Emergency Department Utilization of the Intermittently Uninsured*

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Emergency Departments (EDs) represent the only federally mandated site for health care in the United States. The Emergency Medical Treatment and Active Labor Act (EMTALA)[1] mandates that all individuals presenting to EDs in the United States receive stabilizing care for their condition, regardless of insurance status or ability to pay.[2] EDs are a unique practice setting, in that they provide a full range of medical services for any complaint, and are singularly accessible 24 hours a day, 7 days a week (Richardson and Hwang 2001). EDs have been a hot topic in the media in recent years for numerous reasons. While the number of EDs has dropped 15% over the last several years, visits to the ED have increased, and some portion of these visits are for problems that are neither emergent nor urgent (McCaig and Burt 2003). There is much debate concerning the proportion of ED visits by both the insured and uninsured that are "inappropriate", with enormous variation across study results (Richardson and Hwang 2001). Regardless, the issue is sensitive and it is controversially believed such visits could competently be handled in an alternate setting (McCaig and Burt 2003, Cunningham and May 2003, Richardson and

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[1]EMTALA, as Established Under the Consolidated Omnibus Budget Reconciliation Act (COBRA) of 1985 (42 USC 1395 dd).

[2]EMTALA does not provide access to primary care or preventive services (Cetta, Asplin, Fields and Yeh 2000).

Hwang 2001, Tyrance, Himmelstein and Woolhandler 1996). Adding fuel to the fire, there are often reports in the popular press concerning the flooding of EDs by the uninsured, stating that the uninsured are more likely than the insured to have such "inappropriate" visits, and visit EDs more often than the insured. Moreover, there is concern that the uninsured do not pay for care they receive in the EDs, with uncompensated care driving up hospitals' costs and bad debt. [3]

There were an average of 108 million ED visits annually in 2000 and 2001, an increase of about 16% from 1996-1997 (Cunningham and May 2003). The increase in ED visits has been attributed to the growing number of uninsured and underinsured individuals, aggressive gatekeeping by managed care primary care providers, general population increase, the aging of our population, declining access to primary care, and lack of a usual source of care (Cunningham and May 2003, Richardson and Hwang 2001). The findings for many of these contentions are inconclusive.[4]

The general consensus is that EDs are overcrowded and their burden is only getting worse (Derlet and Richards 2000). Up for debate, however, is what the causes of the overcrowding are. Conventional wisdom indicates that the uninsured represent a disproportionate share of ED utilizers, for delayed and urgent care, or inappropriate care. A survey released in May 2004 by the American College of Emergency Physicians for the Robert Wood Johnson Foundation suggests that physicians believe EDs are providing care to the uninsured, who are forced to let their illness go untreated because they have nowhere to turn for preventive care (Robert Wood Johnson Foundation 2004). The press release states that ED physicians believe one-third of the patients they treat are uninsured, and 72% believe the number of uninsured patients they treated in the last year increased. A scan of the national newspapers reveals similar accounts. Although there are various anec-

[3]Despite the growth in ED visits and the controversy surrounding it, EDs account for less than 2% of national health spending (Tyrance et al. 1996).

[4] Cunningham and May (2003) attribute much of the growth in ED visits to increased visits by the privately insured, and about one-fourth of the increase in ED visits was due to general population increase.

dotes about the uninsured flooding EDs, such physician surveys and media accounts relate what physicians believe, rather than what the visit data reveal.[5]

Research using national level data on ED visits has not corroborated this anecdotal evidence. Several contemporary studies find that the uninsured do not use the ED more than the insured population (e.g. Zuckerman and Shen 2004, Lane et al. 2003, McLaughlin and Mortensen 2003, Tyrance et al. 1996). In recent years, several researchers working with various datasets have come to the controversial conclusion that the uninsured are not overwhelming the nation's EDs. In fact, these authors are finding that the uninsured are no more likely than the privately insured to use the ED, and are no more likely to use the ED for nonemergent care than the insured. Some studies have found that the publicly insured are twice as likely to have an ED visit than the uninsured (Weber, Showstack, Hunt, Colby and Callaham 2005, Zuckerman and Shen 2004).

The debate concerning ED utilization and health insurance status is often fueled by prior beliefs and opinions rather than evidence. There are many questions left either unanswered or with results that have not convinced people about the true nature of the problem. The answers to these questions are important for the direction of our remedies to the problem. If the uninsured are not disproportionately utilizing the EDs, as many believe they are, efforts to remedy a problem that does not exist are likely to be misguided.

In a separate body of literature, researchers are becoming increasingly aware of the volatile nature of health insurance status. Over 77 million nonelderly individuals experienced at least one month without health insurance coverage over 2001-2002. The intersection between the intermittently uninsured and ED utilization is an area few researchers have investigated. Recent findings suggest that individuals with a change in their health insurance status are more likely to have an ED visit than those who are continuously insured or continuously without coverage (Weber et al. 2005). If the intermittently uninsured

[5]There is enormous variation across EDs, with some public, teaching and safety-net hospitals providing disproportionately more care to the uninsured than others.

are presenting at EDs during their spell of uninsurance rather than while they are insured, this could perhaps explain some of the findings that uninsured are disproportionately using EDs. In fact, the majority of the body of research on ED utilization employs point-in-time measures of insurance status, reflecting the respondent's coverage at the time of the survey rather than at the ED visit. This could potentially affect the findings on the uninsured and ED use.

In this paper I seek to improve upon the current literature on both ED utilization and the intermittently uninsured by examining various issues; some that have been explored before and others that have not been addressed in the previous literature. The first issue I address is utilization of the privately insured and publicly insured relative to the utilization of the uninsured. In an improvement upon the existing literature, I have detailed data on ED visits and health insurance status at the time of visit. The second issue I then explore is the dynamics between churning of health insurance coverage and associated ED use. A conceptual framework applying economic concepts to ED utilization of the privately and publicly insured as well as the uninsured is presented, as is a quantitative analysis of the results. Special attention is paid to individuals who experience a change in their health insurance status, to discover whether the intermittently uninsured indeed are more likely to have an ED visit. The third issue this paper addresses is an examination of health insurance coverage status of the intermittently uninsured when they present at the ED. Fixed effects analysis is used to focus on individuals with changes in their coverage status and their propensity to use the ED in each coverage state.

