

# Describing the Health Status of Women Experiencing Violence or Abuse: An Observational Study Using Claims Data

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## Abstract

**Introduction:** Violence against women (VAW) can result in long-term and varied sequela for survivors, making it difficult to evaluate healthcare intervention. This study seeks to improve understanding of the healthcare experiences of women survivors prior to a violence-related diagnosis, allowing healthcare systems to better design strategies to meet the needs of this population. **Methods:** Using population-based data from 2016 to 2019, this cross-sectional observational study presents healthcare spending, utilization, and diagnostic patterns of privately insured women, age 18 or older, in the 10-months prior to an episode of care for a documented experience of violence (DEV). **Results:** Of 12 624 764 women meeting enrollment criteria, 10 980 women had DEV. This group had higher general medical complexity, despite being 10 years younger than the comparison group (mean age 32.7 vs 43.5). These relationships held up when comparing participants in each cohort by age. Additional key findings including higher numbers of medical visits across clinical settings and higher total cost (\$10 138–\$4585). **Conclusions:** The study utilized population-based data, to describe specific areas of health and medical cost for women with DEV. Increased medical complexity and utilization patterns among survivors broaden the understanding of the health profiles and healthcare touchpoints of survivors to inform and optimize strategies for medical system engagement and resource allocation for this public health crisis.

## Keywords

health care delivery/health services research, social factors in health and health care, family life: domestic violence

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## Introduction

Nearly 20 people a minute are physically abused by an intimate partner in the United States (US).<sup>1</sup> While individuals of any gender can experience intimate partner violence (IPV), women-identifying individuals experience violence at disproportionate rates, with one-in-four women reporting an experience of violence in their lives.<sup>2</sup> Violence against women (VAW) can result in physical, emotional, social, and financial consequences for survivors.<sup>3</sup> The impacts can include missed or lost work, adverse mental health symptoms, and physical health concerns such as chronic pain, gastrointestinal and gynecological disorders, and sexually transmitted infections leading to worsening health outcomes and increased need for health services.<sup>4,5</sup>

The far reaching health impacts of VAW can lead individuals to present for care across all healthcare settings, leading to high healthcare utilization and cost<sup>6–9</sup> even after

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the violence has stopped.<sup>8,10-12</sup> Prior studies have estimated healthcare utilization and costs after an experience of violence but are often limited by small sample sizes and self-reported exposures.<sup>12,13</sup> Few have attempted to assess healthcare costs using population-based data.<sup>11,13,14</sup> Given the sequela and prevalence of VAW, the use of population-based data of disease burdens, healthcare utilization patterns, and medical care costs is an appropriate additional lens to expand identification and intervention opportunities for women who have survived violence.

Using a national insurance claims database, this study describes the health profiles of survivors in the period immediately preceding violence identification in medical settings. These findings may help inform and optimize strategies for medical system engagement and resource allocation for both prevention and treatment of this public health crisis.

## Methods

We used an observational retrospective cohort design with administrative claims from a single large national health insurer in the US. The United Health Clinical Research Database used contains deidentified administrative claims of commercially-insured individuals. Given transition to International Classification of Disease (ICD)-10 coding in the US in 2015, we selected January 1, 2016 as the start of the study period, and data was available through December 31, 2019. The study was deemed exempt by the University of Pennsylvania IRB.

### Identifying ICD-10 Codes

While past studies have used diagnosis coding to identify cases of IPV and VAW, these have mostly used ICD-9 codes.<sup>15,16</sup> The studies using ICD-10 have been conducted outside of the US, limiting the ability to directly adapt the codes to our population of interest.<sup>17,18</sup> To advance the science of identification of VAW in administrative data, this study developed a VAW diagnostic grouping derived from empiric review of the ICD-10 codebook.<sup>19,20</sup> A total of 15 candidate base-codes were identified (Supplemental Tables 1 and 2) and associated claims for women over 18 years old were reviewed. The research team assessed the total number of unique claims, average frequency of use per member, and average interval time between use. Candidate codes which indicated a past history of abuse, had utilization patterns suggesting ongoing care at regular intervals (eg, therapy), or with limited specificity from which to determine an acute experience of violence or abuse (Supplemental Table 2) were excluded. A final list included 9 definitional ICD-10 codes.

