

BRIEF REPORT

Incomplete and biased perpetrator coding among hospitalized assaults for women in the United States

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Background: Since 1997, hospital discharge data have included external cause of injury (E codes) for designating perpetrator relationship in assaults. For intentional injuries, guidelines require using two E codes; one for the injury mechanism and another (E967.n) identifying perpetrator relationship. Completeness and characteristics of the use of these codes have not been studied on a multistate level among states with complete E coding.

Methods: Hospital discharge data for 1997 were solicited from states with good E coding completeness. Data were received from 19 states (51.9% of women in the United States, ages 15–49). For assaulted women, a regression model was constructed to identify factors associated with perpetrator code assignment using age, payment source, pregnancy status, race, and severity as covariates.

Results: Among 137 887 injured hospitalized women age 15–49, there were 7402 assaults (5.4%). Among all assaults to women, perpetrator coding was poor (8.8%). Among those that were perpetrator coded, 83.7% were spouse/partner related. Age was positively associated with probability of having a perpetrator code ($p < 0.001$). Those paid by a private source were 42.9% more likely to have a perpetrator code ($p = 0.007$). Pregnant women were seven times more likely to have a perpetrator code ($p < 0.001$). Non-white women were 66.8% less likely to have a perpetrator code ($p < 0.001$) than white women.

Conclusions: The poor use of perpetrator codes in hospital discharge data minimizes their usefulness for surveillance of serious injury from intimate partner violence. An implication of this research is the need to understand the gaps and strengthen the completeness of perpetrator documentation and coding. The findings suggest caution when interpreting the results from existing hospital discharge data based intimate partner violence surveillance systems.

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Violence against women represents a serious social, legal, and medical problem in the United States and elsewhere.¹ About 1.8 million women in the United States are physically assaulted by an intimate partner each year.² However, complete and accurate documentation in medical records of interpersonal violence and intimate partner violence in particular, has been poor.³

Since October 1996, the *International Classification of Diseases*, 9th revision, clinical modification (ICD-9-CM) has included codes for designating the perpetrator relationship among assaults. These are supplemental codes, which according to published guidelines, are supposed to be used with other mechanism codes. When the cause of an injury is intentional child or adult abuse, the coding guidelines require the use of a first listed E code from categories E960–E968 (for the mechanism) and a second E code from E967.n (see table 1) to identify the perpetrator relationship, if known. The completeness and characteristics of these perpetrator codes have not been studied on a multistate level.

METHODS

Hospital discharge data for 1997 were solicited from states mandating cause (E coding) for two years or more or with an E code completeness rate of 90% or better, and Florida (which had an E code completeness rate of about 60%). Two states (Maine and Michigan) with large populations and fairly good completeness (>60%) but not mandated E coding were also included. Data were received from 19 states (Arizona, California, Florida, Maine, Maryland, Massachusetts, Michigan, Nebraska, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, South Carolina, Utah, Vermont, Virginia, Washington, and Wisconsin), whose total population made up 51.9% of

women in the United States ages 15–49. The combined annual hospital discharge database contained records of about 1.13 million acute injury hospitalizations and accommodated up to 15 ICD-9-CM coded diagnostic fields and six E code fields.⁴

The hospital data underwent extensive editing, filtering, grouping, and development of derived variables to check for errors, enhance compatibility between state data, and to verify as much as possible the diagnosis coding validity. Detailed algorithms were applied to identify injuries based on both diagnosis codes and E codes and for the purposes of excluding cases of (a) non-injury, (b) injuries coded only by place of injury, (c) adverse effects of therapeutic drugs, and (d) late effects of injury.

Injury severity scores were inferred from injury diagnoses using ICDMAP-90 software (John Hopkins University and Tri-Analytics, Inc).⁵ Pregnancies were identified by looking at diagnosis fields for ICD-9-CM diagnostic ranges including 630–669 (complications of pregnancy and childbirth), and 760–779 (certain conditions originating in perinatal period), and “V” codes (“Supplementary Classification of Factors Influencing Health Status and Contact with Health Services”) V22 (normal pregnancy), V23 (supervision of high risk pregnancy), V24.0 (postpartum care immediately after delivery), V27 (outcome of delivery), and V28 (antenatal screening). Injuries were identified by selecting cases with either an injury related E code (excluding adverse effects) or an ICD-9-CM diagnosis in the range 800–999 with specific exclusions (because some diagnoses in this range are not injuries or are not usually considered injuries). For example,

Abbreviations: CI, confidence interval; ICD-9-CM, *International Classification of Diseases*, 9th revision, clinical modification

