DENNISTON DATA
The Healthcare Transparency Company

www.DennistonData.com

Provider Ranking System™ (PRS) Methodology

Introduction

Denniston Data Inc. (DDI) launched *Provider Ranking System*™ (PRS) in 2020, a proprietary, data-driven platform designed to deliver objective, evidence-based rankings of healthcare providers across the United States. Using data science on a comprehensive claims dataset of over 65 billion data points spanning over 10 years, PRS evaluates more than two million providers to empower stakeholders—health plans, employers, concierge teams, and referring physicians—with actionable insights for optimizing healthcare quality and cost efficiency. By prioritizing provider experience and clinical outcomes, PRS transforms the evaluation of medical providers, offering unparalleled transparency and precision.

Data Foundation

PRS was built initially upon the largest and most robust repository of healthcare claims data in the United States, sourced primarily from the Centers for Medicare and Medicaid Services (CMS), which accounts for approximately 45% of the nation's $4 trillion annual

healthcare expenditure. This year PRS adds Medicare Advantage, commercial health, and workers' comp claims data, representing the universe of medical care in the USA[1].

The dataset currently encompasses:

- **Granularity**: Over 6 billion data points annually, totaling over 65 billion across a 12-year longitudinal period up to the most recent available federal fiscal year.
- **Provider Coverage**: Over two million unique providers, including physicians, nurse practitioners, physical therapists, chiropractors, hospitals, ambulatory care centers, and group practices identified by National Provider Identifier (NPI).
- **Volume & Insights Engine**: Detailed Healthcare Common Procedure Coding System (HCPCS) and DRG codes capturing the frequency, type, and cost (billed and allowed) of medical procedures performed by individuals and facilities.
    - Who does what, where, how much, and how well, relative to their peers.
- **Temporal Depth**: Annual updates on a CMS fiscal year basis (October 1–September 30), ensuring current and historical insights.

All data undergoes rigorous cleaning, validation, and error-checking processes to eliminate inconsistencies and outliers, ensuring the highest standards of accuracy and reliability. This expansive dataset enables PRS to deliver granular, provider-specific, specialty-specific, market-specific and procedure-specific rankings with unmatched precision.

Methodological Framework

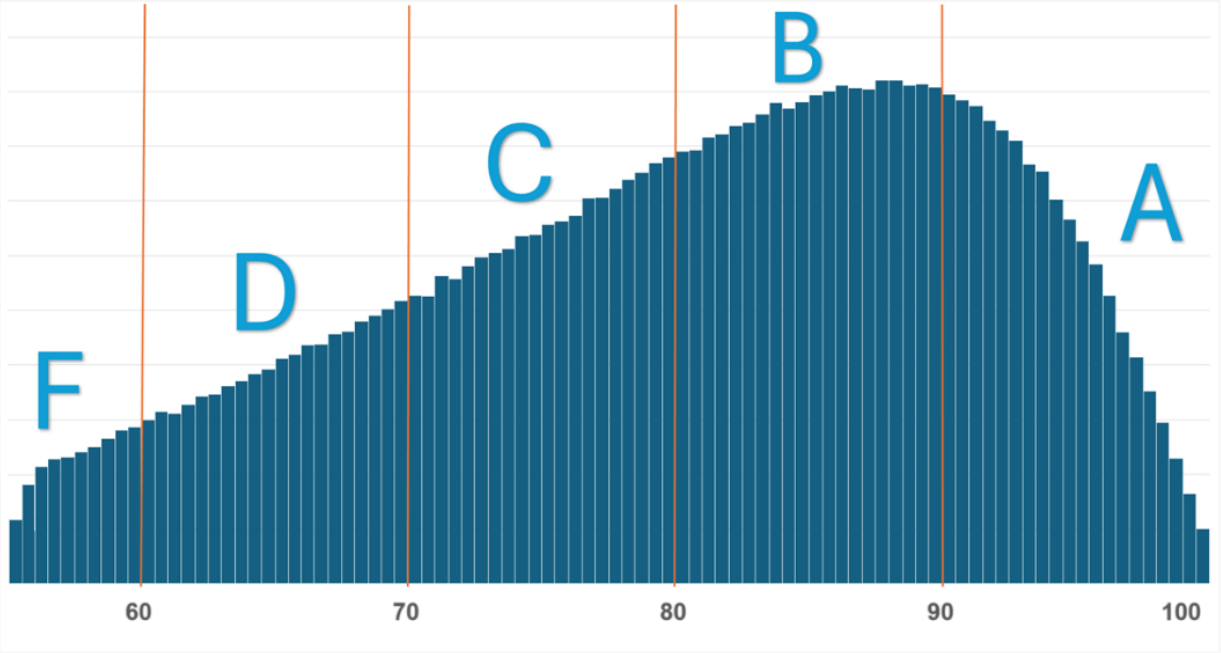
The PRS methodology for its proprietary *Composite Ranking Score* (CRS) and Grade is grounded in proprietary data science that integrates both advanced statistical modeling and evidence-based literature review. The core principle is the use of provider experience—measured by the volume and frequency of specific procedures performed, coupled with outcomes analysis on adverse events and recovery time—as the primary predictor of clinical quality. This approach is supported by the medical literature demonstrating that higher procedural volume correlates with improved patient outcomes, including reduced mortality, readmissions, and complications, then back tested in outcomes analysis.

