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Utilisation of emergency departments of behavioural disorders and supply of workforce in Nebraska

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Abstract

Background—Emergency departments (EDs) have become entry points for treating behavioural health (BH) conditions, thereby rendering the evaluation of their utilisation necessary.

Objectives—This study estimated behavioural-related hospital-based ED visits and outcomes of leaving against medical advice as well as the incurred charges within the primarily rural State of Nebraska. Also, the study correlated behavioural workforce distribution and location of EDs with ED utilisation.

Methods—Nebraska State Emergency Department Database provided information on utilisation of services, charges, diagnoses and demographic. Health Professional Tracking Services survey provided the distribution of EDs and BH workforce by region. To examine the effect of patient characteristics on discharge against medical advice, multivariable logistic regression modelling was used.

Findings—US\$96.4 million were ED charges for 52 035 visits for BH disorders over 3 years. Of these, 35% and 50% were between 25 and 44-years old and privately insured, respectively. The uninsured (OR:1.53, p=0.0047) and 45–64 years old (OR:2.31, p<0.001) had higher odds of leaving against medical advice. The findings from this study identified ED outcomes among high-risk cohort.

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Contributors RJW and FW conceived of the presented idea. RJW and SW-G developed the theory and performed the analyses. HJT and L-WC verified the analytical methods. NW encouraged RJW to understand policy implications and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

Competing interests None declared.

Data availability statement The data was obtained from Healthcare Cost and Utilization Project which is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). Data are available upon reasonable request. All data relevant to the study are included in this article or uploaded as supplementary information.

Conclusions—There were high ED rates among the limited number EDs facilities in rural Nebraska. Rural regions of Nebraska faced workforce shortages and had high numbers of ED visits at relatively few accessible EDs.

Clinical implications—Customised rural-centric public health programmes, which are based in clinical settings, can encourage patients to adhere to ED-treatment. Also, increasing the availability of BH workforce (either via telehealth or part-time presence) in rural areas can alleviate the problem and reduce ED revisits.

BACKGROUND

Behavioural health (BH) disorders comprise a broad range of symptoms that are characterised by a combination of abnormal thoughts, emotions and behaviours. Schizophrenia, depression, intellectual disabilities and disorders due to drug abuse are all examples of BH conditions. Patients suffering from BH conditions and comorbidities frequently visit emergency departments (EDs), which often has become an entry point for treating such conditions.¹² Reports suggest that patients seeking psychiatric care account for between 6% and 9% of all ED visits³ and that 18% of frequent ED users had BH conditions compared with only 6% of the total study population.⁴ Hence, it is necessary to evaluate the reasons for patients to use the ED for BH-related conditions. For example, some communities lack access to general, behavioural and specialty care. Under such circumstances, patients tend to visit and treat the ED as an ‘open door’ for uncomplicated and routine BH care.⁵ It should be noted that many EDs have few BH services to offer, which may compel patients to wait or ‘board’ while the ED staff searches for an open inpatient psychiatric bed. This results in two issues: (i) the patient’s condition might worsen, eventually requiring more intense psychiatric care, and (ii) the ED visit will result in high costs for care.³

The Kaiser Family Foundation reported that 30.2% of Nebraska’s residents suffered from some form of BH condition,⁶ leading to US\$167 million in healthcare expenditures.⁷ However, in Nebraska, 88 of 93 counties have been designated as Mental Health Professions Shortage Areas and 32 counties have no BH provider.⁸ It has been well-documented that there exists a health disparity between rural and urban areas, which is associated with residents’ ability to access BH specialists.⁹ BH service delivery models in urban areas might often be unsuitable and challenging to implement in rural settings.¹⁰ It is widely thought that rural residents experience adverse socioeconomic status and poor access to care compared with urban residents, such as low income, high unemployment and scarcity of health services, resulting in a higher prevalence of BH disorders in rural communities.¹¹ In addition, because of long travel distances to access primary care clinics, EDs in rural hospitals have become the closest point of access to health services for many rural residents.¹² Previous literature has shown increased mortality among adults living in rural areas due to suicide and substance use disorders.¹³ However, there is limited research at the state-level to investigate the impact on the healthcare system that results from a shortage of BH workforce and existing rural-urban disparities in hospital-based EDs. Nebraska is in the unique position to support this type of study because there are detailed data from an active surveillance of health professionals throughout the state, providing county-level data on BH professionals.

ED outcomes include routine release on treatment, transfer to short-term hospitals/skilled nursing facility, discharge with commencement of home health services (HHC) and discharge against medical advice. Those patients who leave against medical advice have a higher likelihood of not adhering to treatment¹⁴ or obtaining follow-up care in outpatient clinics with specialty care for BH disorders.¹⁵ Also, such patients may not use preventative services for existing BH disorders and may not monitor the severity of the BH condition for which they were admitted into the ED. Other studies have analysed the impact of BH disorders on the ED outcome of discharge against medical advice among specific classes of patients. For example, one study examined impact of discharge against medical advice among HIV patients,⁵ while another focussed on older adults.¹⁶ O'Toole and group studied the impact of leaving against medical advice in an outpatient substance abuse treatment unit.¹⁷ However, little information is available on the association of patient-related factors such as age, sex, insurance and income statuses and existing comorbidities with being discharged against medical advice following an ED visit for primary diagnosis of BH disorders. With an increase in prevalence of BH disorders in both rural and urban areas across all age groups,¹⁸ these disorders are an important public health issue that affect the well-being of individuals and the healthcare system in terms of use of services and their corresponding costs. Thus, identification of the high-risk groups who leave ED against medical advice following primary diagnoses for BH can help public health practitioners, hospital administrators and providers to create unique programmes, especially for rural patients who have less access to care and less treatment adherence.

