Original Investigation

Use of Hospital-Based Services Among Young Adults With Behavioral Health Diagnoses Before and After Health Insurance Expansions

Ellen Meara, PhD; Ezra Golberstein, PhD; Rebecca Zaha, MPH; Shelly F. Greenfield, MD, MPH; William R. Beardslee, MD; Susan H. Busch, PhD

IMPORTANCE Young adults have high levels of behavioral health needs but often lack health insurance. Recent health reforms have increased coverage, but it is unclear how use of hospital-based care changed after expanding insurance.

OBJECTIVE To evaluate the association between health insurance coverage expansions and use of hospital-based care among young adults with behavioral health diagnoses.

DESIGN, SETTING, AND PARTICIPANTS Quasi-experimental analyses of community hospital inpatient and emergency department use from 2003-2009 based on hospital discharge data, comparing differential changes in service use among young adults with behavioral health diagnoses in Massachusetts vs other states before and after Massachusetts’ 2006 health reform. This population-based sample included inpatient admissions (n = 2 533 307, representing 12 821 746 weighted admissions across 7 years) nationwide and emergency department visits (n = 6 817 855 across 7 years) from Maryland and Massachusetts for 12- to 25-year-old patients.

MAIN OUTCOMES AND MEASURES Inpatient admission rates per 1000 population for primary diagnosis of any behavioral health disorder by diagnosis; emergency department visit rates per 1000 population by behavioral health diagnosis; and insurance coverage for hospital discharges.

RESULTS After 2006, uninsurance among 19- to 25-year-old individuals in Massachusetts decreased from 26% to 10% (16 percentage points; 95% CI, 13-20). Young adults experienced relative declines in inpatient admission rates of 2.0 per 1000 for primary diagnoses of any behavioral health disorder (95% CI, 0.95-3.2), 0.38 for depression (95% CI, 0.18-0.58), and 1.3 for substance use disorder (95% CI, 0.68-1.8). The increase in emergency department visits with any behavioral health diagnosis after 2006 was lower among young adults in Massachusetts compared with Maryland (16.5 per 1000; 95% CI, 11.4-21.6). Among young adults in Massachusetts, the percentage of behavioral health discharges that were uninsured decreased by 5.0 (95% CI, 3.0-7.2) percentage points in inpatient settings and 5.0 (95% CI, 1.7-7.8) percentage points in emergency departments relative to other states.

CONCLUSIONS AND RELEVANCE Expanded health insurance coverage for young adults was not associated with large increases in hospital-based care for behavioral health, but it increased financial protection for young adults with behavioral health diagnoses and for the hospitals that care for them.

Published online February 19, 2014.

Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Ellen Meara, PhD, The Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine, 35 Centerra Pkwy, Lebanon, NH 03766 (ellen.r.meara@dartmouth.edu).
he coverage and financing of health care services for individuals with mental illness and substance use disorders are changing rapidly in the United States. The 2008 federal parity legislation required that insurance-benefit design and management for mental health and substance abuse treatment match those for medical and surgical services. The 2010 Patient Protection and Affordable Care Act (PPACA), with coverage provisions mirroring Massachusetts’ 2006 health reform, expanded health insurance coverage to populations with high behavioral health needs through Medicaid expansions, established health insurance exchanges to ease purchase of individual and small-group health insurance, and required that insurers permit dependent children to remain on parental insurance policies to age 26 years. Furthermore, the PPACA requires health plans offered through new insurance exchanges to cover mental health and substance abuse treatment, and other PPACA reforms integrated care across settings for behavioral health treatment. 

Most behavioral health disorders (75%) emerge by age 24 years, and the odds of having a 12-month DSM-IV disorder are higher for individuals aged 18 to 29 years than any other adult age group. Despite the long-term mortality, disability, and labor market consequences of these disorders, young adults lack health insurance coverage more often than other age groups. The lack of coverage is particularly important for young adults in foster care, child Supplemental Security Income recipients, and Medicaid recipients, for whom the 18th birthday coincides with a loss of benefits.