Table 1 Perpetrator specific E codes added to ICD-9 CM in 1997

E code	Description of perpetrator specific ICD-9-CM E codes
E967.0	Battering or maltreatment by father or stepfather
E967.2	Battering or maltreatment by mother or stepmother
E967.3	Battering or maltreatment by spouse or partner (intimate partner violence)
E967.4	Battering or maltreatment by child
E967.5	Battering or maltreatment by sibling
E967.6	Battering or maltreatment by grandparent
E967.7	Battering or maltreatment by other relative
E967.8	Battering or maltreatment by non-related caregiver

excluded were complications of surgical and medical care (996–999 and E870–E879), injuries coded only with E849–E849 (place of injury), adverse effects of therapeutic drugs (E930–E949), and late effects of injury (905–909, E929–E929).⁴

Perpetrator coding among assaulted women was analyzed by univariate comparisons and multivariate regression models to explore which patient characteristics were more or less likely to be associated with the assignment of the secondary perpetrator codes. Comparison between perpetrator coded assaults and non-perpetrator coded assaults was done using the χ^2 test. Multivariate logistic regression was done using the default method of entering covariates.

RESULTS

E coding was 92% complete among all women 15–49 in the dataset with an injury related diagnosis. E coding was the only way to determine whether an injury was due to assault or not, therefore non-E coded cases were excluded. This left 137 887 women ages 15–49 discharged from non-rehabilitation hospitals with an acute injury diagnosis. Most hospitalized injuries to women of reproductive age were reported as unintentional (64.4%), followed by self inflicted (28.0%), and 7402 assaults (5.4%).

Among the 7402 assaults, secondary perpetrator coding was poor. For all assaulted women ages 15–49, only 8.8% were assigned a secondary perpetrator code. Some records had the perpetrator code improperly placed in the first (primary) E code position; including them brought the perpetrator coding percentage up to 10.3%. Among the assault cases that were perpetrator coded, 83.7% were spouse or partner related. From a univariate analysis of perpetrator completeness, the most important factors associated with an increase in the perpetrator coding completeness rate were being white (14.4% v 5.3% for non-whites) and being pregnant (25.4% v 8.6% for non-pregnant). Considerable variation by state was also evident in perpetrator coding with completeness ranging from 5% to 23%.

Pregnancy status significantly changed the likelihood of being assigned a perpetrator code. Both white and non-white assaulted pregnant women were more likely to have a perpetrator code than non-pregnant women. The proportion of pregnant white women of reproductive age (0.22) who had a perpetrator code was 3.7 times larger than the proportion of non-pregnant white women (0.06) (95% confidence interval (CI) 0.12 to 0.20, see fig 1 for age breakdowns). The proportion of pregnant non-white women of reproductive age (0.31) who had perpetrator code was 3.1 times larger than the proportion of non-pregnant non-white women (0.10) (95% CI 0.15 to 0.27, see fig 2).

A multivariate logistic regression model was constructed using age, source of payment, pregnancy status, race, and injury severity score (table 2). Older women were significantly more likely to have a perpetrator code ($p < 0.001$). The

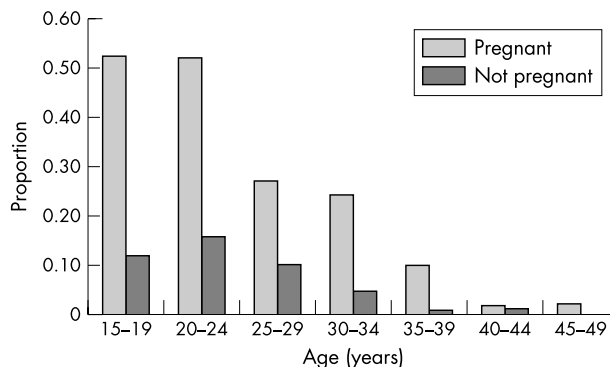


Figure 1 Proportion of assaults with perpetrator coding, by age and pregnancy relatedness among hospitalized white women ages 15–49.

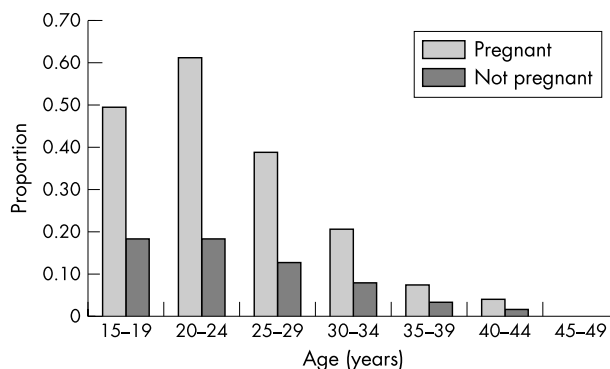


Figure 2 Proportion of assaults with perpetrator coding, by age and pregnancy relatedness among hospitalized non-white women ages 15–49.

odds that an older woman is more likely to have a perpetrator code increases 3.7% over that of a younger individual with each year of age. Women whose care was paid by a private source were 42.9% more likely to have a perpetrator code ($p = 0.007$). Women who were paid by governmental source were 11.2% more likely to have a perpetrator code, but this result was not significant ($p = 0.376$). Pregnant women were seven times more likely to be assigned a perpetrator code ($p < 0.001$). Non-white women were 66.8% less likely to have a perpetrator code ($p < 0.001$) than white women. Women who were less severely injured were more likely to have a perpetrator code ($p < 0.001$).

