

2019

Vermont Hospitals' Emergency Department Utilization Charges by Insurance Payer

Caitlin Beaudet

Catriona Brosius

Jennifer Campbell

Owen Greene

Brittany LaPan

See next page for additional authors

Follow this and additional works at: <https://scholarworks.uvm.edu/mphcp>



Part of the [Public Health Commons](#)

Recommended Citation

Beaudet, Caitlin; Brosius, Catriona; Campbell, Jennifer; Greene, Owen; LaPan, Brittany; Mackillop, Amara; Delaney, Thomas; and Carroll, Barbara EdD, "Vermont Hospitals' Emergency Department Utilization Charges by Insurance Payer" (2019). *Master of Public Health Culminating Projects*. 7.

<https://scholarworks.uvm.edu/mphcp/7>

This Project is brought to you for free and open access by the Larner College of Medicine at ScholarWorks @ UVM. It has been accepted for inclusion in Master of Public Health Culminating Projects by an authorized administrator of ScholarWorks @ UVM. For more information, please contact donna.omalley@uvm.edu.

Author

Caitlin Beudet, Catriona Brosius, Jennifer Campbell, Owen Greene, Brittany LaPan, Amara Mackillop, Thomas Delaney, and Barbara Carroll EdD

Healthcare Utilization of the Emergency Department by Payer

Healthcare Utilization

March 24, 2019

Caitlin Beaudet – Analyst/Data Manager

Catriona Brosius – Lead Analyst

Jennifer Campbell – Project Manager

Owen Greene – Lead Writer

Brittany LaPan – Writer/Editor

Amara Mackillop – Literature Manager

Thomas Delaney

Barbara Carroll, EdD - Faculty Mentor

Author Contributions

Each author has participated sufficiently in the work to take responsibility for the content and be willing to provide any relevant data upon request.

All authors have contributed substantially to: (1) the concept and design, and (2) the drafting, revision, and/or approval of the final version of the article.

The researchers hypothesize that Vermont Medicaid beneficiaries incur greater charges from emergency department (ED) visits compared to non-Medicaid beneficiaries and that total charges for Medicaid beneficiaries have increased during the period of 2012 through 2016. The researchers also looked at associations between Medicaid ED charges and rurality.

1 **ABSTRACT**

2 Objective: To identify the differences in emergency department (ED) charges across all
3 insurance payers and to evaluate ED charges for Medicaid beneficiaries over time.

4 Methods: The Vermont Department of Health's publicly-available Hospital Discharge Data Set
5 (HDD) data for 2012, 2014 and 2016 was analyzed by insurance group and year, as predictor
6 variables, with age and sex as covariates. The primary outcome variable was total charges as a
7 binary variable.

8 Results: Medicare cases had the greatest odds of high total charge visits. The odds of Medicare
9 records having high total charges were 65.0% greater than the odds of Medicaid records having
10 high total charges, holding age group and sex constant. For records representing Medicaid
11 beneficiaries, the odds of high total charges in 2012 and 2014 were 41.1% and 22.3% lower,
12 respectively, than the odds of high total charges in 2016, holding rurality, age, and sex
13 constant.

14 Conclusions: Medicare cases had the greatest odds of being classified as high total charge visits.
15 The odds of Medicaid cases producing high total charges increased during each period from
16 2012 to 2016.

17 **INTRODUCTION**

18 Medicaid beneficiaries comprise one third of Vermont's population of 625,000, creating a high
19 cost to the state's healthcare budget relative to its population.¹⁻³ The growth in Medicaid
20 expenses nationwide has mainly been due to Medicaid beneficiaries having twice the rate of ED
21 use as individuals with private insurance.³⁻⁶ Medicaid beneficiaries incur elevated ED costs
22 due in part to their higher rates of chronic illnesses, mental illnesses, substance use disorders
23 and other health conditions than people with private insurance.³⁻⁶ Much of the increase in
24 Medicaid costs stems from the inclusion of people age 18-64 who were not eligible for
25 Medicaid coverage before implementation of the Medicaid expansion as part of the Patient
26 Protection and Affordable Care Act (ACA) in 2014.^{5,7} Comparing differences in ED charges for
27 Medicaid to other insurance payers may provide insight into overall patterns of ED use.

