Health Care Costs Associated With Posttraumatic Stress Disorder Symptoms in Women

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Background: Posttraumatic stress disorder (PTSD) is a prevalent disorder that has been associated with elevated rates of medically unexplained physical symptoms, significant functional impairment, and high health care use. However, little is known about actual health care costs associated with PTSD.

Methods: We administered the PTSD Checklist (PCL) to 1225 female members of a metropolitan health maintenance organization and validated the instrument using a structured PTSD interview in a subset of 268 women. Participants were classified into 3 groups by PCL score: low (<30), moderate (30-44), and high (≥45). By using the cost accounting system of the health maintenance organization, we examined differences between the groups with respect to total and component health care costs, controlling for chronic medical illness and other forms of psychological distress.

Results: The total unadjusted mean ± SD annual health care costs were $3060 ± $6381 (median, $1283) for the high PCL score group, $1779 ± $3008 (median, $829) for the moderate PCL score group, and $1646 ± $5156 (median, $609) for the low PCL score group. After adjusting for depression, chronic medical disease, and demographic factors, women with high PCL scores had a significantly greater odds of having nonzero health care costs compared with women with low PCL scores (odds ratio, 13.14; 95% confidence interval, 1.70-101.19). Compared with women in the low PCL score group, those in the moderate PCL score group had, on average, a 38% increase in adjusted total annual median costs, and those in the high PCL score group had a 104% increase.

Conclusions: Women with PTSD symptoms in this study had significantly higher total and component health care costs, even after controlling for depression, chronic medical illness, and demographic differences. These findings are similar to those found in studies of costs related to major depression and suggest that instituting health services interventions to improve recognition and treatment of PTSD in primary and specialty care clinics may be a cost-effective approach for lowering the prevalence of this disorder.

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of individuals with PTSD in general health care settings. Such information is critical for understanding the overall impact of PTSD on the individual and the health care system, and may highlight avenues for earlier detection and intervention efforts.

This article examines the health care costs of a large group of women who were members of a metropolitan health maintenance organization (HMO). Given the association between PTSD, affective disorders, and aversive physical symptoms, we hypothesized that patients with PTSD would have significantly increased health care costs and use. Furthermore, we believed that these differences in costs would be specifically associated with PTSD, and would remain after controlling for the presence of depressive symptoms and medical comorbidities.

**METHODS**

**SETTING**

The study took place from 1996 to 1997 among the enrolled membership of the Group Health Cooperative of Puget Sound, a large staff-model HMO that provides primary and specialty medical and mental health services to approximately 400,000 individuals in the Puget Sound area of Washington State. The main purpose of the study was to examine the long-term effects of early childhood maltreatment with respect to health care use, costs, and physical health outcomes.

**STUDY DESIGN**

This 2-stage investigation used a mailed questionnaire and subsequent in-depth structured interviews with selected respondents. The questionnaire allowed the administration of a PTSD assessment instrument to a large sample of participants, while the interview provided a nested validation sample using a clinician-administered structured interview as a gold standard. We selected a random sample of 1963 female HMO members aged 18 to 65 years. The sample was divided into 4 equal waves to reduce the effects of seasonal variation in return rates and to allow for gradual systematic follow-up interviews of selected participants.

**QUESTIONNAIRE**

All study participants received a mailed questionnaire that had been reviewed and approved by the Human Subjects Committees of the Group Health Cooperative of Puget Sound and the University of Washington School of Medicine. The questionnaire contained multiple physical and mental health–related questions, of which the details have been previously reported. The main purpose of this questionnaire was to screen for previous exposure to potentially traumatic events using 2 previously validated instruments.

**Childhood Trauma Questionnaire (CTQ)**

The CTQ inquires about 5 areas of childhood maltreatment: emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect. Validation studies 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 reports obtained with this instrument, including their stability over time, convergent and discriminant validity with structured trauma interviews, and corroboration using independent data. For this study, a short form of the questionnaire was used that showed good reliability and validity in previous studies, including the invariance of its factor structure across clinical and nonclinical samples and external validation against independent evidence. When compared with clinician interviews, the instrument demonstrates better than 80% sensitivity and specificity across all 5 scales for the detection of childhood trauma exposures.

