International Journal of Industrial Organization 32 (2014) 24–32

Contents lists available at ScienceDirect

International Journal of Industrial Organization

journal homepage: www.elsevier.com/locate/ijio

Product choice under price regulation: Evidence from out-patient dialysis markets☆

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ARTICLE INFO

Article history:
Received 7 April 2013
Received in revised form 14 October 2013
Accepted 23 October 2013
Available online 6 November 2013

JEL classification:
L13
I11

Keywords:
Dialysis
Entry
Competition

ABSTRACT

Using a dataset of dialysis facilities operating in more than 1000 U.S. counties in 2007, I examine the product choice of two types of firms: multiproduct dialysis facilities and single product dialysis facilities. I simulate the effect of a Medicare policy proposal in 2008 which reduces the regulated price of a common product that is produced by both types. I find that the policy decreases the number of single product dialysis facilities but increases the number of multiproduct facilities, holding patient behavior and provider cost structure constant. I also find strong evidence for market segmentation between single product and multiproduct dialysis facilities.

1. Introduction

Price regulation is pervasive in many industries, especially in health care. Since the 1980s, Medicare, the largest buyer of health care services in the United States, has paid a fixed rate (known as the Prospective Payment System or PPS) per service treatment. Though it is possible to implement efficient outcomes under fixed price regulation (e.g. Ma, 1994), regulators and industry practitioners have been wrestling with issues such as maintaining quality of care and controlling costs.

A large number of papers have documented how health care providers respond to various changes in PPS reimbursement policy and have shown that fixed price regulation may distort provider incentives and encourage rent seeking activities. While most studies have focused on providers' response in terms of the intensive margin (e.g. volume, intensity of care and patient outcome), relatively little attention has been directed at the extensive margin (i.e. how the reimbursement policy affects the availability of medical treatment). In this paper, I investigate how the set of providers and their services change in response to an adjustment in the Medicare reimbursement rate in the out-patient dialysis market.

Dialysis is the major treatment for the more than 630,000 patients who suffer from End Stage Renal Disease (ESRD). Medicare, the primary buyer of dialysis therapy, spent 8.6 billion dollars on the treatment and medication of dialysis patients in 2007.[2,3] Among the dialysis population, most patients receive hemodialysis (HD). The treatment requires patients to visit a dialysis facility three times a week for a total of 9 to 12 h. Alternatively, peritoneal dialysis (PD) is usually done by the patient at home every day and requires only a monthly visit to a dialysis facility for maintenance.[4] Given the popularity of HD, virtually all dialysis facilities in the U.S. provide HD while 44% of dialysis facilities also provide PD in addition to HD. Overall, single product HD dialysis facilities and multiproduct dialysis facilities with both PD and HD account for 97% of all dialysis centers in the U.S.[5] Though there are relatively fewer PD patients, the lack of access to PD in some markets could significantly affect patients' welfare if PD is highly valued.[6] Studying the

☆ An older version of the paper was circulated under the title "Specialization and Competition in the Out-patient Dialysis Market". I would like to thank the co-editor and two anonymous referees for exceptionally helpful suggestions. I also thank Nathan Bossie, Sebastian Bradley, Federico Ciliberto, Allan Collard-Wexler, Leemore Dafny, Shane Greenstein, Paul Grieco, Teresa Harrison, Jin Li, Vibhas Madan, Roger McCain, Ryan McDevitt, Subramaniam Ramanarayanan, Katja Seim, Kostas Serfes, Mark Stehr, Xun Tang, Matthew Weinberg, Feng Zhu, Tom Zylkin, and the seminar participants at Drexel, SEA 2011 and IIOC 2012 for their comments and helpful discussions.