28 Vermont is a predominately rural state, with only one major urban hospital located in
29 the city of Burlington. Rural residency is associated with both higher ED use by Medicaid
30 beneficiaries and lack of health care access, such as access to primary care providers and walk-
31 in clinics.³⁻⁵ Medicaid beneficiaries may also lack continuity of care, contributing to increased
32 likelihood of repeated ED visits, increasing costs to state Medicaid programs.^{3,6,8}

33 The aims of the current study were to (1) identify the differences in ED charges across all
34 insurance payers and (2) evaluate ED charges for Medicaid beneficiaries over time.

35 **METHODS**

36 *Study Design*

37 We conducted a cross-sectional analysis of data from the Vermont Uniform Hospital
38 Discharge Data Set (HDD) to identify associations between insurance group and total charges
39 for ED visits. Additionally, we looked at changes in total charges for Medicaid beneficiaries over
40 time, using 2012, 2014, and 2016 data to conduct a trend analysis.

41 *Data Source*

42 The HDD comprises de-identified encounter-level data including ED discharge data. Vermont's
43 14 general acute care hospitals contribute records to the HDD, which is managed by the
44 Vermont Department of Health.

45 *Subjects*

46 The available population for the study included Vermont residents and non-residents who
47 visited a Vermont hospital. The study included all records for Vermont residents treated at and
48 discharged from the ED in 2012, 2014 and 2016 (n=652,707). This study meets criteria for an
49 exempt project based on the University of Vermont Institutional Review Board.

50 *Methods*

51 We downloaded the HDD public use files for the relevant years from the Vermont Department
52 of Health website. We included age group, sex and rurality as covariates in our analysis.

53 Insurance Group was consolidated to five categories: Medicaid, Medicare, Other government,
54 Private Insurance, and Missing/Unknown/Other. Age Group was consolidated into three
55 categories: Under 18, 18-44, and 45+. The binary Rurality variable was created by combining
56 twelve 5-digit zip codes representing towns with populations greater than 10,000 as "Urban"
57 and the remaining zip codes as "Rural". Our primary outcome variable, Total Charges,
58 was originally a continuous positively skewed variable in the HDD. To deal with the non-normal
59 distribution, we transformed it into a binary variable where total charges were considered high
60 or low, above or at/below the median.

61 *Analytic Plans*

62 To identify the differences in ED charges across all insurance payers, we used logistic regression
63 analysis. We evaluated the relationship between Insurance Group and Total Charges
64 frequencies of the data set by level of total charges.

65 To evaluate ED charges for Medicaid beneficiaries over time, we again used logistic regression
66 analysis. We evaluated the relationship between Year and Total Charges, including age group,
67 sex, and rurality as covariates.

68 **Results**

69 A total of 652,707 records from 2012, 2014 and 2016 were included in the sample, with
70 approximately one third originating from each year (2012: 34.5%, 2014: 33.0%, 2016: 32.5%).
71 Approximately half the records were attributed to males (46.3%) and half to female (53.7%). A
72 majority of the records were for individuals aged 18-44 (41.2%), and 45+ (41.4%) with the
73 smallest group being Under 18 (17.5%). In terms of insurance, Medicaid (36.5%) was listed most
74 followed by Private Insurance (29.4%), Medicare (24.1%), Missing/Unknown/Other (7.5%), and
75 Other government (2.4%). Over half of the records originated from rural regions (64.9%), with

76 the rest being urban. For total charges associated with each record, 50.2% were considered to
77 have high total charges and 49.8% to have low total charges.

78 The results of both logistic regression analyses are shown in Figure 1. The odds of records with
79 Medicare and Private Insurance having high total charges were significantly greater, 65.0% and
80 36.9% respectively, than the odds of records having high total charges with Medicaid, holding
81 age group and sex constant. The odds of high total charges were greater for Medicaid
82 beneficiaries than for records with Other government insurance or with
83 Missing/unknown/other insurance. When looking at the estimated marginal mean values for
84 total charges, this same trend was seen.

