Inter-American Development Bank

Social Protection and Health Division

DISCUSSION PAPER

No. IDB-DP-269

SERIES OF AVOIDABLE HOPSITALIZATIONS AND STRENGTHENING PRIMARY HEALTH CARE

The Case of Chile

Alejandro Arrieta, Ph.D.
Ariadna Garcia-Prado, Ph.D.

December 2012

SERIES OF AVOIDABLE HOPSITALIZATIONS AND STRENGTHENING PRIMARY HEALTH CARE

The Case of Chile

Alejandro Arrieta, Ph.D.
Ariadna Garcia-Prado, Ph.D.

Inter-American Development Bank
2012

http://www.iadb.org

Alejandro Arrieta: arrietaa@iupui.edu; Ariadna Garcia-Prado: ariadnagprado@gmail.com

SERIES OF AVOIDABLE HOPSITALIZATIONS AND STRENGTHENING PRIMARY HEALTH CARE

The Case of Chile

Cost Sharing and Hospitalizations for Ambulatory Care Sensitive Conditions[1]

Alejandro Arrieta, Ph.D.

Indiana University School of Medicine
Department of Public Health

Ariadna Garcia-Prado, Ph.D.
University of Navarra, Spain

[1] The authors are thankful to Facundo Sepulveda for providing the data for this study.

Cost Sharing and Hospitalizations for Ambulatory Care Sensitive Conditions[2]

1. Introduction

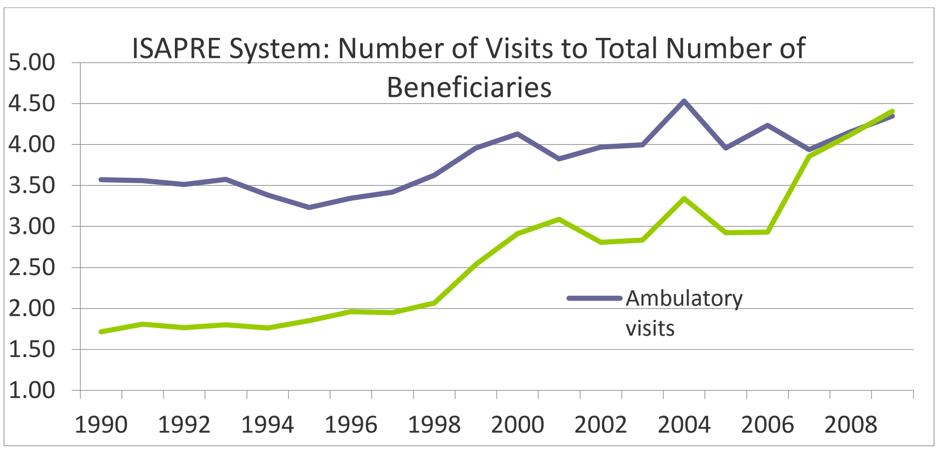
It is well known that lack of timely, appropriate ambulatory care may lead to complications that require hospitalization, creating unnecesary costs in economic and human terms. Wide international evidence show that better ambulatory care can decrease the need for hospitalization (Starfield, 1991, Fleming, 1995, Caminal et al, 2004, Macinko et al, 2010). This is especially true in the case of Ambulatory care-sensitive conditions (ACSC), which are conditions that can be easily managed with timely and effective outpatient care (Rizza et al, 2007). Rates of avoidable hospitalizations have been used as a tracer to assess access, quality and performance of the primary care delivery system (Bindman et al.1995, Ansari et al 2006). Most of the research on ACSC has focused on [2-5] determining the socioeconomic and medical conditions associated with hospitalized ACSC [6-12]. Such studies find that potential avoidable hospitalizations vary by socioeconomic and insurance status. Middle and lower classes are less likely to receive preventive services, more likely to experience delays in health care, and less likely to have a regular source of care. The availability of health insurance is another factor that can affect rates of avoidable hospitalizations [Kestner et al, 2001, Dafny and Gruber, 2005, Bermudez and Baker, 2005]. Thus, Kaester et al, 2001 and Dafny and Gruber, 2005, estimate the impact of Medicaid eligibility expansions on child hospitalizations. While Kaester et al, 2001 find that Medicaid eligibility expansions improves moderately the health of low-income children and reduce hospitalizations, Dafny and Gruber, 2005, show that number of hospitalizations increase, but has a much smaller increase in avoidable hospitalizations. Aizer, 2007 estimates the impact of Medicaid take up rather than insurance eligibility expansion. She estimates the impact of early Medical take up on access to primary care and avoidable hospitalizations, finding that a 15% increase in Medicaid enrolment would lead to a 2.7% decline in avoidable hospitalizations. Little is known, however, on the impact of insurance cost-sharing (through coinsurance or deductibles) on hospitalizations for ACSC (also known as HCSC).

