The impact of cross-border patient movement on the delivery of healthcare services

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ABSTRACT

Motivated by a recent legislative discussion in the European Union about providing European patients with the freedom to choose the country they receive treatment, we use a queueing framework to analyze a game-theoretic model that captures the interactions among the patients, the providers, and the healthcare funders. We examine the impact of such "free choice" on the healthcare systems of different countries in equilibrium. Under the assumption that each patient will always prefer to receive care at home when the waiting time is below her individual tolerance level, we show that, in the long run, cross-border patient movement can increase patient welfare due to increased access to care. However, it has a mixed effect on waiting times and reimbursement rates. Moreover, the additional costs of increased access to care are disproportionately shared between the participating countries.

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1. Introduction

Traveling to obtain health care services abroad is becoming more popular. Over two million people travel from their home countries to obtain such services (Tutton, 2009). In the European Union (EU), a legislative discussion which aims to provide Europeans with the freedom to choose the member-state where they receive health care is already under way. As described in Tutton (2009), the main drivers behind healthcare travel are long waiting times and high prices for accessing care at home. In this paper, we develop a queueing game to explore the long-run implications of patient movement on the operational performance of national healthcare systems. We use the current situation at the EU as the basis that motivates our model.

As described in McKee and Belcher (2008), the number of EU citizens who have been crossing their national borders has increased exponentially. This increase has resulted in cases where citizens obtained care in member-states other than their own and then sought reimbursement at home. So far, guidance on what patients' rights are regarding so-called cross-border healthcare, has only been provided by rulings of the European Court of Justice (ECJ). Since 1998, ECJ has found in several cases that Europeans can seek health care treatments abroad and have the cost covered by their own health system (Euractiv, 2005). However, these cases initiated a formal discussion among EU member-states, which culminated in a proposal for a "Directive on the application of

patients' rights in cross-border healthcare" (Commision of the European Communities, 2008c). The proposal's aim is to clarify the conditions under which Europeans can freely choose where to receive health care services as well as the portion of the costs that should be covered from their home insurance systems. On January 19, 2011, the European Parliament voted that this directive should become effective in 2013 (Euractiv, 2011).

Using the case of Belgium, we can illustrate some of the challenges and opportunities that arise in the context of cross-border healthcare. As described in Glinos et al. (2005), relative to The Netherlands and the United Kingdom (UK), Belgium has spare healthcare capacity and insignificant waiting lists. On the other hand, in both of Belgium's neighboring countries, addressing the issue of growing waiting lists has become a political priority. To resolve this issue, the UK's National Health Service (NHS) initiated contracts with Belgian hospitals in 2003, and Dutch sickness funds initiated contracts with Belgian hospitals after some key rulings of the ECJ (Rosenmöller et al., 2006).

Due to the recency of this phenomenon, data regarding the magnitude of cross-border healthcare are scant but it has been estimated that related expenditures are approximately €10 billion or 1% of total public healthcare budgets and are expected to grow with time (Commission of the European Communities, 2008a). In this paper we focus on patients who choose to go abroad to seek treatment or are sent abroad by their own health funder because of "undue" delays at home.

To better understand the pros and cons of cross-border healthcare, let us consider the three key stakeholders of a healthcare system: (1) The health funders, who cover the majority (or all) of the cost of the provided health care services; (2) The healthcare providers, who provide the services; and (3) The

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patient population, who consumes the health care services. The perspectives of the stakeholders of both the system of origin (i.e., the patient-exporting system) as well as the system of destination (i.e., the patient-importing system) can be summarized as follows: (1) From a patient's perspective, more choice can provide a faster alternative access to care but with the added burden of having to travel abroad. Moreover, patients in the "receiving" country are concerned about potential increases in waiting times when the number of patients arriving from abroad becomes significant. (2) From a provider's perspective, increased patient choice can lead to the creation of a competitive environment, which could impose pressure on providers to improve service and quality in order to secure their patient base and its associated revenues. (3) From a (public) funder's perspective, funding health care abroad can lead to increased patient welfare due to improved access to care. However, this might come at an increased cost, especially when care abroad is more expensive than at home. (The EU aims to address this potential issue in two ways: (a) by requiring prior authorization for in-patient care; and (b) by restricting reimbursement for services provided abroad only up to the level that would be reimbursed had the services been provided at home.)

