# Nationwide and Regional Inpatient and Emergency Department Benchmark Report

**Commissioned by Sound Physicians**

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# Executive Summary

Sound Inpatient Physicians, Inc. (Sound Physicians) retained Milliman, Inc. (Milliman) to develop benchmarks for various inpatient metrics, both at the nationwide and regional level of detail. These metrics are calculated in a manner that aligns with how these metrics are measured by Sound Physicians, to allow for appropriate comparisons. This report presents the methodology of our analysis.

We developed benchmarks for both the commercial and Medicare populations for the following metrics:

1.  Inpatient admission rate after an intense Emergency Department (ED) visit. Intense visits are defined as level 4 or 5 visits, or visits in which the patient is admitted to an inpatient hospital.

2.  Medical and surgical inpatient readmission rates, using the CMS readmission methodology

3.  Inpatient discharge rates to the following locations: Skilled Nursing Facility (SNF), Inpatient Rehab Facility (IRF), Long Term Acute Care Hospital (LTACH), Home Health (HH), and Home

# Methodology

## DATA SOURCES

*Medicare*

Medicare inpatient readmission and discharge rate benchmarks are based on the CY 2018 100% CMS Standard Analytical Files (SAF), which include all inpatient and outpatient facility claims for 100% of the Medicare Fee For Service (FFS) population.

Medicare inpatient admission rates after an intense Emergency Department visit benchmarks are based on the CY 2017-2019 5% CMS Standard Analytical Files (SAF), which include all claims for 5% of the Medicare Fee For Service (FFS) population.

*Commercial*

We developed commercial benchmarks using the 2018 Milliman Consolidated HCG Sources Database (CHSD). This is a database of claims and membership information, consisting of approximately 30 million lives from multiple contributors across the United States. This data was de-identified to protect contributors.

Medicare Severity Diagnosis-Related Group (MS DRG) service type was taken from the Inpatient Prospective Payment System (IPPS) FY 2019 final rule table 5 (v36 MS DRGs) released by CMS.

## CALCULATION OF METRICS

We calculated three metrics for both the commercial and Medicare populations. All benchmarks were calculated using CY 2018 data.

1.  Inpatient admission rate after an intense Emergency Department (ED) visit.

    a.  Level 4 or 5 ED visits were identified by professional claims with one of the following HCPCS codes: 99284, 99285, G0383, G0384. These HCPCS correspond to level 4 and 5 ED visits.  Outpatient facility claims were not used to identify these visits, since ED and inpatient visits are often billed together on a single bill.

    b.  All inpatient stays that originated in the ED (based on the revenue codes included in the inpatient claim) were assumed to be the result of an intense ED visit. It is our understanding that this methodology is consistent with how this rate is calculated by Sound Physicians. These instances were counted as both an inpatient admission and as an intense ED visit, such that the total number of intense ED visits is

equal to the total number of inpatient stays that originated in the ED plus the number of level 4 or 5 ED visits that did not result in an inpatient stay.

   c.   We identified inpatient admissions that take place within one day of the ED visit identified above. Note that this includes inpatient admissions that took place at any facility, and does not necessarily correspond to the outpatient facility of the ED visit. With the data available, it was not possible to match inpatient and outpatient facilities within the same facility.

   d.   The admission rate was calculated as the number of inpatient admissions that follow an ED visit, divided by the total number of intense ED visits.

   e.   Note that maternity cases are included in the numerator and denominator of this metric. This has a significant impact on the rate calculated.

2.   Medical and surgical inpatient readmission rates.

   a.   We identified anchor admissions (admissions eligible for a readmission) and readmissions, consistent with the CMS readmission definition (30 days, all causes)[1].

   b.   We identified medical and surgical admissions using the MS DRG assigned to each inpatient admission. DRGs related to the following services were excluded from our analysis: Alcohol/Drug Dependence, Maternity/Newborn, and Mental Disorders. In addition, the following DRGs were excluded: 919-921, 939-951, and 981-999. These DRGs are for situations such as complications of treatment, contacts with health services, and operating room procedures unrelated to principal diagnosis.

   c.   Note that we excluded December anchor admissions and their resulting readmissions from our analysis as these admissions do not have sufficient runout to determine if a readmission occurred.

   d.   The readmission rates were calculated as the number of readmissions divided by the number of anchor admissions.

   e.   Note that observed readmission rates are not adjusted for the mix of admissions in the initial inpatient stay.  Differences in readmission rates may be explained, at least in part, by differences in case mix.

