

AN ECONOMETRIC STUDY ON A US HYPERTENSIVE POPULATION
AIMING TO ANALYSE THE ROLE OF
DIFFERENT TYPES OF HEALTH INSURANCE ON DRUG USE.

BY

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INTRODUCTION:

Coverage of outpatient prescription drugs, especially for the growing population of elderly is a major policy issue in the United States.

Within the federal program called Medicare, aiming to insure in particular the elderly, very limited coverage for outpatient prescription drug is included. Some attempts have been made through the Medicare Catastrophic Coverage Act of 1988 and the 1993 Clinton Plan, but both failed to propose a feasible program, combining such a public health objective with the different strategic interests of stakeholders in this major policy reform for the US pharmaceutical industry and the taxpayers. In 1997, 56 percent of Medicare beneficiaries had prescription drug coverage but the rest of the Medicare population had no coverage for outpatient prescription drugs (Soumerai, 1999). The use of outpatient prescription drugs by the elderly is especially linked to their high prevalence of chronic conditions.

The objective of this paper is therefore to analyze the role of different types of health insurance on patterns of hypertensive drug use, especially for various types of elderly patients in relation to their health insurance coverage. We will examine in particular different combinations of insurance and types of payments in relation to the federal program called Medicare on patterns of hypertensive drug use.

If the payment for outpatient prescription drugs, especially for the elderly, is a major American policy debate, it may appear less relevant for the European drug policy debate.

However, in the context of rationing, reduction of national health coverage, increase of supplemental insurance premium, especially for pensioners, in the graduated system of benefits, a better understanding of the impact of the public/private mix on drug use pattern can clearly also interest policy makers in Europe and relevant researchers in other countries, struggling with the growth of health care expenditures. For instance, Central European countries who have also been experiencing major reshuffles of their health insurance system have now to address major and complex public/private mix of insurance, in their transitional economies, where a comprehensive coverage for most basic needs of the population is most of the time out of reach for a public scheme.

Thinking about more convergence of social policies in Europe, it is interesting to see whether in a federal system, such as the American system, where state and federal programs coexist, we can identify, at an aggregate level, some variations due to major differences in type of health insurance used.

This project is a continuation of previous research projects, aiming to investigate hypertensive treatment in the French and the US context and the influence of major clinical, socio-demographic and economic/financial predictors (Huttin and Avorn, 1997; Huttin, 1999; Huttin, Moeller and Stafford (forthcoming)). These two studies were based on self-reported information from patients.

This research is based on an econometric study of a US hypertensive sample, extracted from the 1996 US National Ambulatory Care Survey, a national probability sample survey conducted among physicians. The data are based on information coming to a large extent from medical records and physician visits. Self-reported information, even if administrators strictly monitor it, has created a large debate among the health service research community. Our view is that it is interesting to provide results coming from physician as well as patient sources, since on one hand, the clinician uses the scientific description of a condition and the type of treatment needed; on the other hand, the patient describes his health status and reports the type of care, especially drug care he/she needs, according to his perceived and often subjective knowledge

As in the previous research, we will control for a number of patient characteristics that may also explain variations in patterns of drug use. Such impact of clinical and non clinical patient characteristics on cost and drug use have already been explored in a number of studies concerning chronic conditions (Mechanic and Schelsinger, 1993; Mac Manus and Newacheck, Blaum, 1994; Shepard, 1995; Hornbrook and Goodman, 1996; the Rand experiment 1992. Moy et al, 1995, Warr et al, 1997; Fishman et al, 1997, Huttin et Avorn, 1997). Numerous researches have also already investigated for instance the impact of HMOs on use of services. However, patterns of access and drug use and the influence of types of payments or expected types of insurance are under-researched at a disease specific level (Fishman, et al, 1999).

Main assumption:

The main hypothesis of this model is to explore whether different patient reimbursement profiles have an influence on the likelihood to have access to hypertensive drug therapy and the number or type of medications that a physician will prescribe to his patient as a pharmacotherapy.

II Methods

II.1. Data set:

A sample of 1844 individuals, diagnosed with hypertension was extracted from the National Ambulatory Care Survey (NAMCS) of 1996. NAMCS is a national probability sample survey conducted by the Division of Health Care Statistics of NCHS, Centre for Disease Control and Prevention.

These individuals were selected through ICD9 CM codes (4010-4059) that have been assigned to health event records.

