represents a hospital's overall performance in keeping patients safe from preventable harm and medical errors. In addition, secondary data from the American Hospital Association's (AHA) Annual Surveyⁱ and HIT Supplementⁱⁱ or the Maryland Health Care Commission (for hospitals in Maryland only) are used to give hospitals as much credit as possible towards their Safety Grades.

The measure set is divided into two domains: (1) Process/Structural Measures and (2) Outcome Measures. Each domain represents 50% of the Leapfrog Hospital Safety Grade. The following table lists the 27 measures included in the Safety Grade, as well as the data source and reporting period for each measure. In some cases where a hospital's information was not available for a certain measure, Leapfrog used a [secondary data source](#) (as indicated in the table). In cases where a hospital's information is not available from any data source, Leapfrog has outlined a methodology for dealing with the [missing data](#).

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SAFETY GRADE

PROCESS AND STRUCTURAL MEASURES (12)				
Measure Name	Primary Data Source	Reporting Period	Secondary Data Source	Reporting Period
Computerized Physician Order Entry (CPOE)	2017 Leapfrog Hospital Survey	2017	AHA HIT Supplement ⁱⁱ	2016
ICU Physician Staffing (IPS)	2017 Leapfrog Hospital Survey	2017	AHA Annual Survey ⁱ	2015
Safe Practice 1: Leadership Structures and Systems	2017 Leapfrog Hospital Survey	2017	N/A	N/A
Safe Practice 2: Culture Measurement, Feedback and Intervention	2017 Leapfrog Hospital Survey	2017	N/A	N/A
Safe Practice 4: Identification and Mitigation of Risks and Hazards	2017 Leapfrog Hospital Survey	2017	N/A	N/A
Safe Practice 9: Nursing Workforce	2017 Leapfrog Hospital Survey	2017	N/A	N/A
Safe Practice 19: Hand Hygiene	2017 Leapfrog Hospital Survey	2017	N/A	N/A
H-COMP-1: Nurse Communication	CMS Hospital Compare	10/01/2015 - 09/30/2016	N/A	N/A
H-COMP-2: Doctor Communication	CMS Hospital Compare	10/01/2015 - 09/30/2016	N/A	N/A
H-COMP-3: Staff Responsiveness	CMS Hospital Compare	10/01/2015 - 09/30/2016	N/A	N/A
H-COMP-5: Communication about Medicines	CMS Hospital Compare	10/01/2015 - 09/30/2016	N/A	N/A
H-COMP-6: Discharge Information	CMS Hospital Compare	10/01/2015 - 09/30/2016	N/A	N/A

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HOSPITAL
SAFETY GRADE

OUTCOME MEASURES (15)				
Measure Name	Primary Data Source	Reporting Period	Secondary Data Source	Reporting Period
Foreign Object Retained	Data.cms.gov	07/01/2014 - 09/30/2015	MHCC**	07/01/2014 - 09/30/2015
Air Embolism	Data.cms.gov	07/01/2014 - 09/30/2015	MHCC**	07/01/2014 - 09/30/2015
Falls and Trauma	Data.cms.gov	07/01/2014 - 09/30/2015	MHCC**	07/01/2014 - 09/30/2015
CLABSI	2016 Leapfrog Hospital Survey	01/01/2015-06/30/2016*	CMS Hospital Compare	01/01/2015 - 12/31/2015*
CAUTI	2016 Leapfrog Hospital Survey	01/01/2015-06/30/2016*	CMS Hospital Compare	01/01/2015 - 12/31/2015*
SSI: Colon	2017 Leapfrog Hospital Survey	01/01/2016 - 12/31/2016	CMS Hospital Compare	10/01/2015 - 09/30/2016
MRSA	2017 Leapfrog Hospital Survey	01/01/2016 - 12/31/2016	CMS Hospital Compare	10/01/2015 - 09/30/2016
C. Diff.	2017 Leapfrog Hospital Survey	01/01/2016 - 12/31/2016	CMS Hospital Compare	10/01/2015 - 09/30/2016
PSI 3: Pressure Ulcer	CMS Hospital Compare	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015
PSI 4: Death Among Surgical Inpatients	CMS Hospital Compare	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015
PSI 6: Iatrogenic Pneumothorax	CMS Hospital Compare	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015
PSI 11: Postoperative Respiratory Failure	Data.cms.gov	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015
PSI 12: Postoperative PE/DVT	CMS Hospital Compare	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015
PSI 14: Postoperative Wound Dehiscence	CMS Hospital Compare	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015
PSI 15: Accidental Puncture or Laceration	CMS Hospital Compare	07/01/2013 - 06/30/2015†	MHCC**	10/01/2013 – 06/30/2015

* Due to an error at NHSN, CMS has suppressed all CLABSI and CAUTI data on Hospital Compare in the July update. Therefore, Leapfrog is required to use data sources from the Spring 2017 Leapfrog Hospital Safety Grade. This data includes CLABSIs and CAUTIs in ICUs only, and does not incorporate the updated NHSN baselines or SIR methodology. The MRSA, C. Diff. and SSI Colon measures were not impacted by this issue.

