Published in final edited form as:

Surg Innov. 2015 December ; 22(6): 588–592. doi:10.1177/1553350615573579.

Insurance expansion and the utilization of inpatient surgery: evidence for a “woodwork” effect?

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Abstract

INTRODUCTION—The impact of insurance expansion on the currently insured population is largely unknown. We examine rates of elective surgery in previously insured individuals before and after Massachusetts healthcare reform.

METHODS—Using the State Inpatient Databases for Massachusetts and two control states (New York and New Jersey) that did not expand coverage, we identified patients aged 69 and older who underwent surgery from January 1, 2003, through December 31, 2010. We studied five elective operations (knee and hip replacement, transurethral resection of prostate, inguinal hernia repair, back surgery). We examined statewide utilization rates before and after implementation of healthcare reform, using a difference-in-differences technique to adjust for secular trends. We also performed subgroup analyses according to race and income strata.

RESULTS—We observed no increase in the overall rate of selected discretionary inpatient surgeries in Massachusetts versus control states for the entire population (−1.4%, $p=0.41$), as well as among the white (−1.6%, $p=0.43$) and low-income (−2.2%, $p=0.26$) subgroups. We did, however, find evidence for a woodwork effect in the subgroup of non-white elderly patients,

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CONFLICTS OF INTEREST:

Chandy Ellimoottil, M.D: None

Sarah Miller, Ph.D: None

Matthew Davis, M.D., M.A.P.P: Dr. Davis serves as the Chief Medical Executive for the State of Michigan in the Department of Community Health. The views expressed herein do not necessarily represent the views of the State of Michigan or the Michigan Department of Community Health.

David C. Miller, M.D: Dr. Miller is a paid consultant for ArborMetrix.

among whom the rate of these procedures increased by 20.5% ($p=0.001$). Among non-whites, the overall result reflected increased utilization of all five individual procedures, with statistically significant changes for knee replacement (18%, $p<0.01$), back surgery (18%, $p=0.05$), transurethral resection of the prostate (28%, $p=0.05$), and hernia repair (71%, $p=0.03$).

CONCLUSION—Our findings suggest that national insurance expansion may increase the use of elective surgery among subgroups of previously insured patients.

INTRODUCTION

As implementation of the Affordable Care Act (ACA) accelerates the number of new patients enrolling in public insurance programs, there is great interest in understanding both the intended and unintended consequences of health care reform. The term “woodwork effect” has been used to describe one unanticipated consequence of the ACA, whereby individuals already entitled to Medicaid come “out of the woodwork” to enroll only after media coverage and outreach associated with the reform makes them aware of their eligibility.¹ While the federal government covers the expenditures of individuals who are newly eligible under the ACA’s Medicaid expansion provisions, the costs of previously eligible new enrollees are absorbed by state governments. With nine million adults and children currently eligible, but not enrolled in Medicaid, the woodwork effect may yield billions of dollars in unanticipated healthcare expenditures.¹

It is plausible that a similar woodwork phenomenon exists regarding healthcare utilization. Specifically, heavy media coverage and local outreach about the benefits of healthcare coverage may motivate already-insured patients (e.g., elderly) to increase their use of services, including elective surgery. For example, previous investigators have noted an increase in the rate of surgery among elderly blacks and Hispanics after passage of the 2006 Massachusetts healthcare reform.² This finding is surprising because the provisions of the state law were focused on expanding health insurance coverage for the non-elderly. The increase in surgical utilization may be the result of a woodwork effect, or it may reflect a secular increase in the rate of surgery for the elderly.

To examine this issue further, we performed a difference-in-differences analysis using the elderly population of Massachusetts and two control states to determine whether healthcare reform increased the utilization of elective surgeries among individuals with pre-existing insurance coverage. A better understanding of the presence and magnitude of a woodwork effect for utilization would help clarify the full impact of national insurance reform.

METHODS

Data Sources and study population

We used the State Inpatient Databases (SID) for Massachusetts and two nearby Northeastern control states (New York and New Jersey) as our primary datasets.³ New Jersey and New York were selected as controls because these states are in close geographic proximity to Massachusetts, had comparable high surgical volumes, and had data available during the study period. We also used data from the U.S. Census Bureau to estimate rates of uninsured

individuals, median household income and population growth.^{4–6} This study was deemed exempt from review by the University of Michigan Institutional Research Board.