OBJECTIVES

The objectives of this study were four-fold. First, we characterised ED visits for BH conditions within Nebraska at the regional-level. Second, we mapped the distribution of BH workforce, availability of EDs, and patient BH-related ED visits at the region-level. Third, we estimated the association of patient-level factors with being discharged against medical advice. In addition, we explored factors associated with ED charges for BH disorders. We anticipate that findings from this study will help to guide policy recommendations for predominantly rural states such as Nebraska to address specific BH-related treatment needs by increasing workforce and access in such areas. We expect that such health policies will improve patient outcomes and reduce rates of costly revisits and ED visits.

METHODS

Data sources

State Emergency Department Database—This study uses the Nebraska State Emergency Department Database (SEDD) from the Healthcare Cost and Utilisation Project, 2011–2013, which contains de-identified patient information. SEDD belongs to the family of databases sponsored by the Agency for Healthcare Research and Quality.¹⁹ SEDD provides census data on treat-and-release ED visits. Important patient-related and hospital-related variables available in SEDD include age, sex, the presence of comorbidities, charges, disposition status, patient location, the number of ED visits and insurance and median household income.

Health Professions Tracking Service annual survey—We used data obtained from the 2013 Health Professions Tracking Service annual survey database to calculate the number of EDs and BH professionals. BH professionals are categorised as psychiatric prescribers, independent BH professionals and other BH professionals. Based on the ability of these professionals to prescribe within the State, psychiatric prescribers consist of three licensed professionals: psychiatrists, advanced practice registered nurses and physician assistants. Additionally, alcohol and drug counsellors, as well as other BH professionals that practiced as a mental health practitioner and held a license, were included in the group as other BH professionals. This study includes all seven subtypes of BH professionals. All patients with behavioural-related ED visits in Nebraska comprised the study population.

Measures

Our study has restricted ED visits where the first-listed or primary diagnosis is for BH disorders because by including ED visits with all-listed diagnoses for BH conditions, there may be an overestimation of associated comorbidities and underestimation of the severity of BH disorders. The International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes for psychotic conditions; other neurotic disorders; neurotic disorders, personality disorders, substance-use-related and other non-psychotic mental disorders; and intellectual disabilities were selected (online supplementary appendix 1).

The independent variables included in the study were demographic characteristics. Using the latest census data, there are three criteria that have been used to differentiate between ‘urban’, ‘large rural town’, ‘small rural town’ and ‘isolated rural’, which are (1) the size of their largest urban community, (2) the proportion of that population regularly commuting to larger urban areas and (3) the size of the urban destinations. Based on the patients’ disposition at discharge (routine, transfer to another hospital, etc), a variable was defined to denote disposition status. Income status was defined using a quartile classification of the estimated median household income of residents in the patient’s ZIP code. The variable ‘insurance status’ indicated the primary payer who was expected to cover charges, for example, Medicaid, Medicare and private insurance.

The comorbid burden was estimated using the Elixhauser Comorbidity Index (ECI) measure, which was computed by summing up the 29 binary comorbidities available in the current Elixhauser Comorbidity Software V3.7. An ECI measure of 0 indicates the absence of comorbid conditions. All comorbidities were determined using ICD-9-CM codes. Clinical conditions primarily responsible for visits such as depression, psychoses, alcohol and drug-related abuse were not considered comorbidities, as per the standard norms of computing ECI measure. The remaining conditions called ‘unrelated comorbidities’ comprise of congestive heart failure, pulmonary circulation disease, peripheral vascular disease, etc.

Outcomes

The primary outcome variable of discharge against medical advice was coded as a binary variable (0/1). Disposition statuses such as routine discharge, transfer to a short-term hospital; transfer to other facilities; and initiation of HHC were categorised as those ED visits which were not discharged against medical advice.

BH regions

Nebraska is divided into six BH regions and have a total of 13 major cities (online supplementary appendix 2). The regions purchase services from the providers that serve the areas and from other state service providers. Hence, we conducted descriptive and geographical analyses of ED visits by region.

Analytical approach

An individual ED visit was the unit of analysis. Descriptive statistics included the number of BH-related ED visits/10 000 population, number of ED visits stratified by diagnosed for BH conditions, and patient characteristics. The population-based incidence rates of BH conditions/10 000 people were calculated using the 2013 US Census population estimates. ED visits were stratified at the county-level Federal Information Processing Standard (FIPS) code. By categorising disposition status, a multivariate logistic regression analysis was used to estimate association of discharge against medical advice following ED visits for primary diagnoses of BH disorders on patient characteristics, on adjusting for clustering of patients within EDs. Statistical significance was assessed at a level of 0.05. We estimated total charges using a generalised linear model with a gamma distribution and log-1 link function, which best fits this particular data structure with heavy tails.²⁰

All descriptive statistical analyses were performed using the software SAS V9.4. The log-linked gamma distributed Generalised Linear regression Model (GLM) analyses were conducted using Stata (V14). Geographic information system maps were created using the software ArcGIS V10.4 (Esri, Redlands, California, USA).

FINDINGS

There were 52 035 BH-related conditions in Nebraska from 2011 to 2013. Anxiety (23.4%), non-dependent drug use (17.0%), episodic mood disorders (15.6%), depressive disorders (7.8%) and having a history of mental disorders accompanied suicidal ideation (6.2%) were the most common BH conditions (table 1).

Table 2 presents characteristics of patient with primary diagnoses for BH conditions stratified by the state-designated BH regions. There has been an almost 5% increase in BH-related ED visits from 15 756 in 2011 to 18 297 in 2013. During this period, all regions had an increasing number of ED visits for BH conditions, except Region II. Overall, males represented over half of ED visits for all BH disorders. The mean age of patients was 36.6 years. Those between 24 and 44 years of age constituted the highest proportion of ED visits for BH conditions (35.5%). About 40% of patients that visited an ED were covered by private insurance, followed by 23.1% of patients that were uninsured. Only 17.9% and 14.9% of the ED visits were covered by Medicare and Medicaid, respectively. The predominantly rural Regions I–IV (24.0–30.4%) had higher proportions of ED visits made by Medicare enrollees when compared to the urban Regions V (19.4%) and VI (15.2%). In contrast, the uninsured patients residing in the urban regions of V (21.4%) and VI (26.8%) had a higher number of ED visits than the rural regions of I, III and IV, except for Region II, which had comparatively higher utilisation by the uninsured.