### Participants

We identified privately-insured women aged 18 years or older in the database ( $n=16\,934\,473$ ) as of November 3,

2020 (Figure 1). Two cohorts were established: (1) women with documented experience of violence (DEV) identified by any insurance claim with at least 1 of the definitional ICD-10 ( $n=16\,379$ ) and (2) a comparison group of women without DEV. The date of the DEV claim was set as the index date. For women with more than 1 DEV ICD-10 code, the earliest claim was used. Given the potential for insurance change and subsequent uncertainty regarding service use and coverage during periods of disenrollment, inclusion required at least 10-months of continuous insurance enrollment prior to the index date. Compared with requiring a full year of enrollment, the 10-month threshold increased the total number of cases identified by 10% (final  $n=10\,980$ ).

The comparison group included privately-insured women aged 18 years or older with at least 10-months of continuous enrollment during the study period who had no claims with definitional ICD-10 codes ( $n=12\,613\,784$ ). Each individual in the comparison group was randomly assigned an index date (15th day of a random month and year).

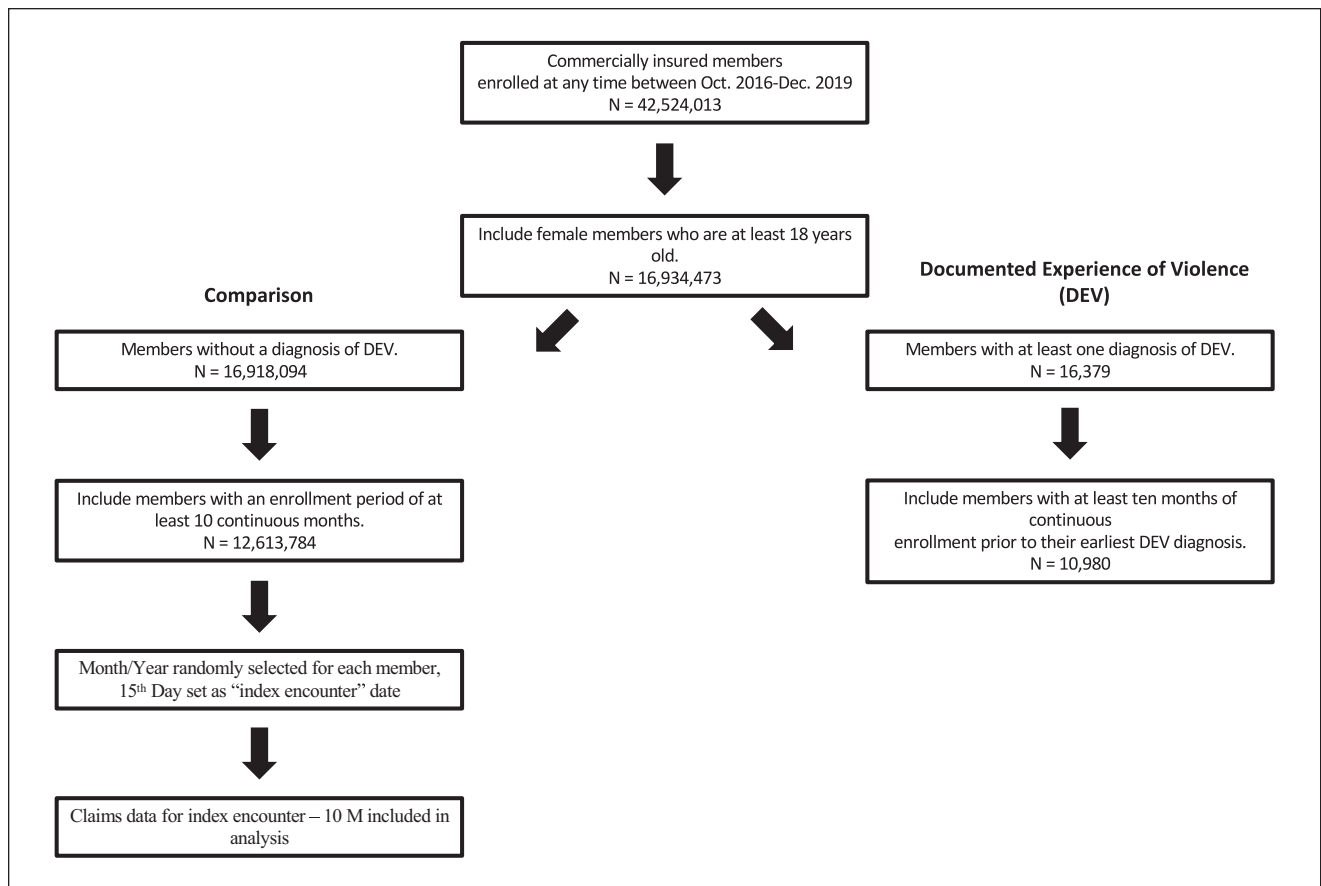
### Variables

*Demographic information* included age, zip code, and status as a primary insured member. *Medical history and complexity* were established using ICD-10 codes submitted with insurance claims in the 10-months prior to the index encounter date. For overall medical complexity we included the Elixhauser Comorbidity Index which includes 29 weighted and scaled comorbidities, and has been used as a proxy for overall health status.<sup>21-23</sup> We separately described both *mental and reproductive health* using ICD-10 diagnosis codes.<sup>23</sup> Mental health diagnoses were categorized as nonorganic mental disorders or substance use disorders. Reproductive health indicated pregnancy status and diagnosis of sexually transmitted disease. For *care utilization* we identified all insurance claims, including care setting and total expenditure, submitted in the 10-months prior to the index date.

## Results

Of the 12 624 764 women with at least 10-months of continuous enrollment during the study period, 10 980 women (0.087%) with DEV were identified (Table 1). On average women in the DEV cohort were younger than the comparison group (mean age 32.7 vs 43.5, respectively) and less likely to be the primary insured member (37.41% vs 55.58%, respectively). Both groups represent all 50 states.

Clinically important differences between the DEV and comparison cohorts were identified. Women with DEV had higher medical complexity, as indicated by Elixhauser score, than women in the comparison group (average score