Because our motivation originated from the EU, we have a primarily public healthcare system in mind. For example, in France the system is regulated by the state, which sets the ceiling on health insurance spending and is responsible for amending benefits and regulation (Grosse-Tebbe and Figueras, 2005). Similarly, the same authors report that in the UK, healthcare is funded through national taxation and is delivered through public providers. In Belgium, healthcare is publicly funded and most hospitals are not-for-profit and run by groups such as municipalities or religious orders (European Hospital and Healthcare Federation, 2010). For these reasons, and to ensure tractability in our model, we shall assume in our analysis that the decisions of the health funders and the care providers are made by a single entity which we call the "health planner". The English NHS can be thought of as a relevant real-world example.

We aim to address the following central question: Does increased patient choice lead to higher patient welfare? Moreover, what is its impact on operational performance for the healthcare systems involved? To answer these questions we use a queueing framework embedded in a game-theoretic model to capture the trade-offs in the decisions that health planners make in the context of cross-border healthcare and analyze how they impact provider performance and patient behavior. To set the stage, we first develop a stylized model of the operation of a single-country healthcare system. The health planner's objective is to maximize patient welfare. Towards this direction, the planner selects a service level (captured by the waiting time) that the provider should offer (for a generic elective health care service), as well as the rate at which the provider should be reimbursed for providing care. Subsequently, to study the impact of patient choice, we extend this model to consider two healthcare systems the patients of which have the freedom to choose where to receive care. This ability of patients to choose, links the operation of the two systems.

Under the assumption that patients will always prefer to receive care at home as long as the waiting time is below their tolerance level, we show that, in the long run, cross-border patient movement can increase patient welfare in both countries as well as the overall patient access to care. Essentially, an inflow of patients from abroad can, in the long run, subsidize capacity investments in the "receiving" country, from which patients in both countries benefit. However, the impact on waiting times, reimbursement rates and costs of provider operation will be mixed and shall depend on whether a country "receives" or "exports"

patients. Therefore, as the EU is fine-tuning its guidelines on the implementation of cross-border healthcare, our analysis generates insights regarding the potential trade-offs that policy makers should take into consideration.

This paper is organized as follows: In Section 2 we provide a brief literature review. In Section 3 we present and analyze our single-country model. In Section 4 we (a) extend our single-country model to consider cross-border patient movement and (b) combine our analytical results from the single-country and cross-border settings to numerically examine the impact of cross-border patient movement. We conclude in Section 5, where we also present directions for future research.

2. Literature review

Our work employs an analytical, game-theoretic approach to study the impact of cross-border patient movement on the performance of healthcare delivery systems and on patient welfare. As such, it is related to several streams of literature. First, from a modeling perspective, it relates to the theory of queueing games through which competition between service systems is studied. Hassin and Haviv (2003) provide an overview of this body of literature. A novel characteristic of our model is that patients choose which provider (queue) to join through a satisficing decision-making process (Simon, 1957) as opposed to utility maximization. The reasons for this choice will be made clear in Section 4.2. In a related paper (c.f., Andritsos and Tang, 2012), we consider the situation where patients choose where to receive care via utility maximization. An additional novelty is that we analyze competition at the social planning level. Finally, as in Cachon and Harker (2002), patients make their choice based on the providers' operational performance (i.e., waiting time) instead of the providers' operational decision (i.e., capacity), which we assume can be adjusted so as to accommodate the realized patient inflow.

Second, the topic of patient choice has been examined in the health economics literature both through analytical as well as empirical approaches. In the analytical stream, Siciliani (2005) finds that increasing patient choice in the context of elective care results in lower supply of treatment and higher waiting times. Similarly, Brekke et al. (2008) find that a sufficiently large competitive hospital segment can lead to increased waiting times. In the empirical stream, Dawson et al. (2006) examine data from the London Patient Choice (LPC) project, under which the offered number of hospitals to patients in the London area was increased. They find that this move did not seem to stimulate unmet demand for health care. Moreover, in Dawson et al. (2007), contrary to the findings of the analytical literature, they show that increasing patient choice can reduce waiting times on an average.

The primary contribution of our work is that it incorporates interactions among the three key stakeholders of a healthcare system in a competitive setting. This enables us to analyze welfare, performance and pricing issues in a unified manner. By using a queueing approach to model service provision at the hospital, we differentiate our work from the health economics literature and capture more accurately the impact of increased patient flow on service performance. To the best of our knowledge, our model is the first to explicitly capture patient choice without restricting the directionality of patient movement while incorporating key elements of the proposed implementation of patient choice in the EU, the reimbursement for care provided abroad is limited by the reimbursement level that is allowed at home. In Andritsos and Tang (2012), we consider the situation where it is the full cost of care for treatment abroad that is covered.