In this paper, we study the effect of ambulatory and hospital coinsurance rates on HACSC among individuals with private insurance in Chile. During the last decade, Chile´s

[2] The authors are thankful to Facundo Sepulveda for providing the data for this study.

private health sector has experienced a dramatic increase in its hospitalization rates, growing at four times the rate of ambulatory visits (see graph 1). Such evolution has raised concern among policy makers, interested in promoting more preventive services, and a major use of ambulatory care. The growth on the prevalence of chronic diseases has also set up the alarm. A burden disease study made in 2007 shows that 84% of the total diseases in the country were non-communicable diseases (Universidad Católica de Chile, 2008). The 2003 National Health Survey showed that only a small fraction of those affected by a chronic disease had their condition under control (Bitrán et al, 2010). In this context, coinsurance can be a valuable tool for dealing with cost escalating problems in the health system while, at the same time, promoting more ambulatory visits and preventive services and less HCSC.

Graph 1: Evolution of Ambulatory Versus Hospital Visits in the Chilean Private Sector



Cost sharing is a common feature of insurance contracts. It is useful to reduce patient moral hazard, and, therefore, overconsumption of medical care. By raising coinsurance rates, insurers can reduce unnecessary care and control costs. However, high coinsurance rates may also produce losses due to reduced financial risk protection. The search for an optimal coinsurance rate that balances this trade-off has been broadly study both theoretically and empirically [Arrow, 1976, Newhouse, 2006, Ellis and Manning, 2007, Pauly and Blavin, 2008]. We analyze cost sharing in the context of an inter-temporal relationship between primary care visits and avoidable hospitalizations. Such relationship presents an additional feature that increases the losses of an un-optimally high coinsurance rate: a high ambulatory coinsurance rate could reduce consumption of effective care, and, as a result, leading to a potential future increase of HACSC. What is the optimal coinsurance that would allow to reduce the HACSC? What are the effects of different coinsurance levels on hospital and ambulatory visits for ACSC? We respond to these questions by means of a structural model that describes the inter-temporal correlation between ambulatory visits and HACSC. We use a large administrative dataset of private insurance claims in Chile so as to examine the effects of ambulatory and hospital coinsurance rates on both, ambulatory visits and HACSC. Since HACSC are avoidable through timely outpatient treatment, policy makers must assure that the coinsurance for hospital and ambulatory care promotes adequate primary care coverage.

2. The Data

Data was provided by the health regulator, the *Superintendencia de Salud*, which validates and consolidates information provided on quarterly basis[3] by all the private insurers (ISAPREs or Instituciones de Salud Provisional) operating in Chile. Health Insurance in Chile is dual, i.e. employed individuals must purchase insurance for a minimum of 7% of their taxable income up to a threshold, in order to enroll in the public insurer (Public Health Fund, PHF) or purchase a health plan from a private insurer (ISAPRE). A total of 2.8 million individuals, or 16.8% of the population, were covered by a contract in one of the 14 ISAPREs that operated in the market by the end of 2007. Our data cover the period from January the 1st to December 31st 2007.

Information provided by the ISAPRES includes characteristics of plan holders, as well as all the beneficiaries, including sex, age, income, and earnings. We also have extensive information on all claims made by these individuals, including ambulatory visits, recording diagnosis using the *International Statistical Classification of Diseases and Related Health Problems*, Tenth Revision (ICD-10), codes for hospitalizations, and plan characteristics including coinsurance rates and caps. A health plan from ISAPRES typically specifies copayment rates for both outpatient and hospital services, together with caps on coverage by unit of service. Few health plans do not include this cap. For instance, an insurance plan may have a 30% coinsurance for GP visits, up to a cap of 40 dollars, after which the individual pays the full marginal cost. An insurance contract, therefore, specifies two sets of parameters that define coverage: a set of coinsurance parameters for outpatient and hospital services, and a set of cap parameters, one for each service. Some plans may include the option of having a preferred health

[3] Starting in 2008, ISAPRES are required to provide information on monthly basis.

provider, in which case the coverage and cap parameters would be more generous for this provider.

