Final Updates to the Leapfrog Hospital Safety Grade Methodology

Background

In September 2020, Leapfrog was notified by the American Hospital Association (AHA) that it would not be renewing Leapfrog's data license for their AHA Annual Survey and Health Information Technology Supplement datasets used in the Hospital Safety Grade. These two datasets have been used by Leapfrog since 2012 to assign scores to hospitals that decline to publicly report via the Leapfrog Hospital Survey on Computerized Physician Order Entry (CPOE), Bar Code Medication Administration (BCMA), and ICU Physician Staffing (IPS).

Each of these three measures reflect important, evidence-based structures that hospitals should implement to ensure the safest patient care, and each represent a significant weight within the Hospital Safety Grade. CPOE and BCMA both address the most prevalent patient safety issue – medication errors – and research has shown that staffing ICUs with intensivists (IPS) can reduce ICU mortality by up to 40%.

Final Changes to the Hospital Safety Grade Methodology

On January 12, 2021 Leapfrog published planned changes to the Hospital Safety Grade methodology and held a 3-week public comment period. We thank commenters for their insightful feedback and suggestions that helped us refine the methodology. This document summarizes the final changes that will be made to the scoring methodology effective with the spring 2021 Hospital Safety Grade.

In addition, this document includes other important information about the spring 2021 Safety Grade including:

- **Appendix A: Spring 2021 Leapfrog Safety Grade Measures, Reporting Periods, and Data Sources**
- **Appendix B: Responses to Public Comments**

Based on the public comments that we received, Leapfrog continued to work with a team including statisticians at Mathematica, Leapfrog's National Expert Panel, and scientific partners at Johns Hopkins Medicine to refine the imputation model. This final model, described below, includes the following refinements: removal of Step 2 from the model, a 4-round look back period rather than a six round look back period in Step 1, and twelve rather than 32 "like" hospital cohorts in Step 3.

First, Leapfrog received a number of public comments that the AHRQ Compendium of U.S. Health Systems, which Leapfrog proposed to use for defining which hospitals are part of which health system in Step 2, reflected health system configurations that were outdated by a couple of years. Leapfrog has not been able to identify an alternative publicly available data source that could help inform hospital assignments to health systems. Non-publicly available data sources are available for understanding hospital-health system relationships, but Leapfrog concluded that it would not be feasible to communicate those assignments to hospitals in a transparent way and to offer a process for correction. Therefore, *Step 2: Use the Mode of Scores Assigned to Hospitals in the Same Health System* has been removed from the model.

Effective with the spring 2021 Hospital Safety Grade, if a hospital is missing a publicly reported score from the Leapfrog Hospital Survey on Computerized Prescriber Order Entry (CPOE), Bar Code Medication Administration (BCMA), and/or ICU Physician Staffing (IPS), the following methodology will be used to calculate a measure score for each of the three applicable measures:

Step 1: Use a Hospital's Most Recent Score on the Measure

Applies to CPOE, BCMA, and IPS

If the hospital had a score assigned by Leapfrog in the previous four rounds of grades (i.e., fall 2020, spring 2020, fall 2019, spring 2019), the hospital will be assigned the most recent score from those four rounds.

If a hospital did not have a CPOE or BCMA measure score assigned by Leapfrog on any one of the measures in any of the previous four rounds of grades, Step 2 will be applied. If the hospital has not received a score on IPS in any of the previous four rounds of grades, the IPS score will be missing (i.e., displayed as "Not Available") and the measure will not be used to calculate the Hospital Safety Grade. The weight for the measure will be re-apportioned to other measures within the process/structural measure domain to calculate the grade. This is because some hospitals do not operate intensive care units and therefore an ICU staffing measure would not be applicable to the hospital.

Step 2: Use the Mean of the Scores Assigned to Other "Like" Hospitals in the U.S.