Our study cohort included elderly patients over the age of 69. We selected this group for several reasons. First, we wanted to analyze a cohort of patients that were almost all insured (i.e., due to Medicare eligibility) prior to healthcare reform in Massachusetts.⁷ Second, because there is a sharp increase in the use of healthcare services when patients initially become Medicare eligible⁷, we excluded patients between the ages of 65–69. We also excluded patients who did not reside in Massachusetts or the control states (10.6%) and those with primary payer listed as “self-pay” (0.30%), “free-care” (0.03%), “other” (0.87%) or missing (<0.01%).

We hypothesized that, if present, the woodwork effect for utilization would be greatest for discretionary surgical care.⁸ Guided by expert opinion and the literature, we defined discretionary procedures as inpatient surgeries with high levels of preference sensitivity, recognized medical management alternatives, and documented regional variation.^{8–10} Likewise, we excluded all patients who underwent emergent procedures (8.1%) using the appropriate flag available in the State Inpatient Database. Ultimately, our analytic cohort included patients undergoing one of five elective operations knee replacement, hip replacement, transurethral resection of the prostate, back surgery, and inguinal hernia repair.

Because the woodwork effect may vary across patient populations, we decided a priori to perform separate analyses for the following patient subgroups: 1) non-Hispanic whites; 2) non-whites (included blacks and patients of Hispanic origin); and 3) low income. We used variables available in the SID to identify race and ethnicity. To define our low income cohort, we used the Small Area Income and Poverty Estimates from the Census Bureau. We linked patient zip codes to counties in Massachusetts and identified patients that lived in the tertile of counties in Massachusetts with the lowest median household income.

Analysis

We examined statewide utilization rates before and after implementation of healthcare reform using a difference-in-differences technique to adjust for secular trends including the introduction of Medicare Part D. While Massachusetts healthcare legislation was enacted in April 2006, we assigned July 2007 as the transition point between the pre- and post-reform eras. We selected this date because the provisions of the law were implemented in a staggered fashion from July 2006 through July 2007, and the number of uninsured individuals did not decline significantly until 2007.^{5,11,12}

In order to implement the DID analysis, we fit separate ordinary least square regression models for all patients and the subgroups that we examined. The primary outcome (i.e., dependent variable) was the total number of discretionary surgeries in each state per quarter per 10,000 individuals. We adjusted for unemployment¹³ and seasonal differences in rates of surgery.¹⁴ We performed a DID analysis for the entire population, and then performed subgroup analyses according to race and income strata.

RESULTS

We identified 366,642 procedures performed on Medicare beneficiaries in all 3 states. We observed no increase in the overall rate of selected discretionary inpatient surgeries in Massachusetts versus control states for the entire population (-1.4% , $p=0.41$), as well as among the white (-1.6% , $p=0.43$) and low-income (-2.2% , $p=0.26$) subgroups. We did, however, find evidence for a woodwork effect in the subgroup of non-white elderly patients, among whom the rate of these procedures increased by 20.5% ($p=0.001$) (Figure 1). Among non-whites, the overall result reflected increased utilization of all five individual procedures, with statistically significant changes for knee replacement (18% , $p<0.01$), back surgery (18% , $p=0.05$), transurethral resection of the prostate (28% , $p=0.05$), and hernia repair (71% , $p=0.03$) (Table 1).

DISCUSSION

We found that insurance expansion increased the use of elective surgery for some, but not all, previously-insured populations. This “woodwork effect” for utilization was specifically observed among elderly non-whites in Massachusetts.

There are several possible reasons for this finding. First, the non-white population had the highest pre-reform risk of being uninsured in Massachusetts.⁵ Accordingly, local outreach surrounding the benefits of obtaining healthcare coverage may have been most pronounced for communities enriched with racial/ethnic minorities. Specifically, Massachusetts health centers, which are often strategically positioned in areas where racial/ethnic minorities live, play a pivotal role in educating the community about health related issues. In a similar vein, provisions in the ACA encourage the use of community health workers to conduct outreach regarding health problems and promote healthy behaviors in medically underserved communities.¹⁵ These educational efforts may have influenced health care behaviors not only for the uninsured, but also for community members with existing coverage.¹⁶

Second, evidence suggests that, independent of insurance status, there is a large unmet need for elective surgical procedures (e.g. joint replacement surgery) in minority populations.¹⁷ While white and non-white patients older than 65 years of age have access to the same insurance benefits through Medicare, total knee replacement rates are 37% lower for non-whites compared to whites. It is possible that outreach through health centers in Massachusetts facilitated the clinically necessary growth of discretionary surgeries in minority communities. Furthermore, there is evidence that patients are more likely to undergo joint replacement if a member of the patient’s social network has undergone the same procedure with a successful outcome.^{18,19}

Finally, increased physician capacity may have induced demand in areas with large numbers of non-whites. Anticipating a large influx of newly insured patients, physicians and hospitals may have expanded services in areas with racial/ethnic minorities. Such added capacity could have spurred utilization among previously insured patients in the same communities.