**PTSD Checklist (PCL)**

The PCL is a 17-item self-report checklist based on the DSM-IV diagnostic criteria for PTSD. Each of the 17 symptoms is rated on a 5-point scale, ranging from not at all (1) to extremely (5), yielding scores ranging from 17 to 85. The PCL has been extensively used in research, and is well regarded. Using a cutoff score of 50, the instrument showed a sensitivity of 0.82 and a specificity of 0.83 for male war veterans and a sensitivity of 0.69 and a specificity of 0.99 for women with breast cancer. For civilians exposed to motor vehicle crashes and adult sexual assault, a cutoff score of 44 demonstrated a sensitivity of 0.94 and a specificity of 0.86. In a previously reported receiver-operating characteristic analysis from this study, we found that the PCL had good to very good predictive properties, with the best balance of sensitivity (0.82) and specificity (0.76) at a cutoff score of 30. At a score of 45, the PCL had a sensitivity of 0.36 and a specificity of 0.95 in this sample.

To control for depressive symptoms, we also used the 5-item mental health index (MHI-5) of the 36-Item Short-Form Health Survey. The MHI-5 has been used extensively in studies as a measure of depressive severity and has previously published general population and medical clinic norms.

**INTERVIEW**

To validate the PCL specifically within this population, we used the CTQ to select a group of women for a further in-depth interview. Cutoff scores for the CTQ were derived for identifying likely cases of childhood maltreatment with very good to excellent sensitivity and specificity. By using the CTQ scale scores, we identified 2 groups of women for a subsequent follow-up interview. The first group consisted of women who screened positive for childhood sexual abuse by having a score above the threshold for that scale as determined in previous validation samples. A second group of women was randomly selected from the group of women whose 5 subscale scores were below all cutoff score thresholds. For this study, we combined the 2 groups to construct a sample with a wider range of childhood maltreatment experiences. No later than 2 months after their completion of the questionnaire, we invited the women in the combined sample for an interview using the Clinician-Administered PTSD Scale for DSM-IV (CAPS). The CAPS has specific criteria for intensity and frequency of the 17 symptoms of PTSD, making it one of the most well-studied structured interviews for PTSD. It has been widely used in studies of varying samples and has excellent psychometric properties. The measure has good convergent validity with standard measures of PTSD, such as the Mississippi Scale for Combat-Related PTSD ($\rho = 0.91$), the Minnesota Multiphasic Personality Inventory-2 PTSD subscale ($\rho = 0.77$), and the Structured Clinical Interview for DSM-IV ($\rho = 0.89$). The women were interviewed by a nurse-psychologist who had extensive experience in the use of structured clinical interviews and specific training in the administration of the CAPS. Interviews were reviewed each week with the study psychiatrist (E.A.W.).

**ASSESSMENT OF HEALTH CARE COSTS**

Our dependent variables, use and costs, were determined using the HMO’s automated cost accounting system. This 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 accounting for all overhead costs to each patient care department. Therefore, the total cost figures reported reflect the total costs from the perspective of the HMO. Our analyses focused specifically on total costs (including inpatient, primary care, outpatient, mental health, and pharmacy costs) and emergency department (ED) visits for the 3-year period before the study. Costs were calculated in 6-month increments during the 3 years preceding the survey (1992-1996). If a woman was not enrolled during an entire 6-month period, her costs and use were set up as missing for that 6-month period.

Because some of the variability in use and costs between the groups might have been due to differences in the severity of chronic diseases, we computed a measure of chronic disease severity, the Chronic Disease Score (CDS), developed by the HMO.28 This automated algorithm predicts the mean annual total costs per member based on prescriptions filled by each member during the past 6 months for common chronic medical conditions. It is, therefore, a measure of recognized and treated medical disease. It is highly correlated with physician ratings of physical disease severity, and predicts mortality and hospital use during the subsequent years.29 The CDS has had high stability during a 1-year period and prospectively predicts as much of the variance in primary care visits, outpatient costs, and total costs as do the ambulatory diagnostic groups. It is also a better predictor of hospitalization and mortality than the ambulatory diagnostic groups.29