Applies to CPOE and BCMA only

For hospitals without scores on CPOE or BCMA from the past four rounds of Hospital Safety Grades, the hospital will be assigned to a cohort of other "like" hospitals using combinations of four hospital characteristics obtained from the most recent CMS Impact File (see Table 1): (1) urban/rural status (***URGEO***), (2) number of beds (***BEDS***), (3) teaching status (***Resident to Bed Ratio***), and (4) disproportionate share hospital patient percentage (***DSHPCT***). The hospital will then be assigned the mean score of that cohort, which will be calculated based on hospitals that received a score on the CPOE and/or BCMA measure in the current round (i.e., spring 2021) that is publicly reported from the Leapfrog Hospital Survey or imputed from Step 1 above.

Table 1. Defined Cohorts and Associated Characteristics for Step 2.

	Cohort 1	**Cohort 2**	**Cohort 3**	**Cohort 4**	**Cohort 5**	**Cohort 6**	**Cohort 7**	**Cohort 8**	**Cohort 9**	**Cohort 10**	**Cohort 11**	**Cohort 12**
Urban/ Rural Location *(Derived from CMS Impact Variable: URGEO)*	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Urban	Rural	Rural	Rural	Rural
Number of Beds (*Derived from CMS Impact Variable: BEDS*)	Small (<100 Beds)	Small (<100 Beds)	Small (<100 Beds)	Small (<100 Beds)	Large (100+ Beds)	Large (100+ Beds)	Large (100+ Beds)	Large (100+ Beds)	Small (<100 Beds)	Small (<100 Beds)	Large (100+ Beds)	Large (100+ Beds)
DSH Patient Percentage (*Derived from CMS Impact Variable: DSHPCT*)	Safety Net (DSH % in top 20%)	Not Safety Net (DSH % in bottom 80%)	Safety Net (DSH % in top 20%)	Not Safety Net (DSH % in bottom 80%)	Safety Net (DSH % in top 20%)	Not Safety Net (DSH % in bottom 80%)	Safety Net (DSH % in top 20%)	Not Safety Net (DSH % in bottom 80%)	Safety Net (DSH % in top 20%)	Not Safety Net (DSH % in bottom 80%)	Safety Net (DSH % in top 20%)	Not Safety Net (DSH % in bottom 80%)
Teaching Status (*Derived from CMS Impact Variable: Resident to Bed Ratio*)	Teaching (Rsdnt to Bed Ratio> 0)	Teaching (Rsdnt to Bed Ratio> 0)	Non-Teaching (Rsdnt to Bed Ratio= 0)	Non-Teaching (Rsdnt to Bed Ratio= 0)	Teaching (Rsdnt to Bed Ratio> 0)	Teaching (Rsdnt to Bed Ratio> 0)	Non-Teaching (Rsdnt to Bed Ratio= 0)	Non-Teaching (Rsdnt to Bed Ratio= 0)				

Important Notes

- The imputation process described above will be applied to ALL hospitals that are missing a score for CPOE and/or BCMA in Spring 2021, **including those hospitals that have always been missing a score for CPOE and/or BCMA and hospitals that have never received a Hospital Safety Grade. This will result in some hospitals receiving a Leapfrog Hospital Safety Grade for the first time.**
- If a hospital's score on a measure is imputed using the 2-step process described above, on Leapfrog's public Hospital Safety Grade Website, the data source for a hospital's score will reported as "Imputation Model Applied" and include a link to the scoring methodology where additional details can be found. The reporting period for a hospital's score will be reported as "Not Available."

Information on the spring 2021 timeline, including the Data Snapshot Date, Courtesy Review Period, and Letter Grade Embargo Period can be found on the Hospital Safety Grade Website at http://www.hospitalsafetygrade.org/for-hospitals/updates-and-timelines-for-hospitals.