LEAPFROG
HOSPITAL
SAFETY GRADE

†CMS has identified an error in the AHRQ Software and has therefore not updated the PSI rates on Hospital Compare in the July update. Therefore, Leapfrog is required to use the PSI data from the Spring 2017 Leapfrog Hospital Safety Grade.

** The Maryland Health Services Cost Review Commission (HSCRC) Hospital Inpatient Discharge Data set for Medicare Fee-for-Service patients was used to generate all results. The data collection periods used to calculate the HAC rates are consistent with the data collection periods used by CMS for all hospitals. The data collection periods used to calculate the PSI rates have been modified to account for the date in which Maryland hospitals began to record present-on-admission (i.e. the data collection period for all PPS participating hospitals is 24 months, the data collection period for Maryland hospitals will be 21 months).

MEASURE DESCRIPTIONS

PROCESS/STRUCTURAL MEASURES

For Process/Structural Measures, a higher score is always better because these are measures of compliance with best practices in patient care.

COMPUTERIZED PHYSICIAN ORDER ENTRY (CPOE)

The CPOE measure is collected by The Leapfrog Group in the Leapfrog Hospital Survey. It measures a hospital's progress toward implementing a CPOE system and the efficacy of that system in alerting prescribers to common medication errors such as drug-drug interactions and drug-allergy interactions. CPOE is a categorical measure: hospitals receive either "Fully Meets the Standard," "Substantial Progress," "Some Progress," "Willing to Report," or "Declined to Respond" based on the information they submit via the Leapfrog Hospital Survey. A numerical score is assigned to each performance category from the Leapfrog Hospital Survey for the purposes of calculating a Leapfrog Hospital Safety Grade:

Leapfrog Performance Category	Numerical Score
Fully Meets the Standard	100
Substantial Progress	50
Some Progress	15
Willing to Report	5
Declined to Respond	See Uses of Secondary Data

For hospitals that did not submit a Leapfrog Hospital Survey by August 31, see [Using Secondary Data Sources](#) for detailed information on assigning a CPOE score to hospitals using the 2016 AHA HIT Supplement as a secondary data source.

ICU PHYSICIAN STAFFING (IPS)

The IPS measure is collected by The Leapfrog Group in the Leapfrog Hospital Survey. It measures a hospital's use of intensivists in ICUs. IPS is a categorical measure: hospitals receive either "Fully Meets the Standard," "Substantial Progress," "Some Progress," "Willing to Report," or "Declined to Respond" based on the information they submit via the Leapfrog Hospital Survey. A numerical score is assigned to each performance category from the Leapfrog Hospital Survey for the purposes of calculating a Leapfrog Hospital Safety Grade:

**LEAPFROG
HOSPITAL
SAFETY GRADE**

Leapfrog Performance Category	Numerical Score
Fully Meets the Standard	100
Substantial Progress	50
Some Progress	15
Willing to Report	5
Declined to Respond	See Uses of Secondary Data
Does Not Apply	Not Available (See Scoring Terms)

For hospitals that did not submit a Leapfrog Hospital Survey by August 31, see [Using Secondary Data Sources](#) for detailed information on assigning an IPS score to hospitals using the 2015 AHA Annual Survey as a secondary data source.

NQF SAFE PRACTICE SCORES

Five (5) NQF Safe Practice measures are collected by The Leapfrog Group on the Leapfrog Hospital Survey. They measure a hospital’s progress in implementing NQF-endorsed processes and protocols that promote safe patient care. The maximum possible score for each NQF Safe Practices ranges from 60 – 120. Individual scores for each Safe Practice are used to calculate the Leapfrog Hospital Safety Grade.

Leapfrog Performance Category	Possible Measure Score
SP 1: Culture of Safety Leadership Structures and Systems	0 - 120
SP 2: Culture Measurement, Feedback, and Intervention	0 - 120
SP 4: Risks and Hazards	0 - 100
SP 9: Nursing Workforce	0 - 100
SP 19: Hand Hygiene	0 - 60

There is no secondary data source for the NQF Safe Practice Scores. Therefore, hospitals that did not submit a 2017 Leapfrog Hospital Survey by August 31, will not have these measures included in their Safety Grade.

HOSPITAL CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SYSTEMS (HCAHPS) LINEAR MEAN SCORES

The Centers for Medicare & Medicaid Services (CMS), along with the Agency for Healthcare Research and Quality (AHRQ), developed the HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) Survey, also known as Hospital CAHPS®, to provide a standardized survey instrument and data collection methodology for measuring patients’ perspectives on hospital care. The HCAHPS Survey is administered to a random sample of patients continuously

**LEAPFROG
HOSPITAL
SAFETY GRADE**

throughout the year. CMS cleans, adjusts and analyzes the data, then publicly reports the results. Five of the seven composite topics are used in the Leapfrog Hospital Safety Grade. The composite topic linear mean score for each measure is calculated by CMS.

HCAHPS Composite Topic	Possible Measure Score
H-COMP-1: Nurse Communication	0 - 100
H-COMP-2: Doctor Communication	0 - 100
H-COMP-3: Staff Responsiveness	0 - 100
H-COMP-5: Communication about Medicines	0 - 100
H-COMP-6: Discharge Information	0 - 100

OUTCOME MEASURES

For Outcome Measures, a lower score is always better because these are measures of harm experienced by patients (e.g., central-line associated blood stream infections).