The basic sampling unit for NAMCS is the physician-patient encounter or visit. The physician, aided by his/her office staff when possible, carried out the data collection. The patient record forms lists information from the visit in the physician's office. A systematic

random sample of patient visits has been secured by the NCHS, during the reporting period (more information on the sampling strategy can be found in the NAMCS survey data-file documentation).

Each doctor reported three diagnoses associated to the patient visit. It included the current diagnosis and also some related to the visit. In practice, it represents the main reasons why the patient was at the visit, and the associated diseases. The physician normally diagnosed the most important complaints or symptoms presented by the patient on this visit. This represents the best judgement at the time, expressed in acceptable medical terminology.

Contrary to the previous research mentioned above using self reported data, this data set is therefore based on information collected by physicians. We thought then, we did not need to ascertain the casemix of patients by ensuring that they were also on drug therapy as we did in the case of patient surveys. We believe this survey provides a better way to identify a casemix of patients with a specific condition.

Pharmacological treatment for hypertension was defined by building a hypertensive drug list from the 95-96-97 Facts' comparisons and comparing this list to the generic medication codes, for this dataset, within the cardiovascular drug categories (codes 500-514), including the combination products.

II.2. Methods for the analysis and enabling patient characteristics:

Insurance profiles and influence of net price of drugs:

The main objective of this paper is not so much to propose a different theoretical framework for modeling the demand for care and in particular for pharmaceutical care. It is to use existing modeling forms to explore the complexity of variations in insurance profiles of patients and its impact on access to therapy and drug use.

In comparison with the NMES national survey data, the NAMCS data set previously

introduced in the last section provides the opportunity to capture different types of payment and different expected types of insurance, based on what is specified by the physician. In practice, the physician cannot be sure if the patient declared the exact system of insurance and coverage that he can benefit from. In particular, the patient may think it is a type of information that may influence physicians' decision in a way that he may not be so satisfied with.

The different types of models of demand for care, when we started this research, were based on the development of the Grossman model which aims to model patient demand for health.

It is expected that net prices (1) of inputs influence the demand for health and its derived demand for health care services like pharmaceutical services and physicians' visits. In this paper, we consider mainly a description of what happens during a physician visit.

With a graduated system, the net price is a drug characteristic derived from his market price. However, most of the time, it is disconnected from this market price. It is more or less entirely dependent on the insurance scheme and the type of drug benefit attached to the patient. Therefore it becomes a patient characteristic, for a patient diagnosed with a specific condition rather than a product attribute. This patient/condition combination is more likely to really capture what would be the net price of drug care for a patient and determine his demand for the type of access or type of use to some pharmaceutical services.

Moreover, we have no way in the data set, of obtaining accurate information on the net price paid by each patient diagnosed with hypertension, for the drug therapy received.

The net price is very dependent on drug benefit schemes proposed by the insurers, within the enrolment in various types of health insurance and associated types of payment. Therefore, as a proxy for testing the influence of net prices on patterns of use, it is relevant to capture the diversity of insurance profiles.

It is true though that the simple fact of being enrolled in a private versus a public insurance

scheme does not especially mean that drug benefits are systematically different between the two expected types of insurance. Moreover, a huge variation exists on the range of prescription drug benefits, not only according to the type of health insurance, but also the State. Soumerai (1999), for instance, did a study on the characteristics of the State Pharmacy assistance programs for poor elderly and disabled persons, who do not benefit of Medicaid, across a number of States. His findings reveal that according to health insurance programs, in this case as a public state scheme, drug coverage can include a diverse set of net prices or costs

(1) We call net price here the price paid by the consumer. We keep the assumption from the Grossman model that the net price influences the demand for pharmaceuticals.

to the patient, covering different ranges of drugs, including deductible as well as fixed charge or a graduated system of drug coverage (see table1).

So, the only source of information enabling us to identify for instance if a patient is on a public State insurance scheme or a private insurance, does not automatically imply certain homogeneity in the net price. However, at this stage of the research, it is still relevant to explore potential influence of different layers in reimbursement systems. In this project, we intend to capture a range of more system specific variations, linked to broad categories of insurance and type of payments. In order to have a comprehensive view of the influence of different systems of coverage though, it would be important, in a second step, to understand also the specificities of drug benefit programs within each system.