Data collected for 2007 includes a total of 3,004,102 observations on the insured and their beneficiaries. We excluded newborns and a people age 60 or more. As a result, the sample was reduced to a total of 2,884,819 individuals. For each individual, we constructed indicators for ambulatory visits and subsequent hospital visits within a 30 days window. To check the robustness of the results, we also considered 60 and 90 days. We classified hospitalizations as ACSC using ICD-10 codes, and following the definitions of Alfradique et al. (2009). The list of ACSC included are reported in the appendix.

Table 1 provides descriptive statistics by age group of all variables used in the study.

Table 1. Descriptive Statistics by Age Group

	Age group	
	1 to 14 years old	15 to 60 years old
Ambulatory visits (fraction)	0.767	0.688
	(0.423)	(0.463)
Hospitalizations for ACSC (fraction)	0.001	0.001
	(0.034)	(0.027)
Coinsurance (ambulatory)%	28.414	28.832
	(17.934)	(19.963)
Coinsurance (hospitalization)%	14.923	16.591
	(22.712)	(25.855)
Age (in years)	7.195	35.472
	(3.65)	(13.365)
Gender (female=1)	1.511	1.527
	(0.5)	(0.499)
Income (in thousands of Chilean pesos)	993.72	933.628
	(405.576)	(436.872)
Sample size (individuals)	637,448	2,191,719

Note: Averages and standard errors (in parenthesis). It only considers hospitalizations for ACSC that occurred after the first 30 days of any ambulatory visit.

Coinsurance is, in average, higher for ambulatory visits than for hospital visits according to age group. While the ambulatory coinsurance accounts for 28% of the total expenditures in health made by both groups of age, hospital coinsurance accounts for 14% and 16 % for children, and adults respectively. The incidence of hospitalizations for ACSC is not high (compare to other countries in the region), but yet accounts for 10 hospitalizations for every 10,000 insured individuals. Finally, the fraction of ambulatory visits for children and adults are 0.767 and 0.68 respectively, in spite the fact that ambulatory coinsurance is higher than hospital coinsurance.

3. The empirical strategy

Since the main goal of this study is to assess the impact of coinsurance on HACSC, a simply estimation strategy is to model the probability of being hospitalized as a function of coinsurance and ambulatory visits, as shown in equation 1. Considering two periods, the probability that patient *i* is hospitalized for an ACSC in period 1 depends on the hospital coinsurance rate in patient *i*'s plan (c_i^h), a variable indicating if patient i had a ambulatory visit in the past (period 0), and an a contemporaneous error term. We expect that for ACSC, a patient who had an ambulatory visit would have a lower probability of being hospitalized ($\theta < 0$). However, if patient's health status is not controlled, a estimation strategy such as the one in equation 1 could get biased estimates. First, health status may drive both, ambulatory and hospital visits, and, therefore, if health status is not fully controlled, it would bias the estimate of θ. Second, the insurance plan selection, and consequently the observed coinsurance rate, could also depend on health status if individuals are free to choose among plans or if insurance companies select customers on the basis of health conditions. In this case, if health status is not fully controlled it would bias the estimate of γ^h.

$$\Pr(h_{i1} = 1) = \gamma^h c_i^h + \theta a_{i0} + \varepsilon_i^h \quad (1)$$

Although we control for patient's characteristics, a significant component of patient's health status remains unobservable, thus, creating potential omitted variable bias. To overcome the problem of simultaneous dependency between ambulatory and hospital visits (endogeneity), we consider a model of two periods where individuals decide to visit an ambulatory setting in the first period and a hospital setting in the second period. The patient's decision is based on coinsurance for ambulatory and hospital visits, and also on health status in each period. Health status evolves stochastically between period 0 and period 1, and we assume that having an ambulatory visit can affect future health status. This is easily justifiable, since, we focus on ambulatory care-sensitive conditions, which are those that can improve health and avoid future hospitalizations. The dynamic of health status is as follows:

$$\tilde{s}_{i1} = \tilde{s}_{i0} + \tilde{\theta} a_{i0} + \mu_{i1} \qquad (2)$$

Where $\tilde{s}_{i1}$ is the (unobserved) health status of individual i in period 1, a_{i0} is a binary variable that indicates if individual i visited an ambulatory setting in period 0, and μ_{i1} is an independent error term.