In outpatient settings, demand for behavioral health treatment is more responsive to insurance coverage and patient cost-sharing than other health care services, suggesting that hospital-based services may increase in response to increased insurance coverage. Alternatively, hospital-based services may fall with increased insurance coverage either because outpatient care use substitutes for inpatient care or owing to utilization management techniques of managed behavioral health organizations responsible for new enrollees such as requiring prior authorization for hospital-based services. Little is known about behavioral health service use when young adults acquire coverage.

In this report, we studied the experience of the Massachusetts health reform to examine inpatient hospital admissions and emergency department (ED) visits for young adults aged 19 to 25 years diagnosed as having behavioral health disorders. To understand how use of hospital-based care and insurance coverage for such care changed following health insurance coverage expansion, we compared inpatient admissions before and after 2006 in Massachusetts with the rest of the United States. We further compared these differences among the 19- to 25-year-old individuals with differences among adolescents aged 12 to 18 years in Massachusetts for whom insurance coverage changed less after health reform. To examine changes in ED visits, we used a similar approach, focusing on available ED visits in Massachusetts and Maryland. We estimated the net effect of opposing influences of insurance coverage on hospital-based behavioral health services against a null hypothesis that service use would not change after coverage expanded.

Methods

Study Population
To analyze hospital-based care for behavioral health disorders, we assembled 4 sources of hospital discharge records from the Agency for Healthcare Research and Quality’s Healthcare Cost and Utilization Project. First, the 2003-2009 Nationwide Inpatient Sample provided discharge records of inpatient admissions from annual random samples of 20% of community hospitals in the United States. With sample weights, the data represent US inpatient admissions excluding admissions to psychiatric hospitals or alcohol and chemical-dependency hospitals. Second, we used all available discharge records from Massachusetts (State Inpatient Database), and thus we excluded Massachusetts from Nationwide Inpatient Sample estimates. Finally, for ED visits, we used the 2 State Emergency Department Data sets from Massachusetts and Maryland. National data on ED visits do not exist before 2006. Of the subset of states with ED data before 2006, we chose Maryland because it was most similar to Massachusetts in size, geography, pre-reform uninsurance rates among young adults, and, like Massachusetts, Maryland has more mental health providers than average. To focus on the set of discharges most likely affected by coverage expansions, we present results from nonbirth discharges only (eTable in Supplement), although estimated effects are similar without this exclusion.

From 2,583,954 nonbirth inpatient admission records, representing 12,921,828 weighted admissions among 12- to 25-year-old individuals, we excluded records missing information on sex (n = 35,486), diagnosis (n = 702), or payment source (n = 14,459), leaving 2,533,307 admission records, representing 12,821,746 weighted admissions for any diagnosis. From 6,893,810 nonbirth ED visit records among 12- to 25-year-old individuals, we excluded observations missing information on sex (n = 711), diagnosis (n = 65,444), or payment source (n = 68,700), leaving a total of 6,817,855 ED visits for any diagnosis.

To calculate population-based estimates of health insurance rates by single year of age, state of residence, and calendar year, we analyzed the Bureau of Labor Statistics’ 2004-2010 Current Population Survey Annual Social and Economic Supplements. Patient consent was waived for our study of secondary data; this study was reviewed and deemed exempt by Dartmouth College’s Committee for the Protection of Human Subjects.

Study Variables
We classified Current Population Survey respondents reporting no health insurance coverage at any time in the prior calendar year as uninsured.

Inpatient outcomes included admission rates for any reason; any primary diagnosis for behavioral health; and separately for primary diagnoses of depression, psychoses/schizophrenia, substance use disorders, and all other behavioral health disorders (eTable in Supplement). We expressed admissions as rates per 1000 population in a given age, sex, state (Massachusetts vs other), and year cell. Because the
Nationwide Inpatient Sample samples different hospitals within each state in every year, we pooled other states to mitigate the effects of annual entry or exit of sample hospitals. Numerators were based on total admissions in a given cell for each outcome. Denominators were computed from Census Bureau population estimates to form rates for each of the 392 cells defined by 14 single years of age (12-25 years) × 7 years × 2 sexes × 2 states.