Previous Literature

Uncompensated Care In an effort to dispel many of the myths associated with the uninsured, ED use, and costs of ED care, Tyrance et al. (1996) analyzed 1987 National

Medical Expenditure Survey (NMES) data and found that the perception that the uninsured overuse the ED is false. Their findings contradict the widespread impression that hospitals provide large amounts of uncompensated ED care to the uninsured. They offer the explanation that this impression may have arisen because many academic emergency physicians work at urban teaching hospitals that provide disproportionate amounts of care to the uninsured (Tyrance et al. 1996). They found little evidence of cost-shifting from uninsured ED patients, and that the uninsured paid 47% of ED costs themselves and only 10% of the uninsured visits were uncompensated. In a similar vein, Alexander Tsai and colleagues, using 1999 data drawn from the Medical Expenditure Panel Survey (MEPS), found that a substantial proportion of the uninsured pay their ED charges out-of-pocket, and third-party payments were made for 47% of ED visits by the uninsured (Tsai, Tamayo-Sarver, Cydulka and Baker 2003).

Coverage Status at Visit Lane, Sorondo and Nituica (2003) examined MEPS data from 1996 to 1998 and found that there were no statistical differences between the insured and the uninsured in terms of frequency of ED visits. A study using 1996 MEPS data and similar definitions of the insured and uninsured found that uninsured and insured persons received ED care in similar proportions (Fryer, Green, Dovey, Yawn, Phillips and Lanier 2003). The studies did not differentiate among insurance status of the insured, rather they identified anyone with private, public or other coverage as insured. A specific definition of how health insurance status was measured is not provided, thus it is assumed the authors used some baseline or point-in-time measure of coverage status, rather than status at the time of visit. Nor did the studies differentiate the uninsured by time spent uninsured, thus the intermittently uninsured are amalgamated with the continuously uninsured.

Yet another study found similar results; the uninsured were equally likely to have an ED visit as those with private insurance (Weber et al. 2005). However, the authors report

that individuals with Medicaid coverage were significantly more likely than the privately insured to report an ED visit. In addition, they note that persons who had a change in coverage during the previous 12 months were more likely to have used the ED than those without a change. Despite acknowledging that individuals can change insurance status during the study period, their measures of insurance status were based on responses at a point-in-time, not at the ED visit. Nor do the authors determine whether visits made by those with changes in coverage were made while the individuals were insured or uninsured.

Cunningham and May (2003) examined trends in ED use and found a 16% increase in ED visits between 1996-97 and 2000-01. Perhaps surprisingly, they found that most of the increase in visits is due to increased use by the insured. ED visits by the insured increased 24% during that period, while the privately insured population increased by only 4.7%. Overall, uninsured ED visits accounted for only 11% of the overall increase in ED visits. Medicaid covered ED visits did not increase, although there was a 10% increase in the Medicaid population during that time (Cunningham and May 2003). Nonurgent trips dominated ED visits, but the uninsured were no more likely than privately insured or Medicaid patients to have a nonurgent visit.

Not only are the uninsured just as likely as the insured to use the ED, the uninsured are just as likely as privately insured adults to be frequent users as well (Zuckerman and Shen 2004). The study analyzed data from the 1997 and 1999 National Survey of America's Families (NSAF). The authors also find that publicly insured adults are more than twice as likely as other adults be frequent users. Again, this is a study that used point-in-time measures of insurance status rather than actual coverage at visit. The authors also dropped all respondents who had a change in health insurance coverage during the past 12 months from their analysis; the very population that we seek to learn more about.

Similar results have been found in research on pediatric ED visits. No significant differences were found in the likelihood of having an ED visit between privately insured

and uninsured children, nor were significant differences in the likelihood of nonurgent ED visits found between the two groups (Luo, Liu, Frush and Hey 2003). Increased parental ED use is significantly associated with increased childhood utilization (Mistry, Hoffman, Yauck and Brousseau 2005).

McLaughlin and Mortensen (2003) distinguished between ED visits by the continuously uninsured and intermittently uninsured. They, too, determined that the uninsured were no more likely to have an ED visit than the insured. Using 1999 MEPS data, they found that 11% of the population was without coverage for the entire year, and represented 10% of ED visits. Another 11% of the population was uninsured for between one and eleven months in 1999, and accounted for 14% of ED visits. Although this study was careful to distinguish between the length of time spent uninsured, they did not determine when the visits were made for the intermittently uninsured; whether the visits were made while the individuals were insured or uninsured. Despite several recent studies finding that the uninsured pay for much of their care and are no more likely than the insured to have an ED visit, these preconceptions linger.

Conceptual Framework

A conceptual framework is useful in examining the differences in ED utilization of the intermittently uninsured across health insurance states. Economic theory posits that when the price of a good changes, the quantity demanded of the good changes; a movement along the demand curve. Ceteris paribus, for normal goods, individuals who face a lower price for a good are expected to consume more of that good. Shifters of the demand curve for medical care include changes in taste for medical care (which affect changes in preferences for medical care), changes in health status, changes in the price of related goods, and changes in income, among other things. An outward shift of the demand curve suggests

that an individual is willing to purchase more of the good at all prices. Gaining or losing health insurance coverage not only changes the price an individual faces for a particular medical care service, it also changes the price of related medical goods, as well as potentially altering the budget constraint. Factors that led to the change in insurance status may also be factors that cause shift in demand, such as a change in preference for medical care (perhaps care in the past has led to new beliefs about the efficacy of medical care) or changes in income or health status. [6] Thus, when an individual changes health insurance status, there are movements both along their demand curve as well as shifts in the curve itself. The demand for outpatient hospital care (including ED visits) has been outlined in the literature. Demand for ED visits can be posited to be a function of: the price of ED services; the price of substitutes and complements (other avenues for seeking medical care such as physician's offices); insurance; the availability and accessibility of alternative care sources; and demographic and patient characteristics that influence demand (including health status) (Gold 1984).