85
86 When evaluating ED charges for Medicaid beneficiaries over time, the odds of Medicaid records
87 having high total charges in 2012 and 2014 were significantly lower compared to 2016 (41.1%
88 and 22.3% respectively), holding rurality, age group, and sex constant. ED charges for Medicaid
89 beneficiaries in 2016 were significantly higher than those in 2012 and 2014.

90 Additionally, rurality was significantly positively associated with higher total charges, holding
91 year, age group, and sex constant. This analysis of rurality was also tested without year
92 included in the model and the relationship was not substantially changed, suggesting that the
93 odds of higher total charges for urban records compared to rural records is mostly consistent.

94 **Discussion**

95 Medicare cases had the highest odds of being classified as high total charge visits across the
96 time period we studied. Vermont residents eligible for Medicare comprise a larger portion of
97 the state's population compared to other states.⁹ Older patients in Vermont may have more
98 chronic conditions and poorer overall health status, which may contribute to the higher charges
99 in the Medicare insurance group. Further research is necessary to determine which Vermont
100 populations have the most frequent ED visits.⁶

101 The odds of Medicaid cases having high charges increased during each period from 2012 to
102 2016. Studies have shown that new Medicaid enrollees tend to have a greater number of initial
103 ED visits to address unattended medical issues.^{10,11} The initial increase in ED visits by new

104 enrollees could account in part for the progressively higher odds of high charge visits in the
105 periods we analyzed. The initial increase in the number of Medicaid beneficiaries resulting from
106 the 2014 Medicaid expansion through the ACA may partially explain these findings.

107 **Limitations**

108 The Vermont HDD public use files are limited and do not include personally identifiable data.
109 Therefore, it was not possible to adjust for covariates associated with both emergency
110 department visits and Medicaid enrollment status such as; race, ethnicity, education level, and
111 socioeconomic status. The unit of analysis is an event, not a person, and the data cannot be
112 aggregated to the person level. The data do not include out-of-state hospital discharges for
113 Vermont residents, although residents living in Vermont towns along state borders routinely
114 seek treatment in neighboring states. The HDD includes data on total charges rather than actual
115 costs of ED visits. Identifying the diseases and conditions associated with high total charges and
116 insurance payer was outside the scope of this research.

117 **Tables and Figures**

Figure 1 – Logistic Regression Results

(1). *Total Charges of All Insurance Groups Compared to Medicaid Results* - Odds of higher total charges for varying insurance groups when compared to Medicaid. Both Medicare and Private insurance groups have higher odds of high total charges when compared to Medicaid.

Predictor	Significance	Odds Ratio	95% C.I.	
			Lower	Upper
Insurance_Group	0.000	NA		
Medicare	0.000	1.650	1.624	1.676
Other Government	0.000	0.664	0.642	0.688
Private	0.000	1.369	1.352	1.387
Missing/Unknown/Other	0.000	0.950	0.931	0.970

(2). *Medicaid Total Charges by Year, 2012 and 2014 Compared to 2016 Results* - Odds of higher total charges for Medicaid Records for years 2012 and 2014 compared to 2016. Both 2012 and 2014 have lower odds of having high total charges when compared 2016.

Predictor	Significance	Odds Ratio	95% C.I.	
			Lower	Upper
Year	0.000	NA		
2012	0.000	0.589	0.577	0.601
2014	0.000	0.777	0.761	0.793

118 **Bibliography**

119 1. United States Census Bureau. Quick Facts VT. U.S. Department of Commerce.
 120 <https://www.census.gov/quickfacts/vt>. Accessed September 8 2018.