Other outcomes, also measured for each age, year, sex, and state cell, included mean length of hospital stay in days; share of admissions with comorbid diagnoses of depression, psychoses, or substance use disorders (excluding admissions for primary diagnoses of depression, psychoses, or substance use disorders, respectively); and share of admissions by insurance status. Insurance status was based on payment source, including uninsured (self-pay), Medicaid, private, or Commonwealth Care, subsidized coverage from Massachusetts’ health insurance exchange.

Outcomes for ED visits were similar but reflect the presence of any behavioral health diagnosis because no primary diagnosis was available. We created 3 2-way interaction terms between the variables MA (1 in Massachusetts and 0 otherwise), after (1 in years 2007-2009 and 0 otherwise), and age 19 to 25 (1 for age 19-25 years and 0 otherwise), along with the triple interaction between the 3 variables. The coefficient, β5, yielded our estimate of interest, the differential change in admissions per 1000 for 19-to-25-year-old individuals relative to 12-to-18-year-old individuals in Massachusetts vs other states after health reform. Negative estimates of β5 indicated that admissions or ED visits for 19- to 25-year-old individuals in Massachusetts decreased relative to other age groups and states after health reform, or, in cases of increasing use, increased less relative to other groups. We report the estimated coefficient, β5, and 95% CIs based on robust Huber-White–estimated standard errors. P values are based on 2-sided tests of statistical significance, defined as P < .05. Analyses were conducted using SAS version 9.3 and Stata version 11.2.

Results

Figure 1 confirms prior evidence that the Massachusetts health reform led to a dramatic decline in uninsurance rates for young adults in Massachusetts compared with other states and age groups. Among 19- to 25-year-old individuals in Massachusetts, uninsurance rates decreased from 26% to 10% (16 percentage points; 95% CI, 13-20) after health reform.

Primary behavioral health diagnoses accounted for 48,889 nonbirth inpatient admissions for 19- to 25-year-old individuals in Massachusetts over our study period, or 28% of inpa-
tient admissions in this age group, compared with 16% for the rest of the United States (Table 1). Notably, the number of inpatient admissions declined over time for total admissions and admissions with primary behavioral health diagnoses. Finally, as inpatient admissions with primary diagnoses of behavioral health disorders declined after 2006, there was a statistically insignificant increase in the share of admissions with secondary diagnoses of psychoses, depression, or substance use disorders.

Total ED visits declined in both age groups in Massachusetts and Maryland (Table 2). In contrast, visits with any behavioral health diagnosis on the record increased in absolute terms and per 1000 population. For example, among 19- to 25-year-old individuals, visits increased from 53 to 72 per 1000 in Massachusetts and from 65 to 99 per 1000 in Maryland. Much of this growth was among visits with diagnoses of substance use disorder, which grew from 22 to 34 per 1000 in Massachusetts and from 38 to 64 per 1000 population in Maryland.

Figure 2 displays the differential change in inpatient admissions per 1000 for 19- to 25-year-old individuals after Massachusetts’ health reform from our regression analyses. Across all behavioral health diagnoses, relative declines in admission rates were 2.0 per 1000 (95% CI, 0.95-3.2). Comparing young adults in Massachusetts with adolescents and with other states, the relative declines in admissions for primary diagnoses of substance use disorders (1.3 per 1000; 95% CI, 0.68-1.8) were greater than the declines in the other specific behavioral health categories. Relative declines in depression admissions among young adults in Massachusetts were also statistically significant (0.38 admissions per 1000; 95% CI, 0.18-0.58). Admissions for other behavioral health diagnoses were unchanged, an insignificant decline of 0.27 per 1000 (95% CI, decrease of 0.62 to increase of 0.08).