The RAND Health Insurance Experiment is the only randomized study to test the effects of cost-sharing on medical care use. The study results show the amount of out-of-pocket costs for health care services have significant effects on utilization of such services (Newhouse and the Insurance Experiment Group 1993, Manning, Newhouse, Duan, Keeler, Leibowitz and Marquis 1987). Demand for ED visits specifically is also price sensitive (O'Grady, Manning, Newhouse and Brook 1985, Gold 1984). Patients have been found to have limited knowledge about the level of their co-pays for ED care, and higher perceived co-pay amount was strongly associated with avoidance or delays in seeking ED care which again suggests demand for ED visits is price sensitive (Hsu, Reed, Brand, Fireman, Newhouse and Selby 2004). These findings indicate that changes in prices for ED visits faced by the intermittently uninsured may have effects on their ED utilization.

[6] These factors could also affect health care utilization, independent of insurance status.

In general, individuals face lower prices for medical care while they are insured relative to when they are uninsured. Medicaid beneficiaries pay no or very low co-pays, while the privately insured pay substantially more, but an amount often far less than the full cost of the care. [7] Not only do the insured face lower, often pre-determined out of pocket prices for care, they also tend to experience fewer barriers to access than the uninsured. Although health insurance does not guarantee access, it has been found to lessen barriers to access (Institute of Medicine 2002). In contrast, the uninsured face higher, more uncertain prices for the full costs of medical care, and have been found to report significantly higher barriers to access. The uninsured face varying degrees of access difficulty, as they may find it quite difficult to find a physician willing to accept an uninsured patient and relatively easier to present at an ED, where they are required by law to be stabilized. [8] This suggests that the "price" the uninsured face for various medical care visits differs not only by the out-of-pocket price, but also includes the non-pecuniary costs of securing a physician visit versus an ED visit, especially when one considers other access barriers such as hours the physician office is open, location and travel options to the office, etc.[9] Thus the price of substitutes (e.g. physician visit versus ED visit) are different not only when individuals are insured compared to when uninsured, but also differ for the uninsured once the non-pecuniary costs of different levels of access for different types of visits are incorporated. [10]

Although it is clear that variations in insurance status can cause changes in demand and quantity demanded of various types of medical care, or be associated with factors

[7]Federal law prohibits the imposition of cost-sharing for Medicaid beneficiaries with a true emergency in the ED. States may impose cost-sharing of up to $6 (in 2007), twice the nominal cost-sharing rate, for non-emergency services provided in the ED (Guyer 2006, Schneider 2003).

[8]Callers claiming to be uninsured patients seeking urgent follow-up care recommended by a physician after presenting at an ED with an urgent condition were much less likely to secure an appointment than callers claiming to be insured (Asplin, Rhodes, Levy, Lurie, Crain, Carlin and Kellermann 2005).

[9]A similar argument specific to access to Medicaid has previously been espoused (Long, Coughlin and King 2005).

[10]The notion of indirect costs of treatment serving as a non-pecuniary co-pay is common in health economics literature. E.g. Baumgardner (1991) included the indirect costs of both the patient's time in receiving treatment as well as the disutility caused by the treatment's effects in his analysis.

that might cause changes, the magnitude of the resulting changes is less clear. The effects can be expected to differ across types of health insurance transitions. For a subset of the population, Medicaid beneficiaries, the outcome might be predictable.[11] Individuals who gain Medicaid after a spell of uninsurance see the price of an ED visit drop from the full cost of care to no or minimal co-pay. Although their barriers to access are fewer than those of the uninsured, they are still significant. [12] Medicaid beneficiaries often have more difficulty than the privately insured finding providers who will see them, have longer wait times to schedule appointments, have more difficulties with transportation, and other issues (Long et al. 2005). EDs have long recognized themselves as a safety net for vulnerable and disenfranchised populations who are turned away by other providers (Richardson and Hwang 2001). The combined sudden lower cost and existence of barriers to other sources of care suggests that the income effect (more real income due to lower prices) and substitution effect (price of ED services lower relative to other services) reinforce one another and may lead to an outward shift of demand for ED services as well as an increase in quantity demanded (movement along the demand curve). These influences might make an ED visit more attractive than other sources of care for a new Medicaid enrollee. The effects on utilization for those who transition within private coverage and uninsurance are less clear, since there are many providers willing to accommodate those with private coverage.

If the ED visits by the intermittently uninsured are more likely to be uninsured visits, it can be hypothesized that the access argument effect is stronger. The increase in price of ED visits due to the loss of insurance coverage and the resulting decrease in quantity demanded is dominated by the lack of access to other providers, or the relatively higher indirect costs

[11] I use the terms public coverage and Medicaid interchangeably. Eleven percent of the panel ever had public coverage, with over 10% of the panel ever having Medicaid. The remaining less than 1% had some other type of state or public coverage.

[12] Asplin et al. (2005) found that 34.2% of callers claiming to have Medicaid coverage were able to secure a follow-up appointment within seven days for a serious condition, compared to 64.4% of those stating they had private insurance, and 25.1% of the uninsured willing to pay $20 up front. Callers posing as Medicaid (or uninsured) were no more likely to secure a visit at a safety-net provider than a nonsafety-net clinic.

of accessing alternative sources of care. If the distribution of visits by the intermittently uninsured are more likely to be privately insured visits, it can be hypothesized that the drop in relative prices of a privately insured ED visit versus an uninsured ED visit increases quantity demanded of insured ED visits. This effect then dominates the effect of increased access to other providers of care willing to see privately insured patients, which would have led to a decrease in insured ED visits.

It is important to note that without experimental analysis, such as the RAND health insurance experiment, one cannot rule out the issue of reverse causality (Newhouse and the Insurance Experiment Group 1993, Manning et al. 1987, O'Grady et al. 1985). Although results from the RAND study suggest that ED utilization is price sensitive, thus individuals' ED use is responsive to changes in price as my conceptual framework suggests, one must consider the causality thread from the other direction. There could be instances where an individual becomes sick and therefore presents at the ED, and might gain or lose coverage as a result of the illness or visit to the ED.

