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Benchmarking Health Care Provider Performance: Some Statistical Considerations

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Refreshments served at 3:00 PM in room 51-254 CHS

ABSTRACT: Setting performance standards for health care providers is central to quality of health care improvement efforts. A typical approach is to analyze data to determine performance targets, or statistical benchmarks, that define high-quality care. Statistical benchmarks are typically set to reflect a high level (e.g., top 10%) of observed provider performance. In this talk, I will discuss some statistical issues with widely-used benchmarking approaches. One issue is that such benchmarks tend to over-identify small hospitals as top performers given they are based on raw hospital performance estimates. One previously proposed alternative is to estimate the benchmark using posterior means derived from a hierarchical model. However, this may over-compensate for smaller, higher-variance providers. I propose a compromise of using the histogram of the provider-specific parameters obtained from a Bayesian hierarchical model. The posterior mean histogram is optimal under integrated squared error loss for estimating the distribution of provider-specific performance. I examine the performance of histogram-based statistical benchmarks relative to more widely-used methods using data on quality measures collected from hospitals that serve Medicare beneficiaries. Another statistical issue with benchmarks is to estimate and account for the uncertainty in benchmark estimates. I will discuss a percentile-based empirical distribution function (EDF), or histogram, estimate for univariate provider-specific parameters. It involves computing order statistics of samples drawn from the posterior distribution of provider-specific parameters under a two-stage hierarchical Bayesian model to obtain relevant uncertainty assessments of an EDF estimate and its features, such as thresholds and percentiles. We apply our method to data from the Medicare End Stage Renal Disease (ESRD) Program, a health insurance program for people with irreversible kidney failure.