Results

Many systems boast of their ability to help members find the best doctors, but if you try them, it's Lake Wobegon, where every doctor gets an A, rendering them useless. Worse, they rank doctors in a vacuum, or only by specialty. The member needs a total knee replacement, and the system refers an orthopod who's never done one, specializing in the

[1] Excluding private pay, which is not typically aggregated or available

spine instead. PRS solves these problems by ranking doctors not only by specialty, but by procedure. The average CRS Grade is C+. Providers with A's and B's stand out as best-



Key Inputs

1. **Experience Metrics**:
    - **Procedure Volume**: The number of times a provider performs a specific procedure annually and over a 10-year period.
    - **Comparative Analysis and Specialty Focus**: Provider performance relative to national and local peers within the same specialty and geographic region.
    - **Longitudinal Trends**: Analysis of experience consistency and growth over time to identify sustained expertise.
2. **Claims Data Attributes**:
    - **Frequency and Repeat Procedures**: Captures procedural patterns to assess efficiency and appropriateness of care.
    - **Cost Metrics**: Includes billed and allowed costs to evaluate cost-effectiveness alongside quality.
    - **Provider Specialization**: Accounts for medical specialty and practice focus to ensure contextually relevant comparisons.
3. **Adverse Event Back-Testing**:
    - PRS validates its experience-based quality proxy by back-testing against clinical outcomes, including:

        - **Mortality Rates**: In-hospital and post-discharge mortality for relevant procedures.
        - **Readmission Rates**: 30-day hospital re-admissions as a marker of limited care quality.
        - **Reoperation Rates**: Incidence of repeat surgeries, indicating potential complications or suboptimal outcomes.
        - **Recovery Periods:** As measured by treatment discontinuation and in the case of workers' compensation claims, return-to-work.
    - Statistical models adjust for patient risk profiles and social determinants of health (SDOH) to mitigate bias against serving high-risk populations.

Analytical Process

The PRS analytical pipeline comprises the following stages:

1. **Data Ingestion and Preprocessing**:
    - Raw claims data is ingested annually, cleaned, and normalized to ensure consistency across providers and years.
    - Outliers are identified and reviewed using automated algorithms and manual validation to maintain data integrity.

2. **Experience Scoring**:
    - For each provider and procedure code, an experience score is calculated based on procedure volume, frequency, and peer benchmarking.
    - Scores are normalized to account for variations in procedure complexity and specialty-specific demands.

3. **Quality Validation**:
    - Data modeling correlates experience scores with adverse event rates, using both data science and computer algorithms to confirm predictive accuracy.
    - Risk adjustment incorporates patient demographics, comorbidities, and SDOH factors to ensure equitable comparisons.

4. **Ranking and Output**:
    - Providers are ranked nationally and locally for each procedure or specialty, with rankings accessible via NPI look-up or procedure-specific queries.
    - Outputs include detailed provider profiles including PRS ranks, CRS scores, comparative MIPS scores, scheduling & export tools, hospital, practice and network affiliations, cost comparisons, and peer benchmarking visuals.
    - For individual networks (BUCA, etc.) *Smart Scoring* can be incorporated using network negotiated rates to combine PRS quality data with price for member navigation to the best doctors at the best prices.

