

# Costs of Health Care Use by Women HMO Members With a History of Childhood Abuse and Neglect

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**Background:** Early childhood maltreatment has been associated with adverse adult health outcomes, but little is known about the magnitude of adult health care use and costs that accompany maltreatment. We examined differences in annual health care use and costs in women with and without histories of childhood sexual, emotional, or physical abuse or neglect.

**Methods:** A random sample of 1225 women members of a health maintenance organization completed a 22-page questionnaire inquiring into childhood maltreatment experiences as measured by the Childhood Trauma Questionnaire. Health care costs and use data were obtained from the automated cost-accounting system of the health maintenance organization, including total costs, outpatient and primary care costs, and emergency department visits.

**Results:** Women who reported any abuse or neglect had

median annual health care costs that were \$97 (95% confidence interval, \$0.47-\$188.26) greater than women who did not report maltreatment. Women who reported sexual abuse had median annual health care costs that were \$245 (95% confidence interval, \$132.32-\$381.93) greater than costs among women who did not report abuse. Women with sexual abuse histories had significantly higher primary care and outpatient costs and more frequent emergency department visits than women without these histories.

**Conclusion:** Although the absolute cost differences per year per woman were relatively modest, the large number of women in the population with these experiences suggests that the total costs to society are substantial.

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**S**TUDIES<sup>1</sup> OF THE prevalence of childhood maltreatment (including emotional and physical abuse, neglect, and sexual abuse) in the general population have shown that it is surprisingly common. Although psychological sequelae from this trauma (eg, depression and anxiety) have long been appreciated,<sup>2</sup> only lately have lasting physical health effects been apparent.

Recent studies have suggested an association between prior experiences of adult rape<sup>3</sup> or childhood sexual, physical, and emotional victimization and increased health care use<sup>4-7</sup>; however, these investigations have not yielded consistent results. This may be due to differences in sample sizes, maltreatment case ascertainment, the health care settings in which patients are identified, insurance status, or method of measuring health care use (eg, self-report vs records-based assessment).

We recently completed a large study examining the health care status and use patterns of randomly selected women of a large health maintenance organization (HMO) who had histories of childhood sexual, emotional, and physical abuse and neglect. Compared with women without these experiences, those who reported hav-

ing them had significantly greater functional disability and an increased number of distressing physical symptoms, reproductive and adult sexual health problems, health risk behaviors, and physician-coded *International Classification of Diseases; Ninth Revision*<sup>8</sup> diagnoses.

In this article, we describe the health care use and costs incurred by the women in this study. To our knowledge, no published studies have directly assessed adult health care costs associated with childhood maltreatment. We hypothesized that compared with women without clinically significant histories of childhood maltreatment, those with a history of childhood maltreatment would have higher overall health care use and costs and that because childhood sexual abuse may be associated with specific long-term medical effects (eg, sexually transmitted diseases, infertility, and greater degrees of somatization), women with childhood sexual abuse would have higher health care costs than women who had other forms of maltreatment.

## RESULTS

Of the 1963 surveys initially mailed, 1225 were completed and an additional 51 were

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## PATIENTS AND METHODS

### SAMPLE

This study took place between July 1996 and July 1997 among the enrolled membership of Group Health Cooperative of Puget Sound, a large-staff model HMO that provides primary and specialty medical and mental health services to about 400 000 persons in the Puget Sound area of Washington State. The enrollees are broadly representative of the population of greater Seattle on nearly all demographic variables. Using a computerized randomization process in which each woman in the HMO had an equal chance of being selected, we chose a random sample of 1963 women aged 18 to 65 years who were currently enrolled in the HMO.

The women were mailed a 22-page questionnaire containing several previously validated health surveys. The questionnaire was approved by the Human Subjects committees of both Group Health Cooperative of Puget Sound and the University of Washington School of Medicine, Seattle. To maximize participation rates, we mailed up to 2 reminders to women who did not respond within 2 weeks, including a duplicate copy of the questionnaire, and additional follow-up telephone calls were made.

### MEASURES OF CHILDHOOD MALTREATMENT

Maltreatment severity was determined using the 28-item short form of the Childhood Trauma Questionnaire (CTQ).<sup>9</sup> The CTQ is a self-administered questionnaire that inquires about childhood maltreatment in 5 areas: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Respondents are presented with a series of statements about childhood experiences that are endorsed on a 5-point Likert-type scale, with response options ranging from "never true" to "very often true." Most items are phrased in objective, nonevaluative terms (eg, "When I was growing up, someone touched me in a sexual way or made me touch them"), whereas others call for more subjective evaluation (eg, "When I was growing up, I believe I was sexually abused"). In the questionnaire, the CTQ was preceded by the instruction, "In this section, we would like to know about experiences you may have had before you were 18 years of age."