HOSPITAL-ACQUIRED INFECTIONS

The Leapfrog Hospital Safety Grade includes two (2) hospital-acquired infection measures: central-line associated bloodstream infections and catheter associated urinary tract infections.

Due to an error at NHSN, CMS has suppressed all CLABSI and CAUTI data on Hospital Compare in the July update. Therefore, Leapfrog will be required to use the CLABSI and CAUTI data from the Spring 2017 Leapfrog Hospital Safety Grade. This data includes CLABSIs and CAUTIs in ICUs only, and does not incorporate the updated NHSN baselines or SIR methodology.

The SIR for each infection measure is used to calculate the Leapfrog Hospital Safety Grade.

OTHER HEALTHCARE-ASSOCIATED INFECTIONS

The Leapfrog Hospital Safety Grade includes three (3) additional infection measures collected on the Leapfrog Hospital Survey where hospitals were asked to join Leapfrog’s NHSN group by August 24, provide an accurate NHSN ID in the Profile section of the online survey tool, and submit Section 7 Managing Serious

LEAPFROG HOSPITAL SAFETY GRADE

Errors: Surgical Site Infection following major colon surgery, lab identified MRSA Bacteremia among inpatients, and lab identified Clostridium Difficile among inpatients.

The SIR for each infection measure is used to calculate the Leapfrog Hospital Safety Grade. Information regarding the CDC's SIR methodology for SSI Colon, MRSA, and CDI can be found at: <http://www.cdc.gov/nhsn/acute-care-hospital/index.html>.

HOSPITAL-ACQUIRED CONDITION (HAC) RATES

The Leapfrog Hospital Safety Grade contains three (3) measures of Hospital-Acquired Conditions: Foreign Object Retained after Surgery, Air Embolism, and Falls/Trauma. CMS calculates these rates based on the claims it receives from hospitals that participate in the Inpatient Prospective Payment System (IPPS). The HAC measures are reported as a rate per 1,000 inpatient discharges by CMS, where zero is the best possible rate. This rate is used to calculate the Leapfrog Hospital Safety Grade.

The Maryland Health Services Cost Review Commission (HSCRC) Hospital Inpatient Discharge Data set for Medicare Fee-for-Service patients was used to generate results for the HAC rates for hospitals in Maryland. The data collection periods used to calculate the HAC rates are consistent with the data collection periods used by CMS for all hospitals.

AHRQ PATIENT SAFETY INDICATOR (PSI) RATES

The Leapfrog Hospital Safety Grade contains seven (7) AHRQ Patient Safety Indicators: PSI 3 Pressure Ulcer; PSI 4 Death from Serious Treatable Complications after Surgery; PSI 6 Iatrogenic Pneumothorax; PSI 11 Postoperative Respiratory Failure; PSI 12 Postoperative PE/DVT; PSI 14; and PSI 15 Accidental Puncture or Laceration.

CMS calculates these rates based on the claims it receives from hospitals that participate in the Inpatient Prospective Payment System (IPPS). The PSIs are reported as a rate per 1,000 patient discharges by CMS. This rate is used to calculate the Leapfrog Hospital Safety Grade.

The Maryland Health Services Cost Review Commission (HSCRC) Hospital Inpatient Discharge Data set for Medicare Fee-for-Service patients was used to generate results for the PSI rates for hospitals in Maryland. The data collection periods used to calculate the PSI rates have been modified to account for the date in which Maryland hospitals began to record present-on-admission (i.e. the data collection period for all PPS participating hospitals is 24 months, the data collection period for Maryland hospitals will be 21 months).

USING SECONDARY DATA SOURCES

Twelve (12) of the 27 measures that make up the Leapfrog Hospital Safety Grade are derived from the 2017 Leapfrog Hospital Survey. The Leapfrog Hospital Survey is a voluntary survey, and as such, hospitals may choose not to submit a survey. To address this gap in available data, the Leapfrog Hospital Safety Grade Methodology utilizes secondary data when available. This section describes the methods developed for using secondary data sources and dealing with missing data. For information on how to complete a free Leapfrog Hospital Survey, visit www.leapfroggroup.org/survey

COMPUTERIZED PHYSICIAN ORDER ENTRY (CPOE)

The Leapfrog Hospital Survey data is the **primary data source** for CPOE. Hospitals that report their progress in meeting the CPOE Standard on the 2017 Leapfrog Hospital Survey by August 31, 2017, will receive points based on their Leapfrog score for the CPOE measure.

The 2016 AHA HIT Supplement is a **secondary data source** for CPOE. A hospital’s response to the 2016 HIT Supplement question “Does your hospital have a CPOE system that allows for medication orders?” is used to assign the following score (refer to table 1.1).

Table 1.1 Points Earned for Hospitals That Did Not Submit a 2017 Leapfrog Hospital Survey by August 31, 2017

2016 AHA HIT Supplement Response	Points Earned	Notes
1 – fully implemented across all units	65	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
2 – fully implemented in at least one unit	20	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
3 – beginning to implement in at least one inpatient unit	20	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
4, 5, or 6	5	

If a hospital did not report to the Leapfrog or AHA survey on their CPOE implementation, the hospital receives a score of, and is publicly reported as, “Declined to Report.” This measure is then **not included** in calculating the Leapfrog Hospital Safety Grade.