The differential changes in ED visits after Massachusetts health reform are presented in Figure 3. Although ED visits for behavioral health diagnoses grew after 2006, they grew much
less among young adults in Massachusetts compared with Maryland, by 16.5 per 1000 (95% CI, 11.4-21.6). Substance use disorder visits grew by 12.8 fewer visits per 1000 (95% CI, 9.0-16.6) relative to other groups, and they accounted for most of the relative declines in visits with behavioral health diagnoses. Relative to other ages and to Maryland, visits for young adults in Massachusetts diagnosed as having substance use disorders and at least 1 mental illness declined by 1.7 per 1000 (95% CI, 0.91-2.5). Among young adults in Massachusetts, the percentage of behavioral health discharges that were uninsured decreased by 5.0 (95% CI, 3.0-7.2) percentage points in inpatient settings and 5.0 (95% CI, 1.7-7.8) percentage points in EDs relative to other states.

Finally, in inpatient settings, young adults in Massachusetts did not experience significant changes in length of stay for overall admissions (+0.20; 95% CI, −0.17 to +0.58), but length of stay increased in relative terms for behavioral health admissions (+1.86; 95% CI, 0.77-2.9). The largest increases were in admissions with primary behavioral health diagnoses other than depression, psychosis, or substance use disorder (+1.86; 95% CI, 0.52-3.2). Changes for other specific behavioral diagnoses were not statistically significant.

Discussion

Recent calls for increased access to mental health services have raised concern that increases in coverage will fuel unsustainable increases in use and spending. We examined the effects of Massachusetts’ health reform, which dramatically increased health insurance coverage, on hospital-based use. We focused on young adults aged 19 to 25 years, a group with rela-

### Table 2. Emergency Department Visit Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Age 19-25 y</th>
<th>Age 12-18 y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Massachusetts</td>
<td>Maryland</td>
</tr>
<tr>
<td>Emergency department visits, No.</td>
<td>1 279 720</td>
<td>1 054 785</td>
</tr>
<tr>
<td>Any diagnoses (total)</td>
<td>129 077</td>
<td>11 830</td>
</tr>
<tr>
<td>Depression only</td>
<td>5 809</td>
<td>7038</td>
</tr>
<tr>
<td>Psychoses only</td>
<td>5 854</td>
<td>66 007</td>
</tr>
<tr>
<td>SUD (only)</td>
<td>8971</td>
<td>8714</td>
</tr>
<tr>
<td>Co-occurring SUD and mental disorder</td>
<td>15 148</td>
<td>17 572</td>
</tr>
<tr>
<td>Other behavioral health disorder</td>
<td>31 972</td>
<td>28 666</td>
</tr>
</tbody>
</table>

Visit rate per 1000, mean (SD)*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Age 19-25 y</th>
<th>Age 12-18 y</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Massachusetts</td>
<td>Maryland</td>
</tr>
<tr>
<td>Any diagnoses (total)</td>
<td>522 (55)</td>
<td>542 (68)</td>
</tr>
<tr>
<td>Depression only</td>
<td>5.0 (1.4)</td>
<td>6.1 (1.6)</td>
</tr>
<tr>
<td>Psychoses only</td>
<td>2.4 (0.9)</td>
<td>3.6 (0.6)</td>
</tr>
<tr>
<td>SUD only</td>
<td>22 (4.9)</td>
<td>34 (4.1)</td>
</tr>
<tr>
<td>Co-occurring SUD and mental disorder</td>
<td>6.2 (1.6)</td>
<td>9.1 (1.8)</td>
</tr>
<tr>
<td>Other behavioral health disorder</td>
<td>13 (2.3)</td>
<td>15 (2.6)</td>
</tr>
</tbody>
</table>