Although factors unique to Massachusetts²⁰ limit definitive forecasts about whether a similar phenomenon will occur following widespread implementation of the ACA, states with active

outreach about the benefits of healthcare insurance may be most susceptible to changes in utilization among their previously covered populations. This woodwork effect may lead to improvements the health and quality of life of the already insured and subsequently reduce known racial disparities in the use of elective surgical procedures. Analyses that have examined the effect of insurance expansion on the non-elderly have shown these benefits.^{2,21,22} However, increased utilization of healthcare services (for better or worse) will lead to increased healthcare spending. This has been observed in Massachusetts, where insurance expansion led to increased overall expenditures. Our findings suggest that any economic analysis of insurance expansion should not only consider the financial impact of increased healthcare utilization by the non-elderly newly insured, but also increased utilization by subpopulations that are already insured. While the utilization-centered woodwork effect may vary based on characteristics of the individual states, it should not be ignored when evaluating the comprehensive impact of expanded coverage through the ACA.

Acknowledgments

FINANCIAL SUPPORT:

This research was supported by the Agency for Healthcare Research and Quality (K08 HS018346-01A1 to Dr. Miller), Urology Care Foundation (Astellas Rising Star in Urology Research Award to Dr. Miller) and the National Institutes of Health, National Institute of Diabetes and Digestive and Kidney (T32 DK 7782-14 to Dr. Ellimoottil)

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Figure 1. Change in the rates of discretionary surgery for individuals >69 years in Massachusetts and control states after healthcare reform

Observed change refers to the unadjusted percent change in rate of surgery per 10,000 individuals >69 years old from before to after healthcare reform in Massachusetts and in control states where no reform occurred. Net change was determined using multivariable difference-in-differences analysis and represents the change in rate of surgery potentially attributable to the “woodwork effect”. We assigned July 2007 as the transition point between the pre- and post-reform eras in Massachusetts because the provisions of the 2006 healthcare law were implemented in a staggered fashion. The non-white population includes only elderly blacks and patients of Hispanic origin. Low Income refers to elderly patients residing in Massachusetts counties with low median income. Control states are New Jersey and New York.

Observed and net change in utilization of inpatient surgical procedures in the previously insured after 2006 Massachusetts healthcare reform

Table 1

Surgical procedures	All			White			Non-white			Low income		
	n	Obs change	Net change (95% CI)	p-value	Obs change	Net change (95% CI)	p-value	Obs change	Net change (95% CI)	p-value	Obs change	Net change (95% CI)
Transurethral resection of the prostate	37,375	−42%	−24% −1%	0.03	−42%	−25% −3%	0.01	−7%	0%	56%	−31%	−16%
Hip replacement	91,928	−1%	−6% 4%	0.66	1%	−8% 4%	0.55	13%	−4%	38%	0%	−6%
Knee replacement	159,052	4%	−7% 3%	0.49	6%	−8% 4%	0.52	24%	6%	30%	4%	−8%
Back surgery	67,327	7%	−5% 9%	0.61	10%	−4% 12%	0.35	24%	0%	36%	3%	−19%
Inguinal hernia	10,144	−22%	−12% 35%	0.32	−22%	−13% 27%	0.47	12%	9%	134%	−12%	−18%

Obs change refers to the unadjusted percent change in rate of surgery per 10,000 individuals >69 years old from before to after healthcare reform in Massachusetts and in control states where no reform occurred. Net change was determined using multivariable difference-in-differences analysis and represents the change in rate of surgery potentially attributable to the “woodwork effect”. We assigned July 2007 as the transition point between the pre- and post-reform eras in Massachusetts because the provisions of the 2006 healthcare law were implemented in a staggered fashion. The non-white population includes only elderly blacks and patients of Hispanic origin. Low Income refers to elderly patients residing in Massachusetts counties with low median income. Control states are New Jersey and New York. CI=Confidence interval