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[2] Medicare provides coverage to all ESRD patients regardless of age.
[3] Source: Medicare Payment Advisory Commission's March Report to Congress 2009.
[4] Under HD, a patient's blood is removed from the body and filtered through a dialyzer (a man-made membrane) before being returned to the body while PD uses the membrane inside the patient's own abdomen (peritoneum) to remove the waste from the body. Details of the treatments are introduced in Section 2.
[5] Only 3% of dialysis units are single modality home dialysis centers which provide support and training to peritoneal dialysis patients.
[6] Many studies in the medical literature have documented that a patient's choice of dialysis modality is primarily driven by horizontal preferences (e.g. the ease of scheduling and maintaining current life style) rather than dialysis outcome (e.g. survival). See Johansen (2011) for a summary of key findings in several studies.

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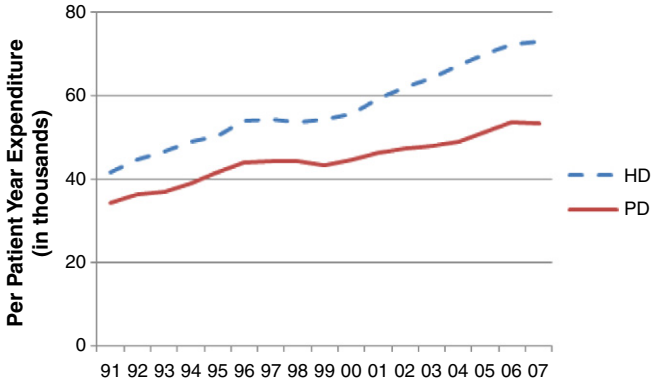
http://dx.doi.org/10.1016/j.ijindorg.2013.10.006



Note: HD represents the average per patient per year expenditure among hemodialysis patients and PD represents the average per patient expenditure among peritoneal dialysis patients. Source: USRDS 2009 Annual Report, Volume 2, Chapter 11.[38]

Fig. 1. Medicare expenditure on ESRD patients. Note: HD represents the average per patient per year expenditure among hemodialysis patients and PD represents the average per patient expenditure among peritoneal dialysis patients.[39]
Source: USRDS 2009 Annual Report, Volume 2, Chapter 11.

[39] The data reported here have been supplied by the United States Renal Data System (USRDS). The interpretation and reporting of these data are the responsibility of the author(s) and in no way should be seen as an official policy or interpretation of the U.S. government.

provision of dialysis modality is one important step in understanding the welfare implication of competitive modality supply in the dialysis market.

From the perspective of regulators, understanding the supply of dialysis modality also helps address the motivation behind recent reforms in the Medicare dialysis payment system, namely, to control cost without compromising quality. In the past decade, increasing Medicare expenditure on dialysis, primarily driven by the profit incentive from using in-center HD, has received significant policy attention. As shown by Fig. 1, the average per patient per year Medicare expenditure is much higher and increases more steeply among HD patients than PD patients. The separately billable services associated with using HD are partly responsible for this phenomenon.

Under the current Medicare reimbursement system, dialysis providers are paid a fixed composite rate regardless of modality for three dialysis treatments per week. Additionally, providers can also receive Medicare reimbursements for separately billable services that are furnished during the in-center HD sessions (e.g. injectable drugs such as Epogen, vitamin D, and iron). The separately billable services represent about 40% of total Medicare payments per dialysis treatment session and have become an important revenue source for dialysis facilities.

In order to contain cost and promote the usage of home dialysis whenever appropriate, Medicare proposed a new expanded payment system that removes the drug revenue incentive from the dialysis modality selection in 2008.[7,8] Under the new system, separately billable drugs are incorporated into a new bundled payment. This effectively reduces the markup for HD, which is currently offered by both single product and multiproduct dialysis firms.[9]

The goal of this paper is to evaluate possible consequences of the price reduction in HD. Particularly, what is the impact of lowering the regulated price on the entry and exit decisions of dialysis facilities? How does the impact differ across markets? Does the new policy promote the availability of PD? The answers to these questions will be important to the ongoing policy debate and will provide useful insights into competitive conduct in dialysis markets and more generally the effectiveness of fixed-price regulation.