Admissions paid by the following, %

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Massachusetts</th>
<th>Maryland</th>
<th>Massachusetts</th>
<th>Maryland</th>
<th>Massachusetts</th>
<th>Maryland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicaid</td>
<td>20</td>
<td>28</td>
<td>17</td>
<td>22</td>
<td>27</td>
<td>34</td>
</tr>
<tr>
<td>Private insurance</td>
<td>41</td>
<td>40</td>
<td>38</td>
<td>35</td>
<td>63</td>
<td>59</td>
</tr>
<tr>
<td>Commonwealth Care</td>
<td>0.01</td>
<td>4.0</td>
<td>0</td>
<td>0.12</td>
<td>0</td>
<td>0.12</td>
</tr>
<tr>
<td>Other</td>
<td>8.1</td>
<td>8.1</td>
<td>6.5</td>
<td>6.2</td>
<td>2.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Uninsured</td>
<td>31</td>
<td>19</td>
<td>39</td>
<td>37</td>
<td>8.3</td>
<td>4.8</td>
</tr>
<tr>
<td>Female, %</td>
<td>54</td>
<td>56</td>
<td>59</td>
<td>61</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Abbreviation: SUD, substance use disorder.

* Rate = No. per 1000 population.

b For visits with diagnoses of depression, SUD, or psychosis, only indicates that no other behavioral health diagnosis was recorded for that visit. Other physical diagnoses may be present.

c Private insurance excludes Commonwealth Care, subsidized coverage through the Massachusetts Insurance Exchange.
tively high behavioral health needs and low rates of insurance coverage prior to reform, and the target of policies to expand coverage among young adults. Increased insurance coverage post-reform coincided with significant relative declines in inpatient admissions and ED visits for behavioral health overall. This change was largely owing to lower rates of encounters for individuals with diagnoses of substance use disorders in Massachusetts relative to other states.

The finding that declines were largest for substance use disorders is unsurprising given that these diagnoses were the single most common type of behavioral health diagnosis in hospital-based settings. Thus, one would expect effects to be larger in absolute value for substance use disorders. Furthermore, because many effective substance abuse treatments can be delivered in outpatient settings, care may appropriately move to outpatient settings as insurance coverage expands. This diversion away from inpatient settings may be facilitated by managed behavioral health organizations, charged with managing those benefits and, in some cases, limiting expensive care by redirecting care to less-intensive and lower-cost settings.

We also found significant declines in admissions or visits without insurance coverage in both hospital and ED settings. This change resulted from increased coverage through Commonwealth Care, private coverage, and Medicaid. This signifies much lower out of pocket burden for young adults with a behavioral health crisis, as well as less uncompensated care burdening hospitals.

To our knowledge, prior to this study, research examining the impact of Massachusetts health reform’s coverage expansion on hospital care focused on use of services for general medical conditions but did not examine patterns of care for behavioral health, conditions that are particularly important for young adults and for which public and private insurance coverage often leaves gaps. An important strength of this study was that we examined the universe of Massachusetts’
hospital admissions, allowing for richer analyses than earlier data using a sample of inpatient admissions.21 The declines in hospital-based care found in this study are consistent with less severely ill young adults using more care in outpatient settings and, consequently, avoiding hospital-based care. Health plans have incentives to limit access to inpatient settings because they assume responsibility for the newly insured population’s behavioral health services. Indeed, evidence from managed behavioral health organizations suggests that inpatient use declines when behavioral health plans manage these services, but the outcome of such diversion depends on whether patients are diverted to suitable alternative care.14

The results presented here should be interpreted with several limitations in mind. First, we did not observe outpatient treatment for mental illness or substance abuse for individuals in the study. Thus, we cannot infer whether reduced use of hospital-based care for mental illness and substance use disorders represents lower rates of morbidity in the population,29 effective care in outpatient settings,24-27 or restrictions on use of hospital-based settings.14 However, it is unlikely that reduced inpatient use represents worse behavioral health after increasing health insurance or limits on care associated with insurance expansion. Because changes within Massachusetts were larger for 19- to 25-year-old compared with 12- to 18-year-old individuals, it is unlikely that Massachusetts’ policies or practices besides health reform explain our findings.