Research Questions

Although individuals with a change in health insurance status have been found to be more likely to report an ED visit than those with no changes in coverage status, studies have not investigated what types of changes in health insurance status are associated with increased likelihood of a visit, or what the coverage status is at the time of these individuals' visits. Are individuals who gain private insurance, gain public insurance, or lose either of those types of coverages associated with more ED visits? Given that they have a change in coverage status, are they more likely to visit the ED when they are uninsured, or insured? These questions have been left unanswered, mainly due to limitations of data available to

researchers.[13]

This study exploits data on monthly health insurance status offered by the MEPS to answer several questions regarding the ED use of the insured and uninsured. I first examine whether the uninsured are more likely to have an ED visit than the insured. I then investigate whether the intermittently uninsured are more likely to use the ED than individuals with stable health insurance coverage, as well as specify which transition types are associated with ED use. Finally, I examine the health insurance status of the intermittently uninsured to investigate which coverage they are more likely to have when they present at the ED. Following longitudinal data on the cross-section of the same individuals over a two year period offers a unique approach to answering these questions regarding the intermittently uninsured. It allows each individual to serve as his own control, since we have data on the health care utilization of these individuals in both states- insured as well as uninsured.

Hypothesis 1 *The uninsured are no more likely than the insured to have an ED visit.*

Consistent with previous literature utilizing national data on ED visits, I hypothesize that the uninsured are not flooding EDs; rather they are just as likely to have an ED visit as the privately insured.

Hypothesis 2 *Individuals with a change in health insurance status are more likely to have an ED visit than those with stable coverage.*

Individuals who experience changes in health insurance face a corresponding change in the relative price of an ED visit. Gaining coverage after a spell of uninsurance results

[13]The nature of many survey questions is to ask respondents about their current health insurance status, a point-in-time measure (e.g. Community Tracking Survey (CTS) as used in Weber et al. (2005), National Survey of American's Families (NSAF) as used in Zuckerman and Shen (2004), CPS, and SIPP. However, health care service utilization is measured over the entire study period, usually 12 or 24 months. Thus, the respondent's particular status at a point-in-time is assigned to all of their health care service use over the study period, potentially mismatching the status reported at the interview to the visit rather than the true coverage status at the visit.

in a dramatic drop in out-of-pocket price for an ED visit. Reinforcing this effect is that individuals who lose coverage may no longer have access to their primary care providers and may find that the ED is more accessible than other sources of care.

Hypothesis 3 *The intermittently uninsured are more likely to have their ED visits while under public coverage than while uninsured.*

The distribution of privately insured visits relative to uninsured visits is not as clear, although I hypothesize that the intermittently uninsured are not more likely to have an ED visit while uninsured than while privately insured. Few studies on pent-up demand specifically consider ED use, but those that do find no evidence that pent-up demand for ED visits exists (Taylor 2003, Kempe, Beaty, Crane, Stokstad, Barrow, Belman and Steiner 2005). There is no reason to expect the intermittently uninsured should be more likely to use the ED while privately insured than while uninsured. Individuals who gain public coverage, however, are expected to be more likely than the uninsured to have an ED visit. For these individuals, the price drop for ED visits relative to the price they face for ED visits while uninsured is reinforced by the effect of having limited access to care from other providers, which increases their indirect costs of seeking care from these other sources.

Data and Methods

This analysis uses data from the Medical Expenditure Panel Survey (MEPS), conducted by the Agency for Healthcare Research and Quality (AHRQ). MEPS is a national probability survey designed to be nationally representative of the U.S. civilian noninstitutionalized population. The Household Component (HC) sample is drawn from respondents to the National Health Interview Survey. Five rounds of interviews over a two and a half year

period on the same sample panel of household were conducted to acquire data on health care use, expenditures, insurance coverage and sources of payment. Two datasets were created for this analysis. The first contains two calendar years of data, for the years 2001 and 2002, aggregated to the event level (the ED visit) rather than the individual level. Thus, where indicated, the unit of analysis is the ED visit so the results apply to the ED visit rather than the individual, since many individuals do not have a visit to the ED while others individuals have one or more than one visit to the ED during the two year study period. The second dataset is at the person-month level, with 24 repeated observations on the same cross-section of survey respondents, with health insurance status able to vary each month. Analysis is restricted to individuals observed all 24 months of the panel, resulting in a balanced panel, such that information on variation in health insurance is maximized. The sample for this analysis is restricted to individuals age 19 to 63. This effectively eliminates individuals who gained Medicare during the panel, since they are almost universally insured, and eliminates children and young adults, whose ED utilization has been found to be highly correlated with their parents' ED utilization (Mistry et al. 2005).

Bivariate analysis is conducted using Stata version 8, software that adjusts for the complex survey design of the data. Fixed effects analysis is used in the person-month regressions, to address some of the concerns of endogeneity in the utilization equation. Health insurance status is not randomly assigned because to a certain extent individuals choose to take up insurance. This potential endogeneity makes it difficult for researchers to test causal relationships. There are a variety of influences that affect an individual's decision to acquire health insurance coverage. Fixed effects analysis controls for unmeasured, stable characteristics of individuals in the dataset, as each person serves as his own control. This method allows one to control for all possible characteristics of individuals in the study (even without measuring them) provided these are invariant characteristics.

Even if one can not be sure if changes in health insurance status *caused* ED utilization (which this analysis does not assert), one can be confident that the differences in ED visits by publicly or privately insured or uninsured are not produced by gender, baseline income, race, ethnicity, or perhaps even predisposition towards or beliefs about health care utilization (if these are invariant). We might expect individuals with greater health care needs or strong preferences for health care to be more likely to use health care regardless of health insurance status, and be more likely choose insurance over uninsurance (Long et al. 2005). Fixed effects allows us to mediate some of this potential bias on the coefficients. Johnston and DiNardo (1997) note that the essence of the fixed effects model is that it is possible with panel data to obtain consistent estimates of parameters of interest even in the face of correlated omitted effects. The promise of fixed effects estimators is that they are robust to the omission of any relevant time-invariant regressors (Johnston and DiNardo 1997).