Validation studies<sup>10</sup> of the CTQ have been conducted in 7 different clinical and nonreferral samples consisting of more than 2200 respondents. These studies have supported the reliability and validity of trauma histories obtained using the CTQ, including their stability over time, convergent and discriminant validity with structured trauma interviews, and corroboration using independent data.<sup>10</sup>

In another part of this study, an experienced clinical interviewer (A.G.) who was blind to the CTQ scores and using standardized definitions of the 5 types of maltreatment administered lengthy structured interviews to 216 of the women to determine whether they had a history of clinically significant abuse or neglect. We then used receiver operating characteristic curves to obtain cut scores for each of the 5 CTQ subscales using these independent clinician assessments as criteria. We calculated sensitivity and specificity for each possible cut point on the 5 CTQ subscales using the independent clinician assessments as the definitive criteria. We then chose the cut point for each of the scales that provided the best balance of sensitivity and specificity. Both the sensitivity and specificity based on these cut points were 0.85 or better for each of the 5 subscales.<sup>10</sup>

Using the cut points for each of the CTQ clinical scales, we then determined the percentage of participants who were at or above the cut points for different forms of childhood maltreatment. We also calculated the number of maltreatment categories for each woman that exceeded these cut points.

We next constructed 3 mutually exclusive groups using these cut points. All women who scored at or above the cut point of 8 on the sexual abuse scale were placed in the "sexual maltreatment" group (including women who had also had cut points exceeding other maltreatment scale thresholds in addition to sexual abuse). Next, women who scored at or above the cut points on 1 or more of the nonsexual scales—physical abuse, cut point of 8; physical neglect, 8; emotional neglect, 15; or emotional abuse, 10—and who also did not have sexual abuse scores at or above 8 were classified as a "nonsexual maltreatment." Finally, the remaining women with scores below the thresholds for all 5 maltreatment groups were considered to be a below-threshold group. This hierarchical approach placed women with multiple forms of abuse (those who exceeded the cutoff for >1 scale) in the nonsexual maltreatment group if

ineligible or returned as undeliverable, for a final adjusted return rate of 62.4%. The 1225 participants had a mean ( $\pm$ SD) age of 42.1  $\pm$  11.4 years. Fifty one percent of the women were married or living with a partner, and 57.2% had completed college. The median income was about \$40 000. The participants were 79.0% whites, 6.0% African Americans, 8.0% Asians, 2.0% Hispanics, 1.0% Native Americans, and 4.0% of other races. These demographics closely mirror those of the HMO population from which the sample was drawn and are also typical of the Puget Sound region of Washington. Childhood abuse and neglect histories were reported by 42.8% of the women in this HMO sample (sexual abuse: 18.4%; physical abuse: 14.2%; emotional abuse: 24.1%; emotional neglect: 21.1%; physical neglect: 12.2%), with about half of these women meeting severity criteria for more than one type of maltreatment.

An analysis of automated medical records from the HMO showed that there were no significant differences

between women who did and did not complete the survey with respect to a limited number of available variables, including age, mean number of primary care or specialty clinic visits, ED visits, outpatient mental health visits, filled prescriptions, or number of physician-coded ICD-9 diagnoses.

Of the 1225 women who returned surveys, 1175 had at least 1 year of cost data (50 women were new enrollees and did not have a full year of cost data). The 1175 women were divided into the following maltreatment groups: below threshold, 672 (57.2%); nonsexual abuse, 294 (25.0%); and sexual abuse, 209 (17.8%).

Each woman contributed up to 5 years of cost data to these analyses. Women were not required to have continuous coverage; instead, they could drop in and out of coverage and were included if they had at least one complete year of cost data. Nearly two thirds of the women had 5 or more years of cost data (**Table 1**), and there

the thresholds exceeded did not include sexual abuse, or the sexual maltreatment group if the sexual abuse scale was above the cut point. Thus, both maltreatment groups contain women who could have either only 1 form of maltreatment or several forms.

#### AUTOMATED MEDICAL RECORDS

Our dependent variables, use and costs, were determined using the automated cost-accounting system of the HMO. The system tracks inpatient services, outpatient services, prescription drugs, and ancillary services such as laboratory use. Each primary care clinic allocates its actual monthly costs (facilities, payroll, and supplies) over the total number of outpatient visits provided, thus fully allocating all overhead costs to each patient care department. Therefore, the total cost figures reported reflect the total costs from the perspective of the HMO. Inpatient costs, both medical and psychiatric, are reflected in total costs. Our analyses focus specifically on total costs, primary care costs, outpatient costs, and emergency department (ED) visits for the 5-year period before the study. Costs were calculated in 6-month increments between 1992 and 1996, the 5 years preceding the survey. If a woman was not enrolled during an entire 6-month period, her costs and use were classified as missing for that 6-month period.