**Figure 1.** Flow Diagram of Study Group Assignment.

9.6 vs 3.3). In the 10-months prior to the index date, 49.47% of women with DEV had a medical claim with a mental health diagnosis, compared to 18.46% of the comparison group. A similar trend was found for the diagnosis of substance use disorders (11.07% of survivors of DEV vs 1.21% of comparison cohort). In terms of sexual and reproductive health, 3.01% of women with DEV had a diagnosis of an STI versus 0.78% of the control group. We also identified more pregnancy-related diagnoses for women in the DEV group (8.14% vs 4.50%).

In addition to differences in disease burden, women with DEV had different patterns of healthcare utilization prior to the index encounter. On average, women in the DEV cohort had two-times more inpatient visits, 1.68-times more outpatient visits, and 4.5-times more emergency room visits than the comparison group. Finally, we identified higher average healthcare expenditure for women with DEV than for the comparison group (\$10,138 vs \$4,585, respectively).

Results were unchanged when stratified by age with the exception of a slightly higher percentage of at least 1 claim related to pregnancy in controls age 30–39 compared to the DEV group (15% vs 11.6%, respectively; Supplemental Tables 3.1 and 3.2).

## Discussion

This study describes the health status and healthcare utilization of a national cohort of privately-insured women with DEV. A comparison group of women without DEV provides a referent for assessing the unique attributes of identified survivors. While past literature has suggested an increased risk of illness and cost for survivors of violence,<sup>4,12,24</sup> this study builds on prior science by adding population-based data to include women who may not have otherwise participated in research.

Our methodological approach found clinically relevant differences. Findings of this study are consistent with existing literature on survivors while contributing new knowledge on the scale of the economic, mental and physical costs associated with DEV.<sup>4-12</sup> Women with DEV had a higher illness burden, with an almost 3-times higher comorbidity score, than the comparison population, despite being an average of 10 years younger. Our results indicate a 2.7-times increased rate of mental health diagnoses and a 9-fold increase in substance use disorders in women with DEV as compared to their peers. Similar differences existed across age groups with the exception of pregnancy claims. These findings are

**Table 1.** Descriptive Statistics for the 10-months Prior to Index Date for Women with Documented Experience of Violence and Comparison Group.