Fixed effects analysis is not without drawbacks. Measurement error in the explanatory variables can attenuate the estimates, especially if the covariates are correlated across time (as health status likely is) (Johnston and DiNardo 1997). If left uncorrected, measurement error can seriously bias fixed effect estimates (Johnston and DiNardo 1997, Bound and Krueger 1991). Variations in changes in the explanatory variables cannot be assumed to be exogenous, which is another limitation to fixed effects estimation. The fixed effects estimator is not perfect, and it is possible the "cure is worse than the disease" which leaves us at best with downward-biased estimates of the relationship between insurance status and ED use (Johnston and DiNardo 1997). Fixed effects analysis, by definition, removes the effects of any observed variables that are time invariant (such as gender, race/ethnicity, etc.), however, given the focus on variations in insurance status, those explanatory variables are not central to this analysis.

Using logit regression analysis, I specify the likelihood of having an ED visit as:

$$\text{Probability(ED Visit=1)} = \alpha + \kappa B + \vartheta P + \beta S + \zeta H + \gamma T + \theta A + \epsilon \quad (1)$$

where:

B is an indicator for public insurance coverage,

P is an indicator for private insurance coverage,

S is a vector of demographic and socio-economic variables, including gender, age, race/ethnicity, marital status, education, income at baseline, and employment status,

H is a vector of health status measures, including self-perceived health status and total chronic conditions,

T is an indicator for transition in health insurance status,

A is a vector of variables measuring access to health care services and attitudes towards health insurance and risk, and

ϵ is the error term.

Variables The outcome measure is whether an individual had an ED visit in a person-month. The key independent variables are health insurance coverage status; whether one was privately insured or publicly insured in a person-month, relative to uninsured. The MEPS asks survey respondents in each round to report their coverage status for each month in the round, with each previous round response reviewed with the respondent. In this analysis, responses were coded to be mutually exclusive according to the following hierarchy: private coverage (employer-sponsored or union group coverage, non-group, or other group), public coverage (Medicaid, Medicare or TriCare), and uninsured (did not report any of the preceding coverage types). Explanatory variables were selected according

to predisposing, enabling, and need-related characteristics of Andersen's behavioral model of health service use (Aday and Andersen 1974). The predisposing component encompasses variables that describe the propensity of individuals to use services, including age (in years), sex (female as referent), race/ethnicity (Non-Hispanic white referent), and whether or not the individual had a particular provider or a routine appointment in the last year. Values and attitudes towards risk and health insurance that might influence the decision to choose health insurance or use services were also considered, including whether the respondent felt they needed health insurance, and if they are more likely to take risks than the average person.

The enabling component describes the means that individuals have available to them for the use of services. These variables include the insurance variables discussed above (uninsured referent), income at baseline as a percent of FPL (over 400% referent), employment status at each round (full-time referent), and educational attainment (college degree or more, referent). The need component reflects the most immediate cause for health services use, including self-perceived health status at each round (excellent referent), and total number of chronic conditions.

Results

The results will be presented as follows: I first address issues of reverse causality of intermittent status and ED visits by exploring differences in time varying covariates across insurance states. Next, in order to test hypotheses 1 and 2, I begin with descriptive statistics from bivariate analysis on ED visits to provide a description of the data on insurance status at time of ED visit. I then present results from bivariate analysis exploring whether the intermittently uninsured are more likely to have an ED visit, and types of transitions that are associated with an increased likelihood of an ED visit. Results from a several

logit regressions controlling for time invariant as well as time variant covariates under various specifications (logit, logit controlling for multiple observations on the same individual, logit adjusting for complex survey design) are discussed. These methods allow for a more sophisticated approach to testing the hypotheses that were initially tested with bivariate analysis. Applying the fixed effects logit to the repeated cross-section to difference out individuals without a change in health coverage during the panel, as well as individual specific characteristics that may influence ED use to allow us to evaluate Hypothesis 3.

Results from cross-sectional, non-experimental analyses are always subject to issues of reverse causality. Although it is impossible to placate those fears altogether, the results in Table 1 suggest it might not be of enormous concern in these analyses. There are no significant differences between the intermittently uninsured and continuously uninsured in terms of changes in marital status. The intermittently uninsured are much more likely than the continuously insured and uninsured to have changes in employment status, as one might expect since these employment fluctuations are likely causing a considerable amount of the insurance changes. In terms of increases or decreases in the income bracket, there were no significant differences amongst the uninsured. Perhaps most meaningful to this analysis, the intermittently uninsured were no more likely than the continuously uninsured to have increases or decreases in their self-perceived health status during the panel. Self-perceived health was just as likely to worsen over the panel as it was to improve. These results offer some reassurance that ED visits of the intermittently uninsured do not appear to be overwhelmingly driven by changes in health status. [14]

[14]Two percent of the intermittently uninsured with ED visits were found to have gained Medicaid in the month they had the ED visit, also suggesting that reverse causality might not play a large role in ED use of the intermittently uninsured.

Figure 1: Insurance Status at Time of ED Visit- Population of all ED Visits

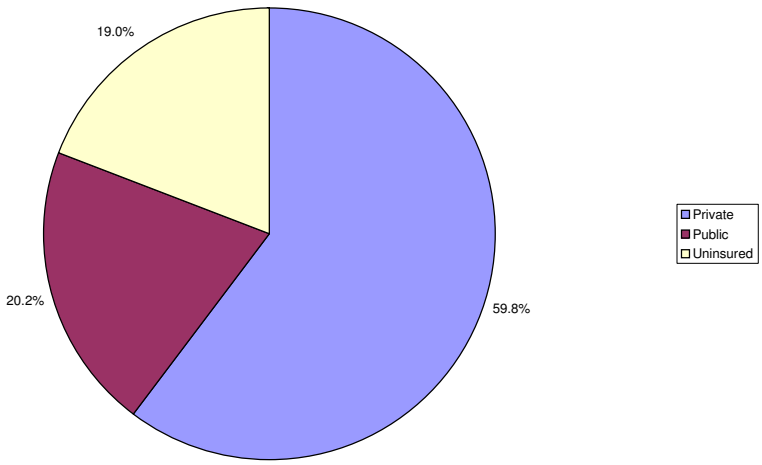

Table 1: Time-Varying Characteristics of the 2001-2002 Panel[a,b]