ICU PHYSICIAN STAFFING (IPS)

The Leapfrog Hospital Survey data is the **primary data source** for IPS. Hospitals that report their progress in meeting the IPS Standard on the 2017 Leapfrog Hospital Survey by August 31, 2017, will receive points based on their Leapfrog score for the IPS measure.

LEAPFROG HOSPITAL SAFETY GRADE

The 2015 AHA Annual Survey is a **secondary data source** for IPS. A hospital’s responses to the 2015 AHA Annual Survey questions on the number of Med/Surg and/or Pediatric ICU beds, the closed/open status of the Med/Surg ICU and/or Pediatric ICUs, and number of FTEs of intensivists in Med/Surg and/or Pediatric ICUs are used to assign the following score (refer to Table 2.1).

Note 1: If a hospital reported zero (0) Med/Surg **AND** zero (0) Pediatric ICU beds, the hospital will receive a score of “Not Available” and this measure will not be included in calculating the Leapfrog Hospital Safety Grade.

Table 2.1 Points Earned for IPS for Hospitals That Did Not Submit a 2017 Leapfrog Hospital Survey by August 31, 2017

2014 AHA Annual Survey Response	Points Earned	Notes
If Med/Surg ICU is “Closed” and the number of intensivist FTEs is >6	85	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
If Med/Surg ICU is “Closed” and the number of intensivist FTEs is <=6 and >0	65	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
If Med/Surg ICU is “Open”	5	
If Pediatric ICU is “Closed” and the number of intensivist FTEs is >6	85	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
If Pediatric ICU is “Closed” and the number of intensivist FTEs is <=6 and >0	65	Score was imputed based on an analysis comparing hospital performance on Leapfrog and AHA surveys
If Pediatric ICU is “Open”	5	

EXAMPLE 1:

Med/Surg ICU is closed and staffed with 10 FTEs = 85

Pediatric ICU is open and staffed with 6 FTEs= 5

Overall IPS Score calculation: $85 + 5 = 90 / 2 = 45$

Overall IPS Score used to calculate Leapfrog Hospital Safety Grade = 45

EXAMPLE 2:

Med/Surg ICU is closed and staffed with 20 FTEs = 85

Pediatric ICU is closed and staffed with 5 FTEs = 65

Overall IPS Score calculation: $85 + 65 = 150 / 2 = 75$

Overall IPS Score used to calculate Leapfrog Hospital Safety Grade = 75

If a hospital did not report to Leapfrog or AHA on ICU Physician Staffing, the hospital receives a score of, and is publicly reported as, “Declined to Report.” This measure is **not included** in calculating the Leapfrog Hospital Safety Grade.

HOSPITAL-ACQUIRED AND HEALTHCARE-ASSOCIATED INFECTIONS

Due to an error at NHSN, CMS has suppressed all CLABSI and CAUTI data on Hospital Compare in the July update. Therefore, Leapfrog will be required to use the CLABSI and CAUTI data from the Spring 2017 Leapfrog Hospital Safety Grade. This data includes CLABSIs and CAUTIs in ICUs only, and does not incorporate the updated NHSN baselines or SIR methodology.

LEAPFROG
HOSPITAL
 SAFETY GRADE

For the other three infection measures, Facility-wide inpatient MRSA Blood Laboratory-identified Events, Facility-wide inpatient C. Diff. Laboratory-identified Events, and SSI: Colon, Leapfrog will use standardized infection ratios (SIRs) obtained directly from the CDC’s National Healthcare Safety Network (NHSN) application for hospitals that joined Leapfrog’s NHSN group by August 24, provided an accurate NHSN ID in the Profile section of the online survey tool, and submitted Section 7 Managing Serious Errors Leapfrog by August 31, 2017. If a hospital did not report to Leapfrog for this measure, CMS data will be used as a secondary data source.

Table 3.1 Hospitals That Did Not Submit a 2017 Leapfrog Hospital Survey by August 31, 2017

As Reported by CMS	Measure Score	Notes
Not Available (no locations or low volume)	N/A	Measure is not included in calculating the Leapfrog Hospital Safety Grade.
Standard Infection Ratio (SIR)	SIR	Measure is included in calculating the Leapfrog Hospital Safety Grade.

WEIGHTING INDIVIDUAL MEASURES

Each measure included in the Leapfrog Hospital Safety Grade is assigned a standard weight. The methodology to assign standard weights includes three criteria that reflect the quality of the measure. These criteria are: (1) Impact, (2) Evidence, and (3) Opportunity. These three (3) criteria are then combined using the following equation to compute a standard weight for each measure that represents its relative importance within the composite score: **[Evidence + (Opportunity x Impact)]**.