Table 1

	prescription drugs covered	deductible	copayment
New Jersey	all drugs	none	5 dollars
Maryland	drugs for specified chronic conditions	none	5 dollars
Pennsylvania	most drugs	none	6 dollars
Illinois	most drugs	15	20% of cost after 800 dollar benefit

Rhode Island	drugs for cardiovascular diseases, diabetes, arthritis	none	40 % of cost
Connecticut	most drugs	none	12 dollars
New York	most drugs	none	3 to 23 dollars according to drug cost

Source: table issued from a Soumerai study on characteristics of State Pharmacy assistance programs for elderly and disabled persons. Soumerai S, NEJM, (1999).

The model

The uptake of medicines is the result of a combination of physician and patient decisions. So the fact that a patient is more or less likely to have access and use more prescribed medicines partly reveals his decision. But, it is also the result of a physician diagnosis and his prescribing practice. In this paper, we intend to model and provide estimations on the likelihood of access, at a physician visit, to different levels of drug therapy and to capture the influence of some major enabling patient characteristics. By using information at the physician practice level, we mainly reflect then the prescribing decision and the result of the interaction between the physician and his patient.

In the previous research performed with National Medical Expenditure Survey data, we intended to analyze the purchase of medicines. This then clearly included a patient's decision, taking the prescription from his doctor, to go to a pharmacy and purchase the prescribed medicines (Huttin, Moeller, Stafford, forthcoming). However, it was difficult then to disentangle in this purchase of medicines, what were exactly the sources of variations coming either from a physician prescribing decision or from a patient's purchasing decision or his complying behavior. The level of insurance is usually more associated with patients' decision, assuming that a patient with a good drug benefit will tend to be less price sensitive and to purchase or consume more.

However, insurance and the level of drug coverage are probably taken into account also during a physician visit and in what happens in the practice. Previous studies tend to show that cost to the patient does not influence so much physicians (Denig and Haaijer-Ruskamp, 1995). On the contrary, an ongoing research on the topic tends to show that various cost minimization clinical strategies may be used by physicians when they become aware of patient affordability issues (ENDEP/Biomed project and, in particular Huttin and Andral, 2000). Therefore, the access to drug therapy is determined by the result of the physician/patient interaction, at the physician practice, where the knowledge of the insurance profile of a patient may affect the physician.

The model is operationalized through a series of estimations of the likelihood that there may be an access to one or more prescribed medicines. In this stage of the research, we did not introduce physicians' characteristics, but mainly patients' characteristics that can distinguish those more or less likely to have access to hypertensive drug treatment.

The various equations of the model are therefore along this main format:

$$\text{Likelihood to have access to drug therapy} = f(\text{socioeconomic and insurance, lifestyle factors})$$

The access to drug therapy will be analyzed in various ways:

- the access to drug therapy versus no drug therapy (through a simple logistic regression)
- the access to 0,1,2,3,4 hypertensive drugs (through an ordinal logistic regression)

The influence of the insurance profile will be analyzed at various levels of aggregation and in combination with different types of payments.

Dependent variables:

Our key dependent variable is therefore the probability for patients who have been diagnosed with hypertension to be on hypertensive drug after a physician visit. The

measure on the number of prescribed medicines is primarily reported by the practice. It mainly reveals the physician judgement, taking into account some patient's characteristics. Our objective is not, here, to understand the physicians' judgements, in relation with some clinical predictors, but to see whether the access to the drug therapy, at the physician visit is influenced by socio-demographic characteristics, insurance profile, some life style characteristics and some geographical factors.

It will be interesting to compare the findings with the results of the previous study on a US hypertensive sample, on the likelihood to have an uptake of medicines, measured from self-reported information. We measured then the number of items of prescriptions purchased by the patient. On the contrary, in the case of NAMCS data, the dependent variable directly measures drugs prescribed by the physicians, based on his report.

Independent variables:

The independent variables mainly include the insurance profile, socio-demographic and two lifestyle variables. Contrary to the previous research on NMES, we could not include, at this stage, clinical predictors.

The insurance profile:

The key enabling characteristic, in this research, is the insurance profile. From our previous discussion, the physician's perception of the insurance profile of his patient can be influential on the physician, the patient and the results of the interaction between a physician and his patient during a physician visit.

As health insurance status is very country specific. We will explain briefly then some major characteristics which are relevant to understand the scope of this research on impact of different health insurance profiles in relation with different type of insurance or/and type of payments.