### RESULTS

Of the 1963 surveys initially mailed, 1225 were completed and an additional 51 were ineligible or returned as undeliverable, for a final adjusted return rate of 62.4%. The 1225 participants were a mean±SD age of 41.8±11.5 years. Of the women, 51.4% were married and 57.3% had completed college. The median annual income was approximately $40000. The participants were 79.0% white, 5.7% African American, 8.1% Asian, 2.1% Hispanic, 1.2% Native American, and 3.9% other ethnicities. These demographic characteristics closely mirror those of the HMO population drawn from the sample and are also representative of the Puget Sound region of Washington State.

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 age (P=.37), mean number of primary care (P=.06) or specialty clinic visits (P=.48), ED visits (P=.29), outpatient mental health days (P=.14), pharmacy visits (P=.19), filled prescriptions (P=.09), or physician-coded International Classification of Diseases, Ninth Revision diagnoses (P=.26). This suggests that the nonparticipant population was similar to the women who returned completed surveys.

Of the 1225 participants who completed questionnaires, 305 (24.9%) had a history of childhood sexual maltreatment based on the CTQ cutoff score. We were able to contact 204 (66.9%) of those with sexual abuse histories; of those who could be reached, 152 (74.5%) agreed to participate in a follow-up interview. In addition, we selected a second sample of 250 women who had scores below those of the CTQ cutoff scores for all forms of maltreatment and were able to contact 155 (62.0%) of them; 116 (74.8%) agreed to be interviewed, for a total interview sample of 268.

The mean±SD score on the PCL for the full questionnaire sample of 1225 women was 27.2±10.3 (median, 24.0; range, 17-77). The smaller interview sample had a mean±SD score of 27.9±10.5 (median, 25.0; range, 17-66). Within the interview sample, 28 (10.4%) of the women met the criteria for current PTSD using the CAPS. The women who had PTSD on the CAPS had a mean±SD PCL score of 41.1±12.3 compared with 26.3±9.0 for the remaining women who were not study patients.

### Table 1

Table 1 presents the demographic and clinical variables for the larger sample. The 3 groups did not differ in CDS, but were significantly different in age, MHI-5, percentage of college graduates, and percentage living with partners. Post hoc Bonferroni-corrected tests showed that the women in the low PCL score group were significantly older than those in the middle and high PCL score groups, which did not differ, and that those in all 3 PCL score groups varied significantly on the MHI-5. Women in the high PCL score group were less likely to graduate from college, whereas women in the low PCL score group were most
likely to have partners. Table 2 shows, for descriptive purposes, the unadjusted costs by service category.

Table 3 presents the first stage of the adjusted cost analyses, showing the percentage of patients in each category with nonzero costs, including odds ratios and 95% CIs comparing the middle or high PCL score group with the low PCL score group. In general, women in the high PCL score group were more likely to have nonzero costs for all categories, with the exception of a trend in pharmacy costs. The odds of having a cost within a given category were significantly different between the low and middle PCL score groups, respectively. These estimates are adjusted for significant covariates. In all models except mental health and ED costs, CDS was a significant covariate (P < .001). In the primary care model, educational level was a significant covariate (P = .01), while in the pharmacy model, age (P = .006) and MHI-5 (P = .02) were also significant covariates.

Because of the possible comorbidity between depression and PTSD, we removed the effects of the MHI-5 from the model and recalculated the adjusted annual cost ratios for the median pharmacy costs. The results were similar: the ratio for the low to medium PCL score groups was 1.49 (95% CI, 1.27-1.76), and the ratio for the low to high PCL score groups was 1.67 (95% CI, 1.30-2.17). No covariates were significant in the inpatient model.