While a lower regulated price may decrease the profitability of single product dialysis providers and induce exit, the effect on multiproduct providers is ambiguous. On the one hand, the declining margin for treating HD patients lowers the profitability of multiproduct dialysis units. On the other hand, the exit of single product dialysis providers reduces the intensity of competition faced by the multiproduct providers. Overall, we may expect either an increase or a decrease in the number of multiproduct providers depending on which effect dominates.

I estimate an endogenous product type choice model by exploiting the differences between single modality dialysis units and dual-modality dialysis units. Though one can answer similar questions using a diff-in-diff approach, the new reimbursement rule has been in effect since 2011 and the full implementation is expected to be completed in 2014. The entry and exit of the dialysis facilities as a result of the new rule may take place over a longer time horizon. In my model, a dialysis facility will enter the market if the variable profit is large enough to cover the fixed entry cost. In the meantime, dialysis facilities anticipate competition and choose which modality mix to offer, knowing that the margin declines faster with the presence of competitors who offer the same modality mix. Using these estimates, I simulate the counterfactual modality distribution following the policy proposal in 2008, assuming that patient behavior and provider cost structure don't change in response to the implementation of the new policy.[10]

I find that the competition is much more intense among dialysis facilities who offer the same mix of modalities. For example, in a market that could sustain two dialysis firms, if the incumbent is a single modality dialysis unit, the next entrant is much more likely to be a dual-modality unit and vice versa. The estimates imply that it is unprofitable for a dual-modality dialysis facility to offer PD in an average market, which is consistent with the casual observation that only 3% of the dialysis units are single modality PD facilities in the U.S.

Holding patient behavior and dialysis provider cost structure constant, I show that the new reimbursement policy, which reduces margins for both single product and multiproduct dialysis units, will increase the number of multiproduct dialysis units. This is because the reduction in the margin on HD has a stronger effect on single product units and induces exit. The exit of single product dialysis units relaxes the competitive pressure faced by multiproduct units. The effect of the reduced competition dominates, making multiproduct firms more profitable and eventually attracts the entry of multiproduct firms. However, the number of single product facilities that exit is greater than the number of entrants, so the total number of dialysis facilities will decrease. I find no evidence that the new reimbursement policy promotes PD availability. Though there is an increase in PD penetration through the growing number of multiproduct dialysis units, there is no change in the number of markets without PD.[11] Thus the policy goal of increasing the accessibility of peritoneal dialysis cannot be achieved.

[7] The new payment proposal was released on Feb 20, 2008 through "Report to Congress: A Design for a Bundled End Stage Renal Disease Prospective Payment System" as required by the Medicare Prescription Drug, Improvement, and Modernization Act of 2003. The proposal can be downloaded at http://www.cms.gov/Medicare/End-Stage-Renal-Disease/ESRDGeneralInformation/downloads//ESRDReportToCongress.pdf.

[8] Low PD utilization generates significant concerns and in 2008, CMS issued a new rule aiming at encouraging home dialysis. Specifically, the new rule requires a plan for each patient's home dialysis treatments or explanation why the patient is not a candidate for home dialysis. Source: Government Accountability Office (GAO) Report to Congressional Committees "End-Stage Renal Disease: Although Cost of Home Dialysis Will Be Included in Bundled Payment, CMS Should Monitor Effect on Home Dialysis Utilization Rates," May 2009, GAO-09-537.

[9] In this paper, I use the term single product firm to refer to the single modality HD facility and use the term multiproduct firm to refer to the dialysis facility who offers both PD and HD. In Sections 4 and 5, we explain why single product PD is not an active choice of the firm.

[10] Section 5.3.3 briefly discusses the possibility that the policy alters a consumer's preference over dialysis modality.

[11] Since PD is offered only in multiproduct dialysis facilities, a market without PD refers to a market without the presence of multiproduct firms.