Characteristic	Insurance Status		
	Continuously Insured N=7,231	Intermittently Uninsured N=2,538	Continuously Uninsured N=1,671
Changes in Marital Status			
Got Divorced	4.0	7.1	5.8
Got Married	5.8*	11.7	9.0
Changes in Employment Status			
Changed Jobs During Study Period	18.4*	57.5*	32.6
Changed Jobs, Remained Employed	10.7*	35.9*	18.0
Changed Jobs, Became Unemployed	8.8*	30.2*	19.9
Changes in Percent of FPL			
Increased % of FPL	15.3*	25.0	24.8
Decreased % of FPL	13.8*	23.0	26.2
Changes in Health Status			
Self-Perceived Health Improved	13.7*	17.2	18.7
Self-Perceived Health Worsened	14.1*	19.1	20.2

[a] Weighted statistics for noninstitutionalized adults age 19-63
[b] Changes reflect changes that occurred over the study period

Almost 61% of the ED visits reported by individuals in the panel age 19 to 63 were covered by private health insurance coverage at the time of the ED visit; 20.2% were covered by public insurance and 19.0% were visits by individuals who were uninsured that month (Figure 1). The results for uninsured visits are slightly higher than those of studies that use point-in-time measures of insurance, that find 85.4% of ED visits were by individuals with some form of health insurance coverage, and 14.6% of visits were by the uninsured (Weber et al. 2005). Table 2 illustrates insurance status at time of visit by the length of time spent uninsured. As the length of time without coverage increases, percentage of private visits decreases, percentage of uninsured visits increases, but percentage of visits made while having public coverage does not display a monotonic trend downward, rather it hovers around 22% for each length of time spent uninsured category. Reason for visit does not vary in any meaningful way among the continuously insured, intermittently uninsured, or continuously uninsured. No insurance category is found to be more likely to have a visit for diagnosis or treatment versus an emergency.

Almost 67% of the population is continuously insured (public, private or some combination of both), while they represent 64.0% of ED visits (Table 3). The intermittently uninsured represent 21.4% of the population, while accounting for 25.4% of ED visits. Although 11.9% of the sample is continuously uninsured, they represent only 10.5% of ED visits. These results provide initial evidence that the intermittently uninsured disproportionately utilize EDs.

Table 2: Reason for ED Visit and Coverage Status at Visit[a]

Reason for Visit	Continuously Insured	Length of Time without Insurance				Continuously Uninsured
		1-5 months	6-11 months	12-17 months	18-23 months	
Reason for Visit						
Diagnosis or Treatment	44.0	45.8	37.9	56.3	41.5	47.6
Emergency	50.0	47.8	56.9	37.8	54.2	47.0
Other[b]	6.0	6.4	5.2	5.9	4.3	5.4
Coverage at Visit						
Private	77.9	60.8	51.4	26.7	14.6	-
Public	22.1	27.6	25.6	18.0	22.3	-
Uninsured	-	11.6	23.1	55.2	63.1	100.0

[a] Event level weighted statistics for noninstitutionalized adults age 19-63.
[b] Other includes psychotherapy/mental health, follow-up/post-op visit, immunization/shot, or maternity care.

Table 3: Distribution of Coverage Status at Time of ED Visit[a]

Coverage at Visit	Insurance Status		
	Continuously Insured	Intermittently Uninsured	Continuously Uninsured
% of Population	66.8	21.4	11.9
% of ED Visitors	64.0	25.4	10.5
Private	77.9	42.7	-
Public	22.1	23.9	-
Uninsured	-	33.4	100.0

[a] Event level weighted statistics for noninstitutionalized adults age 19-63

The intermittently uninsured spent 51% of the panel (12.2 months) covered by private insurance (Table 4). They spent 10% of the panel on public coverage (2.3 months) and 39% of the panel uninsured (9.4 months).[15] Of the intermittently uninsured with an ED visit, 48% of the panel was spent with private coverage (11.5 months), 12% with public coverage (2.8 months), and 40% (9.6 months) without insurance coverage. Considering ED visits made by the intermittently uninsured, 43% were covered by private coverage at the time of visit, 24% had public coverage at the time of visit, and 33% of visits were uninsured. The intermittently uninsured were at risk of making an uninsured visit 39% of the time, but only 33% of their visits were made while uninsured. These results suggest

[15]It should be noted that this does not suggest the average uninsured spell length is 9.4 months. It refers to the number of months of observed coverage that were spent uninsured during the panel. Some individuals experience multiple spells of uninsurance during the panel.

the intermittently uninsured were disproportionately more likely to have an ED visit while publicly insured than while privately insured or uninsured, as percentage of ED visits covered by public coverage is nearly double the proportion of length of time individuals spent insured by public coverage. Again, these are initial results and will be confirmed or refuted with more sophisticated analysis.

Table 4: Distribution of Time Spent in Coverage Status and Status at ED Visit[a]

Insurance Status	% Time Spent in Status		
	All Intermittently Uninsured	Intermittently Uninsured w/ ED Visit	Insurance Status at Visit
Private	51% (12.2 months)	48% (11.5 months)	43%
Public	10% (2.3 months)	12% (2.8 months)	24%
Uninsured	39% (9.4 months)	40% (9.6 months)	33%

[a] Event level weighted statistics for noninstitutionalized adults age 19-63

Returning to the questions raised in hypothesis one, person-month logit regressions clustered on each individual's person-id number (to account for the dependence of the 24 observations on each individual) shed more light on the health insurance status at time of ED visit. The results confirm that the uninsured are not more likely than the privately insured to have an ED visit (Table 5). It is not possible to definitively say that the privately insured are more likely to have an ED visit than the uninsured, as the results across the columns are sensitive to various indicators representing the intermittently uninsured; all the coefficients on private insurance are positive and near significance but only significant in the second column regression which includes an indicator for whether that individual ever had a gain or loss of coverage. The public coverage results are more robust across covariate classifications, with visits covered by public insurance always being positively and significantly greater than uninsured visits.