The reason to analyze the US health insurance system is to explore the influence of various combinations of private, market-based insurance as well as several public

programs. These have been in particular, established for American Indians, the elderly, veterans, migrant workers and other deemed vulnerable groups (1). We cannot capture, with the data set, the full picture of the very complex scene of health insurers. However, a few major categories are listed. As we were keen, in this project, to focus, in particular on the issue of elderly, with or without coverage of outpatient prescription drugs, the main categories listed were sufficient for this purpose. The two main federal programs, Medicare and Medicaid, are identified in this data set and can be combined with additional private insurance. Medicare was enacted in 1965 and pays for care to people over 65 years of age, permanently disabled and to people with end stage renal disease. It does not cover most of outpatient prescription drugs and many people cover this cost with a supplemental insurance (one of the most popular is called Medigap).

(1) The reader can refer to Igleharts articles (1992) for a description of the American Health Insurance system, in particular for a description of Medicare
Medicaid, also established in 1965, is linked to eligibility for welfare cash assistance and is financed by a mixture of federal and state taxes. Most of the beneficiaries are low-income families, however, most of the funds go to elderly and disabled persons with acute and chronic illnesses. Unlike Medicare, the States provide the coverage of outpatient prescription drugs as an optional service under Medicaid.

The NAMCS database therefore enables analysis of different insurance profiles as well as types of payments, that have been reported by physicians and their staff members. We assume then that variations in these two sets of variables lead to some variations in drug benefits.

However, a drug benefit has normally a number of characteristics, in relation with how much it is going to cost to the patient and which categories of patients are concerned then by these different cost sharing arrangements. The main usual characteristics are (1):

- The type of charge (e.g. fixed, graduated, graduated above a fixed cost deductible): this will determine in particular if there is a relation with drug prices.
- The existence or not of a deductible system.
- The range of exemption categories (based on rather clinical versus

economic or demographic factors for instance)

- The existence of a ceiling or not on patient charge (e.g. 2% of income, generally in Germany).
- The existence of supplemental insurance (combination or not of multi-insurance schemes).
- Different types of methods of payment (fee for service, capitation and prepayment, third party versus advance payment). According to types of payment, physicians may also be more or less at risk with cost.

As we cannot capture this complexity within the data set, we will address only some areas of variations linked to number and types of plans or types of payments.

(1) See for instance the research undertaken within the ENDEP group, EIASM, Brussels and in particular the article from Noyce, Huttin, Atella and als (2000).

Measurement of types of payments:

The different types of payments that were measured are the following:

- Insured within a fee for service system
- payment within a PPO (Preferred Provider Organization) system (1)
- payment within a HMO/other prepaid, or IPA (in IPA, physicians are not at risk for the cost) (2).
- Self payment
- No charge
- types of payment unspecified
- other

This classification only reveals physicians' expectations, since they cannot really be sure that such types of payments will really happen after the visit.

Measurement of expected type of insurance

In the NAMCS classification, the following categories have been listed:

Blue Cross/ Blue Shield, Other private insurance, Medicare, Medicaid, Worker' s compensation, other insurance, unknown.

Other socio-demographic variables:

Other socio-demographic variables were including in the model to control for variations in other patient characteristics. They include the following variables: age, sex, race, and geographical variations, rural versus city areas, smoking, and obesity.

The influence of age, sex and race have already been largely described in the literature on chronic conditions and a number of studies have explored in particular their influence on likelihood of drug use for hypertensive treatment (see Huttin, Moeller and Stafford, forthcoming, including a literature review on the impact of such variables on hypertensive drug therapy).

(1) The PPOs are for instance the most popular managed care plan offered by Blue Cross and Blue Shield (64% of the Blues managed care enrollees are in PPOs; only 26% in HMOs (Slomski,1996)).

(2) prepayment plan in many HMO means payment by capitation. Capitation rates vary a lot from one HMO to another and from area to area. Capitation payment usually ranges from only 7dollars to 15 dollars per member per month. This may sometimes appear too low in relation to the number or types of services that physicians are expected to perform (Terry, 1996).

Geographical variations are usually very important to capture, since many authors have also demonstrated large variations in practice patterns (see for instance Wennberg articles on the topic). However, this data set allows only to capture major regions in the United States and therefore results at this level of aggregation will need to be interpreted with caution. The urban/suburban/rural sources of variations are usually also taken into account to analyze patterns of use. It usually explains variations on types of physician practices and variations in ways patients use their medicines or purchase them.