In this study, we found that more severe PTSD symptoms (as measured by the PCL) were associated with increased health care costs. Compared with the group with PCL scores below 30, those with high PCL scores had greater mean unadjusted total annual health care costs in all categories measured. They also had significantly higher odds of nonzero costs, including total outpatient, specialty care, primary care, pharmacy, and men-
that women with high PCL scores had trauma occur-
are likely to have even higher health care use. The fact
rent trauma. Women with PTSD after a current trauma
study. In addition, this sample was not selected for a cur-
method, but it was beyond the limited resources of our
essment on all participants would have been a preferable
nosis. We recognize that a formal PTSD diagnostic as-
related distress, it cannot provide a formal PTSD diag-
properties for the quantitative measurement of PTSD-
accurately reflects the demographics of the Seattle met-
A mixed-sex study. In addition, even though the sample
lower health care use of men might yield lower costs in
cause of mental health costs. The increase (Table 2) was
higher in women with moderate PCL scores. The in-
twice as high in women with high PCL scores and 38%
with low PCL scores. Total annual costs were more than
for women with high PCL scores compared with women
with low PCL scores. Total annual costs were more than
twice as high in women with high PCL scores and 38%
in women with moderate PCL scores.

Only a small portion of the increase in costs was be-
cause of mental health costs. The increase (Table 2) was
in every cost component measured, especially within the
high PCL score group. These increased costs remained
after adjusting for significant covariates, such as chronic
medical illness and depression. The results of the study
are similar to previous investigations1,2,5 that compare the
costs of primary care patients with and without depres-
ion, showing that mixed-age patients with depression
have 1.5 to 2.5 times greater health care costs. The in-
increased costs in depressed patients are also found across
every cost component measured and are not primarily
due to mental health costs.

The design of this study limits the generalizability
of our results. Our sample contains only women, and the
lower health care use of men might yield lower costs in
a mixed-sex study. In addition, even though the sample
accurately reflects the demographics of the Seattle met-
ropolitan area, it has fewer minorities and a higher so-
cioeconomic status than the country as a whole. Next,
although the PCL demonstrates excellent psychometric
properties for the quantitative measurement of PTSD-
related distress, it cannot provide a formal PTSD diag-
agnosis. We recognize that a formal PTSD diagnostic as-
essment on all participants would have been a preferable
method, but it was beyond the limited resources of our
study. In addition, this sample was not selected for a cur-
rent trauma. Women with PTSD after a current trauma
are likely to have even higher health care use. The fact
that women with high PCL scores had trauma occur-
ing at varying times over their lifetime may minimize the
effect of PTSD symptoms on health care costs. Fi-
tally, causation cannot be determined from this study.
It is conceivable, for example, that high users are more
likely to report PTSD-related problems, as opposed to
PTSD-related problems causing health care use.

Nevertheless, despite these limitations, this study has
several strengths. We used an automated cost accounting
system in a well-established HMO that captured a wide range
of medical care costs in a large well-defined population
sample. We attempted to minimize the diagnostic limita-
tion of the PCL by calibrating the instrument with a nested
validation study against a clinician-administered structured
PTSD interview to obtain cutoff points using receiver-
operating characteristic curves from prior research with this
and other samples. In part because the PCL items repro-
duce the exact language of DSM-IV criteria for PTSD, the

Table 3. Patients in 3 PCL Score Groups With Nonzero Costs by Service Category and Adjusted ORs for PCL Score Groups With Any Costs for 1196 Women

<table>
<thead>
<tr>
<th>Service Category</th>
<th>PCL Score*</th>
<th>OR (95% CI)††</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>〈30 (n = 843)</td>
<td>30–44 (n = 270)</td>
</tr>
<tr>
<td>Primary care</td>
<td>83.0</td>
<td>87.8</td>
</tr>
<tr>
<td>Specialty care</td>
<td>49.1</td>
<td>49.3</td>
</tr>
<tr>
<td>Emergency care</td>
<td>5.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>80.0</td>
<td>81.9</td>
</tr>
<tr>
<td>Mental health</td>
<td>6.5†‡</td>
<td>21.5</td>
</tr>
<tr>
<td>Total outpatient</td>
<td>90.4</td>
<td>90.7</td>
</tr>
<tr>
<td>Inpatient</td>
<td>5.7</td>
<td>5.2</td>
</tr>
<tr>
<td>Total costs</td>
<td>90.4</td>
<td>90.7</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; OR, odds ratio; PCL, Posttraumatic Stress Disorder Checklist.
*Twenty-nine women did not complete the PCL. Data are given as percentage of patients.
†Adjusted for age, marital status, educational level, Chronic Disease Score, and the 5-item mental health index. The reference is the group with a PCL score of less than 30.
‡P < .05.
§P < .01.
††Significantly more individuals with nonzero costs than in the other 2 groups.
#P < .001.
**P < .001.
†††Significantly fewer individuals with nonzero costs than in the other 2 groups.