3.   Inpatient discharge rates to the following locations: Skilled Nursing Facility (SNF), Inpatient Rehab Facility (IRF), Long Term Acute Care Hospital (LTACH), Home Health (HH), and Home.

   a.   Discharges to each of the locations above were determined using the following discharge status codes; we relied on the discharge status reported on the inpatient admission data and did not review the subsequent claims data to confirm that the inpatient admission data correctly identified the location of discharge:

         i.    SNF – Discharge status 03

         ii.   IRF – Discharge Status 62

         iii.  LTACH – Discharge Status 63

         iv.   HH – Discharge Status 06

         v.    Home – Discharge Status 01

   b.   Discharge rates were calculated as the number of inpatient admissions discharged to the locations above divided by the total number of inpatient admissions.  The total number of admissions excludes those with discharge status 30 ("still a patient").

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[1] https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeedbackProgram/Downloads/2015-ACR-MIF.pdf

    c.    Note that observed discharge rates are not adjusted to the mix of admissions in the underlying inpatient stay. Differences in discharge rates may be explained, at least in part, by differences in case mix.

All of the metrics reported reflect raw unadjusted benchmarks. We did not make any adjustments to the data to normalize HRRs for differences in population mix such as age, gender and health status.

## HOSPITAL REFERRAL REGION ASSIGNMENT

We calculated all metrics at the Hospital Referral Region (HRR) level[2]. Claims were mapped to HRR using the provider's zip code. Some judgment was required in mapping the commercial data to HRR.

## DECILE BENCHMARK CALCULATIONS

We developed the national benchmark metrics by stratifying HRRs into deciles. For each metric, we sorted and stratified HRRs so that a roughly equal number of the denominator measure is in each decile. For example, for the readmission metric, there are roughly the same number of anchor admissions in each decile. The deciles do not reflect any adjustment for differences in local population risk characteristics.

For ED admissions, readmissions, SNF discharges, IRF discharges, and LTACH discharges, a lower percentage is considered to be consistent with favorable experience, while for HH discharges and home discharges, a higher percentage is consistent with favorable experience. Note that it is not necessarily the case that higher rates of HH discharges are favorable. This framework was chosen for this analysis in order to align with the framework of analytics performed by Sound Physicians.

The mean metrics across the entire population were also calculated along with the median HRR.

We calculated deciles independently for each metric and therefore, a given HRR may be in a different decile for each metric.

## HOSPITAL REFERRAL REGION CREDIBILITY

Some HRRs, particularly for the commercial benchmarks, did not have enough data available to be determined credible and as such were not included in the regional benchmarks. In order to calculate an HRR's credibility, we used the standard formula for calculating the needed sample size for a proportion statistic such that the denominator of each metric (n) must satisfy the statement of inequality below:

$$n \geq \left(\frac{Z_c \sigma}{ME}\right)^2$$

Where $Z_c$ is the Z-value for confidence level $c$, $\sigma$ is the standard deviation of the population, and *ME* is the margin of error.

$Z_c$ was calculated using a 95% confidence interval.

$\sigma^2$ was calculated as $p(1-p)$ where $p$ is the population proportion. A conservative $p$ was chosen for each metric to ensure that the standard deviation was sufficiently large to apply in each HRR.

*ME* was calculated as a percentage of the nationwide rate for each metric, with maximum and minimum thresholds put in place to ensure a reasonable *ME*.

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[2] https://atlasdata.dartmouth.edu/downloads/supplemental

# Caveats and Limitations

Milliman's work is prepared solely for the internal business use of Sound Physicians. Any use of the work product with other parties must be approved in writing in advance by Milliman and must be accompanied by a link to the published version of this report. Milliman does not intend to benefit any third party recipient of its work product, even if Milliman consents to the release of its work product to such third party.

The benchmarking methodology described here was designed to align with data sources and analysis techniques that are available to Sound Physicians. As such, there are limitations discussed in the Methodology section of the report that limit the applicability of these benchmarks for any other purposes.

In performing this analysis, we relied on data from a variety of sources. We have not audited or verified this data and other information. If the underlying data or information is inaccurate or incomplete, the results of our analysis may likewise be inaccurate or incomplete. We performed a limited review of the data used directly in our analysis for reasonableness and consistency and have not found material defects in the data. If there are material defects in the data, it is possible that they would be uncovered by a detailed, systematic review and comparison of the data to search for data values that are questionable or for relationships that are materially inconsistent. Such a review was beyond the scope of our assignment.

Where we relied on models developed by others, we have made a reasonable effort to understand the intended purpose, general operation, dependencies and sensitivities of those models.

The services provided for this project are subject to the terms of the signed Consulting Services Agreement between Milliman and Sound Physicians dated December 18, 2020 and the engagement agreement between Milliman and Sound Physicians, also dated December 18, 2020.

Guidelines issued by the American Academy of Actuaries require actuaries to include their professional qualifications in all actuarial communications. The authors of this report are members of the American Academy of Actuaries, and meet the qualification standards for performing the analyses in this report.