The data set also allowed measuring smoking and obesity profiles of the patients. These two lifestyle factors are usually cited in the literature as very important risk factors for cardiac diseases and large benefits can be expected from their modifications. Some former studies, which have already used the NAMCS survey, have also suggested that private insurance coverage is usually associated with more aggressive prevention practices by

physicians, particularly compared to patients with Medicaid coverage or no insurance (self pay), especially for costly services (Stafford and Blumenthal , 1995; Stafford and Meigs, 1996; Stafford, Pasternak and Blumenthal, 1997).

III. RESULTS AND DISCUSSION:

III.1. Description of the sample:

The hypertension sample size, extracted from the NAMCS data, is 1844 patients. It is composed of 56.2 % female. The age structure is the following:

age groups	percentage
age <= 44	11%
45 < age <=54	17.10%
55 < age <=64	20.6%
65 < age <=74	26.5%
75 < age <=84	20.2%
age > 85	4.6%

In term of expected source of insurance, 46.1 % of the sample represents patients with Medicare; 19% with Blue Cross, 13.4 % with other private insurance, 7.6 % with Medicaid, and others unspecified types (13.90%).

In term of types of payments, we have the following distribution:

types of payment	
PPO	10.3 %
Fee for Service	46.5%
HMO/other prepaid	21.1%
Self Pay	6.9%
No charge	0.6%
Other	0.6%
Unspecified or blank	13.90%

III.2. Results on the likelihood to have access to drug therapy:

III.2.1. Influence of health insurance, demographic and geographical factors on the likelihood of access to hypertensive drug therapy:

Table 1 provides the results of an ordinal logistic regression on the selection of socio-demographic, lifestyle factors and insurance profiles, previously discussed. We compare different insurance groups. Among the group of Medicare patients, we distinguish the ones with Medicare only from the patients who could get access to Medicare, plus one or more of any other expected insurance (Medicaid, other private insurance, Blue Cross, other insurance).

Influence of type of insurance:

We aimed to estimate in particular whether there was a major difference of access to therapy between the population with Medicare and the average American, insured with private insurance.

The results tend to show a significant reduction in the likelihood to get access to drug therapy for the patients with Medicare only. As soon as Medicare patients can also benefit from any kind of other type of insurance, the difference with privately insured patients is not significant. We can also notice that Medicaid patients are not significantly less likely to get access to drug therapy than patients with private insurance. It appears then it is mainly the lack of coverage for outpatient prescription drugs, which seems to introduce such a lower access to therapy. These findings confirm previous results on self-reported data. What happens at the physician visit, determines to a certain extent not only what the patients purchases, but in fact what the physician prescribes, when he has a certain knowledge of his patient's expected insurance status.

Influence of demographic variables:

Age has a strong influence on the likelihood of access, for patients aged below 44 (the

Odds ratio shows that these patients are less than twice likely to have access to a drug therapy). We could however not notice other major statistical difference among other age categories in comparison with the oldest group aged over 75.

Female appears to be less likely to be on drug therapy than male. We could not observe any difference in relation with the type of race. This is different from previous findings where racial differences were significant from self-reported data. It would tend to prove then that the decisions to prescribe drug therapies and what happens in the physician practice are not so influenced by race or ethnicity, but that it is mainly what happens after the physician visit and when different racial groups go to purchase their medications that the likelihood of drug use is different. This would then imply that it is mainly the purchasing behavior of the patient, which seems to vary with racial differences.

Influence of lifestyle factors:

The influence of smoking and obesity could be examined in the scope of this study. We could not identify statistical differences according to variations in smoking habits. On the contrary however, it is very clear that obesity is a major risk factor taken into account by physicians. Therefore, the likelihood to a different access to drug therapy is influenced by this factor. These first results present the results on the ordinal regression, taking into account patients with 0, versus 1, 2,3 or 4 medications. It is interesting to remark that when we had run a simple logistic regression comparing the likelihood of access versus no access, obesity was not so significant. That would mean that the variations seem to take place not so much between the dichotomy of no versus some drug use, but more in the range of number of drugs that are prescribed to the patients. So, once a patient is in a physician practice, more or less obese patients would get access to drug therapy, but more obese patients get probably more drugs than less obese patients. This was confirmed by subgroup analyses.

Influence of geographical factors:

It is clear that geographical variables seem to have a role, and it has already been shown

in the literature (see Wennberg's work). In our results, we found that systematically hypertensive patients who live in the Middle West have lower likelihood of access than patients do from other regions. However, it is hard to interpret such results, since the level of aggregation is very high for the size of the country.