Overall, approximately 71.0% of the ED visits were in urban areas, followed by large rural towns (15.7%), small rural towns (7.5%) and, finally, isolated rural areas (6%). Also, nearly a third of ED visits due to BH conditions were for patients residing in zip codes with low median household incomes. Interestingly, about 95% of the ED visits in Region II belonged to low-income areas with no visits from high-income populations, whereas over one-third of ED visits in Regions V and VI were made by high-income populations. About 82% of ED visits related to BH conditions were not concurrent with comorbidities. Also, after adjusting for inflation, mean hospital ED charges were US\$1854/visit with a total of US\$96.4 million in ED charges due to BH-related conditions, 2011–2013. The rural Region II had higher ED charges of US\$1717, while the highest charges were made by residents from Region VI (US \$2120).

Table 3 shows the number of BH-related ED visits/10 000 population made by region, and the availability of ED facilities and BH providers by region. The highest number ED visits were made by residents of rural Region II (11 805/10 000 population), followed by the urban Region V (3015/10 000 population), while, conversely, the least visits were made by those residing in Region VI (1394/10 000 population). Regions IV (21) and V (22) had the highest number of EDs whereas Region I had the least number of EDs (8). Interestingly, comparatively lower ED visit rates were observed in Regions III and IV (2538 and 1908/10 000 population, respectively), which had higher numbers of BH providers (94 and 89/10 000 population, respectively).

Figure 1 represents the distribution of population estimates of BH-related ED visits and BH professionals in Nebraska by BH region. ED visit rates are higher in rural regions (scarcely populated rural Regions I, II and IV) where BH workforce supply is low. Region II had access to 37 BH providers and had the highest ED visit rates of 11805/10 000 population. Also, the converse is true because Region IV had access to more (89) BH providers which was correlated to reduced ED visit rates (1908/10 000 population) for BH disorders. On the other hand, in the urban Region VI, despite the lower supply of BH providers, the ED visit rate was lower. This may result from having sufficient access to primary-level behavioural healthcare services

Figure 2 denotes that EDs in rural regions of Nebraska had higher rates of ED visits. For example, Region I had lower number of EDs (8), which accommodated 2072 visits/10000 population for BH disorders. Similarly, Region II had only 9 EDs for 11 805 BH-related visits/10 000 population. Moreover, Region III had 2538 visits/10 000 population across 18 EDs despite having the highest supply of BH professionals (94).

Table 4 displays the results from the multivariate logistic regression that was conducted to evaluate the associations between patient-level factors and discharge against medical advice. Females (OR: 0.77; $p = 0.0046$) are significantly less likely to be discharged against medical advice than males. Compared to those up to the age of 17 years, those aged 25–44 years (OR: 1.59; $p = 0.0032$) and aged 45–64 years (OR: 1.90; $p < .001$) were associated with higher odds for discharge against medical advice. Among payer types, those who were uninsured were associated with higher odds (OR: 1.53; $p = 0.0047$) of being discharged against medical advice compared to those covered by Medicaid. Those residing in ZIP codes

with median household income belonging to the third (OR: 0.64; $p = 0.0012$) quartile were associated with significantly lower odds for discharge against medical advice than those living in ZIP codes with first quartile median household income.

DISCUSSION

These findings show that most ED visits for BH-related conditions were by males, those aged 25–44 years and those who were privately insured and residing in urban areas. Also, multivariate logistic regression suggested that patients discharged against medical advice were more likely to be males, between the ages of 18 and 64 years, uninsured, living in low-income areas and having no unrelated comorbidities. Not surprisingly, we found that the uninsured incurred higher total ED charges for BH-related conditions. Because 33% counties have no BH professional and about 25% counties have no EDs, the statewide access to care is minimal, particularly in rural counties.

Few studies have examined the distribution of BH professionals or BH-related ED utilisation in largely rural states. One prior study examined only urban counties in North Carolina,²¹ while Choi *et al* studied the impact of specific BH illnesses on non-suicidal self-injury and suicide attempts among ED patients aged 50 years and older.¹⁶ Other studies have focussed on specific subpopulations, such as adolescents and older adults.²²

One of the key findings from this study is that charges of about US\$96.4 million were levied during 2011–2013 on a total of 52 035 ED visits due to BH-related conditions, across all age groups. Because federal law mandates EDs to screen, diagnose and treat patients, EDs have become an important place for treating BH-related conditions, though at a high cost.²³ Our data show that 12 of 93 counties have an ED without any practicing BH professionals. Many BH-related conditions can be assessed and treated successfully in outpatient settings using integrated care and tele-mental services. In addition to the high cost of ED treatment, rural ED staff may have limited experience in detecting and treating BH-related conditions.²⁴ This may further increase the costs of treating these conditions in the long run. Undiagnosed, untreated or delayed diagnoses of BH conditions can lead to an increased number of ED visits, require more intensive interventions compared with early diagnosis, or result in societal costs such as increased arrest and incarceration rate.⁷

Approximately 18% of young adults in Nebraska are more likely to be burdened by BH disorders, despite only comprising 7% of population.²⁵ Even though patients living in non-metropolitan areas account for 40% of population,²⁶ the majority of ED visits for BH disorders are in urban areas. Patients covered by Medicare, other insurance and the uninsured are also disproportionately burdened by BH disorders.²³ Our results suggest that a substantial proportion of ED patients are uninsured, and the charges levied on them are the highest when compared with other payers.