Table 5: Insurance Status at Visit and Various Transition Indicators, Person-Month Logit Results[a]

Insurance Status	Various Transition Indicators			
	(1)	(2)	(3)	(4)
Private Insurance	.1085	.1339*	.0856	.0904
	(.0583)	(.0582)	(.0590)	(.0590)
Public Insurance	.3987*	.4197*	.3707*	.3599*
	(.0746)	(.0742)	(.0751)	(.0756)
Had Ins. Gain or Loss	-	.1377*	-	-
	(-)	(.0473)	(-)	(-)
Gain	-	-	.5975*	-
	(-)	(-)	(.1389)	(-)
Loss	-	-	-.4148	-
	(-)	(-)	(.2554)	(-)
Gain Private	-	-	-	.3432
	(-)	(-)	(-)	(.2033)
Gain Public	-	-	-	.8691*
	(-)	(-)	(-)	(.1953)
Lose Private	-	-	-	-.4439
	(-)	(-)	(-)	(.3054)
Lose Public	-	-	-	-.3468
	(-)	(-)	(-)	.(4547)

[a] Controlling for Covariates (coefficients not reported)
Logit results clustered on individual id
* indicates significance at the $P < 0.05$ level

In order to determine if the results were sensitive to the regression model, a survey weight adjusted logit was applied to the data and provides similar results (Table 6). Both privately insured and publicly insured individuals were more likely to have an ED visit than the uninsured. Although the survey weight-adjusted analysis adjusts for complex survey design, it does not allow for clustering on the individual person-id. This makes it difficult to convincingly believe that the privately insured are more likely to have an ED visit than the uninsured, but at best one can be confident that it is not vice-versa. That publicly insured are more likely to have an ED visit is consistent across specifications.

Table 6: Person-Month Logit Regression Results

Independent Variable	Logit Model Type		
	Logit	Survey Logit	Fixed Effects Logit
Private Insurance	.1339*	.1384*	.3361*
	(.05827)	(.0644)	(.0942)
Public Insurance	.4197*	.5141*	.4003*
	(.07425)	(.0952)	(.1111)
Had Ins. Gain or Loss	.1377*	.1137*	-
	(.04737)	(.0489)	(-)
Age	-.0214*	-.0197*	-
	(.0023)	(.0027)	(-)
Male	-.1893*	-.1969*	-
	(.0451)	(.0520)	(-)
Non-Hispanic Black	.0653	.0823	-
	(.0581)	(.0657)	(-)
Hispanic	-.3713*	-.3026*	-
	(.0654)	(.0745)	(-)
Asian	-.6438*	-.6188*	-
	(.1617)	(.1863)	(-)
American Indian	.1623	.2803	-
	(.1657)	(.1499)	(-)
Divorced	.2919*	.3325*	.4060*
	(.0631)	(.0690)	(.1825)
Never Married	-.0449	.0063	-.3981
	(.0565)	(.0590)	(.2259)
Separated	.1861	.2511*	.1637
	(.1069)	(.1074)	(.1901)
Widowed	-.0358	-.0531	-.2001
	(.1443)	(.1582)	(.5077)
< High School	.1505*	.2535*	-
	(.0749)	(.0741)	(-)
HS Degree	.1006*	.1737*	-
	(.0554)	(.0648)	(-)
Some Post HS	.0364	.1092	-
	(.0659)	(.0767)	(-)
<100% FPL	.2869*	.2444*	-
	(.0799)	(.1102)	(-)
100-200% FPL	.0058	.0108	-
	(.0688)	(.0880)	(-)
200-400% FPL	.0959*	.0753	-
	(.0533)	(.0553)	(-)
Part-Time	.0008	.0019	.0379
	(.0660)	(.0793)	(.1108)
Self Employed	-.0466	-.0267	-.1212
	(.0767)	(.0846)	(.1869)
Not Working	.0636	.0427	.0624
	(.0509)	(.0572)	(.0827)
Very Good	.3373	.3325*	.2702*
	(.0622)	(.0689)	(.0766)
Good	.7029*	.6894*	.5112*
	(.0644)	(.0695)	(.0813)
Fair	1.147*	1.0776*	.8943*
	(.0789)	(.0854)	(.0963)
Poor	1.536*	1.4054*	1.2077*
	(.1030)	(.1176)	(.1231)
Total Chronic Conditions	.1428*	.1500*	-
	(.0201)	(.0216)	(-)
No Particular Provider	.1088	.0640	-
	(.0576)	(.0684)	(-)
No Appt. Last 12 Mos.	-.2193*	-.2064*	-
	(.0501)	(.0525)	(-)
Don't Need H. Ins.	-.1891*	-.1598	-
	(.0692)	(.0852)	(-)
More Likely to Take Risks	.1821*	.1857*	-
	(.0449)	(.0537)	(-)

The results in Table 5 also offer insight as to whether the intermittently uninsured are more likely to have an ED visit. Column 2 reports coefficients on a logit regression including an indicator for whether that individual ever had a transition into or out of health insurance coverage during the panel. Individuals with a change in coverage status are more likely than individuals with no change in status (i.e. the continuously insured and continuously

uninsured) to have had an ED visit, confirming earlier results. It is possible to further investigate the type of transition, for example insurance gain or loss, or more specifically gain of private or public coverage and loss of private or public coverage. We see from column 3 that gaining of insurance is significantly associated with an increased likelihood of ED visits, whereas losing insurance is negatively associated with having an ED visit, yet doesn't quite near significance at the 5% level. Column 4 reveals that not only is gaining insurance important, but the type of insurance that was gained matters. Individuals who gained public insurance in any month during the panel were more likely than individuals who never gained public insurance (individuals with and without a transition alike) to have an ED visit. For a variety of reasons, this does not imply that gaining public coverage caused an individual to have an ED visit. However, the association is intriguing and suggests that individuals who transition from uninsured to gaining Medicaid at any point in the panel are likely affected by both the dramatic change in price of an ED visit relative to the full price in the uninsured state, as well as the lack of providers willing and able to provide services outside of the ED to the Medicaid population, making the ED the most viable option for seeking care. [16]

The fixed effects analysis in Table 6 differences out individuals who had stable coverage or consistently lacked coverage, thus allowing us to focus our analysis on only the intermittently uninsured. The intermittently uninsured are more likely to have visits while they are privately or publicly covered than while they are uninsured, confirming findings presented earlier. Although the transitioner indicator is differenced out in the fixed effects model, similar models with varying indicators of gaining and losing insurance that do not difference out (e.g. gained insurance in a person-month, lost insurance, or gained private, gained public, lost private, lost public in a person-month) all had similar results in terms of coefficient, sign and significance on the public and private coverage variables.