DISCUSSION

Incomplete and biased perpetrator coding among women of reproductive age was observed in this multistate study. White

Table 2 Logistic regression summary for likelihood of being assigned a perpetrator code

Covariate	Odds ratio	p Value
Age	1.037	0.000
Source of payment: government*	1.112	0.376
Source of payment: private†	1.429	0.007
Pregnant‡	6.973	0.000
Race (non-white v white)§	0.332	0.000
Injury severity score	0.972	0.004

*Referent group: source of payment, other.
 †Referent group: source of payment, other.
 ‡Referent group: non-pregnant.
 §Referent group: white.

women, pregnant women and older women were found to be significantly more likely to be assigned a perpetrator code. Similar findings were observed in one other large cross sectional study: Caucasian women were 3.4 times more likely (95% CI 1.6 to 7.7) to have intimate partner violence perpetrator code compared with African-American.⁶ Investigators from this latter study suggested that white women, compared with African-American, are more likely to disclose abuse, even though African-American women are generally at increased risk.⁶ However, neither that study nor the current one elucidates very well the myriad possible reasons that may transpire and interact in a complex process of clinician/patient interaction and medical record documentation and coding practices.

Another important reason may be a lack of reimbursement incentive. Reimbursement is partly dependent upon the ICD-9 codes assigned by medical records staff. Both Medicaid and Medicare include the primary diagnosis and one secondary code for reimbursement. Lead diagnostic codes often receive the maximum reimbursement for the services provided. Since domestic violence codes do not directly impact on the level of reimbursement, there is a little incentive for documenting domestic violence by adding additional codes.⁷⁻⁹ It is also speculated that certain unfavorable consequences of more accurate documentation of perpetrator codes might be anticipated by hospital personnel. Some insurance companies might deny victims of domestic violence coverage. According to the Subcommittee on crime and Criminal Justice of the United States Senate Judiciary Committee, in 1994, eight insurance companies used domestic violence as a factor when deciding whether to issue insurance.⁹

Accurate documentation depends on clinician willingness to explore the needs of the victim of intimate partner violence. Such documentation must involve careful observation combined with sensitive interviewing techniques. In addition, the gender of the physician might play an important part in successfully documenting intimate partner violence.¹⁰ To avoid potential bias, some have recommended using computer based self interviewing over written or face-to-face interviews.¹¹

Despite the barriers, complete and accurate coding for hospitalized domestic violence holds the potential for improving community understanding of the impact of domestic violence. At a minimum, the rate of perpetrator coding among hospitalized assaults among different institutions might be used as a widely available measure to monitor the outcomes of policies designed to improve the screening and surveillance of intimate partner violence. In addition, such local information, even in incomplete forms, may help justify funding levels and policy reforms that support improved surveillance, and effective interventions.

CONCLUSIONS

Among hospitalized assaulted women, the use of the available perpetrator codes remains very incomplete, biased, and challenging. The poor use of perpetrator codes observed in the hospital discharge data clouds the issue of separating intimate partner violence from stranger assaults and minimizes the usefulness of hospital discharge data for surveillance of serious injury due to intimate partner violence. However, this can also be seen as a challenge to improve inpatient screening, medical record documentation, and proper coding. This might be accomplished by more and better training of coders, increased financial incentives, changes to electronic systems to allow the better use of multiple E codes, and better documentation by clinicians.

More comparative research is needed to determine exactly what practices and systems enhance perpetrator E coding and

Key points

- This is first study to look at the completeness and characteristics of perpetrator coding in well E coded hospital discharge data on a multistate level.
- For all 7402 assaulted women ages 15–49, only 8.8% were assigned a secondary perpetrator code.
- Non-white women who were assaulted were two thirds less likely to receive a perpetrator code.
- Pregnant women who were assaulted were seven times more likely to receive a perpetrator code.
- The findings suggest caution when interpreting the results from existing intimate partner violence surveillance systems.
- Complete and accurate coding for hospitalized domestic violence provides an opportunity for improving community understanding of the impact of domestic violence.

what factors may be important barriers. The findings that older women, pregnant women, and white women are more likely to receive perpetrator codes suggest new areas of research to explore and areas to be cautious of when interpreting the results from intimate partner violence surveillance systems.

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