The urban patients were levied higher ED charges than those living in rural towns. This may be because EDs within urban areas offer more health services. However, a prior study showed that BH services are provided to rural populations at lower reimbursement rates than in urban areas.¹¹ Moreover, rural residents often travel long distances to procure health

services, are less likely to be insured for BH services, may face greater social stigma, and have less probability to be diagnosed with BH-related illnesses than urban residents.²⁷ This is consistent with our results depicting that there are fewer ED visits and charges for rural patients than those from urban areas for BH disorders.

The findings from our study are consistent with the literature, which suggests that the leading causes of BH disorders are anxiety, episodic mood, and depressive disorders, and alcohol dependence.²² In our study, patients aged 25–44 years, residing in low-income or urban areas and with private insurance, were more likely to use ED for BH conditions. These patients are ‘high-risk’, and prior studies have found similar results.¹²² Therefore, our findings suggest the need to tailor interventions to address BH issues for high-risk patients.

Prior research has reported that one in five patients with either primary or secondary diagnoses of substance abuse disorders were discharged against medical advice.²⁸ The unwanted consequences of such discharge could lead to revisits or even mortality.²⁹ Consequently, the revisits could be due to severe disorders and can have high healthcare costs. To our knowledge, no prior work has evaluated determinants of leaving an ED against medical advice following primary diagnoses for BH disorders across all age groups, especially in rural states that offer limited healthcare services. Our results show these patients are more likely to be male, uninsured, living in low-income areas and with no other unrelated comorbidities. Parents play a vital role in facilitating healthcare and make decisions like obtaining discharge against medical needs. Hence, this could be the reason why children and adolescents have lower odds of leaving against medical needs. Also, those patients who are uninsured and have low-income status may be discharged against the advice of providers because of financial concerns. By characterising this high-risk cohort, our findings can be used to help tailor community-based health programmes in order to encourage compliance to treatment and provide screenings for psychiatric disorders. ED-based peer coaching, education for BH conditions, and counselling can improve ED outcomes as well as reduce the likelihood of discharge against medical advice.

Multiple studies have demonstrated that there are substantial geographic shortages and maldistribution of the BH workforce in USA.³⁰ From figure 1, it is evident that BH-related ED visits are higher in areas where the numbers of BH providers are lower. One reason for the high utilisation could be that rural regions had higher proportions of uninsured, low-income populations with higher comorbidities. It should also be noted that not all of these BH professionals are licensed to prescribe medication. Most prescribers are concentrated near the major medical centres and state hospitals located in three most populated counties (Regions V and VI). Among those BH professionals who are board-certified to prescribe in rural areas, many may not be working as full-time professionals. This could be the reason why certain regions have greater ED use for BH services despite having a moderate supply of BH professionals.

On the other hand, figure 2 shows EDs in rural regions may be overcrowded and a ‘failsafe’ healthcare setting for BH disorders because ED visits are more common in those regions that have fewer ED facilities. This highlights the consequences of unmet BH needs, shortage of BH services and providers. ED facilities in such counties may be expected to be crowded.

Therefore, further research must be conducted to understand the ratios of ED and outpatient facilities to visits for BH-related conditions, impact of the lack of access to full-time BH prescribers in rural communities on preventable ED utilisation.

The findings from our study can be used by region-based teams in rural areas to target the highest healthcare utilisers and provide care coordination, supportive therapy, substance abuse treatment, supportive housing and assertive community outreach to those routinely discharged as well as those transferred to home health agencies. These teams can also help ensure that rural residents are provided access to community-based organisations or large community-based primary care practices such as federally-qualified health centres. On a larger scale, results from small, region-specific studies can be valuable in the absence of results from nationally representative studies. Such studies can provide detailed, rural-specific information that is useful for comparative purposes, especially when studies offer detailed descriptions of their rural target population, along with descriptive and demographic information about the study sites, health services in the areas as well as availability of health professionals.

This study is conducted at the discharge-level and not at patient-level and, thereby, patients could contribute towards multiple ED visits. Although SEDD contains detailed information on healthcare utilisation, there is a possibility that the discharge records may not have been assigned proper ICD-9-CM codes. However, even if the estimates were biased due to misclassification, it is still likely that we underestimated the number of ED visits related to BH disorders. The Nebraska SEDD does not include race and ethnicity variables, which limits the interpretation of the findings. Moreover, SEDD data did not provide information on patient's education level and homelessness, which may be associated with BH utilisation. Also, SEDD contains information on only ED visits that did not eventually result in hospitalisation.