We model a system of two equations, one for ambulatory visits and the second for hospital visits. For identification purpose we make the reasonable assumption that hospital visits depends only on hospital coinsurance, while ambulatory visits depend on both, ambulatory and hospital coinsurances. We justify this because patients may potentially avoid ambulatory care if hospital visits are relatively cheap. The system of simultaneous equations is represented by equations (3-4).

$$\Pr(a_{i0} = 1) = \gamma^{0a} c_i^a + \gamma^{0h} c_i^h + \alpha^a s_i + \beta^a \tilde{s}_{i0} + \epsilon_{i0}^a \qquad (3)$$
$$\Pr(h_{i1} = 1) = \gamma^{1h} c_i^h + \alpha^h s_i + \beta^h \tilde{s}_{i1} + \epsilon_{i1}^h \qquad (4)$$

Where h_{i1} is binary variable that indicates that individual i visits the hospital for chronic ACSC in period 1. Coinsurance for ambulatory visits (c_i^a) and hospital visits (c_i^h) are assumed to be time independent, i.e. defined when the individual selected an insurance plan. s_i are patient's observable characteristics such as age, gender, income, etc. The error terms are independently distributed.

Replacing (2) in (4), we can re-write the simultaneous equation model (3-4) as:

$$\Pr(a_{i0} = 1) = \gamma^{0a} c_i^a + \gamma^{0h} c_i^h + \alpha^a s_i + \varepsilon_{i0}^a \qquad (5)$$
$$\Pr(h_{i1} = 1) = \theta {a_{i0}}^h + \gamma^{1h} c_i^h + \alpha^h s_i + \varepsilon_{i1}^h \qquad (6)$$

Where $\theta \equiv \beta^h \tilde{\theta}$, $\varepsilon_{i0}^a \equiv \beta^a \tilde{s}_{i0} + \epsilon_{i0}^a$, and $\varepsilon_{i1}^h \equiv \beta^h \tilde{s}_{i1} + \beta^h \mu_{i1} + \epsilon_{i1}^h$

Although this system corrects for the simultaneity of ambulatory and hospital visits, coinsurance rates could still be correlated with error terms in equations (5-6). If insurance selection is endogenous and driven by unobserved health status, the impact of coinsurance on ambulatory and hospital visits would be biased. In the selection of an insurance plan, two factors may make insurance choice dependable of health status. First, patients may select plans based on their health status (adverse selection). In that case, sickly patients may choose better plans, with lower coinsurances as more care visits are expected. This effect will downward bias the effect of coinsurances on hospital and ambulatory visits. However, a second possibility is that insurance companies can discriminate based on health status (cream skimming). In that case the insurance pool will be formed by healthy patients, which use less care visits. In Chile there is evidence of cream skimming by ISAPRES [Sapelli, 2004]. This effect will upward bias the effect of coinsurance on hospital and ambulatory visits. To overcome this problem, we follow a second step and include two instruments that are correlated to the plan's generosity (and therefore correlated to coinsurance rates) but uncorrelated to health status. In particular, the first instrument is popularity of the plan measured as the number of members in a given plan. To the extent that individual may select plans that are specific to their health status, popular plans are most likely to be attractive because of characteristics that are common to a large number of members rather than to individual specific benefits. We expect plan's popularity to be uncorrelated with individual's health status. The second instrument is the minimum legal insurance premium. By law, Chileans in the ISAPRE system has to purchase insurance whose minimum premium is equivalent to 7% of personal income up to a maximum limit of 60 UF (legal unit of account adjusted by inflation commonly used in Chile). However, Chileans are free to pay higher premiums in order to obtain more generous plans. We expect the minimum legal insurance premium to be uncorrelated with individual's health status because it is set by law. Although one may argue that income is associated with health status, we consider that in our sample that argument is weak since individuals with private insurance in Chile are usually from medium to high socioeconomic status and similar age (younger than those affiliated to the public insurance).