We could not identify, at this level, differences between urban/suburban areas. We suspect that such a level of aggregation cannot really capture the potential sources of variations, in particular on physician practices and their prescribing patterns.

Table 1
Likelihood of access to an anti-hypertensive drug therapy.
National Ambulatory Medical Care Survey (1996)

	coefficients with (95% CI)	Odds ratio	P > X2
age <= 44 (1)	-0.518 (-0.883 - -0.154)	0.595	0.00
45 < age <=54	-0.291 (-0.626 - 0.043)	0.747	0.08
55 < age <=64	-0.222 (-0.532 - 0.086)	0.800	0.15
65 < age <=74	-0.022 (-0.261 - 0.217)	0.978	0.85
female	-0.193 (-0.367 - -0.018)	0.824	0.03
race 23	-.117 (-0.096 - 0.330)	1.124	0.28
obesity	0.281 (0.047 - 0.515)	1.326	0.01
smoke1	0.013 (-0.258 - 0.284)	1.013	0.92

smoke3	-0.169 (-0.372 - 0.032)	0.844	0.10
Noreast	-0.106 (-0.372 - -.160)	0.899	0.43
Midwest	0.277 (0.025 - 0.529)	1.320	0.03
south	-0.115 (-0.363 -0.132)	0.891	0.36
smsa	0.007 (-0.206 - 0.222)	1.008	0.94
mediplus (2) (3)	0.067 (-0.219 -0.355)	1.070	0.64
Medicare only	-0.346 (-0.636 - -0.056)	0.707	0.01
blue cross	-0.194 (-0.436 - 0.047)	0.823	0.11
Medicaid	0.027 (-0.313 - 0.368)	1.028	0.87
unknown1	-0.540 (-0.943 - -0.135)	0.583	0.00
other insurance	-0.495 (-0.817 - 0.174)	0.609	0.00

N= 1844

Prob > x2 = 0.00

(1) The control group for age is the group of patients aged over 75.

(2) the variable Mediplus represent the Medicare insurance and any additional coverage coming from Blue Cross, other private insurance, Medicaid or other insurance

(3) The control group for the insurance variable is the group with other private insurance (where we added 4 patients with worker compensations).

III.2.2. Influence of various types of Medicare coverage on the likelihood of having access to drug therapy:

In a second stage of the analysis and since the Medicare coverage is a major concern in relation with outpatient drug coverage, we intended to analyze more in detail differences in insurance profiles of different patients enrolled in the Medicare program. Table 2 presents then the disaggregated results on the group of insurance variables, from a simple logistic regression. The only major difference was to examine the situation of patients with different combinations of insurance schemes. So, the Mediplus variable was then replaced by Medicare + Blue Cross, Medicare + Medicaid, Medicare+ other insurance (private or not private other insurance). The findings confirm what was found at an aggregate level. It is really only the group of Patients who cannot access any of other types of insurance that face a lower access to hypertensive drug therapy. For instance, the

group of patients who combine Medicare and Medicaid only, are not less likely to be on hypertensive drug therapy than other privately insured patients.

Table 2

Influence of expected health insurance on the Likelihood of having a hypertensive drug therapy - National Medical Ambulatory Care Survey (1996) - results on simple logistic regression - (1)

	Adjusted Odds ratio	P
Medicare and Blue cross (2)	0.83	0.47
Medicare and other insurance (private or other)	1.08	0.73
Medicare and Medicaid	0.61	0.22
Medicare only	0.62	0.00
Blue Cross	0.89	0.53
Medicaid	1.42	0.24
Unknown	0.52	0.00
Other Insurance	0.66	0.02

(1) The following variables were also used to control the variations in probability of use: age, sex, race, obesity, smoking, regions, and urban/rural areas.

(2) The patient with other private insurance (and 4 observations represents the control group used for the different types of insurance from workers compensation).

This control group has been chosen because it represents the most common type of insurance in the American system.

III.2.3. Influence of insurance and types of payments on the likelihood of access to drug therapy:

In a third part of the analysis, we were then interested to explore potential influence not only from the expected source of insurance but also from different types of payments, which exist in the United State. The focus was to compare three major different types of payments, tied to different types of systems of payments: Fee for service, PPO and HMO/prepaid (mainly capitation rate). Further analysis could also include other sources of payment such as self-pay, but the sample then becomes quite small on such categories. One explanation is that, in NAMCS, patients who come for a physician visit have already overcome financial potential barrier of cost of physician visit. Results of this analysis are presented in table 3.