#### CHRONIC DISEASE SCORE

Because some of the variation in use and costs across the groups might be due to differences in the severity of chronic diseases, we computed a measure of chronic disease severity recently developed within the HMO.<sup>11</sup> This automated algorithm predicts mean annual total costs based on prescriptions filled by each member during the previous 6 months for common chronic medical conditions. It is, therefore, a measure of recognized and treated medical disease. It has been shown to be highly correlated with physician ratings of physical disease, predicted mortality, and hospital use.

#### STATISTICAL ANALYSES

We computed the unadjusted mean and median annual costs for several categories of use, using up to 5 years of cost data

for each subject. All costs were adjusted for inflation to 1997 dollars.

Because cost data are highly skewed (ie, many members have zero costs, most have modest costs, and a few may have high costs), we analyzed the automated data using median regression, a method similar to ordinary least squares regression. The advantage of median regression is that it minimizes the influence of extreme points.

We used bootstrap resampling<sup>12</sup> to estimate standard errors of median-regression coefficients. For each model, 1000 bootstrap samples were drawn, sampling 1175 women replacing all women before each new sample. The bootstrap approach yields point estimates and confidence intervals (CIs) for median regression coefficients, rather than *P* values. We report bias-adjusted point estimates and 95% CIs. All estimation was carried out using commercial statistical software (Stata Release 5.0; Stata Corp, College Station, Tex). We did not attempt 2-stage models because our data did not satisfy model assumptions (they were not log-normally distributed) and because it was unclear how to consistently estimate standard errors when there was a clustering of observations within women.

For the regression models, we created 2 indicator variables: any maltreatment (exceeding  $\geq 1$  CTQ cut point threshold) and sexual maltreatment (exceeding only the sexual abuse threshold). A comparison group included women who reported maltreatment below the cut points.

Emergency department and mental health visits were dichotomized into "any visits" and "no visits" for the entire 5-year period. Logistic regression was used to estimate the probability of any ED or mental health visit. Robust covariance adjustments were used to account for multiple observations from each woman (ie, up to 5 years of data). Odds ratios (ORs) are used to describe model results.

All cost and use models accounted for marital status and years of education, variables that were shown to be significantly different between the groups in a previous analysis. Marital status was dichotomized into women who were currently married or living with a partner and those who were not. Education was coded as college graduate or not. Predicted total costs (chronic disease score), marital status, and education were included in all models. Linear combinations of regression parameters allow all pairwise comparisons between these groups.

were no significant differences in the proportions of women in each group who contributed fewer than 5 cost periods. In any given year, about 20% of women did not have any medical costs.

#### TOTAL AND COMPONENT COSTS

We calculated the observed mean and median annual costs for each group across all available time periods (**Table 2**). These are the actual costs per group, not accounting for differences in marital status, educational level, and chronic disease score. Median costs are presented in addition to means due to the highly skewed distributions. Women with histories of childhood maltreatment generally showed greater total and component costs.

Median regression modeling showed that maltreatment had a significant effect on total costs. Women who

reported any maltreatment had median total health care costs that were \$97 (95% CI, \$0.47-\$188.26) greater than costs among women who did not report maltreatment. Women who reported sexual maltreatment had median total health care costs that were \$245 (95% CI, \$132.32-\$381.93) greater than costs among women who did not report maltreatment. When mental health costs were removed, the differences in median total health costs were \$55 (95% CI, -\$17.87 to \$135.86) and \$119 (95% CI, -\$1.83 to \$239.68) greater for women who reported any maltreatment and those who reported sexual maltreatment, respectively. The chronic disease score was a statistically significant predictor of total yearly medical costs, but marital status and educational level were not. There were no significant differences in the distributions of unadjusted total annual costs among the 3 groups. Median costs increased as a function of the number of abuse categories (**Table 3**).

