Hospital Contests

Background  Hospital-acquired infections occur when patients become infected during a medical procedure or a hospital stay. They affect about 1.7 million patients annually (between 5% and 10% of the patient population) in the United States and are responsible for 99,000 deaths and an estimated $20 billion dollars in health care costs.¹

In an attempt to improve these statistics, the Centers for Medicare and Medicaid Services (CMS) put in place the Hospital-Acquired Conditions Reduction Program (HACRP). The program started in 2015 and is part of the pay-for-performance policies that CMS instated as a way to link the quality and performance of healthcare providers to their compensation, with the idea that this linkage will provide the appropriate incentives for hospitals to improve the quality of their care. Other pay-for-performance policies include the Value-Based Purchasing and Hospital Readmission Reduction programs. Unlike these programs however, HACRP is unique in that the performance evaluation of hospitals is relative. This means that the performance of a hospital is determined by comparing it to how other hospitals are doing. This paper argues that such an incentive scheme coupled with the transparency requirements imposed by the Affordable Care Act can lead to unexpected consequences, worsening the quality of care in a substantial number of hospitals and having an ambiguous effect on the remaining hospitals.

Setup  We first describe how the HACRP policy works. The following procedure is done once a year: for each hospital, CMS computes Standard Infection Ratios (SIR) for several categories of infections (e.g. bloodstream infections, urinary tract infections, etc.). The SIR for

each category is the ratio between the number of actual infections that happened at the hospital and the number of infections that the hospital was predicted to have (these predictions are based on logistic or negative-binomial regression models that CMS builds using recent national data), so an SIR greater than one implies that the hospital had more infections than predicted. The SIRs are then compared across all hospitals: for each category, hospitals are arranged in ascending order of SIRs and the top 10% of hospitals get 1 point each, the second 10% get 2 points each and so on for each decile (so that the bottom 10% get 10 points each). Here, more points indicate worse relative performance. The points for the different infection categories are combined into a single score for each hospital — the final HAC score, where again lower scores indicate better performing hospitals. Hospitals are then ranked in ascending order of that score. The bottom 25% of hospitals are subject to a penalty equal to 1% of their Medicare pay entitlement while the top 75% receive no penalties. While 1% might appear low, it can easily be equal to hundreds of thousands of dollars each year, since a medium-sized hospital usually has an average of $65,000,000 in Medicare revenues. The process repeats again at the end of the following year.

Model The above setup is essentially a contest, i.e. a compensation scheme in which players — hospitals — get rewarded or penalized in a rank-based fashion. This is not dissimilar to how firms penalize their worst employees (a practice that is sometimes referred to as rank-and-yank). We model the problem as a contest where hospitals exert costly effort to obtain better outcomes (in this case, to improve their SIRs) in order to obtain better HAC scores and avoid falling into the bottom quartile. Crucial to our analysis is the following fact: the transparency requirements necessitated by the Affordable Care Act requires that information about hospital performance is made public. This means that over time hospitals learn not only about their own performance, scores, and penalties, but they also learn these quantities for all other hospitals as well.

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Main Findings  We show the following analytically and empirically. The repeated nature of the contest (hospitals go through this process every year) combined with the transparency requirement make hospitals learn about where they stand compared to the competition. Thus, after one round of this game being played, hospitals that have done well decrease their efforts (and therefore have worse SIRs) in the next year. This is because these hospitals now know that they are better than other hospitals and, importantly, they also know how much better. In particular, these hospitals recognize that the chances of them falling into the bottom quartile and incurring a penalty are slim, and hence they can continue avoiding the penalty while exerting less effort (and achieving worse infection ratios in the process). This analytical finding is confirmed in the data, where we find that hospitals that placed in the top 10% are at least three times more likely to perform worse the following year compared to the median hospital. In fact, more than 77% of the hospitals in the top 10% performed worse the following year and about 56% out of the top quartile performed worse the following year.

While those near the top can afford a decline in performance without incurring a penalty, the situation is more serious near the bottom as hospitals compete to climb out of or not fall into the bottom quartile. Our model predicts increased effort and it is here where we see the most improvement, with 96% of the hospitals in the bottom quartile improving their infection rates. These results suggest that the HACRP policy affects hospital performance in a strongly asymmetric fashion. It can improve infection rates for the worst-performing hospitals, but at the cost of worsening care and infection rates in a substantial number of other hospitals. The paper suggests two modifications to the current policy to mitigate these negative consequences: One is to provide information in a more coarse fashion (for example, by informing hospitals whether they are in the top 75% or the bottom quartile instead of exact rankings), and another is to restrict the set of hospitals that each hospital competes against, so that the possibility of incurring a penalty if performance declines is always present, creating an urgency similar to the one experienced by the hospitals in the bottom quartile across the entire set of hospitals.