Table 4. Adjusted Annual Cost Ratios of Median Health Care Costs for 1196 Patients by PCL Score Group

<table>
<thead>
<tr>
<th>Service Category</th>
<th>Low PCL Score (〈30) (n = 843)</th>
<th>Medium PCL Score (30–44) (n = 270)</th>
<th>High PCL Score (≥45) (n = 83)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary care</td>
<td>1.21 (1.07-1.37)†‡</td>
<td>1.35 (1.11-1.66)†‡</td>
<td></td>
</tr>
<tr>
<td>Specialty care</td>
<td>0.98 (0.79-1.23)</td>
<td>0.95 (0.69-1.31)</td>
<td></td>
</tr>
<tr>
<td>Emergency care</td>
<td>1.20 (1.07-2.04)</td>
<td>1.95 (1.00-3.79)§</td>
<td></td>
</tr>
<tr>
<td>Pharmacy</td>
<td>1.42 (1.17-1.71)§</td>
<td>1.56 (1.16-2.08)‡</td>
<td></td>
</tr>
<tr>
<td>Mental health</td>
<td>1.34 (0.93-1.92)</td>
<td>0.92 (0.57-1.49)</td>
<td></td>
</tr>
<tr>
<td>Total ambulatory care</td>
<td>1.40 (1.18-1.66)§</td>
<td>2.00 (1.53-2.62)§</td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>0.83 (0.37-1.86)</td>
<td>1.01 (0.26-3.83)</td>
<td></td>
</tr>
<tr>
<td>Total costs</td>
<td>1.38 (1.16-1.66)§</td>
<td>2.04 (1.52-2.74)§</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviation: PCL, Posttraumatic Stress Disorder Checklist.
*Twenty-nine women did not complete the PCL. Adjusted for the significant covariates of age, marital status, educational level, Chronic Disease Score, and 5-item mental health index. If the lower limit of the confidence interval is at least 1.00, this is equivalent to P < .05.
†P < .01.
‡P < .05.
§P < .001.
instrument demonstrates good to very good sensitivity and specificity as a proxy measure. Regardless of the chosen cut-off score, however, there is a clear increase in costs as PCL scores increase. That this increase persists after the effects of depressive symptoms and medical comorbidities are removed from the analysis attests to the strength of the association.

It seems likely that the findings of this study underestimate the true cost differences that might be incurred by patients with PTSD in general medical settings. The relatively higher socioeconomic status of this HMO population may be associated with lower rates of PTSD than might be found in uninsured or indigent populations that have diminished access to mental health treatment resources. Also, the primary care culture of this HMO tends to minimize specialty and emergency care services, which is demonstrated by the lower differential in costs in these categories. Health care systems that do not have a prevention or primary care gatekeeping focus on this would likely show higher costs in these areas as individuals seek treatment in expensive EDs or are referred to medical specialists because of unexplained physical symptoms such as chest pain.

In conclusion, this study provides strong evidence that reports of PTSD symptoms are associated with increased health care costs. Because prior studies have shown a marked association between PTSD, trauma, and somatic symptoms, somatic complaints may be one factor related to the increased costs in these non-mental health categories. Future research into the nature of somatic symptoms in patients with PTSD and the factors related to increased health care use is clearly needed. In addition, an important next question is whether improved diagnosis and treatment of PTSD might be associated with decreased medical care costs. Evidence-based treatment of PTSD has decreased distress and improved functioning and quality of life. The impact of such treatments on health care use could be similarly assessed. Finally, because most patients with PTSD initially present in primary care settings, collaborative care models that enhance patient education and integrate mental health professionals or nurses into the primary care treatment (such as those developed for the treatment of major depression and panic disorder) may be beneficial for this population. Large-scale effectiveness studies will be needed to test such approaches in populations with PTSD.

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