EVIDENCE

The Evidence Score for each individual measure is assigned a value of one (1) or two (2) using the following criteria:

- 1 = Supported by either suggestive clinical or epidemiological studies or theoretical rationale
- 2 = Supported by experimental, clinical, or epidemiological studies and strong theoretical rationale

OPPORTUNITY

The Opportunity Score for each individual measure is based on the Coefficient of Variation (Standard Deviation/Mean) of that measure, using the following formula: **[1 + (Standard Deviation/Mean)]**. The Opportunity Score is on a continuous scale that is capped at three (3). Any measure with an Opportunity Score above three (3) is assigned a three (3).

IMPACT

The Impact Score for each individual measure is comprised of two (2) parts, each of which is assigned a value from one (1) to three (3):

1. Number of patients affected
2. Severity of harm

The *number of patients affected* score is determined by the following:

- 0 = Extremely rare event (e.g. Air Embolism)
- 1 = Rare event (e.g., Foreign Object Retained After Surgery)
- 2 = Some patients in hospital affected (e.g., ICU Physician Staffing)

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HOSPITAL
SAFETY GRADE

- 3 = All patients in hospital affected (e.g., Hand Hygiene Safe Practice)

The *severity of harm* score is determined by the following:

- 1 = No direct evidence of harm or harm reduction (e.g., Hand Hygiene Safe Practice)
- 2 = Clear documentation of harm or harm reduction; adverse events (e.g., Foreign Object Retained After Surgery)
- 3 = Significant mortality reduction (more than 1,000 deaths or a 10% reduction in hospital wide mortality) (e.g., ICU Physician Staffing)

The values from each part are then added together to arrive at the overall Impact Score using the following criteria:

- 1 = Score of 2 (Low Impact)
- 2 = Score of 3-4 (Medium Impact) (e.g., Foreign Object Retained After Surgery; Hand Hygiene Safe Practice)
- 3 = Score of 5-6 (High Impact) (e.g., ICU Physician Staffing)

FALL 2017 STANDARD MEASURE WEIGHTS

Measure	Evidence Score	Opportunity Score	Impact Score	Measure Weight
Process/Structural Measure Domain (50%)				
CPOE	2	1.34	3	6.3%
IPS	2	1.96	3	8.3%
SP 1	1	1.06	2	3.3%
SP 2	1	1.16	2	3.5%
SP 4	1	1.10	2	3.4%
SP 9	1	1.08	3	4.5%
SP 19	2	1.12	2	4.5%
H-COMP-1	1	1.02	2	3.2%
H-COMP-2	1	1.02	2	3.2%
H-COMP-3	1	1.04	2	3.3%
H-COMP-5	1	1.04	2	3.3%
H-COMP-6	1	1.04	2	3.2%
Outcome Measure Domain (50%)				
HAC: Foreign Object	1	3.00	2	4.2%
HAC: Air Embolism	1	3.00	1	2.4%
HAC: Falls and Trauma	2	2.04	3	4.9%
CLABSI	2	1.94	3	4.7%
CAUTI	2	1.88	3	4.6%
SSI: Colon	2	1.81	2	3.4%
MRSA	2	1.79	3	4.4%
C. Diff.	2	1.46	3	3.8%
PSI 3	1	1.94	3	4.1%
PSI 4	1	1.14	2	2.0%
PSI 6	1	1.22	2	2.1%
PSI 11	1	1.33	2	2.2%
PSI 12	1	1.37	2	2.2%
PSI 14	1	1.16	2	2.0%
PSI 15	1	1.34	3	3.0%

SCORING METHODOLOGY

Once all data elements have been collected for a given hospital, the Leapfrog Hospital Safety Grade can be calculated using the methodology described below.

CALCULATING Z-SCORES

Z-Scores are used to standardize data from individual measures with different scales. This allows for the comparison of individual scores from different types of data. For example, a raw score of 5 on H-COMP-1: Nurse Communication cannot be compared to a CLABSI SIR of 0.87, as they are reported on different scales. In addition, Z-Scores can indicate to a hospital whether their score on a particular measure is above, below, or equal to the average hospital.

In the Scoring Methodology, a Z-Score is calculated for each measure that is applicable to a hospital. A Z-Score is calculated using a hospital’s actual measure score, the national mean for that measure, and the standard deviation for that measure. The Z-Score for each measure is calculated using the following formulas:

- **For Process/Structural Measures: $[\text{Hospital Score} - \text{Mean}] / \text{Standard Deviation}$**
- **For Outcome Measures: $[(\text{Mean} - \text{Hospital Score}) / \text{Standard Deviation}]$**

The following table includes the national mean and standard deviation for each measure. These values are used to calculate your hospital’s Z-Score using the formulas above. Please note, for display, means and standard deviations shown below are rounded to two or three decimal places. For scoring, these values are not rounded.