CLINICAL IMPLICATIONS

Many patients needing BH-related services seek help in EDs instead of more appropriate settings for psychiatric care such as primary clinics, leading to substantial and preventable healthcare expenditures, particularly in rural communities. With an exception for some BH-related events such as an opioid overdose, tending to injuries from self-harm behaviours, etc, BH-related ED visits are avoidable. Community-based interventions should be tailored with a goal of reducing unnecessary and expensive ED visits among high-risk patient groups. These include those aged 25–44 years, uninsured, covered by private insurance, residing in low-income areas and suffering from other comorbidities. Being male, between 18 and 64 years of age, uninsured and living in low-income areas had higher odds of patient discharge against medical advice. Innovative rural-centric public health programme can focus on encouraging patients to adhere to ED-treatment and continue follow-up BH care, provide education and counselling, thereby, improving ED outcomes and reducing hospital revisits. Increasing BH workforce, especially in rural areas, can alleviate the problem and reduce ED visits. Future studies should work towards identifying challenges to providing and procuring holistic BH services.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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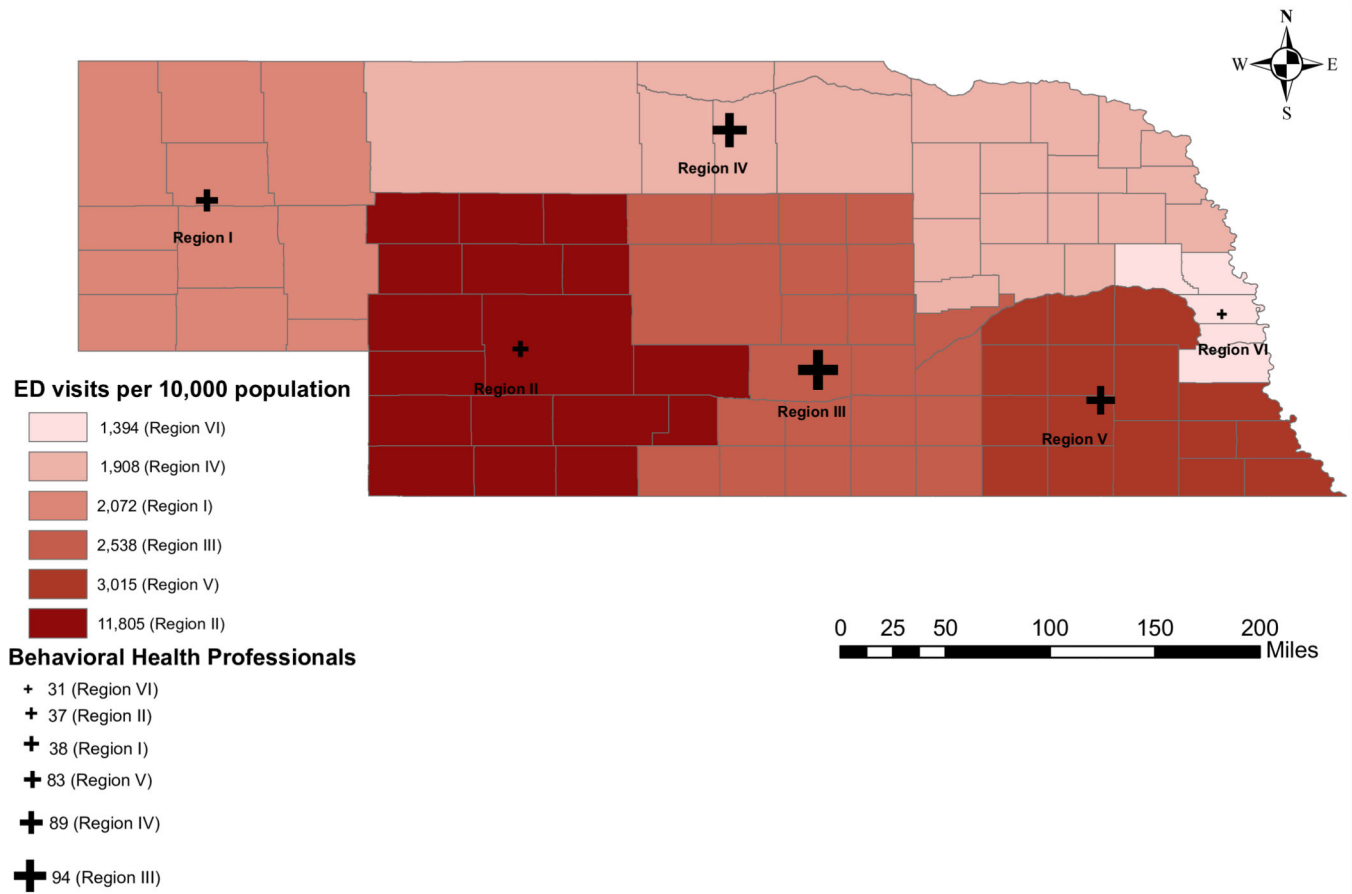
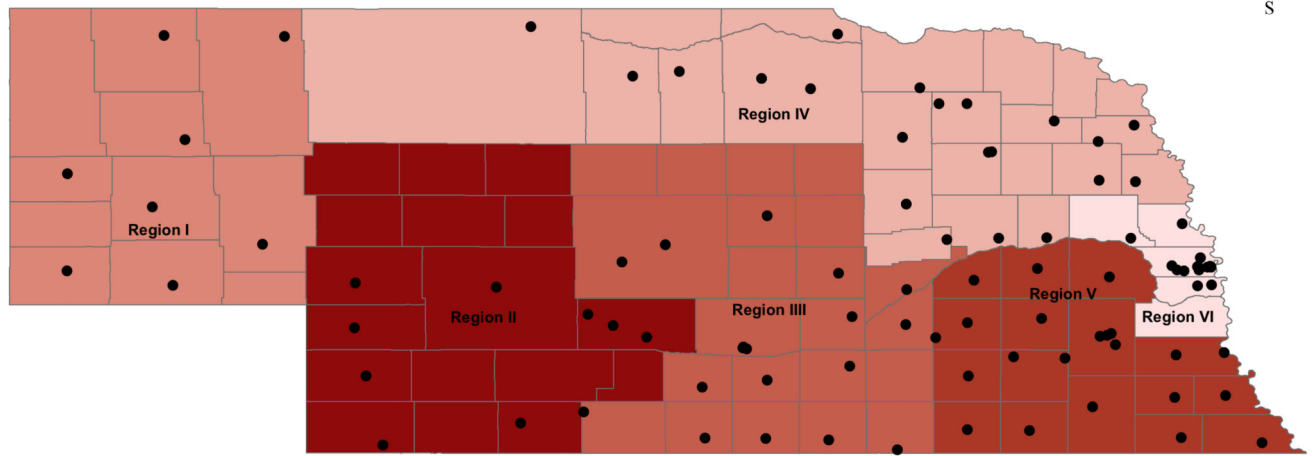








Figure 1. Data source: Nebraska Emergency Department Database (2011–2013) and Health Professionals Tracking Services. Emergency Department (ED) Visits in Nebraska per 10,000 population for Behavioural Health (BH) Disorders and Distribution of BH Professionals. ED, emergency department.



