The Evolving Role of Advanced Practice Providers in Spine Care: A National Analysis of Utilization, Reimbursement, and Access

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INTRODUCTION: Advanced practice providers (APPs), including physician assistants (PA's) and nurse practitioners (NP's), are increasingly integral to the delivery of spine care in the United States. As demands on surgical teams grow and physician shortages persist – particularly in underserved regions – APPs have taken on broader clinical roles. However, national trends in APP utilization, geographic distribution, reimbursement, and procedural roles in spine care remain under-characterized.

METHODS: We conducted a retrospective analysis of Medicare claims data from 2005 to 2016, identifying spine procedures performed by APPs using CPT code groupings and modifier flags (e.g., AS, SA, AN, YS). Claims were aggregated by year, region, and modifier. Geographic analyses used state-level population data and Health Professional Shortage Area (HPSA) scores to map claims per 100,000 and overlay APP utilization with provider access deficits. Financial trends were evaluated using total charges and allowed reimbursements, and procedural roles were stratified into clinically relevant modifier groups: Assistant at Surgery, Imaging, and Injections. Linear regression and forecasting models were used to assess utilization trajectories through 2030.

RESULTS: APP-managed spine care claims rose sharply from 2005 to 2016 (11.9% year-over-year), and is projected to grow further by 73.7% between 2016-2030 (Figure 1). Stratification of these claims revealed that APPs played a growing role in diagnostic (73% growth), therapeutic (74% growth), and perioperative (103% growth) services (Figure 2). APP spine claims varied geographically and, when combined with HPSA scores, revealed that over half of U.S. states had composite scores below 0.4, with the lowest concentrated in the South and Southeast (Figure 3). Despite their growing demand, the reimbursement-to-charge ratio for APP services has largely stagnated or declined across major procedural categories, dropping by 49.6% for Imaging and 49.0% for Injections and increasing by 13.9% for Assistant at Surgery services (Figure 4).

DISCUSSION AND CONCLUSION: APPs are playing an expanding and increasing role in spine care, particularly in underserved regions with accelerating demand in the years to come. Although procedure volume continues to rise, declining reimbursement relative to charges raises concerns about long-term financial sustainability. Stratifying APP services by procedural context reveals not only their adaptability but also the economic and access-related implications of their utilization. Policymakers and healthcare systems should recognize the evolving contributions of APPs in spine care and align reimbursement models to support equitable, high-quality delivery.

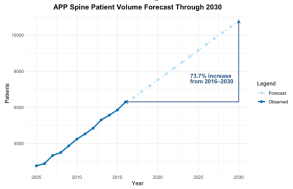

Figure 1. Forecasted spine care patient volume managed by advanced practice providers (APPs), 2005–2030.

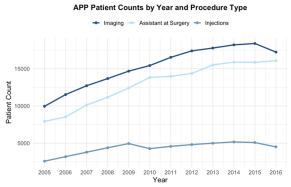

Figure 2. Distribution of APP spine procedure claims by procedure type over time, 2005-2016

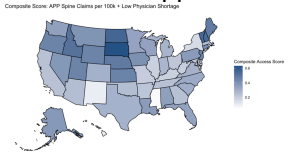

Figure 3. Composite national map of APP spine claims per 100,000 population and primary care shortage areas (HPSA score), 2005–2016.

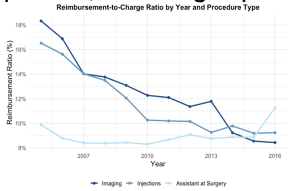

Figure 4. Average reimbursement-to-charge ratio per patient by procedure type over time, 2005-2016