**Table 1. Percentage of Women in Each Maltreatment Group Who Had Available Cost Data for Each of 5 Time Periods**

| Category        | No. of Patients | Women With Data Available, % |         |         |         |         |
|-----------------|-----------------|------------------------------|---------|---------|---------|---------|
|                 |                 | 1 Year                       | 2 Years | 3 Years | 4 Years | 5 Years |
| Below threshold | 672             | 7.1                          | 10.3    | 8.6     | 7.7     | 66.2    |
| Nonsexual abuse | 294             | 10.9                         | 10.9    | 9.2     | 9.5     | 59.5    |
| Sexual abuse    | 209             | 10.5                         | 13.4    | 10.5    | 7.2     | 58.4    |
| Overall         | <b>1175</b>     | 8.8                          | 11.0    | 9.1     | 8.1     | 63.2    |

**Table 3. Median Annual Health Care Costs for a 5-Year Period by Number of Maltreatment Categories\***

| No. of Maltreatment Categories | No. (%) of Patients (N = 1175) | Median Costs, \$ |             |
|--------------------------------|--------------------------------|------------------|-------------|
|                                |                                | Total            | Outpatient† |
| 0                              | 672 (57.2)                     | 591              | 571         |
| 1                              | 238 (20.2)                     | 657              | 624         |
| 2                              | 116 (9.9)                      | 726              | 704         |
| 3                              | 78 (6.7)                       | 853              | 821         |
| 4 or 5                         | 71 (6.0)                       | 1030             | 987         |

\*Costs were adjusted for inflation to 1997 dollars.  
†Includes medical and psychiatric costs.

**Table 2. Unadjusted Annual Health Care Costs for Patients With and Without Childhood Maltreatment\***

| Costs                | Below Maltreatment Threshold (n = 672 [57%]) | Nonsexual Maltreatment (n = 294 [25%]) | Sexual Maltreatment (n = 209 [18%]) |
|----------------------|--|--|-------------------------------------|
|                      | Total  | 1361 ± 2989<br>(559)                   | 1377 ± 2420<br>(655)                |
| Primary care         | 329 ± 420<br>(216)                           | 351 ± 458<br>(231)                     | 379 ± 497<br>(248)                  |
| Specialty care       | 251 ± 584<br>(0)                             | 223 ± 488<br>(0)                       | 254 ± 525<br>(0)                    |
| Emergency department | 20 ± 140<br>(0)                              | 20 ± 120<br>(0)                        | 53 ± 330<br>(0)                     |
| Prescription         | 151 ± 306<br>(57)                            | 197 ± 383<br>(63)                      | 208 ± 493<br>(64)                   |
| Inpatient‡           | 301 ± 1999<br>(0)                            | 260 ± 1447<br>(0)                      | 304 ± 1785<br>(0)                   |
| Outpatient‡          | 1026 ± 1491<br>(541)                         | 1088 ± 1491<br>(627)                   | 1266 ± 1868<br>(677)                |
| Mental health‡       | 47 ± 321<br>(0)                              | 87 ± 330<br>(0)                        | 127 ± 504<br>(0)                    |

\*Data are given as mean ± SD (median) dollars, adjusted for inflation to 1997 dollars.

†Includes both medical and psychiatric costs.

‡Includes specialty mental health outpatient visits but not inpatient or pharmacy costs.

## ED AND MENTAL HEALTH VISITS

Because relatively few women had any ED costs (on average, >1 of 5 made an ED visit each year), we did not analyze these costs. Instead, we focus on ED visits. Women who reported any maltreatment were no more likely to visit the ED during the 5-year period than women who reported below threshold maltreatment (6.6% vs 4.4%, respectively). Women who reported sexual abuse, however, were nearly twice as likely to visit the ED as women reporting below threshold abuse (8.4% vs 4.4%, respectively; OR = 1.91; 95% CI, 1.33-2.73;  $P < .001$ ).

Women who reported sexual abuse were also significantly more likely to visit the ED than women who reported only physical abuse or neglect (8.4% vs 5.2%, respectively; OR = 1.66; 95% CI, 1.10-2.52). The chronic disease score and educational level were also significant predictors of any ED visits. Women with higher chronic disease scores were more likely to visit the ED in the 5-year period. Women with a college education were less likely to use emergency services (OR = 0.69; 95% CI, 0.51-0.93).

Compared with women with subthreshold maltreatment (19.8%), those with sexual and nonsexual maltreatment were twice as likely to make mental health visits during the 5 years before the study (40.7% and 37.4%, respectively; OR = 2.29; 95% CI, 1.68-3.12).

## COMMENT

Childhood maltreatment was significantly associated with increased adult medical care costs and visits for women. Compared with women with subthreshold histories of maltreatment, those with threshold levels of any childhood maltreatment had significantly higher total costs

as adults. Furthermore, women with sexual maltreatment had significantly higher primary care and outpatient costs and ED use. These differences persisted after controlling for demographic and chronic disease variables.