Notice that although system (5-6) is a recursive system of equations, identification cannot rest on recursivity because both error terms are dependent (through the unobserved health status). For simplicity, we assume a linear probability model, which produce a linear system of equations. Because the system is just identified, we estimate the system by 2SLS corrected by heteroskedasticity via GMM estimation [Greene, 2008].

4. Results

Table 2 presents results for hospitalizations by group age. We present those results corresponding to the two equations of interest, hospital visits and ambulatory visits. The equation of hospital visits estimates the probability of having a hospital visit. The first main result from this equation confirms the basic hypothesis underneath ACSC studies: ambulatory visits tend to reduce the probability of future hospitalizations. In particular, the probability of having a HACSC after having had one or more ambulatory visits, decreases by 0.54% and 0.68% for both, children and adults. The hospital equation offers a second result: increasing the hospital coinsurance does not reduce the probability of having more hospital visits. This is only statistically significant for adults, and the effect is very small.

The ambulatory visits equation estimates the probability of having ambulatory visits. This equation offers two main results. On the one hand, if the ambulatory coinsurance increases, the probability of having an ambulatory visit decreases in 1.14%. for children, and 0.69% for adults. On the other hand, if hospital coinsurance augments, ambulatory visits will increase, showing a substitutive relationship between ambulatory and hospital visits.

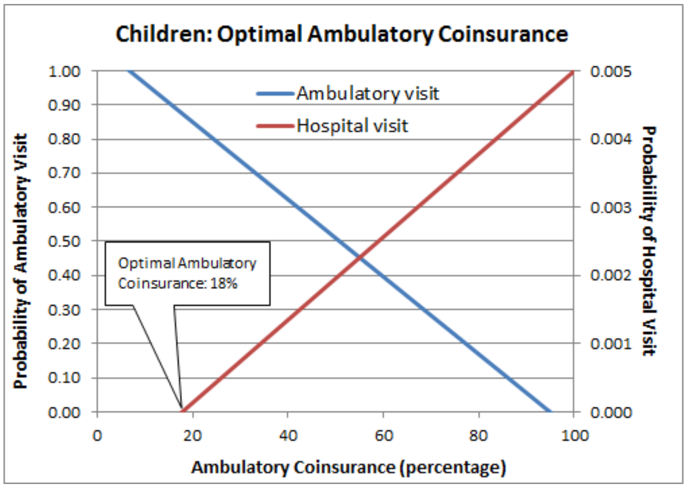
Table 2. Results for ambulatory and hospital visits

	Age group	
	1 to 14 years old	15 to 60 years old
Ambulatory visits		
Intercept	1.0453**	1.0033**
	(0.0083)	(0.0045)
Ambulatory coinsurance	-0.0114**	-0.0091**
	(0.0004)	(0.0002)
Hospital coinsurance	0.0063**	-0.0002
	(0.0004)	(0.0002)
Age	-0.0161**	0.0021**
	(0.0002)	(0.0000)
Gender (male)	-0.0016	-0.1173**
	(0.0011)	(0.0007)
Income	0.0001**	0.0000**
	(0.0000)	(0.0000)
Hospital visits		
Intercept	0.0046**	0.0054**
	(0.0014)	(0.0009)
Ambulatory visit (1 or more)	-0.0054**	-0.0068**
	(0.0018)	(0.0010)
Hospital coinsurance	0.0000	0.0000**
	(0.0000)	(0.0000)
Age	-0.0002**	0.0000**
	(0.0000)	(0.0000)
Gender (male)	0.0001	-0.0010**
	(0.0001)	(0.0001)
Income	0.0000**	0.0000**
	(0.0000)	(0.0000)

Note: Simultaneous equation linear model estimated by 2SLS. Ambulatory and Hospital visits are binary variables. The heteroscedasticity produced by the linear probabilities are adjusted using GMM.
* Significant at 1%, ** Significant at 5%, *** Significant at 10%. Robust standard errors in parenthesis.