121 2. CMS Fast Facts Overview. CMS.gov Centers for Medicare & Medicaid Services. 2018.
 122 [https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-](https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMS-Fast-Facts/index.html)
 123 [Reports/CMS-Fast-Facts/index.html](https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMS-Fast-Facts/index.html). [https://www.medicare.gov/federal-policy-](https://www.medicare.gov/federal-policy-guidance/downloads/cib-01-16-14.pdf)
 124 [guidance/downloads/cib-01-16-14.pdf](https://www.medicare.gov/federal-policy-guidance/downloads/cib-01-16-14.pdf). Accessed September 21, 2018.

125 3. Mann, C. Reducing Nonurgent Use of Emergency Departments and Improving Appropriate
 126 Care in Appropriate Settings. Department of Health and Human Services. Centers for Medicare

127 and Medicaid Services. 2014. [https://www.medicaid.gov/federal-policy-](https://www.medicaid.gov/federal-policy-guidance/downloads/cib-01-16-14.pdf)
128 [guidance/downloads/cib-01-16-14.pdf](https://www.medicaid.gov/federal-policy-guidance/downloads/cib-01-16-14.pdf). Accessed September 21, 2018.

129 4. Gindi, RM, Black, LI, Cohen, RA. Reasons for Emergency Room Use Among Adults Age 18-64:
130 National Health Interview Survey, 2013 and 2014. National Health Statistics Report. Center for
131 Disease Control and Prevention. 2016;90.

132 5. Agarwal, P, Bias, TK, Madhavan, S, Sambamoorthi, N, Frisbee, S, Sambamoorthi, U. Factors
133 Associated With Emergency Department Visits. *Health Serv Res Manag Epidemiol*. 2016;3. doi:
134 10.1177/2333392816648549

135 6. Gierzynski A. Non-Emergency Use of Emergency Departments by Medicaid Beneficiaries. The
136 University of Vermont. 2016.
137 [http://www.uvm.edu/~vlrs/Health/Medicaid%20and%20use%20of%20Emergency%20Departm](http://www.uvm.edu/~vlrs/Health/Medicaid%20and%20use%20of%20Emergency%20Department.pdf)
138 [ent.pdf](http://www.uvm.edu/~vlrs/Health/Medicaid%20and%20use%20of%20Emergency%20Department.pdf). Accessed September 21, 2018.

139 7. Martinez ME, Ward BW. Health Care Access and Utilization Among Adults Aged 18–64, by
140 Poverty Level: United States, 2013–2015. 2013;(262):2013-2015.
141 <https://www.cdc.gov/nchs/data/databriefs/db262.pdf>. Accessed September 20, 2018.

142 8. Schroeder S, Leigh-Peterson M. Rural and Urban Utilization of the Emergency Department for
143 Mental Health and Substance Abuse. 2017:1-6.

144 9. Center for Medicare and Medicaid Services. Total Medicare Enrollment: Part A and/or Part B
145 Enrollees by Type of Entitlement and Area of Residence, Calendar Year 2016. CMS Program
146 Statistics. [https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-](https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMSProgramStatistics/2016/Downloads/MDCR_ENROLL_AB/2016_CPS_MDCR_ENROLL_AB_8.pdf)
147 [Reports/CMSProgramStatistics/2016/Downloads/MDCR_ENROLL_AB/2016_CPS_MDCR_ENROL](https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMSProgramStatistics/2016/Downloads/MDCR_ENROLL_AB/2016_CPS_MDCR_ENROLL_AB_8.pdf)
148 [L_AB_8.pdf](https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/CMSProgramStatistics/2016/Downloads/MDCR_ENROLL_AB/2016_CPS_MDCR_ENROLL_AB_8.pdf). Accessed October 18, 2018.

149 10. Medford-Davis LN, Eswaran V, Shah RM, Dark C. The patient protection and affordable care
150 act's effect on emergency medicine: A synthesis of the data. *Ann Emerg Med*. 2015. doi:
151 10.1016/j.annemergmed.2015.04.007.

152 11. Widmer AJ, Basu R, Hochhalter AK. The Association Between Office-Based Provider Visits
153 and Emergency Department Utilization Among Medicaid Beneficiaries. *J Community*
154 *Health*. 2015. doi: 10.1007/s10900-014-9970-3.