Patient compliance, physician empathy and financial incentives within a principal-agent framework

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ABSTRACT

Compliance with medication regimens among patients with chronic conditions in the U.S. and other developed countries averages only 50%. Numerous studies have attributed poor compliance to physicians' failure to exhibit sufficient empathy with patients' problems. Can financial incentives help modify physicians' empathic behavior? In view of contradicting evidence in the health psychology literature, the present paper addresses this question from a rational-choice perspective, introducing a principal-agent model of physician empathy and patient compliance. The model allows the physician to exhibit empathy with the patient, to which the patient responds by choosing his desired level of compliance, which the physician takes into account when determining the level of empathy she exhibits. The model is first applied to rationally substantiate the evidence that patient compliance rises with physician empathy, and subsequently to examining the relationship between physician empathy and the physician's fee. The analysis reveals that the physician will exhibit less empathy in response to a higher fee, implying that the higher the fee the less compliant her patient will be.

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1. Introduction

In August 2007, the U.S. National Council on Patient Information and Education released a detailed 10-step action plan to reduce the adverse health and economic consequences associated with patient poor compliance with medication regimens. Referring to poor compliance as "America's other drug problem", the Council stresses that this persistent and pervasive public health threat has reached crisis proportions, therefore addressing it cannot wait (NCPIE, 2007). A survey commissioned by the U.S. National Community Pharmacists Association found that nearly one third of those polled (31%) had not filed a prescription they were given and almost one quarter (24%) has taken less than the recommended dosage (NCPA, 2006). According to the World Health Organization, compliance among patients with chronic conditions in the U.S., as well as in other developed countries, averages only 50%, resulting in unnecessary disease progression and complications, reduced work productivity, increased absenteeism, lowered life quality, and premature death (WHO, 2003).[1] The total direct and indirect costs to U.S. society

from failing to adhere to prescribed medication has been estimated to reach $177 billion annually (Ernst and Grizlle, 2001).[2]

While a number of factors may contribute to poor compliance, such as the complexity of the medication regimen, the cost of medication, concern about possible side effects, or social stigma associated with taking medicine, numerous studies have indicated that effective communication between the physician and patient is the single most powerful predictor of patient adherence to a treatment plan (Stewart, 1995). Of all elements involved in effective communication, empathy seems to play the most important role (Squier, 1990; Bellet and Maloney, 1991). Defined as the socio-emotional competence of a physician to be able to understand the patient's situation, perspective and feelings, to communicate

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[1] Research reveals that even the potential for serious harm may not suffice to induce patients to take their medication appropriately: although hypertension increases the risk of a heart attack three to four fold, just 51% of patients took their prescribed dosage of drugs to manage this condition (Kramer et al., 2006); less than

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2% of persons with diabetes followed recommended dietary restrictions and medication use (Beckles et al., 1998); only 42% of glaucoma patients met minimal criteria for compliance after having been told they would go blind if they did not comply, while already going blind in one eye raised compliance rates to 58% only (Cramer, 1991); about 18% of renal transplant patients facing organ rejection or even death from poor compliance were not taking their medicine as prescribed (Rovelli et al., 1989).
[2] Poor compliance costs the U.S. health care system about $100 billion annually (TFC, 1994), including approximately $47 billion each year for drug-related hospitalizations (Johnson and Bootman, 1995). Furthermore, poor compliance has been associated with as many as 40% of admissions to nursing homes and with an additional $2000 a year per patient in medical costs for visits to physicians' offices (APA, 2003).

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this understanding to the patient and to act on that understanding with the patient in a therapeutic way (Mercer and Reynolds, 2002), many experts believe that empathetic communication is a teachable and learnable skill (Spiro, 1992; Platt and Keller, 1994) and many medical schools have developed clinician-patient communication courses with strong emphasis on empathy. One might thus suppose that physicians would scramble to learn about and use such a powerful communication skill at every available opportunity. Unfortunately, this is not necessarily the case as physicians may have various reasons for not offering empathy to patients. The most common one is their belief that exhibiting empathy is time consuming and emotionally exhausting.

Can financial incentives help modify physicians' empathic behavior? The health psychology literature has not tackled this question, with two exceptions. In a recent study of German hospital inpatients, Neumann et al. (2011) found that physician empathy, as measured from patients' perspective, was higher among patients who held private health insurance than among those who had statutory insurance. Arguing that physicians who are compensated by private insurance can (and presumably do) charge higher fees for their services, the researchers conclude that financial incentives positively affect physicians' empathic behavior. Conversely, a Dutch study comparing fee-for-service with fixed salary plans found that physicians on fixed salaries provided longer visits, more information and advice, and greater empathy (van Dulmen, 2000).