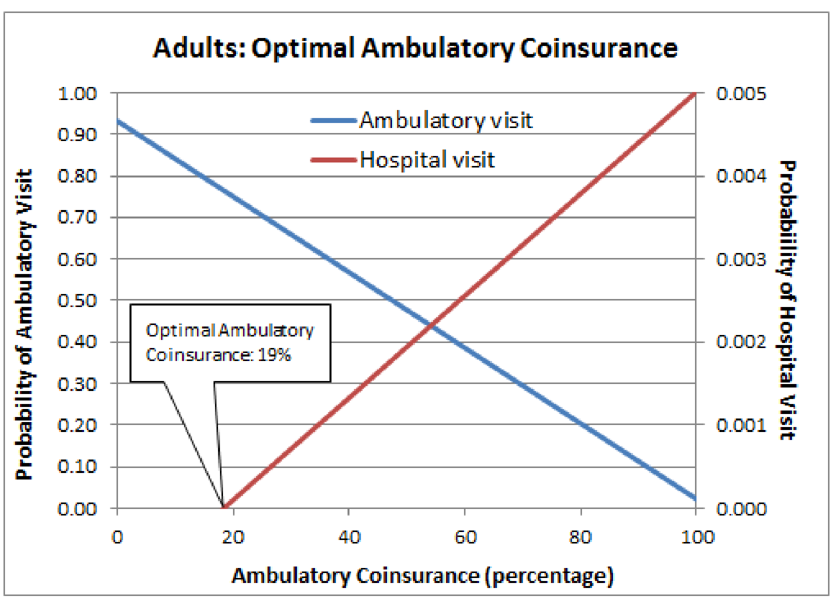
Since increasing ambulatory visits reduce the probability of future hospitalizations, and at the same time, increasing ambulatory coinsurance, decreases ambulatory visits, results seem to indicate the need to reduce the ambulatory coinsurance as a way to reduce hospitalizations. In graphs 2 and 3 we calculate what would be the optimal ambulatory coinsurance for children and adults. These graphs present the different probabilities of having an ambulatory visit (blue line) or a hospital visit (red line) under various scenarios with different ambulatory coinsurances.

Graph 2. Estimation of the Optimal Ambulatory Coinsurance for Children



ISAPRES established an ambulatory coinsurance of 28% in 2007, as shown in table 1. Our estimations show that for a given hospital coinsurance (fixed at 15%, which was the hospital coinsurance determined by ISAPRES in 2007), the optimal ambulatory coinsurance should be established at 18% for children and 19% for adults in order to reduce subsequent hospitalizations.

Graph 3: Estimation of Optimal Ambulatory Coinsurance for Adults



5. Discussion

In this paper, we have used a large administrative dataset of private insurance claims in Chile to estimate, through a structural model, the effects of ambulatory and hospital coinsurance rates on both, ambulatory visits and HACSC. We find evidence supporting that ambulatory visits avoid hospitalizations. We also find that increasing ambulatory coinsurance decreases the probability of having ambulatory visits. These two findings imply that the ambulatory coinsurance should be decreased substantially in order to reduce the high rate of hospitalizations found in the private sector of Chile.

How much should ambulatory coinsurance be diminished so as to reduce hospitalizations for ACSC to zero? We show that for a hospital coinsurance of 15%, the optimal ambulatory coinsurance should be 18% for children and 19% for children, a figure substantially lower than the ambulatory coinsurance in 2007 (28%). On the other hand, altering hospital coinsurance does not seem to have a significant effect on hospitalizations. We believe this result is justified because hospitalizations are less sensitive to price changes mainly due to two factors: (1) health condition of patients who decide to search for healthcare at the hospital is generally worse than those who search for ambulatory care, (2) the final decision on hospitalizing a patient relies mostly on the doctor. However, we also find a substitutive relationship between ambulatory and hospital visits. The ambulatory equation shows that a higher hospital coinsurance increases the probability of having more ambulatory visits. This is consistent with the hypothesis that ambulatory and hospital visits are correlated, and shows that the effect of a higher hospital coinsurance would have a stronger effect on ambulatory visits than on hospital visits.

These results are aligned with previous findings in the health insurance and cost-sharing literature. Thus, Ellis, Jiang and Manning, 2011 find that optimal treatment cost shares should be lower for positively correlated treatment goods and goods with positive cross price effects, reaffirming previous findings by Besley (1988) on multiple goods.

We do not measure the supply incentives that may exist among physicians working for ISAPRES to hospitalize patients. While decreasing ambulatory coinsurance seems to be a good policy, the Government should analyze what are the incentives behind the dramatic increase of hospitalizations in the private sector of Chile. We offer a demand side solution, through coinsurance, but clearly, the analysis is insufficient without evaluating the effects from the supply side.