Process and Structural Measures	Mean	Standard Deviation
Computerized Physician Order Entry (CPOE)	78.21	26.25
ICU Physician Staffing (IPS)	45.62	43.71
Safe Practice 1: Leadership Structures and Systems	116.34	7.17
Safe Practice 2: Culture Measurement, Feedback, & Intervention	114.29	17.83
Safe Practice 4: Identification and Mitigation of Risks and Hazards	96.26	9.87
Safe Practice 9: Nursing Workforce	97.19	7.71
Safe Practice 19: Hand Hygiene	57.37	7.03
H-COMP-1: Nurse Communication	90.94	2.17

LEAPFROG
HOSPITAL
SAFETY GRADE

Process and Structural Measures	Mean	Standard Deviation
H-COMP-2: Doctor Communication	91.27	1.93
H-COMP-3: Staff Responsiveness	84.03	3.54
H-COMP-5: Communication about Medicines	77.79	3.40
H-COMP-6: Discharge Information	86.82	3.07

Outcome Measures	Mean	Standard Deviation
Foreign Object Retained	0.02	0.06
Air Embolism	0.002	0.01
Falls and Trauma	0.37	0.38
CLABSI	0.49	0.46
CAUTI	0.55	0.49
SSI: Colon	0.86	0.70
MRSA	0.95	0.75
C. Diff.	0.90	0.42
PSI 3: Pressure Ulcer	0.44	0.41
PSI 4: Death Among Surgical Inpatients	137.00	18.77
PSI 6: Iatrogenic Pneumothorax	0.41	0.09
PSI 11: Postoperative Respiratory Failure	13.92	4.64
PSI 12: Postoperative PE/DVT	5.12	1.88
PSI 14: Postoperative Wound Dehiscence	2.32	0.38
PSI 15: Accidental Puncture or Laceration	1.43	0.49

A NOTE ABOUT NEGATIVE Z-SCORES

To ensure that a single measure does not dominate a hospital's overall score in an unintended way, Leapfrog truncates negative Z-scores at -5.00. Hospitals that have a calculated Z-score below -5.00 on a measure will receive a modified Z-score of -5.00 on that measure.

A NOTE ABOUT EXTREME VALUES

For hospitals that have an “extreme” value for a particular measure (i.e. a value that exceeds the 99th percentile) Leapfrog “trims” the reported value to the 99th percentile. For example, if CMS has reported a rate of 0.50 per 1,000 patient discharges for the Foreign Object Retained measure for your hospital, Leapfrog has “trimmed” this rate to 0.379 (e.g. the 99th percentile). Therefore, on the Leapfrog Hospital Safety Grade website, you’ll see the measure score for Foreign Object Retained displayed as 0.379. Please see the table below for a list of the “trim” values for the Fall 2017 Leapfrog Hospital Safety Grade.

Measure	99 th Percentile
Foreign Object Retained	0.379
Air Embolism	0.122
Falls and Trauma	1.797
CLABSI	2.339
CAUTI	2.13
SSI: Colon	3.177
MRSA	3.61
C. Diff.	2.232
PSI 3: Pressure Ulcer	2.28
PSI 4: Death from Serious Treatable Complications after Surgery	184.68
PSI 6: Iatrogenic Pneumothorax	0.71
PSI 11: Postoperative Respiratory Failure	29.52
PSI 12: Postoperative Pulmonary Embolism (PE) or Deep Vein Thrombosis (DVT)	12.11
PSI 14: Postoperative Wound Dehiscence	3.69
PSI 15: Accidental Puncture or Laceration	2.97

DEALING WITH MISSING DATA

The weight of any measures that are missing for a hospital is redistributed to the other measures in the same measure domain. The new weight for each measure is determined by summing the weights of all available measures in the domain, and then dividing each measure weight by the total weight. The result is the new measure weight within that domain. Note that each domain contributes to 50% of the overall letter grade, and therefore must be divided in half to



find the final measure weight. For more information about how the measure weight redistribution is calculated and affects the overall score, please see the Leapfrog Hospital Safety Grade Calculator, which can be found on the last page of the [Review Website](#).

CALCULATING WEIGHTED MEASURE SCORES

To calculate your hospital's numerical safety score, multiply the Z-Score of each process measure by the weight assigned for that measure to get the weighted process measure score. (Remember, if your hospital had other process measures that were not available, your hospital's weight on any given process or structural measure may differ from the standard weight). Then, find the total process score by adding the weighted process measure scores of each process measure together. This is your hospital's overall weighted process score.

Then, multiply the Z-Score of each outcome measure by the weight assigned to that measure to get the weighted outcome measure score. (Remember, if your hospital had other outcome measures that were not available, your hospital's weight on any given measure may differ from the standard weight). Then, find the total outcome score by adding the weighted outcome measure scores of each outcome measure together. This is your hospital's overall weighted outcome score.

To calculate the overall Leapfrog Hospital Safety Grade for your hospital, add the weighted process score and the weighted outcome score calculated in the previous step. Add 3.0 to your score; this is done to normalize scores to a positive distribution.

To assist hospitals in calculating their numerical score, a calculator is available on the Hospital Safety Grade Review Website: www.hospitalsafetygrade.org/data-review.

ADDITIONAL SCORING INFORMATION

TERMS USED IN SCORING AND PUBLIC REPORTING

“Not Available” means that the hospital does not have data for this measure. This could be because the measure is related to a service the hospital does not provide. For example, a hospital that does not have an ICU would not be able to report data about ICUs. It could also be because the hospital had too few patients or cases to report data for a particular condition or procedure. A “Not Available” result does not mean that the hospital withheld information from the public.