Appendix A: Spring 2021 Leapfrog Safety Grade Measures, Reporting Periods, and Data Sources

PROCESS AND STRUCTURAL MEASURES (12)				
Measure Name	**Primary Data Source**	**Reporting Period**	**Secondary Data Source**	**Reporting Period**
Computerized Physician Order Entry (CPOE)	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	2019 or 2020	Imputation Model Applied	N/A
Bar Code Medication Administration (BCMA)	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	2019 or 2020	Imputation Model Applied	N/A
ICU Physician Staffing (IPS)	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	2019 or 2020	Imputation Model Applied	N/A
Safe Practice 1: Leadership Structures and Systems	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	2019 or 2020	N/A	N/A
Safe Practice 2: Culture Measurement, Feedback & Intervention	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	2019 or 2020	N/A	N/A
Safe Practice 9: Nursing Workforce	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	2019 or 2020	N/A	N/A
Hand Hygiene	2019 Leapfrog Hospital Survey or	2019 or 2020	N/A	N/A

PROCESS AND STRUCTURAL MEASURES (12)				
Measure Name	**Primary Data Source**	**Reporting Period**	**Secondary Data Source**	**Reporting Period**
	2020 Leapfrog Hospital Survey			
H-COMP-1: Nurse Communication	CMS	01/01/2019 – 12/31/2019	N/A	N/A
H-COMP-2: Doctor Communication	CMS	01/01/2019 – 12/31/2019	N/A	N/A
H-COMP-3: Staff Responsiveness	CMS	01/01/2019 – 12/31/2019	N/A	N/A
H-COMP-5: Communication about Medicines	CMS	01/01/2019 – 12/31/2019	N/A	N/A
H-COMP-6: Discharge Information	CMS	01/01/2019 – 12/31/2019	N/A	N/A

OUTCOME MEASURES (15)				
Measure Name	**Primary Data Source**	**Reporting Period**	**Secondary Data Source**	**Reporting Period**
Foreign Object Retained	CMS	07/01/2017 – 06/30/2019	N/A	N/A
Air Embolism	CMS	07/01/2017 – 06/30/2019	N/A	N/A
Falls and Trauma	CMS	07/01/2017 – 06/30/2019	N/A	N/A
CLABSI	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	07/01/2018 – 06/30/2019 or 01/01/2019 – 12/31/2019	CMS	01/01/2019 – 12/31/2019
CAUTI	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	07/01/2018 – 06/30/2019 or 01/01/2019 – 12/31/2019	CMS	01/01/2019 – 12/31/2019
SSI: Colon	2019 Leapfrog Hospital Survey or	07/01/2018 – 06/30/2019 or 01/01/2019 – 12/31/2019	CMS	01/01/2019 – 12/31/2019

OUTCOME MEASURES (15)				
Measure Name	**Primary Data Source**	**Reporting Period**	**Secondary Data Source**	**Reporting Period**
	2020 Leapfrog Hospital Survey			
MRSA	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	07/01/2018 – 06/30/2019 or 01/01/2019 – 12/31/2019	CMS	01/01/2019 – 12/31/2019
C. Diff.	2019 Leapfrog Hospital Survey or 2020 Leapfrog Hospital Survey	07/01/2018 – 06/30/2019 or 01/01/2019 – 12/31/2019	CMS	01/01/2019 – 12/31/2019
PSI 3: Pressure Ulcer Rate	CMS	07/01/2017 – 06/30/2019	N/A	N/A
PSI 4: Death Rate among Surgical Inpatients with Serious Treatable Conditions	CMS	07/01/2017 – 06/30/2019	N/A	N/A
PSI 6: Iatrogenic Pneumothorax Rate	CMS	07/01/2017 – 06/30/2019	N/A	N/A
PSI 11: Postoperative Respiratory Failure Rate	CMS	07/01/2017 – 06/30/2019	N/A	N/A
PSI 12: Perioperative PE/DVT Rate	CMS	07/01/2017 – 06/30/2019	N/A	N/A
PSI 14: Postoperative Wound Dehiscence Rate	CMS	07/01/2017 – 06/30/2019	N/A	N/A
PSI 15: Unrecognized Abdominopelvic Accidental Puncture/Laceration Rate	CMS	07/01/2017 – 06/30/2019	N/A	N/A

Appendix B: Responses to Public Comments

Below are responses to public comments received in response to the Planned Changes announced on January 12, 2021.

