Research has shown that higher rates of appropriate Diabetes preventive care can lead to better health outcomes, fewer hospitalizations, and lower spending (Gray et al., 2012; Kralewski et al., 2013). Our previous work has demonstrated that geographic variation exists for Medicare spending, hospitalizations, and preventive care, while also identifying priority regions for improving care (Topmiller, 2016). However, little is known about the strategies that lead to higher rates of preventive care and why rates vary so much across geographic regions. Finding the "bright spots," regions with higher than expected rates of appropriate Diabetes preventive care, can assist researchers and policy makers in identifying successful strategies for producing higher rates. This brief utilizes a two-step geospatial approach for identifying regions that are appropriate Diabetes preventive care "bright spots."

Using data at the hospital referral region (HRR) level from the Dartmouth Atlas, we created a composite appropriate Diabetes preventive care measure using the percentage of fee-for-service (FFS) diabetic beneficiaries ages 65-75 with an annual hemoglobin A1C test, annual blood lipids LDL-C test, and annual eye exam (Dartmouth, 2013). We identified "bright spots" for appropriate Diabetes preventive care using a two-step geospatial approach: first, we used the Local Moran's I tool to identify spatial outlier HRRs, which are HRRs with high composite appropriate Diabetes preventive care scores surrounded by HRRs with low composite scores; second, we performed a spatial regression analysis and mapped the residuals to identify HRRs with the highest preventive care scores when compared to their expected scores. "Bright spot" regions are defined by the following criteria: (1) HRRs that have residuals (better than expected rates of preventive care) in the top one percentile, or (2) HRRs that are identified as spatial outliers from the Local Moran's I analysis AND have residuals (better than expected rates of preventive care) in the top fifth percentile.

The map below displays the results from the Local Moran's I analysis and reveals significant geographic variation in the composite preventive care scores for HRRs. Blue regions are clusters of HRRs with low rates, red regions are clusters of HRRs with high rates, and the light red are the spatial outlier "bright spot" HRRs, which have high rates of preventive care and are surrounded by HRRs with low rates of preventive care. The map reveals four potential "bright spot" regions: Tupelo, Miss., San Angelo, Texas, Dallas, Texas, and Wichita, Kan.

Potential "Bright Spots"

Legend:
- Potential "Bright Spots"
- High-High
- Low-Low
- Low-High
- High-Low
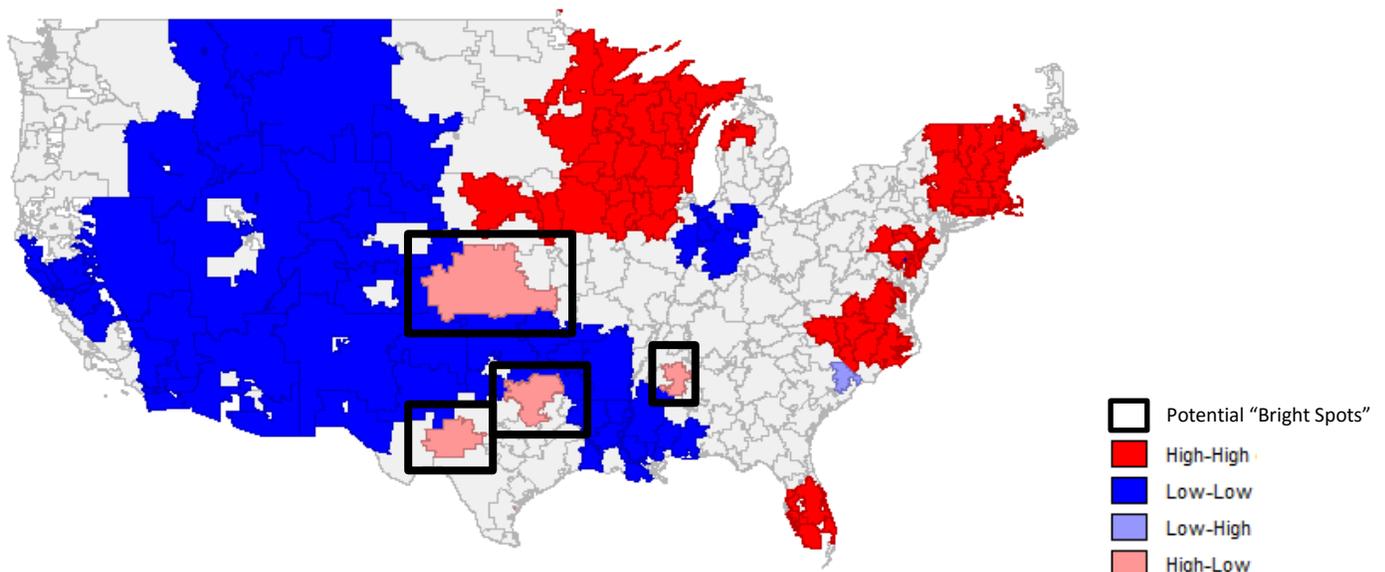
To identify HRRs with higher than expected rates of preventive care, we utilized a spatial lag regression model, controlling for percent dual-eligible for Medicaid, percent African-American, percent Diabetic, percent utilization of evaluation and management, and primary care physician rates per 100,000 population (CMS, 2013; Dartmouth, 2013). We define "bright spots" as those regions that are in the top percentile of having better than expected rates of appropriate Diabetes preventive care, which we can visualize by mapping the residuals of the spatial lag model by percentile. In the residual map below, the dark red regions are HRRs that have the highest values above their expected rates; the top one percentile includes Wilmington, N.C., Muskegon, Mich., and Bangor, Maine. In addition, two of the four regions identified as potential "bright spots" from the Local Moran's I analysis were in the top fifth percentile - Tupelo, Miss., and San Angelo, Texas.