These findings are generally in agreement with previous studies<sup>3-7</sup> that have found increased health care use associated with childhood maltreatment status. This study, however, had several methodological strengths that increase the validity of the findings: we used a large random sample of HMO enrollees, including clinic attenders and nonattenders, which increases the generalizability of the findings; our use and cost data were collected using automated health care data in a population whose health care use was nearly completely captured, and maltreatment case determination was accomplished using a recently developed instrument with established validity and reliability.

Several features of the methods we used may have underestimated the actual magnitude of the costs. We measured only direct treatment costs from the perspective of the HMO. This tends to minimize the total economic burden associated with maltreatment because it does not include all direct (eg, telephone calls from the HMO) and indirect costs (eg, lost workdays) to the women, their families, and employers. Furthermore, the resultant health care costs incurred by children, spouses, and other family members of the affected patients were also not measured in this study.

Finally, we chose to treat chronic medical disease as a confounding covariate and statistically removed its contribution to cost estimates. It is unlikely that the total chronic disease burden is exclusively due to unrelated medical conditions. In many cases, maltreatment

acts through mediator variables (ie, depression and low self-esteem) that result in the indirect production of physical disease. An example of this is the high rate of obesity and chronic sexually transmitted diseases we also found in this sample. Maltreatment can result in behavior changes that ultimately lead to health risk behaviors. Thus, the chronic disease score is a mixture of both confounding and mediating effects. Because mediated effects should not be removed, our decision to do so conservatively biased the cost estimates toward smaller differences among the groups.

This report has several limitations. First, the retrospective method used in this study does not allow for the establishment of causality, although the antecedence of the childhood trauma satisfies the temporal sequence requirement. Second, the use of medical care is a complex behavior with multiple causes. We do not know if there are other differences between the groups that we did not measure for which we were unable to control statistically. Third, we did not study men in the HMO. Little is known about the specific health use patterns of men who have experienced childhood victimization. Although rates of maltreatment may be lower in men, and they generally make fewer primary care visits than women, previously recognized associations between victimization in boys and subsequent adult antisocial behavior may result in higher costs from the short- and long-term health effects of alcoholism and violence.<sup>2</sup> Finally, we relied on self-reports of maltreatment, which may be biased, although the method used is well validated.

Although the group of women who reported threshold levels of sexual maltreatment had the highest total costs, it is unlikely that sexual abuse per se is the only factor associated with these increased costs. First, for many women in this group, sexual abuse was one of several forms of maltreatment that they experienced as children. Other findings from this study have demonstrated that the number of abuse categories (ie, physical, emotional, sexual, and neglect) is correlated with an increased number of adverse health outcomes. Because of the way our groups were formed for this analysis, the sexual abuse group contains many women with multiple forms of maltreatment (some with all 5 types). We think that the increased costs for this group are largely due to the presence of several forms of maltreatment in women who were not properly protected in their early families. This is clearly evident from Table 3, and we are exploring this hypothesis further in a cluster analysis of the data.

Second, and more important, it should not be concluded from these data that a history of maltreatment is the only force driving the costs differences. Women with these histories have a range of additional psychosocial risk factors that we did not measure in this study (eg, domestic violence) that may play a role in placing women at an increased risk for adverse health outcomes. It is far more likely that maltreatment is only one of a host of factors that, acting together, are responsible for increasing the adult health problems and health care costs.

We found that emergency and specialty care use was relatively low compared with that related to primary care. This may be related to established patterns of care within

this particular HMO that foster stable, long-term relationships between patients and their primary care physicians. In fee-for-service systems, costs in EDs and specialty clinics may be considerably higher if a stable relationship with a physician is lacking.

The annual costs associated with maltreatment amount to a few hundred dollars per woman per year. Yet, the actual magnitude of the total cost to society is not clearly seen unless the high prevalence of maltreatment is considered. We found that 42.8% of the HMO population had maltreatment experiences surpassing study thresholds (17.8% sexual abuse and 25.0% nonsexual maltreatment). Using the difference in mean annual costs between the maltreatment and nonmaltreatment groups and the prevalence of these experiences in the HMO population of 163 844 adult women, we estimate the total attributable cost associated with maltreatment in this HMO to be \$8 175 816 per year (prevalence rate  $\times$  total population  $\times$  cost differences from Table 2).

Cost is only one outcome that should be considered in weighing the results of this study. Although focusing on the added costs of health care associated with maltreatment may not reduce or eliminate these extra expenditures, it calls attention to the long-term health effects of these experiences. Further research is needed to better understand the nature and causes of these health outcomes and how these adverse health effects and their associated costs may be reduced.

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