ED visits per 10,000 population

-  1,394 (Region VI)
-  1,908 (Region IV)
-  2,072 (Region I)
-  2,538 (Region III)
-  3,015 (Region V)
-  11,805 (Region II)

● Emergency Departments

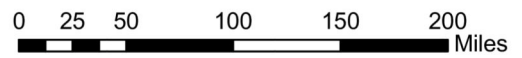


Figure 2. Data source: Nebraska Emergency Department Database (2011–2013) and Health Professionals Tracking Services. Emergency Department (ED) Visits in Nebraska per 10,000 population for Behavioural Health Disorders and Distribution of ED facilities. ED, emergency department.

Table 1

Number and per cent of emergency department visits stratified by diagnoses for behavioural health conditions, Nebraska State Emergency Department Database 2011-2013

| Types of BH conditions | Ed visits (N=52 035) | |
|--|----------------------|------|
| | N | % |
| Anxiety, dissociative and somatoform disorders | 12 154 | 23.4 |
| Non-dependent abuse of drugs | 8827 | 17.0 |
| Episodic mood disorders | 8115 | 15.6 |
| Depressive disorders | 4060 | 7.8 |
| History of mental disorders, family-based problems and suicidal ideation | 3244 | 6.2 |
| Alcohol dependence syndrome | 3012 | 5.8 |
| Other non-organic psychoses | 1887 | 3.6 |
| Schizophrenic disorders | 1590 | 3.1 |
| Other specifically mental health-related conditions | 1498 | 2.9 |
| Special symptoms or syndromes not elsewhere classified | 1145 | 2.2 |
| Adjustment reaction | 1057 | 2.0 |
| Drug-induced mental disorders | 971 | 1.9 |
| Alcohol-induced mental disorders | 796 | 1.5 |
| Specific non-psychotic mental disorders due to brain damage | 752 | 1.5 |
| Disturbance of conduct not elsewhere classified | 696 | 1.3 |
| Disturbance of emotions specific to childhood and adolescence | 662 | 1.3 |
| Persistent mental disorders due to conditions classified elsewhere | 604 | 1.2 |
| Acute reaction to stress | 569 | 1.1 |
| Drug dependence | 396 | 0.8 |

BH, behavioural health; ED, emergency department.

Table 2

Descriptive characteristics for emergency department visits related to behavioural health conditions in Nebraska State Emergency Department Database, 2011–2013*

| Characteristics | Overall ED visits | | Region I (n=1405) | | Region II (n=2534) | | Region III (3739) | | Region IV (1747) | | Region V (12,886) | | Region VI (25,151) | |
|---|-------------------|------|-------------------|------|--------------------|------|-------------------|------|------------------|------|-------------------|------|--------------------|-------|
| | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| Sex | | | | | | | | | | | | | | |
| Male | 26333 | 50.6 | 667 | 47.5 | 1206 | 47.6 | 1728 | 46.2 | 775 | 44.4 | 6459 | 50.1 | 13079 | 52.01 |
| Female | 25682 | 49.4 | 728 | 51.8 | 1320 | 52.1 | 2011 | 53.8 | 972 | 55.6 | 6427 | 49.9 | 12072 | 47.99 |
| Age group (in years) | | | | | | | | | | | | | | |
| Up to 17 | 7340 | 14.1 | 193 | 13.7 | 285 | 11.2 | 396 | 10.6 | 210 | 12.0 | 1976 | 15.3 | 3819 | 15.2 |
| 18–24 | 9396 | 18.1 | 223 | 15.9 | 450 | 17.8 | 678 | 18.1 | 281 | 16.1 | 2293 | 17.8 | 4434 | 17.6 |
| 25–44 | 18464 | 35.5 | 424 | 30.2 | 810 | 32.0 | 1224 | 32.7 | 580 | 33.2 | 4432 | 34.4 | 9193 | 36.6 |
| 45–64 | 12356 | 23.7 | 332 | 23.6 | 658 | 26.0 | 844 | 22.6 | 348 | 19.9 | 3027 | 23.5 | 6115 | 24.3 |
| 65 and over | 4479 | 8.6 | 233 | 16.6 | 331 | 13.1 | 597 | 16.0 | 328 | 18.8 | 1158 | 9.0 | 1590 | 6.3 |
| Mean age (in years) | 36.6 | | 40.9 | | 39.8 | | 40.7 | | 41.2 | | 36.5 | | 35.5 | |
| Primary payer | | | | | | | | | | | | | | |
| Medicare | 9317 | 17.9 | 428 | 30.5 | 609 | 24.0 | 929 | 24.8 | 478 | 27.4 | 2506 | 19.4 | 3953 | 15.7 |
| Medicaid | 7762 | 14.9 | 355 | 25.3 | 326 | 12.9 | 619 | 16.6 | 233 | 13.3 | 1070 | 8.3 | 4741 | 18.9 |
| Private insurance | 20872 | 40.1 | 462 | 32.9 | 1077 | 42.5 | 1525 | 40.8 | 707 | 40.5 | 6088 | 47.2 | 8627 | 34.3 |
| Uninsured | 12036 | 23.1 | 142 | 10.1 | 486 | 19.2 | 562 | 15.0 | 298 | 17.1 | 2756 | 21.4 | 6732 | 26.8 |
| Other | 2048 | 3.9 | 18 | 1.3 | 36 | 1.4 | 104 | 2.8 | 31 | 1.8 | 466 | 3.6 | 1098 | 4.4 |
| Admission day | | | | | | | | | | | | | | |
| Weekday | 37245 | 71.6 | 1019 | 72.5 | 1791 | 70.7 | 2536 | 67.8 | 1202 | 68.8 | 9347 | 72.5 | 18150 | 72.2 |
| Weekend | 14789 | 28.4 | 386 | 27.5 | 743 | 29.3 | 1203 | 32.2 | 545 | 31.2 | 3539 | 27.5 | 7000 | 27.8 |
| Disposition status | | | | | | | | | | | | | | |
| Routine | 40746 | 81.2 | 1111 | 79.1 | 2065 | 81.5 | 30% | 82.8 | 1465 | 83.9 | 11766 | 91.3 | 19054 | 75.8 |
| Transfer to short-term hospital | 4230 | 8.4 | 141 | 10.0 | 143 | 5.6 | 238 | 6.4 | 136 | 7.8 | 458 | 3.6 | 2842 | 11.3 |
| Transfer other, includes SNF, ICF, another type of Facility | 4139 | 8.3 | 124 | 8.8 | 239 | 9.4 | 344 | 9.2 | 126 | 7.2 | 358 | 2.8 | 2725 | 10.8 |
| Home healthcare | 25 | 0.1 | 0 | 0.0 | 4 | 0.2 | 2 | 0.1 | 0 | 0.0 | 6 | 0.0 | 12 | 0.0 |

