Person, Place, and Prevention in Primary Care:  
A Multilevel Analysis of Variation in Preventive Service Delivery

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by

Alex Hoyt

Over several decades of research, John Wennberg and colleagues have demonstrated  
unwarranted geographic variation in the delivery of health care services. This research has  
highlighted the need for a greater evidence base in clinical decision-making. In Wennberg’s  
typology of health services, “effective” care has strong evidence for its use and should vary the  
least; “preference sensitive” care is subject to idiosyncratic utilization because no treatment is  
clearly better than another for the condition; and “supply sensitive” care varies inordinately  
according to the supply of specialists or hospital beds because no compelling evidence is  
available. In disparities research, health care services have been shown to vary by age, gender,  
and race/ethnicity, although geographic differences are often not considered. Although  
Wennberg’s research has taken care to show that geographic variation is not the result of patient  
characteristics or demand, most disparities research has not accounted for variation across  
geography. Moreover, most of the geographic variation research has focused on medical and  
surgical procedures observed in Medicare paid claims, rather than preventive services like  
screening and counseling that might be under greater sociologic influence and at greater risk for  
disparities.

This research focused on six services delivered in the primary care setting that would be  
characterized as “effective care” – 1. inquiring about alcohol/drug use, 2. inquiring about  
anxiety/depression, 3. intervening (counseling, medicating, or referring) for behavioral health  
problems (substance use disorders, depression, and anxiety), 4. intervening in obesity (BMI≥30),  
5. intervening with everyday smokers, and 6. referring for mammography. A multilevel  
observational design with time-order effects was used to accomplish three aims: 1) describe the  
rates of clinical preventive service delivery in a national sample; 2) develop multivariate models  
predicting the probability of preventive service delivery, and testing the influence of individual-  
level demographics, health and risk behavior status, and health care utilization; and 3) using  
multilevel analysis, test the influence of community-level characteristics including  
socioeconomics and demographics, risk factor prevalence, primary care sector capacity, specialist  
sector capacity, and managed care market characteristics on the provision of preventive services  
in primary care.

The individual level data came from the longitudinal cohort of Healthcare for  
Communities and the household survey of the Community Tracking Study. The study sample was  
subset to those survey respondents who had visited a general medical provider in the year prior to  
the interview. Respondents to both surveys were drawn from sixty communities, which were the  
settings used to create a community-level database from several sources: the US Census, Area  
Resource File, Community Tracking Study physician survey, the National Survey of Substance  
Abuse Treatment Services, the Brandeis Survey of Health Plans, and the National Cancer  
Institute's Surveillance, Epidemiology, and End Results (SEER) Program.

It was found that the rate of alcohol/drug inquiry was 24.6%, anxiety/depression inquiry  
was 18.8%, and behavioral health intervention was 20.1%. The rate of obesity intervention was
68% and smoking intervention was 67.5%, while the proportion of women with an up-to-date mammogram was 76.4%. Not only were the rates of behavioral health services lower than the somatic service (mammography), the geographic variation was much greater. The coefficient of variation across 60 communities was 5.72 for having a mammography up to date, but 22.7 and 21.6 for obesity and smoking intervention (respectively) and 47.4, 30.1, and 36.5 for behavioral health intervention, alcohol/drug inquiry, and anxiety/depression inquiry (respectively).

In multivariate models controlling for demographics, income, insurance, health care utilization and a broad range of health/risk status variables, Hispanics were twice as likely as Whites to report alcohol/drug inquiry; Blacks and Hispanics were twice as likely to report obesity intervention, and women were more likely to report anxiety/depression inquiry and behavioral health intervention. Given the measures controlling for risk, it appears that the higher rate of services in these groups may be related to providers’ perceptions more than individual patients’ actual health needs. In multilevel models, alcohol/drug inquiry, anxiety/depression inquiry, and obesity intervention were positively associated with the local supply of specialty resources, and negatively associated with a ratio of specialists to primary care physicians. These results were significantly associated with prevalence, suggesting that providers are more likely to inquire or intervene in communities where problem rates are generally higher. The proportion of primary care physicians using information technology for preventive service reminders had a positive association with alcohol/drug and anxiety/depression inquiry.

Among six services that meet Wennberg’s criteria for “effective” care, the rates for behavioral health care and behavioral change intervention were both lower than for a strictly somatic service – mammography – and exhibited substantially more geographic variation. This suggests that scientific evidence alone does not explain patterns of variation across services and that local resources play an important role in clinical decision making. These findings have several policy implications. First, students in the health care professionals may benefit from training that builds their confidence in asking about behavior health and counseling for behavior change as part of routine and necessary practice. Second, incentives to practicing primary care providers to screen and counsel patients may need to be enhanced. Third, this research provides support for the implementation of information technology to assist in the delivery of clinical preventive services.

The members of my committee are:
Chris Tompkins, Chairperson
Constance Horgan
Cindy Parks-Thomas
Peter D. Friedmann, MD, MPH
Professor of Medicine and Professor of Health Services, Policy & Practice at Brown University
Rhode Island Hospital, Division of General Internal Medicine
593 Eddy Street
Providence, RI 02903

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