Our data on ambulatory visits is not disaggregated to disentangle what ambulatory visits are preventive. Future research should explore this matter, since it would be relevant to determine the effect of coinsurance on prevention and hospitalizations for ACSC. A recent paper by Cabral and Cullen, 2011, explores the effect of insurance coverage on preventive care and explains how an insurance company in the US increased the marginal price of curative care while decreasing the marginal price of prevention. They find a cross-price effect; i.e., increases in the price of curative care can depress preventive care utilization. Their results are aligned with previous findings in the literature like those of the RAND health insurance experiments that showed that cost-sharing does not induce a selective choice between more effective and less effective medical care, deterring the access of both, unnecessary and necessary care [Manning et al, 1987, Tamblyn et al, 2001].

Finally, we could not perform a more detail analysis, considering individual ACSC, and/or different groups of ACSC. Since we only have data for one year, 2007, we would compromise the statistical robustness of the estimation by adding more groups. Unfortunately, we could not get data for more years, but we expect to be able to access to new data in the future. Such analysis would have been extremely interesting, especially because the AUGE law was passed in Chile in 2005. This law prioritized the health services related to fifty-six medical conditions, most of them chronic, promoted preventive services and introduce new treatment guidelines and new co-sharing rules, among other measures. In particular, the AUGE law mandated coverage for a set of interventions for children and adults aimed at prevention and early detection of hypertension, types 1 and 2 diabetes, HIV/AIDS, cervival cancer, and other chronic diseases. The new law also established that insurers, both PH and ISAPRES, must reimburse an explicit amount for each guaranteed health intervention, so that the beneficiary´s out of pocket spending will not exceed a predefined share of household income. In addition, when seeking care for a medical problem under the AUGE reforms, both PH and ISAPRES beneficiaries could make two care choices: select a closed mode, choosing providers from AUGE network and paying a lower or no copayment, or they can obtain care outside of AUGE through a free choice mode, paying higher copayments but receiving faster, higher-quality care; better amenities; and continued access to a personal doctor (Bitrán et al, 2010). AUGE law also promoted the systematic application of treatment guidelines in order to lower the incidence of complications, and therefore, hospitalizations from inadequate disease management. Having the specific information for certain ACSC would be essential to understand the new cost-sharing rules and its effects on the particular ACSCs.

Appendix

List and Definition of Ambulatory Care Sensitive Conditions (ACSC)

Group	Diagnostic	ICD-10 (Primary condition only)
1	Vaccine-preventable	G00.0,A17.0,A33,A34,A35,A36,A37,A95,B16, B05,B06,B26,A19
2	No vaccine-preventable (rheumatic fever, syphilis, tuberculosis)	A17.1,A17.2,A17.3,A17.4,A17.5,A17.6,A17.7, A17.8,A17.9,A15,A16,A18,I00,I01,I02,A51, A52,A53,B50,B51,B52,B53,B54, B77
3	Dehydration and gastroenteritis	E86,A00,A01,A01,A03,A04,A05, A06,A07,A08,A09
4	Iron deficiency anemia	D50
5	Nutritional deficiencies	E40,E41,E42,E43,E44,E45,E46, E50,E51,E52,E53,E54,E55,E56, E57,E58,E59,E60,E61,E62,E63, E64
6	Ear, nose and throat infections	H66,J00,J01,J02,J03,J06,J31
7	Bacterial pneumonia	J15.3,J15.4,J15.8,J15.9,J18.1,J13,J14
8	Asthma	J45,J46
9	Chronic obstructive pulmonary disease	J20,J21,J40,J41,J42,J43,J44, J47
10	Hypertension	I10,I11
11	Angina pectoris	I20
12	Congestive heart failure	I50,J81
13	Cerebrovascular disease	I63,I64,I65,I66,I67,I69,G45, G46
14	Diabetes	E10,E11,E12,E13,E14
15	Convulsions and epilepsy	G40,G41
16	Pyelonephritis	N39.0,N10,N11,N12,N30,N34
17	Skin and subcutaneous tissue infection	A46,L01,L02,L03,L04,L08
18	Pelvic inflammatory disease	N70,N71,N72,N73,N75,N76
19	Perforated/bleeding ulcer	K92.0,K92.1,K92.2,K25,K26,K27,K28
20	Prenatal and natal complications	P35.0,O23,A50

References

Aizer, A. 2007. "Public Health Insurance, Program take-up, and Child Health". *The Review of Economics and Statistics*. 89(3): 400-415.

