Physician Peer Effects on Speed and Quality: Evidence from the Emergency Department

1. Introduction

Understanding the impact of peers on an individual's performance is an important aspect of operations management and has been studied in a variety of settings including education, labor markets, and consumer behavior. Despite the abundance of evidence on the existence of peer influence, establishing peer effects deems challenging as the peer network could be endogenous and strongly correlated with individual characteristics (Jackson 2013).

In this study, we estimate peer effects in the context of an Emergency Department (ED) setting by addressing the question of whether peer physicians' characteristics including relative performance, experience, type of medical degree (MD vs. DO), and gender affect a physician's performance. We define a physician’s peer as a physician who is scheduled to work side-by-side with him/her. We measure a physician's performance in terms of his/her quality and speed using the 72-hour return patient visits and the average patient length of stay, respectively.

There is a large body of literature devoted to improving ED operations (See Saghaafian et al. 2012, Saghaafian et al. 2014, Ang et al. 2016). Our study contributes to this literature by examining whether peers’ influence on a physician’s performance should be considered a pertinent factor in devising effective physician staffing strategies.

2. Methodology and Data

The data, including more than 115,000 patient visits, consist of detailed care delivery information associated with 32 ED physicians in a leading U.S. hospital. All patients arriving to this ED are randomly assigned to physicians upon their arrival through an automated rotational patient assignment process (Traub et. al 2016). This randomization essentially removes all patient selection biases or preferences of physicians in selecting their patients, providing us with a unique
opportunity to treat performance outcomes in this setting as almost entirely natural experiments.

We included in our analysis all visits from July 12, 2012, to July 31, 2016 that were associated with patients who were identified in the Electronic Medical Record as having been seen by an ED physician. Patient-specific data for these 115,350 visits included demographic (age, gender, race, etc.) and insurance information. Encounter-level data included labs, chief complaint, Emergency Severity Index (ESI), day of the ED visit, and time of day, among others, totaling over 70 variables. To avoid distortion of the results by outliers, observations associated with 6 physicians with relatively low patient volumes (fewer than 250 visits over the 4-year period) were excluded from the analysis.

Our empirical strategy involves correcting for the effects of nonrandom assignment of physicians such that we isolate the effect of a physician’s peer from other changes affecting the physician’s performance. We use propensity score matching to construct a matched sample of physicians that achieve balance across a set of covariates related to physician characteristics including admission rate, average number of IV med/fluid orders per patient visit, average number of radiology orders per patient visit, and number of patients seen per hour. Our unit of analysis is physician \( i \) who has worked alongside his/her peer physician \( j \) for at least 5 hours. We choose the 5-hour criterion to be able to capture any peer physician effect. In addition to controlling for patient- and physician-level characteristics, we control for any unobserved time-varying effects by including both day-of-the-week and hour-of-the-day fixed effects.

3. Main Contributions and Key Results

We find statistically significant evidence of peer effects on a physician's performance. Our findings suggest that peers with diverse characteristics in terms of relative speed, quality, medical degree, and experience improve a physician’s performance on average. Specifically, our results
show a statistically significant negative effect of a faster peer on a physician's speed. A higher quality peer, however, is shown to have a statistically significant positive effect on a physician's speed, and a statistically significant negative effect on the physician's quality. In addition, we find that the presence of a different-degree peer has a positive effect on a physician's speed. We also observe an increase in the average physician's speed when he/she is scheduled to work with a more experienced peer.

Our findings provide strong empirical evidence on the existence of peer effects in an ED setting, and suggest that peer diversity leads to an improvement in an average physician’s performance. Our results have important practical implications for improving the operations of hospital EDs. These include superior physician staffing and scheduling where one needs to decide which providers should be scheduled during the same shift, as well as in physician training where one needs to provide guidance to physicians with ways to improve their operational efficiency. More broadly, our insights can be used in research areas such as hospital operations management and contribute to finding new ways to improve the delivery of healthcare.

References