Demographic	Comparison (N= 12,613,784)		DEV (N= 10,980)	
	Mean	(Median, SD)	Mean	(Median, SD)
Age	43.5	(42, 16.0)	32.7	(27, 14.8)
Age range	Count	Percentage of total	Count	Percentage of total
[18,20]	4 87 633	3.87	1429	13.01
[20, 25]	11 55 450	9.16	3080	28.05
[25, 30]	13 61 125	10.79	1489	13.56
[30, 35]	13 14 782	10.42	1044	9.51
[35, 40]	12 85 616	10.19	1015	9.24
≥40	70 08 874	55.57	2923	26.62
Fully insured	29 89 218	23.70	2157	19.65
Primary policy holder	70 10 264	55.58	4107	37.41
Comorbidity score	Mean	(Median, SD)	Mean	(Median, SD)
Elixhauser score	3.3	(0, 7.5)	9.6	(4, 13.1)
Elixhauser score range	Count	Percentage of total	Count	Percentage of total
[0]	88 95 402	70.52	4235	38.57
[1,5]	9 17 824	7.28	1526	13.90
[5, 10]	13 33 018	10.57	1295	11.79
[10, 15]	6 47 641	5.13	1420	12.93
≥15	8 19 595	6.50	2504	22.81
Diagnosis	Count	Percentage of total	Count	Percentage of total
Mental Health (F20-29, F30-39, F40-48, F50, F53, F60, F63, F90)	23 28 426	18.46	5431	49.47
Pregnancy (Any ICD-10 code starting with O)	5 68 152	4.50	894	8.14
STI (A50-A64)	98 817	0.78	331	3.01
Substance Abuse (F10, F11, F12, F13, F14, F15, F16, F18, F19)	1 52 435	1.21	1215	11.07
Utilization	Mean	(Median, SD)	Mean	(Median, SD)
ER encounters	0.2	(0, 0.6)	0.9	(0, 2.0)
Inpatient encounters	0.1	(0, 0.3)	0.2	(0, 0.7)
Outpatient encounters	2.5	(1, 4.7)	4.2	(2, 8.3)
Cost	Mean	(Median, SD)	Mean	(Median, SD)
Total spend	4585	(835, 18,843)	\$10,138	(2,702, 28,216)
Total spend range	Count	Percentage of total	Count	Percentage of total
[0, 2000]	86 08 637	68.25	4754	43.30
[2000, 5000]	18 33 133	14.53	2194	19.98
[5000, 8000]	6 57 803	5.21	1047	9.54
≥8000	15 13 907	12.00	2985	27.19

interesting, as researchers have disagreed about whether the risk of violence decreases during pregnancy, remains about the same, or increases.<sup>25</sup> Our findings suggest risk may vary by age group, but additional research is needed.

With the demonstrated increased comorbidity burden, it is perhaps not surprising to find utilization and cost differences. The scale of this difference, however, is critical to

review. This study finds DEV is associated with 2.2 times increased cost, leading to an average of over \$6500 additional spending per woman per year. In the 10 months prior to an index encounter, women in our DEV population had more inpatient, outpatient, and emergency visits than the control group. Interestingly the increased rate was not uniform across locations. While outpatient visits were only

1.68 times more frequent for our DEV cohort, women with DEV had 4.5 times more emergency visits in the months preceding the index encounter, suggesting the ED as an important clinical setting for IPV screening.

To compare the expected percentage of women experiencing violence who access healthcare services with the rate we identified, we referenced the most recent estimated data from the National Intimate Partner and Sexual Violence Survey (NISVS) and National Violence Against Women Survey.<sup>2,26</sup> According to the NISVS, women in the US have a 12-month prevalence of “any contact sexual violence, physical violence, and/or stalking” of 5.5% [95% CI 4.8–6.3%].<sup>26</sup> Based on the estimates from the NVAW survey, 39.0% of survivors were injured in their most recent experience of violence and 30.2% of those injured received medical care for their injury.<sup>2</sup> Using these values, one would expect 0.65% of a cohort of women to have sought medical care over a 12 month period for an injury related to experiencing violence. We identified 10 980 women or 0.087% over 10 months. The difference in our identification rate and the prevalence reported in national surveys illustrates the need for ongoing research aimed at developing best practices for early intervention for survivors of violence in the healthcare setting. As healthcare systems prioritize screening and intervention around social determinants of health, it is important to consider provider and patient factors which contribute to a low recognition rate despite increased care needs and utilization.<sup>27-29</sup> By describing the specific health experiences of women with DEV, this study provides insights which can help shape the direction of future investigation.