"Bright Spot" Regions

Legend:
- ☐ "Bright Spots"
- < 1% (3)
- 1% - 10% (27)
- 10% - 50% (122)
- 50% - 90% (122)
- 90% - 99% (27)
- > 99% (3)
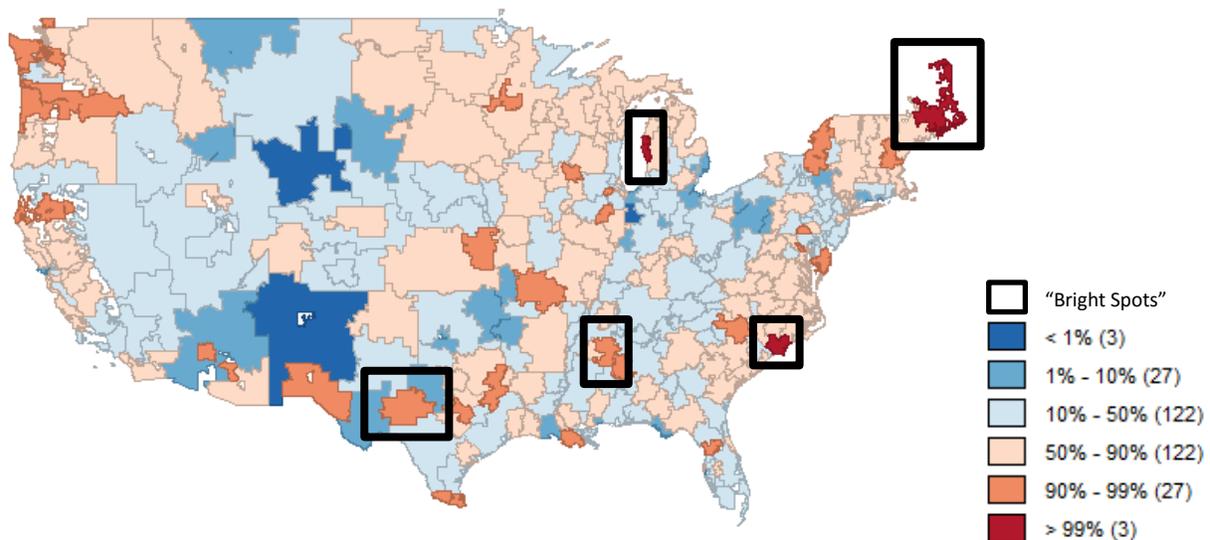
The geospatial analyses revealed five "bright spot" regions for appropriate Diabetes preventive care. The "bright spot" regions are diverse, with varying rates of primary care physicians, Diabetes prevalence, and socioeconomic and demographics characteristics. For example, Tupelo has low rates of primary care physicians, high prevalence of Diabetes, and a high percentage of African Americans, while Bangor is overwhelmingly white, has high rates of primary care physicians, low prevalence of Diabetes, and a high percentage of dual-eligible for Medicaid. Thus, the strategies that have led to high rates of preventive care in these regions are likely quite different.

Our approach for identifying "bright spots" builds off the work of Bodenheimer and the Stanford Clinical Excellence Research Center (CERC), which have demonstrated the use of a "bright spot" approach to identify successful strategies for improving primary care (Bodenheimer, 2014; CERC, 2014). Similar to our previous work in identifying priority regions, our "bright spot" method is intended to be the first phase of a mixed-methods approach (Topmiller, 2016). Following a positive deviance framework (Pascale et al., 2010), next steps are to use qualitative approaches to explore healthcare systems within the "bright spot" regions to identify successful strategies for improving preventive care and disseminate these strategies to improve care in other regions.

Michael Topmiller, PhD
Health GIS Research Specialist

References

Bodenheimer, Thomas S., (2014). Find the" bright spots." *Joint Commission journal on quality and patient safety/Joint Commission Resources*, *40*(4), pp.147-147.

Centers for Medicare and Medicaid (CMS), 2013. Geographic Variation Public Use File
Accessed at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/

Clinical Excellence Research Center (CERC), Stanford University, 2014. "America's Most Valuable Care: Primary Care." Clinical Excellence Research Center at Stanford University, Bright Spots Research.
Accessed at https://med.stanford.edu/cerc/research/bright-spots-research.html

Dartmouth Atlas of Health Care, 2013. Data Downloads.
Accessed at http://www.dartmouthatlas.org/tools/downloads.aspx

Gray, Bradley, C., Andy Schuetz, Weifang Weng, Barbara Peskin, Benjamim Rosner, and Rebecca S. Lipner. (2012). Physicians' Actions and Influence, Such As Aggressive Blood Pressure Control, Greatly Improve the Health of Diabetes Patients. *Health Affairs,* 31(1): 140-149.

Kralewski, John E., Bryan E. Dowd, Yi Xu, (2013). Medical Groups Can Reduce Costs by Investing in Improved Quality of Care For Patients With Diabetes. *Health Affairs* 31(8): 1830-1835.

Pascale, Richard, Jerry Sternin, and Monique Sternin, (2010). *The Power of Positive Deviance: How Unlikely Innovators Solve the World's Toughest Problems.* Harvard Business Press, United States of America.

Topmiller, Michael, 2016. "Where are "Hot Spots" of Medicare Spending and Preventable Hospitalizations and "Cold Spots" for Preventive Care?" HealthLandscape Geospatial Research Brief #2.
Accessed at http://www.healthlandscape.org/Geospatial-Analysis.cfm