Second, we did not observe admissions to psychiatric or alcohol and chemical-dependency facilities. Because community hospitals represent nearly 60% of inpatient spending for mental health treatment and more than 70% of spending for substance use disorders, we believe they represent an important majority of such spending.29

Third, Massachusetts’ mental health system was more expansive, with 32.4 psychiatrists per 100,000 residents18 compared with 14.5 for the United States.28 Finally, high rates of hospitalization for behavioral health in Massachusetts compared with other states limit our ability to generalize findings to areas of the country where hospital-based care is less common. The decline in the use of hospital-based mental health services found here may not be generalizable to the lean mental health system found in the rest of the United States, although it is encouraging that a system more likely to use hospital-based care did not increase inpatient admissions and ED visits when coverage increased.

It is important to consider these results within the context of the Massachusetts behavioral health care landscape and reforms more broadly. Massachusetts’ health reform required insurance plans to cover dependents up to age 26 years on parental policies, just as the PPACA has required since September 2010. The remaining coverage-related provisions in the PPACA have started taking effect in 2014. Furthermore, Massachusetts’ health reform allowed for low-cost Young Adult Plans for 18- to 26-year-old individuals without access to employer-sponsored coverage.29 Finally, in addition to the PPACA, the federal parity law, implemented in 2010-2011, is likely to improve care for individuals with behavioral health conditions. Although Massachusetts had a state mental health parity law prior to reform, this law was less extensive.

As developmental neuroscience indicates, brain development continues into early adulthood. Similarly, the rates of onset of major mental illnesses are very high in this period.30 Thus, providing high-quality preventive and treatment services to this age group is an important goal.31 These data offer a snapshot of one aspect of policies to improve access to behavioral health treatment, expanded insurance coverage. It is reassuring that use of expensive emergency and inpatient treatments did not increase with greater insurance coverage, a result that stands in contrast to a recent analysis describing the aggregate increase in behavioral health spending during recent years.32 Further studies should examine patterns of care across inpatient and outpatient settings, particularly as data emerge since implementation of federal parity laws. The increase in visits for substance use disorders is noteworthy and speaks to the need for effective treatment and preventive services. Expanded health insurance coverage for young adults is not associated with large increases in hospital-based care for behavioral health, but it increased financial protection to young adults with behavioral health diagnoses and to the hospitals that care for them.

ARTICLE INFORMATION

Submitted for Publication: May 30, 2013; final revision received August 29, 2013; accepted October 8, 2013.


Author Affiliations: The Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine, Lebanon, New Hampshire (Meara); National Bureau of Economic Research, Cambridge, Massachusetts (Meara); Department of Health Policy and Management, University of Minnesota School of Public Health, Minneapolis (Golberstein); The Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine, Lebanon, New Hampshire (Meara); McLean Hospital, Belmont, Massachusetts (Zaha); Harvard Medical School, Boston, Massachusetts (Greenfield, Beardslee); Department of Psychiatry, Boston Children’s Hospital, Boston, Massachusetts (Beardslee); Department of Health Policy and Management, Yale School of Public Health, New Haven, Connecticut (Busch).

Author Contributions: Dr Meara had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Drs Meara and Golberstein and Ms Zaha completed all physical data analysis. Study concept and design: Meara, Golberstein, Zaha, Beardslee, Busch. Acquisition of data: Meara, Zaha, Beardslee. Analysis and interpretation of data: All authors. Drafting of the manuscript: All authors. Critical revision of the manuscript for important intellectual content: Meara, Golberstein, Beardslee, Busch. Statistical analysis: Meara, Golberstein, Zaha, Busch. Obtained funding: Meara, Golberstein.

Administrative, technical, and material support: Meara, Beardslee.
Study supervision: Meara, Beardslee.

Conflict of Interest Disclosures: None reported.

Funding/Support: This research was supported by National Institutes of Health grants K24DA019855, DA030391, and DA026414 from the National Institute of Drug Abuse.

Role of the Sponsor: The National Institutes of Health had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

REFERENCES


23. Long SK, Yermane A, Stockley K. Disentangling the effects of health reform in Massachusetts: how important are the special provisions for young adults? Am Econ Rev. 2010;100(2):326-302. doi:10.1257/jae.100.2.297.