In view of the contradicting evidence regarding the effect of financial incentives on physicians' empathic behavior, there is interest in examining this question from a rational-choice perspective. The present paper introduces a rational-choice model of physician empathy and patient compliance. We adopt a principal-agent framework, where the principal (the physician) derives satisfaction from the agent's (the patient's) therapeutic outcome which is dependent on the use of medication. She thus prescribes for the agent an effective medication regimen which she orders him to follow. The agent, however, being concerned with the adverse side effects of the medication, may opt not to comply with the principal's order, or to comply only partially, consequently failing to reach the full therapeutic outcome. To induce compliance, the principal may exhibit empathy with the agent, to which the agent responds by choosing his desired level of compliance though maximizing his expected utility and which the principal, being familiar with the agent's preferences, takes into account when determining the level of empathy she exhibits.[3]

While exhibiting empathy is, by assumption, time consuming and therefore costly in terms of forgone earnings or leisure, it is not a philanthropic act on part of the physician, as it improves the therapeutic outcome and contributes to the physician's self-esteem and professional reputation. In this sense, the paper is also related to the literature on warm-glow giving initiated by Andreoni (1989, 1990), which suggests that making donations to charity may not be motivated by pure altruism, but also (and very often only) by the desire for a "warm glow' that comes with being the kind of person who gives money to charity. Viewing accordingly the amount donated as a private good which enters the donor's utility function, Andreoni shows that contrary to the standard model of donation, the modified model bears implications that are consistent with observed patterns of giving to charity.[4]

The principal-agent (physician–patient) model introduced in this paper is first applied to rationally substantiate the evidence that patient compliance rises with physician empathy and subsequently to examining the relationship between physician empathy and the physician's fee. The analysis reveals that the level of empathy exhibited by the physician is *negatively* related to her fee. Consequently, the higher the physician's fee, the less empathetic she will be. Because patient compliance is positively related to physician empathy, it follows that the higher the physician's fee the less compliant her patient will be.

2. The compliance decision

Consider a patient, who, following the diagnosis of an above-normal value of a critical health indicator (e.g., high blood pressure), seeks the advice of an expert physician. Suppose that the physician recommends a certain medication and prescribes it for the patient at a dosage of $\bar{m}$ milligrams per unit of time, which is destined to lower the value of his critical health indicator to normal levels. Suppose, however, that the medication involves unpleasant side effects of severity S, about which the physician informs the patient. The side effects are assumed to increase with the dosage consumed, m, hence $S = S(m)$, where $S'(m) > 0$ and $S''(m) \geq 0$. Being concerned with the side effects, the patient may consider the possibility of not fully complying with the physician's recommendation (i.e., choose $m < \bar{m}$).

Failing to fully comply with the prescribed dosage bears the risk of dying. To encourage compliance, the physician may exhibit some empathy, E, with the patient's situation and feelings. Suppose that physician empathy helps alleviate the discomfort associated with the side effects of medication. Specifically, suppose that empathy reduces the severity of side effects to $\rho(E)S(m)$, where $\rho(E) < 1$ and $\rho'(E) < 0$.

The patient is assumed to derive utility from longevity, L, and the quality of life, Q. Suppose that longevity is determined by the patient's compliance level, in accordance with the function:

$$L = \frac{m}{\bar{m} - m}, \tag{1}$$

hence $L = 0$ if $m = 0$, but $L = \infty$ if $m = \bar{m}$. The quality of life is given by

$$Q = q - \rho(E)S(m), \tag{2}$$

where q is a fixed parameter. The patient's utility function is

$$U = U(L, Q), \tag{3}$$

where $U_L > 0$, $U_Q > 0$, $U_{LL} < 0$, $U_{QQ} < 0$, $U_{LQ} > 0$. The latter assumption implies that an increase in the quality of life increases the marginal utility of longevity.

Suppose finally that the patient is fully covered by health insurance and is therefore exempted from paying the physician's fee and the price of medication. He thus chooses m^* so as to maximize the utility function (3) subject to (1) and (2). The first-order condition for this maximization problem is[5]

$$U_m = \frac{\bar{m}}{(\bar{m} - m)^2} U_L(L, Q) - \rho(E)S'(m)U_Q(L, Q) = 0, \tag{4}$$

implying that the patient balances, at the margin, the benefit from a longer duration of life against the cost of reduced quality of life.

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[3] While a few earlier models of rational patient compliance have been offered in the literature [e.g., Ellickson et al., 1999; Lamiraud and Geoffard, 2007], they view the compliance decision as a discrete choice problem (i.e., either to be perfectly compliant or not compliant at all) and do not involve empathy as a physician's compliance-enhancing instrumental choice variable.

[4] Andreoni's warm glow theory has stimulated further theoretical discussions [e.g., Harbaugh, 1998; Altman, 2006] as well as been subjected to experimental tests

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[e.g., Eckel and Grossman, 2003; Davis et al., 2005; Crumpler and Grossman, 2008] which supported the hypothesis that warm glow does motivate charity giving.

[5] The second-order condition is $U_{mm} \equiv \Delta = \frac{\bar{m}}{(\bar{m}-m)^2}\left[\frac{\bar{m}}{(\bar{m}-m)^2}U_{LL} - \rho S'U_{LQ}\right] - \rho[S''U_Q - \rho(S')^2 U_{QQ}] - \frac{2\bar{m}}{(\bar{m}-m)^3}U_L < 0.$