Table 3
Influence of health insurance and type of payments on the likelihood
to have drug therapy - NAMCS - 1996 -

	Adjusted Odd Ratio	P
Medicare and Blue cross (1)	0.78	0.36
Medicare and other insurance (private or other)	0.95	0.81
Medicare and Medicaid	0.61	0.22
Medicare only	0.58	0.00
Blue Cross	0.85	0.39
Medicaid	1.33	0.32
Unknown	0.51	0.00
Other Insurance	0.65	0.02
dx (2)	0.75	0.03
PPO	0.74	0.09
HMO/prepaid	0.80	0.12

(1) the control group for insurance: private (and 4 from worker compensation)

(2) the control group for the type of payment is “fee for service”

at this stage, the aim was to compare mainly the three types of payments: PPO, fee for service and HMO/other prepaid. So all other categories have been pooled in a dx category. d0: no source of insurance listed; d1: PPO; d2: fee for service; d3: HMO/other prepaid, d4: Self-Pay (it could also have been interesting to distinguish the “self pay” category but they represent 6% of the sample); d5: no charge; d6: Other; d7: unspecified. dx includes patients with the types of payments in the following categories: d0, d4, d5, d6, and d7.

As in the previous case, when we consider separately types of payments and expected types of insurance, we cannot find statistically significant difference between the three main types of payments. However, if we tolerate a large error rate, then, PPO could be to, a certain extent, significantly significant; showing that patients with PPO are less likely to have access to drug therapy than Fee for Service patients. But, there is no difference between HMO and Fee for Service patients in term of access to hypertensive therapy.

III.2.4. Influence of Medicare, types of payments and interactions between types of payments and Medicare status on the likelihood to be on drug therapy:

As types of payments and expected sources of insurance are closely related, we wanted then to examine, in a fourth step of the analysis, a model with interactions. We will present here some preliminary results focusing on interactions. The analysis is run with the only group of patients for which the insurance status seems to lead to substantial reduction of access, namely patients covered with Medicare only.

This model with interactions on Medicare and types of payments seem to point out that the interrelation between types of payment and expected health insurance is very strong. Table 4 shows that patients covered with Medicare only are less than twice likely to get access to drug therapy than privately insured patients are. However, when we examine the interaction between the three main types of payments and patients with Medicare only, we found that Medicare patients with HMO/prepaid plans are more than twice as likely as Medicare patients with Fee for Service to get access to drug therapy.

Table 4
Influence of health insurance, type of payments
and interactions for Medicare only, on the likelihood
to have drug therapy - NAMCS - 1996 -

	Adjusted Odd Ratio	P
Mediplus: Medicare and any type of other insurance (1)	0.81	0.25
Medicare only	0.48	0.00
Medicare only and PPO	0.89	0.79
Medicare only and HMO	2.18	0.04

Medicare only and other types of payment	1.16	0.59
Blue cross	0.78	0.11
Medicaid	1.11	0.61
Unknown	0.51	0.00
Other insurance	0.67	0.04
Dx	0.69	0.03
PPO	0.73	0.12
HMO/prepaid	0.68	0.02

- (1) The variable called Mediplus include Medicare combined with the following types of other insurance: Blue Cross or other private insurance or other insurance or Medicaid.
- (2) The control group is the group of Medicare only and fee for service type of payment.

III.2.5. Influence on the number of plans on the likelihood to have access to hypertensive drug therapy.

The previous sections have mainly analyzed the influence of various types of plans, especially Medicare. As a last part of this analysis, we aim to provide some results on the influence of the enrollment for one versus several plans, whatever the plans. 67.7% of hypertensive patients in the sample are only insured through one plan, while 30.7% are enrolled in two or three plans (respectively 30.5% in two and 0.3% in three).

We ran a similar logistic regression, with the same independent variables as the one previously described. We used as a regressor the variable count1, which stands for a patient enrolled in one plan only, whatever the plan. We found that patients are 78 % less likely to have access to drug therapy than the patients who have enrolled to two or three plans.

Table 5 describes the results obtained when interactions between types of payment and expected number of health plans are taken into account:

Table 5

	Adjusted Odds Ratio	P
PPO (1)	0.918	0.844
HMO	0.418	0.013
Dx	0.731	0.137
PPOcount (2)	0.820	0.677
HMOcount	2.101	0.051
Dxcount	1.007	0.976
Count1	0.719	0.058

(1) the control group is the group of patients with fee for service.