- DDI can add your own internal quality metrics weighted against PRS quality data as appropriate for your own use-case.

Risk Adjustment and Equity

Traditional quality metrics relying only on adverse events penalize providers serving high-risk or underserved populations due to inadequate risk adjustment. PRS addresses this by:

- Using experience as a universal, bias-resistant metric available for all providers.
- Incorporating SDOH variables (e.g., socioeconomics, co-morbids, access to care) into risk adjustment models to account for external factors influencing outcomes.
- Avoiding over-reliance on rare adverse events, which provide limited insight into the performance of most providers.

This approach ensures fairness, encouraging providers to treat complex patients without fear of ranking penalties, thereby advancing healthcare equity.

Clinical and Scientific Validation

The PRS methodology is anchored in peer-reviewed medical evidence. Studies, such as those below, demonstrate that high-volume providers achieve superior outcomes, including lower mortality, reduced complications, and shorter hospital stays. PRS back-testing confirms providers with higher CRS scores exhibit statistically significant reductions in adverse events (e.g., 15–20% lower readmission rates for high-volume surgeons).

By focusing on experience and outcomes, PRS aligns with evidence-based medicine, offering a transparent and defensible quality metric.

Clinical Evidence Supporting Provider Experience

High-quality, peer-reviewed studies published in leading medical journals consistently identify provider experience as the key determinant of superior clinical outcomes, particularly when tested against claims data. Experienced physicians outperform their less seasoned or novice counterparts across all medical specialties and procedures, including specialists of all types, primary care providers, and physical medicine and rehabilitation. While intuitive, this finding is rigorously validated by comprehensive data analysis.

Key examples are cited below-

- Physicians – including primary care providers – with greater experience achieve higher diagnostic accuracy, reducing misdiagnosis rates by approximately 20% for common conditions, thereby lowering costs and patient harm (*Hall, 2020*).
- Experienced providers in physical medicine can enhance functional outcomes and shorten recovery times by up to 25% for musculoskeletal injuries (Fullen, 2023).

- In joint replacements, complication rates are dependent on surgeon volume and experience. Higher volume is associated with low complications (*Chapman, 2020*).
- For pancreatic surgery, the experienced (vs novice) categories were related to a decreased risk of postoperative pancreatic fistulas (odds ratio [OR] 0.46) and in-hospital mortality (OR 0.45). Frequent practice was associated with a significantly lower risk of delayed gastric emptying (OR 0.56), postpancreatectomy hemorrhage (OR 0.64) and in-hospital mortality (OR 0.45) (*Krautz, 2019*).
- Patients undergoing surgeries are more likely to suffer complications, harm, or even death when the surgeon and hospital are inexperienced at that procedure. An analysis examining five common procedures in 2019 found 11,000 volume-related deaths might have been prevented for those procedures alone. For one low-volume provider, the analysis showed patients were 24 times more likely to die from a knee replacement surgery than with the highest-volume providers (*Leapfrog, 2020*).
- In facial repair, the level of surgeon experience affects the accuracy of implant placement; even the use of computer-guided surgery does not completely compensate for the level of operator experience (*Marei, 2019*).
- For all types of medical services, increasing provider age and experience was associated with decreasing rates of postoperative death, readmission, and complications in a nearly linear fashion after accounting for patient-, procedure-, surgeon- and hospital-level factors; 1.2M eligible patients who were treated by 3,314 surgeons and ranged in age from 27 to 81 years. A 10-year increase in surgeon age was associated with 5% decreased odds of the composite negative outcome (adjusted odds ratio 0.95, p = 0.002) (*Satkunasivam, 2020*).
- Even in robotic surgery, experienced operators are needed. Minimum numbers of cases needed to achieve plateau performance were wide-ranging but overlapping for different kinds of operations: up to 128 cases for colorectal, 95 for foregut/bariatric, 48 for biliary, and 80 for solid organ surgery (*Pernar, 2017*).
- In urinary laser surgery, surgeon experience contributed to shortened enucleation & operative time, & decreased postoperative urinary incontinence (*Shigemura, 2017*).
- Experienced surgeons can operate on their own, but inexperienced ones should not. Junior surgeons benefit by operating with an experienced surgeon (*Sarwahi, 2020*).
- Laparoscopic liver resection for lesions in the difficult posterosuperior segments and major hepatectomies, especially in cirrhosis, should only be attempted by surgeons who have acquired a minimum of experience (*Goh, 2018*).
- In thyroid surgery, higher operative volumes improve cure rates and decrease the rates of complications, recurrent disease, and perioperative costs (*Erinjeri, 2019*).