Some commenters shared their concern about Leapfrog using the AHRQ Compendium of U.S. Health Systems file for assigning hospitals to health systems for Step 2 (*Use the Mode of Scores Assigned to Hospitals in the Same Health System)*, as the file reflected health system configurations that were often outdated by a couple of years.

Leapfrog conducted follow-up phone calls with a number of hospitals that expressed this concern and reached the conclusion that using the AHRQ Compendium file would indeed pose challenges for accurate hospital-health system assignments. Leapfrog explored if other publicly available sources for this information were available but did not identify any viable alternatives. Based on these limitations, the decision was made to remove this step from the imputation methodology.

Some commenters shared their concern that Leapfrog's proposal to impute scores using scores up to three years old for Step 1 (*Use a Hospital's Most Recent Score on the Measure*) would result in Leapfrog using data that was too outdated.

Based on the public comments, Leapfrog reconsidered the "look back" period that it plans to use for Step 1. Leapfrog agreed it was to best to adjust the "look back" period to two years (4 rounds).

Some commenters shared their concern that hospitals did not receive advance notice that Leapfrog was not going to use AHA Survey data in spring 2021 grades before the close of the 2020 Leapfrog Hospital Survey reporting cycle. Hospitals indicated that if they would have known this, they might have made a different decision about completing a 2020 survey.

Leapfrog notified hospitals after receiving notification from AHA, at the start of the fall 2020 Safety Grade Review Period in October 2020. The information was included, both in the scoring methodology document and on the Safety Grade Review Website. In addition, with the impact of COVID-19, Leapfrog offered hospitals the opportunity to maintain their 2019 Leapfrog Hospital Survey Results on its public reporting website and for use in the fall 2020 and spring 2021 Hospital Safety Grade and some hospitals took advantage of that opportunity.

Some commenters shared their concern that Leapfrog's proposal to impute scores for hospitals that do not report to the Leapfrog Hospital Survey as performing at the mean could incentivize hospitals to take the imputed score instead of participating in the Survey. Commenters suggested this is unfair to hospitals that demonstrate the commitment and transparency to report to the Leapfrog Survey. One commenter suggested Leapfrog input the 10th or 25th percentile instead of the national mean. Another hospital suggested that all missing data should receive a score of zero.

Leapfrog agrees that the best approach is to use data that a hospital shares with Leapfrog voluntarily for public reporting. But where hospitals choose not to voluntarily share these data, Leapfrog uses expert consensus to derive a score closest to a hospital's actual performance. The idea of assigning an explicit penalty (whether that be imputing the 10th percentile, 25th percentile, or zero) remains a potential option and one that some experts believe has merit, particularly with regard to the significant evidence of correlation between transparency and higher performance. To date expert consensus supports imputation of the mean for the Hospital Safety Grade scoring, as long as secondary data sources are unavailable, but the issue will be revisited by the Expert Panel on an annual basis.

Some commenters asked how imputed scores will be reflected on the public Hospital Safety Grade website.

Hospital scores that are imputed will be shown on the public website as "Imputation Methodology Applied."

Some commenters expressed concern over the small sample size potential within some of the proposed cohorts and concern that the cohort assignments are not transparent.

Based on public comments that expressed concerns about small sample sizes in some of the proposed cohorts, Leapfrog merged some of the proposed cohorts together. The cohorts that were merged together were those that had small numbers of hospitals and/or where hospital performance was negligibly different from those in a near-same cohort. Leapfrog also simplified the number of bed categories from four to two– which will now stratify hospitals into "less than 100 beds" and "100 and more beds." These collective changes reduce the number of cohorts from the original 32 down to 12.

Leapfrog defines the 12 cohorts that will be used for assigning hospitals into "like" categories (Table 1 of this document). The characteristics used for defining hospitals into "like" groups include: urbanicity, number of beds, safety net status, and teaching status. Note that these cohorts could be redefined in future rounds.

In addition, the mean scores for each cohort for the CPOE and BCMA measures will be published in the Safety Grade Scoring Methodology along with instructions for hospitals to review the data in the IMPACT file that was used to place them into a cohort.