| Characteristics | Overall ED visits | | Region I (n=1405) | | Region II (n=2534) | | Region III (3739) | | Region IV (1747) | | Region V (12 886) | | Region VI (25 151) | |
|---|-----------------------|--------------------|-----------------------|-----------------------|----------------------|----------------------|------------------------|------|------------------|------|-------------------|------|--------------------|------|
| | N | % | N | % | N | % | N | % | N | % | N | % | N | % |
| Against medical advice | 1054 | 2.1 | 29 | 2.1 | 83 | 33 | 59 | 1.6 | 20 | 1.1 | 298 | 2.3 | 518 | 2.1 |
| Patient location | | | | | | | | | | | | | | |
| Urban | 36177 | 70.8 | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 | 27 | 1.5 | 9982 | 77.5 | 23472 | 93.3 |
| Large rural town | 8014 | 15.7 | 459 | 32.7 | 1634 | 64.5 | 2651 | 70.9 | 630 | 36.1 | 610 | 4.7 | 1106 | 4.4 |
| Small rural town | 3835 | 7.5 | 641 | 45.6 | 557.0 | 22.0 | 357 | 9.5 | 347 | 19.9 | 1380 | 10.7 | 238 | 0.9 |
| Isolated rural | 3093 | 6.1 | 288 | 20.5 | 286 | 11.3 | 678 | 18.1 | 725 | 41.5 | 650 | 5.0 | 143 | 0.6 |
| Median household income national quartile for patient ZIP code [†] | | | | | | | | | | | | | | |
| First quartile | 16284 | 31.8 | 510 | 36.3 | 239 | 9.4 | 298 | 8.0 | 318 | 18.2 | 3444 | 26.7 | 10358 | 41.2 |
| Second quartile | 18757 | 36.6 | 795 | 56.6 | 2157 | 85.1 | 3100 | 82.9 | 1162 | 66.5 | 4391 | 34.1 | 5724 | 22.8 |
| Third quartile | 9769 | 19.1 | 83 | 5.9 | 81 | 32 | 287 | 7.7 | 249 | 14.3 | 3556 | 27.6 | 4275 | 17.0 |
| Fourth quartile | 6399 | 12.5 | 0 | 0.0 | 0 | 0.0 | 1 | 0.0 | 0 | 0.0 | 1230 | 9.5 | 4684 | 18.6 |
| Elixhauser Unrelated Comorbidity Index measure [*] | | | | | | | | | | | | | | |
| 0 | 42691 | 82.04 | 1035 | 73.7 | 1884 | 743 | 2558 | 68.4 | 1409 | 80.7 | 10948 | 85.0 | 21 052 | 83.7 |
| 1 | 6585 | 12.65 | 259 | 18.4 | 428 | 16.9 | 787 | 21.0 | 235 | 13.5 | 1361 | 10.6 | 2934 | 11.7 |
| 2 | 2119 | 4.07 | 88 | 6.3 | 145 | 5.7 | 278 | 7.4 | 79 | 4.5 | 419 | 3.3 | 956 | 3.8 |
| =>3 | 640 | 1.23 | 23 | 1.6 | 77 | 3.0 | 116 | 3.1 | 24 | 1.4 | 158 | 1.2 | 209 | 0.8 |
| Behavioural health-related ED visits by year | | | | | | | | | | | | | | |
| 2011 | 15756 | 30.91 | 422 | 30.0 | 796 | 31.4 | 1188 | 31.8 | 566 | 32.4 | 4104 | 31.8 | 7181 | 28.6 |
| 2012 | 16924 | 33.20 | 426 | 30.3 | 915 | 36.1 | 1249 | 33.4 | 572 | 32.7 | 4314 | 33.5 | 8519 | 33.9 |
| 2013 | 18297 | 35.89 | 557 | 39.6 | 823 | 32.5 | 1302 | 34.8 | 609 | 34.9 | 4468 | 34.7 | 9451 | 37.6 |
| Hospital ED charges (inflation adjusted to 2013 US-dollar value) | | | | | | | | | | | | | | |
| Mean (median) charges | US\$1854.48 (1352.00) | US\$1663.25 (1240) | US\$1717.25 (1163.25) | US\$1693.53 (1157.74) | US\$1486.76 (995.28) | US\$1418.44 (701.00) | US\$22120.44 (1597.82) | | | | | | | |
| Total charges | US\$96 353163.18 | US\$2 330 214.51 | US\$4 347 037.37 | US\$6 330 422.39 | US\$2 597 377.38 | US\$18 273 816.23 | US\$53 210 242.25 | | | | | | | |

* The sum of individual counts may not add up to the total number of visits because of missing information for certain variables.