(2) The control group is the group of patients with fee for service and only one plan.

We found that when we control for the number of plans, then HMO patients are twice more likely than Fee For Service patients, to have access to drug therapy, when they are only on one plan. But, HMO patients, on average, are less likely than fee for service patients to have access to hypertensive drug therapy.

CONCLUSIONS:

This paper provides a number of findings on the influence of different combinations of insurance and types of payment on patterns of drug use. Hypertension is selected as one major chronic condition where the issue of lack or insufficient coverage creates a real barrier to therapy. This additional step which complete a previous research on self reported data, should allow to disentangle the effects of physicians decisions from patients purchasing behaviors for pharmaceutical care. This paper provides the preliminary analysis and should be completed with comparison of the analysis performed on the different data sets.

Appendix:

Additional information on the results of the ordinal logistics (run with Stata)

While most of the analysis has been performed with the software package SAS, there are some difficulties of interpretation for the coefficients of ordinal logistics regression.

Therefore, we also run the first analysis on the Stata software which provide cut off points and a possibility to differentiate the probability of drug use according to number of drugs. We will therefore present here an interpretation of the coefficients taking into account the additional information provided within the software.

Ancillary parameters:

cut 1	-1.19
cut 2	0.55
cut 3	2.46
cut 4	4.13

counts	Probabilities	Observed
count 0 (n. of drug=0)	Pr ($xb + u < \text{cut } 1$)	0.31
count 1 (n. of drug=1)	Pr ($\text{cut } 1 < xb + u < \text{cut } 2$)	0.40
count 2 (n. of drug=2)	Pr ($\text{cut } 1 < xb + u < \text{cut } 2$)	0.22
count 3 (n of drug=3)	Pr ($\text{cut } 1 < xb + u < \text{cut } 2$)	0.04
count 4 (n of drug=4)	Pr ($\text{cut } 4 < xb+u$)	0.01

The patient has no drug if the score is less than cut 1. The probability for a patient with Medicare only to have no drug is the probability that:

$$-0.3463 + u_j < -1.1981.$$

$$u_j < -0.85$$

$$\text{Prob} = 1/1+e(0.85) = 1/3.34 = 0.30.$$

So the probability of a patient with Medicare only to have access to zero drug is 0.30.

The probability of a patient with Medicare only to have access to one drug is the probability that $-0.3463 + u_j \leq 0.5589$, namely it leads to a probability of 0.29

The probability of a patient with Medicare only to have access to two drugs is the probability that $-0.3463 + u_j \leq 2.4651$, namely it leads to a probability of 0.06

The probability of a patient with Medicare only to have access to three drugs is the probability that $-0.3463 + u_j \leq 4.14$, namely it leads to a probability of 0.01.

References:

Denig, P , Haaijer-Ruskamp,F. Do physicians take cost into account when making prescribing decisions ? *Pharmacoeconomics*, 8 (4) , 1995 , pp 282-290.

Huttin C, Andral J. How the reimbursement system may influence physicians' decisions, results from focus groups interviews in France (forthcoming in *Health Policy*, 2000).

Iglehart JK. The American health care system, Medicare. *The New England journal of medicine*, 327, n.20 (1992) pp 1467-1472.

Noyce P., Huttin, C., Atella V., Brenner G., Haaijer-Ruskamp F., Hedvall M.B., Metchler R., The cost of prescription medicines to patients, *Health Policy* 52 (2000) 129-145.

Stafford R and Blumenthal D. Primary care specialities differ in cardiovascular disease prevention practices. *J Gen Inter Med* 10 Supplement , 1995, p 104.

Stafford RS and Meigs JB, Cardiovascular disease prevention practices by US physicians for patients with diabetes. *J Gen Intern Med*, 1996.

Stafford R, Pasternak RP, Blumenthal D. Variations in Cholesterol management practices of US physicians. *J Am Coll Card* 29 (1997),pp 140-147.

Soumerai S: Inadequate prescription-drug coverage for Medicare Enrollees - A call for action -*The New England Journal of Medicine*, March 4, 1999, pp 722-728.

Slomski AJ. Getting the most out of your PPO contracts. *Medical economics*, April 15, 1996, pp 140-144.

Terry K. Surprise ! Capitation can be a boon. *Medical economics*, April 15, 1996,pp.126-138.