“Declined to Report” means that a hospital was targeted to submit a Leapfrog Hospital Survey and did not. Therefore, the hospital is indicated as “Declined to Report” for that measure. For example, if a hospital did not report on its progress in implementing the Safe Practices, it will receive a score of “Declined to Report.” Measures scored as “Declined to Report” will not be used in calculating the overall score. As a result, the remainder of a hospital’s applicable measures will receive higher weights, because the weights from measures that the hospital did not report are allocated across the other measures.

SHARED MEDICARE PROVIDER NUMBERS

All hospitals that share a Medicare Provider Number (MPN) will be assigned the same source data as reported by CMS. Affected measures include the HCAHPS measures, Hospital-Acquired Condition measures, infection measures, and Patient Safety Indicators.

UPDATES TO DATA USED IN THE LEAPFROG HOSPITAL SAFETY GRADE

The Leapfrog Hospital Safety Grade relies on publicly reported data that hospitals have had the opportunity to review for accuracy. Therefore, Leapfrog does not allow hospitals to make updates to their data following the Data Snapshot Date. In January of each year, Leapfrog publishes the Data Snapshot Dates for each of the two Leapfrog Hospital Safety Grade public releases at <http://www.hospitalsafetygrade.org/for-hospitals/updates-and-timelines-for-hospitals>. Leapfrog publishes these dates to give hospitals and other stakeholders advance notice so they can be prepared to submit a Leapfrog Hospital Survey, submit an AHA Annual Survey and/or HIT Supplement, and track and review their performance on CMS measures used in the Leapfrog Hospital Safety Grade.

In addition, Leapfrog holds a courtesy three-week Safety Grade Review Period to give hospitals an additional opportunity to review the data that will be used to calculate their hospital's Safety Grade. During the three-week review period, if a hospital finds a data discrepancy (i.e. the measure score on the public report does not match the measure score on the Hospital Safety Grade Review Website) the hospital should contact the Help Desk immediately. Hospitals should double check the data source, measure name, and reporting period before contacting the Help Desk. The Help Desk will need to know which measure and score are in question and will need a copy of the public report that shows a different score than the one Leapfrog has recorded on the Safety Grade Review Website.

Please review the details below which describe Leapfrog's policy for accepting corrections from data sources used in the Leapfrog Hospital Safety Grade after the Data Snapshot Date.

DATA FROM THE LEAPFROG HOSPITAL SURVEY

During the three-week Safety Grade Review Period (September 13 – October 3), Leapfrog will only make corrections to a hospital's data from the Leapfrog Hospital Survey if a recording error is identified (i.e. we have recorded a different measure score than what is posted on our survey results website) or a scoring error is identified (i.e. Leapfrog has calculated an incorrect measure score based on the submitted responses and Leapfrog's published scoring algorithms). Updates to Leapfrog Hospital Survey data that are submitted after the Data Snapshot Date will **not** be included in the current Leapfrog Hospital Safety Grade. Hospitals submitting a Leapfrog Hospital Survey are urged to take advantage of the opportunity to review their survey results for accuracy and completeness prior to each of the two published Data Snapshot Dates.

HOW HOSPITALS CAN REVIEW LEAPFROG HOSPITAL SURVEY RESULTS PRIOR TO THE DATA SNAPSHOT DATE

The Leapfrog Hospital Survey is open from April 1 to December 31 of each year. Following the first reporting deadline (June 30), survey results are published monthly on a secure 'Hospital Details' page and a public website (www.leapfroggroup.org/compare-hospitals). Hospitals are urged to review their survey

**LEAPFROG
HOSPITAL
SAFETY GRADE**

results. Hospitals that identify any reporting errors are instructed to log back in the survey to submit a correction. Hospitals are able to correct and re-submit a previously submitted survey until the survey closes for the year. Note that corrections submitted after the Data Snapshot Date are not included in the current Leapfrog Hospital Safety Grade. Leapfrog has several automated processes in place to prevent hospitals from making data entry errors in the online survey tool and to enhance the overall accuracy of the survey results. Learn more at <http://www.leapfroggroup.org/survey-materials/data-accuracy>.

DATA FROM THE AHA ANNUAL SURVEY OR HIT SUPPLEMENT

During the three-week Safety Grade Review Period (September 13 – October 3), Leapfrog will only make corrections to a hospital’s data from the AHA Health Forum if the correction is issued to all individuals and organizations who license the AHA annual survey and/or HIT supplement data. Hospitals submitting an annual survey or HIT supplement to the AHA Health Forum are urged to take advantage of the opportunity to review their survey results for accuracy and completeness prior to and immediately following survey submission.