[16]Selection bias is probably another factor influencing this; Medicaid eligibles might be enrolling in Medicaid once they need the coverage, which is correlated with having an ED visit.

Discussion

Analyses using national level data on adults from the civilian, noninstitutionalized population reveal that most ED visits were made by individuals who had private or public insurance coverage at the time of visit. Nineteen percent of visits were made by individuals who did not have insurance coverage at the time of visit. This number is not disproportionately higher than the number of individuals who were uninsured during the two year panel. Almost 12% of the respondents were continuously uninsured for the entire two year period, and an additional 21.4% spent at least one month of the panel uninsured. In all, one-third of the individuals in the panel were uninsured for at least one month, and thus at risk of making an uninsured ED visit.

Consistent with Hypothesis 1, I find the uninsured are no more likely than the insured to have an ED visit. Although statistical significance varies across model specification, the privately insured are either more likely to have an ED visit, or just as likely as the uninsured to have an ED visit. Medicaid beneficiaries, however, are significantly more likely to have an ED visit than the uninsured.

ED use was strongly associated with being in fair or poor health status (relative to excellent), having lower income (less than 100% FPL), and having public insurance. Male, Hispanic, Asian, age, and not having a routine appointment in the last 12 months were all negatively associated with the likelihood of an ED visit. Individuals with a change in health insurance coverage status are more likely to have an ED visit, as predicted in Hypothesis 2. Specifically, it appears that individuals who gain public health insurance at some time during the panel are more likely to have an ED visit than individuals who do not gain public insurance over the panel. Gaining private coverage does not have a statistically significant effect, nor does losing private or public coverage.

Regarding the ED utilization of individuals with a change in health insurance status,

fixed effects analysis results suggest that these transitioners are more likely to have an ED visit while publicly or privately insured, relative to visits while uninsured.

Limitations

There are a number of limitations to this study that might compromise the generalizability of the results or affect the coefficients produced by the analyses. The MEPS data are survey data that rely on individuals' self report of health insurance, utilization, and other measures. The data are therefore susceptible to response error, survey attrition, recall bias, and misreporting. Although studies have found respondents report ED utilization more accurately than other types of visits (Bound, Brown and Mathiowetz 2001), there is likely underreporting of ED visits in the MEPS data (Weinick, Owens, Andrews, Sommers and Machlin 2004). Although more specific than previous studies on insurance status and ED use, insurance status assignment to the ED visit is inexact. An individual could have experienced a transition in health coverage in the same month of the ED visit, thus having two coverage types in that month, but only one type is reported.

This analysis relies on a balanced panel of a repeated cross-section of the same individuals. The dataset used for analyses was restricted to individuals who were present and offered complete insurance information for all five rounds of data collection. It is worth noting that individuals who did not provide complete information on health insurance coverage could differ systematically from individuals who were able to provide complete information.

Studies that rely on non-experimental designs to infer information on healthcare utilization, health insurance coverage, and health status suffer from issues relating to endogeneity. There are unmeasured characteristics that are captured in the error term that could be correlated with health insurance status as well as ED utilization. Treating health insur-

ance as exogenous has been found to generally produce results showing that demand for medical care responds to insurance-induced variation in price, whereas treating insurance as endogenous generally has led to coefficients that are not significantly different from zero (Manning et al. 1987).

The fixed effects estimator is not a flawless approach. Although a fixed effects approach differences the time invariant characteristics, factors that are unmeasured and time variant are not controlled for in the analysis. Measurement error in the explanatory variables can invite serious bias into the estimates. Variations in changes in the explanatory variables cannot be assumed to be exogenous, which is another limitation to fixed effects estimation. The fixed effects estimator is not perfect, and it is possible the "cure is worse than the disease" which leaves us at best with downward-biased estimates of the relationship between insurance status and ED use (Johnston and DiNardo 1997).

Conclusions and Directions for Future Research

That our EDs are overwhelmed and having difficulty managing patients is generally accepted with little dissent. The factors causing this burden are less clear, with passion and strong beliefs often fueling the debate. While many ED physicians and policymakers believe the overcrowding is due to increasing numbers of the uninsured, recent studies using national data, including this one, do not corroborate this explanation. The uninsured account for less than one-fifth of ED visits, visits by the privately and publicly insured by far outnumber visits by the uninsured. There is little support for the contention that the uninsured are flooding EDs. Certainly there are a subset of EDs that experience a disproportionate number of visits by the uninsured and there is no doubt this is a problem for such hospitals, but this is not a problem on the aggregate level. Visits by the uninsured are not the source of ED overcrowding. Expanding health insurance to the uninsured will

not result in reducing the burden our EDs face.

Many of these same hospitals that see more than the average share of uninsured patients are also more likely to see a disproportionate share of Medicaid patients. Results presented in this analysis show that Medicaid beneficiaries disproportionately use ED services. The combination of uninsured patients and low reimbursement rates from Medicaid are detrimental to these safety-net hospitals' bottom line. The disproportionate use of EDs by Medicaid patients is a little studied phenomenon that warrants further attention. Medicaid was the primary payer for 20% of the visits in this analysis, while only 11% of the panel ever had public insurance and of that 11%, only 5% were continuously covered by Medicaid the entire two year period. The other 5% were intermittently covered by Medicaid, and 1% had transitions within private coverage and Medicaid with no time spent uninsured.

I also found that the intermittently uninsured were more likely to have an ED visit than those with stable coverage or continuously uninsured. Specifically, individuals who gained Medicaid during the panel were more likely than individuals who never gained Medicaid to have an ED visit. Furthermore, of individuals who had a change in health insurance status, their visits were more likely to be while covered by Medicaid than while uninsured, even though they spent disproportionately more time without coverage than with Medicaid. Again, these results suggest that there is an intriguing link between public coverage and ED use that has not been investigated. Future research should focus less on trying to find a connection between the uninsured and ED use and focus more on Medicaid beneficiaries and ED use. Future analysis should attempt to discern whether it is features of Medicaid coverage itself (minimal or no co-pays, limited access to providers outside the ED) or characteristics of eligible individuals who select to enroll in Medicaid that makes them more likely to have an ED visit.

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