- The dislocation of a total hip endoprosthesis is frequent with inexperienced surgeons. The operation should only be performed with an adequately experienced orthopedic surgeon (*Dargel, 2014*).
- Diagnostic errors account for about 160,000 deaths per year. Misdiagnosis is the leading cause of medical malpractice payments, 28.6% of claims and 35.2% of payouts. Missed, incorrect, or delayed diagnoses occur in 15% of clinical cases, accounting for 8%-20% of adverse events. To reduce cognitive errors in diagnosis, it is necessary to select doctors with increased experience (*Sajid, 2014*).
- Experience is the most important factor in making referral decisions. Two-thirds of physicians do not have all they need to make optimal referral decisions, with the most important missing factor being experience (85%), followed by hospital quality (57%) and patient satisfaction (56%). Better patient outcomes occur with higher volume across most physician specialties and procedures (*Healthgrades, 2014*).
- Patients who have total shoulder arthroplasty or hemiarthroplasty by a high-volume surgeon or hospital are more likely to have a better outcome, including lowered mortality, postoperative complications, and lengths of stay ($p < 0.001$) (*Jain, 2004*).
- In total hip arthroplasty (THA), the latest technique is direct anterior approach (DAA). While DAA outcomes are better, it is more, with longer operative time and more blood loss. DAA surgeons should have extensive prior THA experience before performing through DAA. DAA is not suitable for beginners (*Sun, 2021*).
- There is an association between surgeon experience and outcomes after cardiac surgery. Cox regression identified experience as a protective factor (hazard ratio, 0.99, P = .027). Greater experience correlates with improved outcomes (*Han, 2021*).

In summary, the preponderance of medical evidence shows that experience drives outcomes, improving success and reducing risks. There were no studies found that showed less experienced providers performed as well or better than more experienced providers.

Applications and Impact

PRS is a versatile platform designed for diverse stakeholders:

- **Health Plans and Employers**: Identify high-performing providers to optimize outcomes, network design and reduce costs through steerage.
- **Case Managers, Concierge and Referring Physicians**: Access objective data to make informed referral decisions, enhancing patient care.
- **Hospital/Health Systems:** Identifying market and expansion opportunities, build networks, strengthen departmental focus, identify and target leakage.
- **Pharmaceutical and Medical Device Companies**: Target providers with relevant procedural expertise for product development and marketing.

By enabling data-driven decisions using PRS, US companies can save 15-30% in healthcare costs by building networks and/or steering patients to high-performing providers, reducing ineffective treatments, and minimizing adverse events.

Transparency and Accessibility

PRS delivers objective, unbiased rankings free from advertising or paid placements. Data is accessible through a secure, user-friendly SaaS platform and API.

Limitations

While PRS offers comprehensive coverage, it is not exhaustive:

- Providers not billing to CMS may be underrepresented until the commercial and workers' comp claim data pipeline is processed by the end of year.
- Procedures less common in CMS populations may have limited data until the commercial and workers' comp claim data pipeline is processed by the end of year.
- Clinical nuances unique to individual patients are not fully captured by claims data.
- Consumer ratings, while useful, are not included in PRS as they tend to represent bedside manner and customer service rather than healthcare quality.

PRS should be used as a primary decision-support tool, but can be supplemented by other resources (e.g., internal quality measures, patient reviews) for holistic provider evaluation.

Conclusion

Provider Ranking System™ by Denniston Data (DDI) redefines healthcare provider evaluation through a rigorous, data-driven methodology. By harnessing over 65 billion data points, advanced data science, and a clinically validated focus, PRS delivers objective, equitable, and actionable insights. Trusted by business leaders and medical experts alike, PRS empowers stakeholders to enhance patient outcomes and reduce costs.

Contact: For inquiries, demos, or enterprise access, please email Help@DennistonData.com or visit https://dennistondata.com/contact.

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