In addition, if Leapfrog identifies reporting scenarios which are logically inconsistent and therefore a likely reporting error with respect to a hospital’s ICU Physician Staffing data from the AHA Annual Survey, this data will not be used in calculating the Leapfrog Hospital Safety Grade. Examples of reporting scenarios that will result in ICU Physician Staffing data not being used are listed below:

EXAMPLES OF REPORTING ERRORS THAT WILL NOT BE USED IN THE LEAPFROG HOSPITAL SAFETY GRADE

Med/Surg ICU Data	Pediatric ICU Data
Zero (0) Med/Surg ICU beds and greater than zero (0) Med/Surg Intensivist FTE	Zero (0) Pediatric ICU beds and greater than zero (0) Pediatric Intensivist FTE
Zero (0) Med/Surg ICU beds and a ‘closed’ Med/Surg ICU	Zero (0) Pediatric ICU beds and a ‘closed’ Pediatric ICU
A ‘closed’ Med/Surg ICU and zero (0) Med/Surg Intensivist FTEs	A ‘closed’ Pediatric ICU and zero (0) Pediatric Intensivist FTEs

HOW HOSPITALS CAN REVIEW AHA SURVEY AND HIT SUPPLEMENT SUBMISSIONS PRIOR TO THE DATA SNAPSHOT DATE

The American Hospital Association’s (AHA) Annual Survey and HIT Supplement are administered by the AHA Health Forum. Both online and paper submissions are accepted. Online surveys are run through electronic data evaluation routines designed to test the reliability and validity of reported survey values prior to the electronic submission of the completed survey to the AHA. Error checks fall into two categories: (a) compares the hospital’s current year response against its response to the same question last year and (b) tests for the internal consistency of related questions across the survey. Where a value fails any test, an

LEAPFROG HOSPITAL SAFETY GRADE

error message is immediately returned to the respondent requesting that it either corrects the questionable value or explains in text format why the value is correct. A participant hospital can review its response and make as many changes as many times as deemed necessary prior to final submission. In addition, AHA data analysts apply an even larger version of the routine error checks to all submitted data regardless of online or paper submission. The AHA data analysts review potential problems in the last processing step prior to finalization. A responding hospital is free to modify its submitted survey up until the close of the data collection and data evaluation phases of the Annual Survey process. To correct a survey, hospitals must contact the Health Forum survey support facility.

DATA FROM THE CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)

During the three-week Safety Grade Review Period (September 13 – October 3), Leapfrog will only make corrections to a hospital's data from CMS if the correction is issued by CMS and posted on either the Hospital Compare website (www.hospitalcompare.hhs.gov) or the Data.CMS.Gov website <https://data.cms.gov/>. If a hospital has identified an error with a measure score published by CMS, and CMS cannot post a correction within the three-week review period, the measure score will not be used in calculating the hospital's Safety Grade, provided that the hospital can document that CMS has agreed to publicly issue a correction or remove the measure score from public reporting. Hospitals participating with CMS are urged to take advantage of the opportunity to participate in the CMS 30-day review periods.

HOW HOSPITALS CAN REVIEW CMS DATA PRIOR TO THE DATA SNAPSHOT DATE

CMS administers several hospital-based reporting and payment programs including the Inpatient Quality Reporting Program, HAC Reduction Program, and Value-based Purchasing Program. Several measures collected and calculated by CMS via its various hospital-based programs are used in the Leapfrog Hospital Safety Grade. CMS provides hospitals with a 30-day preview period before publishing measure scores on the Hospital Compare website and the Data.CMS.Gov website. More information is available at <https://qualitynet.org>.

DATA FROM THE MARYLAND HEALTH CARE COMMISSION (MHCC)

During the three-week Safety Grade Review Period (September 13 – October 3), Leapfrog will only make corrections to a hospital's data from CMS if the correction is issued by MHCC to Leapfrog within the Safety Grade Review Period. If a hospital has identified an error with a measure score published by MHCC, and MHCC cannot post a correction within the three-week review period, the measure score will not be used in calculating the hospital's Safety Grade, provided that the hospital can document that MHCC has agreed to publicly issue a correction or remove the measure score from public reporting. Hospitals are urged to take advantage of the review period offered by MHCC.



HOW HOSPITALS CAN REVIEW MHCC DATA PRIOR TO THE DATA SNAPSHOT DATE

MHCC currently reports certain Patient Safety Indicators (PSI) measures on the *Maryland Healthcare Quality Reports* consumer website using the HSCRC Inpatient Discharge Data Set. To support Leapfrog's nationwide transparency effort, MHCC agreed to generate similar PSI measure results for Maryland hospitals (Medicare patients only), in accordance with the specifications used by CMS for hospitals nationwide. They also agreed to generate three CMS Hospital Acquired Conditions (HAC) measures for Medicare FFS patients only. Individual hospital rates for each of these measures was sent out via email on August 1, 2017.



HOW TO PARTICIPATE IN THE LEAPFROG HOSPITAL SURVEY

If your hospital did **not** complete a 2017 Leapfrog Hospital Survey by August 31, results from the survey were not used to calculate your Leapfrog Hospital Safety Grade. Leapfrog will update Leapfrog Hospital Safety Grades again in the spring of 2018. If your hospital would like Leapfrog Hospital Survey Results included in the next Leapfrog Hospital Safety Grade, a 2017 Leapfrog Hospital Survey **must be submitted by December 31, 2017**. For more information about the Leapfrog Hospital Survey, visit <http://www.leapfroggroup.org/survey>.

LEAPFROG HOSPITAL SAFETY GRADE HELP DESK

If you have any questions regarding the scoring methodology, please contact the Help Desk at <https://leapfrogscore.zendesk.com>.

ⁱ Source AHA Annual Survey, Health Forum, LLC, a subsidiary of the American Hospital Association

ⁱⁱ AHA Annual Survey © 2015 Health Forum, LLC