Because quantifying the financial and health impact of VAW has always been challenging, few studies attempt to estimate the cost to survivors or for the healthcare system in general. One study estimated the lifetime cost of IPV was \$103 767 per female survivor, with a national economic burden of \$3.6 trillion, including \$2.1 trillion in medical costs.<sup>30</sup> Previous studies have estimated an increase in annual healthcare costs between \$439 and \$2263 for women experiencing violence.<sup>9,13</sup> These studies relied on small sample sizes and self-reporting of experiences of violence and healthcare utilization. This study leverages a unique and expansive national dataset to increase the reliability of cost estimates, as using private insurance claims allows us to report the administratively observed utilization and cost patterns for women with DEV. Using our rate of DEV detection and estimate of increased annual cost for survivors, the US has \$611 million in annual healthcare costs associated with VAW.

### Limitations

The United Health Clinical Research Database provides a large population-based cohort with verified information for

all healthcare accessed via insurance during the study period. Compared with previous studies seeking to assess outcomes for women experiencing violence, this large sample size and wealth of clinical information provide important new insights into this population while suggesting areas for intervention. However, the use of administrative data has some important limitations. First, we were unable to review charts for clinical clarification, identification of errors in coding, or controlling for differences in billing or diagnostic practices between providers. We believe misclassification errors were likely to occur at random across the data. Second, the lack of consistent racial or ethnic demographic information within the claims data and the inability to identify gender outside what was assigned at birth preclude this study from presenting stratification of outcomes among groups disproportionately impacted by violence.<sup>31</sup> Given known differences in rates of VAW for women of different racial or ethnic backgrounds, as well as increased rates of violence against transgender women, the inability to present outcomes for these populations is a call to action for future research. Third, our data is limited to only privately-insured women and the generalizability of these finds to a publicly-insured population is unknown. Future research should be conducted to estimate the costs of VAW enrolled in Medicare and Medicaid.

Lastly, under-ascertainment of DEV is a threat to validity in this study. To establish inclusion criteria, care was taken to create a comprehensive list of ICD-10 codes. That said, it is possible that we have some omitted diagnostic codes. More significantly, past studies have cautioned that with current provider documentation patterns, ICD-10 coding alone might not have sufficient sensitivity or specificity to replace national surveys in research of prevalence and associated outcomes of IPV.<sup>17,18</sup> Our method identifies women who had an insurance billing claim with an identified code during the study period. Women who experienced violence but did not seek care, or who did not have an identified diagnosis added to the medical record, are not included in the DEV cohort. Given this under-ascertainment, this cohort is not generalizable to the full population of women with violence exposure, but only to women with DEV in a healthcare setting. It is plausible that the DEV cohort may include women with higher-severity injury episodes and that the comparison group includes women with violence experiences that remain undocumented in medical settings.

### Conclusions

Despite the limitations noted above, this study was the first in the past decade to use population-based data to estimate differences in health status and healthcare expenditures for women who experience violence. Our study demonstrates that survivors of DEV have disproportionately adverse

health status and increased touchpoints with the medical system. This adds even more importance to the role of healthcare settings as key access points for primary, secondary, and tertiary intervention efforts. Healthcare providers have a unique role to play, as proper assessment and resource triaging can lead to early detection and intervention for women who experience violence.<sup>32</sup>

Resourcing of targeted efforts to prevent exposure and minimize harm after experiences of violence are needed. Results from this study can be used to promote stakeholder engagement—by expanding our ability to quantify the effect of VAW beyond the individual survivor and demonstrating its impact on the healthcare system at large. These results also illuminate the current insufficiency of public health resources available to support effective violence prevention, as well as the need for more evidence and innovation to support and optimize these resources. The differences in expenditure outcomes identified in this study can be used by advocates and policy makers to demonstrate the value of funding prevention and early intervention programs. Current models showing success include survivor-centered assessments that connect patients to support and services regardless of disclosure, medical record protocols that capture detailed and standardized IPV data, integration of violence-care into quality and meaningful use measures, and community education on the health implications of trauma and violence.<sup>32,33</sup> Given the scale and sequelae of VAW, further funding, research, and support is warranted to create and implement inventions within the healthcare setting and beyond.

### Declaration of Conflicting Interests

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### Supplemental Material

Supplemental material for this article is available online.

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