[†] Median household income quartiles of residents in the patient's ZIP code differ every year. The levels were US\$1-38 999 (quartile 1), US\$39 000-47 999 (quartile 2), US\$48 000-63 999 (quartile 3) and US\$64 000 or higher (quartile 4) in the year 2011. The levels were US\$1-38 999 (quartile 1), US\$39 000-47 999 (quartile 2), US\$48 000-62 999 (quartile 3) and US\$63 000 or higher (quartile 4) in the year 2012. The levels were US\$1-37 999 (quartile 1), US\$38 000-47 999 (quartile 2), US\$48 000-63 999 (quartile 3) and US\$64 000 or higher (quartile 4) in the year 2013.

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*Unrelated comorbidities comprise congestive heart failure, valvular disease, pulmonary circulation disease, peripheral vascular disease, paralysis, other neurological disorders, chronic pulmonary disease, diabetes without chronic complications, diabetes with chronic complications, hypothyroidism, renal failure, liver disease, peptic ulcer bleeding, AIDS, lymphoma, metastatic cancer, solid tumour without metastasis, rheumatoid arthritis, coagulopathy, obesity, weight loss, fluid and electrolyte disorders, chronic blood loss anaemia and deficiency anaemia.

ED, emergency department; ICF, Intermediate Care Facility; SNF, skilled nursing facility.

Table 3

Counties served emergency department facilities, and emergency visits for behavioural health disorders and providers/10 000 population by behavioural health region in Nebraska.

| Behavioural health region | ED visits /10 000 population | Number of ED facilities | Number of providers/10 000 population |
|---------------------------|------------------------------|-------------------------|---------------------------------------|
| 1 | 2072 | 8 | 38 |
| 2 | 11805 | 9 | 37 |
| 3 | 2538 | 18 | 94 |
| 4 | 1908 | 21 | 89 |
| 5 | 3015 | 22 | 83 |
| 6 | 1394 | 16 | 31 |

The population estimates for behavioural health regions 1 through 6 were (1) 87 839; (2) 101 213; (3) 227 270; (4) 207 646; (5) 448 995; and (6) 769 678, respectively.

ED, emergency department.

Table 4

Adjusted ORs from multivariate logistic regression analysis of discharge against medical advice (AMA) by patient-level characteristics, Nebraska State Emergency Department Database, 2011-2013.

| Characteristics | Estimate | ORs (AMA) | 95% CI | | P value |
|---|-----------|-----------|----------|----------|---------|
| | | | Or lower | OR upper | |
| Intercept | -4.59 | | | | <0.0001 |
| Sex | | | | | |
| Male | Reference | | | | |
| Female | -0.26 | 0.77 | 0.65 | 0.92 | 0.0046 |
| Age | | | | | |
| Up to 17 | Reference | | | | |
| 18–24 | 0.32 | 1.38 | 0.99 | 1.93 | 0.0581 |
| 25–44 | 0.47 | 1.59 | 1.17 | 2.17 | 0.0032 |
| 45–64 | 0.64 | 1.90 | 1.37 | 2.65 | 0.0001 |
| 65 and over | -0.53 | 0.59 | 0.33 | 1.06 | 0.0752 |
| Primary payer | | | | | |
| Medicaid | Reference | | | | |
| Medicare | 0.21 | 1.24 | 0.85 | 1.79 | 0.2654 |
| Private insurance | -0.05 | 0.95 | 0.71 | 1.27 | 0.7231 |
| Uninsured | 0.43 | 1.53 | 1.14 | 2.05 | 0.0047 |
| Other | -0.38 | 0.68 | 0.37 | 1.25 | 0.2135 |
| Median household income national quartile for patient ZIP code [*] | | | | | |
| First quartile | Reference | | | | |
| Second quartile | -0.10 | 0.90 | 0.74 | 1.11 | 0.3188 |
| Third quartile | -0.45 | 0.64 | 0.49 | 0.84 | 0.0012 |
| Fourth quartile | -0.17 | 0.85 | 0.63 | 1.14 | 0.2734 |
| Elixhauser Comorbidity Index for unrelated comorbidity [†] | | | | | |
| 0 | Reference | | | | |
| 1 | 0.54 | 1.71 | 1.23 | 2.36 | 0.0013 |
| 2 | 0.36 | 1.43 | 0.82 | 2.50 | 0.2052 |
| 3 or more | -0.29 | 0.75 | 0.23 | 2.44 | 0.6281 |

^{*} Median household income quartiles of residents in the patient's ZIP code vary by year. The levels were US\$1-38 999 (quartile 1), US\$39 000-47 999 (quartile 2), US\$48 000-63 999 (quartile 3) and US\$64 000 or higher (quartile 4) in the year 2011. The levels were US\$1-38 999 (quartile 1), US\$39 000-47 999 (quartile 2), US\$48 000-62 999 (quartile 3) and US\$63 000 or higher (quartile 4) in the year 2012. The levels were US\$1-37 999 (quartile 1), US\$38 000-47 999 (Quartile 2), US\$48 000-63 999 (quartile 3) and US\$64 000 or higher (quartile 4) in the year 2013.

[†] Unrelated comorbidities comprise of congestive heart failure, valvular disease, pulmonary circulation disease, peripheral vascular disease, paralysis, other neurological disorders, chronic pulmonary disease, diabetes without chronic complications, diabetes with chronic complications, hypothyroidism, renal failure, liver disease, peptic ulcer bleeding, AIDS, lymphoma, metastatic cancer, solid tumour without metastasis, rheumatoid arthritis, coagulopathy, obesity, weight loss, fluid and electrolyte disorders, chronic blood loss anaemia and deficiency anaemia.