Ansari, Z., Laditka J.N., and Laditka, S.B. 2006. "Access to health care and hospitalization for ambulatory care sensitive conditions". *Med Care Res Rev*. 63(6): p. 719-41.

Bermudez, D. and L. Baker. 2005. "The relationship between SCHIP enrollment and hospitalizations for ambulatory care sensitive conditions in California". *J Health Care Poor Underserved*. 16(1): p. 96-110.

Bindman, A.B., et al. 1995. "Preventable hospitalizations and access to health care". *Journal of the American Medical Association*. 274(4): p. 305-11.

Bitran, R., Escobar, L., Gassibe, P. 2010. "After Chile´s Health Reform: Increase in Coverage and Access, Decline in hospitalizations and Death Rates". *Health Affairs*. 29 (12):2161-2170.

Caminal, J., Starfield, B., Sánchez, E., et al. 2004. "The role of primary care in preventing ambulatory care sensitive conditions". *European Journal of Public Health*. 14(3).

Dafny, L. and Gruber, J. 2005. "Public Insurance and Child Hospitalizations: Access and Efficiency Effects". *Journal of Public Economics*. 89: 109-129.

Ellis, R., and Manning, W.G. 2007. "Optimal health insurance for prevention and treatment". *Journal of Health Economics*. 26(6): 1128-50.

Fleming, S.T. 1995. "Primary Care, Avoidable Hospitalization, and Outcomes of Care: A Literature review and methodological approach". *Medical Care*. 52:88.

Greene, W.H., *Econometric analysis*. 6th ed. 2008, Upper Saddle River, N.J.: Prentice Hall. xxxvii, 1177 p.

Johnson, W., and Rimsza, M. "The effects of access to pediatric care and insurance coverage on emergency department utilization". *Pediatrics.* 113, 2004.

Kaestner, R., Joyce, T., and Racine, A. 2001. "Medicaid elegibility and the incidence of ambulatory care sensitive hospitalizations for children". *Social Science and Medicine*. 52.

Macinko, J., Dourado, I., Aquino, A., et al. 2010. "Major Expansion of Primary Care in Brazil Linked to Decline in Unnecessary Hospitalization". *Health Affairs*. 29, 12: 2149-2160.

Manning, W.G., Newhouse, J., Duan, N., et al. 1987. "Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment". *American Economic Review*. 77(3): 251–77.

Newhouse, J. 2006. "Reconsidering the moral hazard-risk avoidance tradeoff". *Journal of Health Economics*. 25.

Oster, A. and Bindman, A. 2003. "Emergency department visits for ambulatory care sensitive conditions: insights into preventable hospitalizations". *Medical Care*. 41.

Pauly, M. and Blavin, F.E. 2008. "Moral hazard in insurance, value-based cost-sharing, and the benefits of blissful ignorance". *Journal of Health Economics*. 27 (6): 1407-1417.

Rizza, P., Bianco, A., Pavia, M. et al. 2007. "Preventable hospitalization and access to primary health care in an area of Southern Italy". *BMC Health Services Research*. 7:134.

Roemer, M., Hopkins, C., Carr, L. et al. 1975. "Copayments for ambularory care: penny-wise and pound-foolish". *Medical care*. 13.

Sapelli, Claudio, 2004. "Risk segmentation and equity in the Chilean mandatory health insurance system". *Social Science & Medicine*. 58: 259–265.

Starfield, B. 1991. "Primary care and health: a cross-national comparison". *Journal of the American Medical Association*. 266:2268-2271.

Tamblyn, R. et al. 2001. "Adverse Events Associated with Prescription Drug Cost-Sharing among Poor and Elderly Persons". *Journal of the American Medical Association*. 285(4):421-429, January 2001.

Universidad Católica de Chile. 2008. *Informe final, estudio de carga de enfermedad y carga atribuible*. http://epi.minsal.cl/epi/html/invest/cargaenf2008/Informe%20final%20carga_Enf_2007.pdf