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# Disaster and Subsequent Healthcare Utilization
# A Longitudinal Study Among Victims, Their Family Members, and Control Subjects

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**Background:** The impact of disasters on primary healthcare utilization is largely unknown. Moreover, it is often overlooked how disaster affects those closest to the primary victims, their family members.

**Objective:** The objective of this study was to examine the long-term effects of a catastrophic fire on primary healthcare utilization.

**Research Design:** We conducted a prospective, population-based cohort study covering 1 year pre- and 3 years postfire. Utilization data were extracted from primary care records.

**Subjects:** Subjects consisted of 286 disaster victims, 802 family members of disaster victims, 3722 community control subjects, and 10,230 patients from a national reference population.

**Measures:** As outcome measures, we studied 1) the annual number of contacts in primary care and 2) the annual number of contacts for problems related to mental health. Determinants are injury characteristics of victims and bereavement. All analyses control for age, gender, and insurance status.

**Results:** Being an uninjured victim who witnessed the disaster increases the number of contacts by a factor of 1.55 during the first year postfire (95% confidence interval [CI], 1.35–1.78). Uninjured victims contact the family practitioner more often for mental healthrelated problems than adolescent community control subjects (incidence rate ratio [IRR], 4.54; 95% CI, 1.69 –12.20). In adult family members, the loss of a child predicts overall utilization (IRR, 1.88; 95% CI, 1.35–2.63) and utilization for mental health (IRR, 8.69; 95% CI, 2.10 –35.92) during the first year postfire.

**Conclusion:** Attention should be paid to the primary care needs of bereaved individuals and those who have witnessed the disaster.

Disasters are sudden events that have the potential to terrify and cause substantial losses for many people simultaneously.[1] Disasters inevitably lead to increased healthcare utilization as a result of deaths, injuries, or illnesses in the affected community. How long these effects persist depends on the nature of the disaster and, of course, on the nature of the physical injuries.[2] Severe injuries requiring

immediate trauma care occur mainly at the time of impact, whereas mental health effects may persist for a long time.[3] Reactions to disaster such as depression, anxiety, substance abuse, and posttraumatic stress disorder have been studied extensively.[4] As recent research into the effect of trauma on health suggests, these reactions may also lead to increased service utilization in victims.[5–8]

The present study deals with primary healthcare utilization before and after a fire catastrophe. The fire occurred on January 1, 2001, in Volendam, The Netherlands. Volendam has approximately 20,000 inhabitants and is a former fishing town located 20 miles north of Amsterdam. The fire erupted in an overcrowded pub where approximately 350 adolescents were celebrating New Year's Eve. As a result of the fire, 14 adolescents lost their lives and approximately 240 were hospitalized.[9] The current study is based on the follow up of cohorts identified from electronic medical records in family practice. Because the study uses already existing registrations, baseline information is available as well. This design is exceptional in disaster research, because the effects of disasters usually can only be studied retrospectively as a result of their sudden and unexpected nature. In fact, there are very few longitudinal studies that compare effects before and after exposure, and even fewer studies that consider healthcare utilization as an outcome.[10] Furthermore, most studies examining the relationship between trauma and healthcare utilization have relied solely on self-report. Unfortunately, self-reported utilization data can be substantially distorted, with the distortion becoming more pronounced as time increases.[11–13] For the planning of services, therefore, automated utilization data captured in existing registrations are most desirable.[6]

It is obvious that service utilization increases in victims who have been directly affected by a disaster. It is less clear, however, how disaster affects the utilization rates of others who are psychologically close to the victim. Traumatic experiences of one member can challenge the entire support system of the victim, causing high levels of distress in those who try to help the traumatized or suffering person. In the literature, the concepts of "secondary exposure" or "compassion stress" are used to explain adverse outcomes in family members and other supporters.[14] Caring for a survivor can be emotionally draining, particularly when the victim is in need of prolonged medical treatment, as is the case in burn injuries. [15] The research on the health of family members of burn victims, however, is scarce and has produced inconsistent results. Usually, psychologic outcomes have been studied but never healthcare utilization.[16–20] Furthermore, the sudden and unexpected death of a child is one of the most stressful events to happen to any family.[21] Bereaved individuals may suffer from lowered immune functions, more somatic complaints, interpersonal difficulties, and react with more adverse health behaviors.[22–24] It is therefore expected that those living with a disaster victim and those who have lost a family member as a result of the disaster will have higher primary care utilization rates than unexposed control subjects. To our knowledge, this is the first study investigating these hypotheses. To shed light on the community impact of the fire, the utilization of community members is compared with national reference data.

To summarize, the aim of the present study is to examine the long-term effects of exposure to a catastrophic fire on primary healthcare utilization. For this purpose, the utilization rates of victims with and without burns, their family members, community control subjects, and a national reference population are compared. Two outcome measures are presented: 1) healthcare utilization in general and, more specifically, 2) utilization related to mental health problems.

## METHODS

This cohort study covers a period starting 1 year prefire up to 3 years postfire (January 1, 2000, until January 1, 2004). Data were collected at the practices of family practitioners (FPs). In The Netherlands, every citizen is listed with 1 family practice. Direct access to specialist care is limited by the gate-keeping function of the FP. In 1 year's time, more than 75% of the Dutch population will see their FP at least once and more than 90% at least once every 3 years.[25]

## Data Collection

### *Identification of Victims*

According to official estimates, approximately 300 to 350 people were in the building at the time of the fire. Within 1 month after the fire, all local family practices (n = 4) were contacted with the request to identify all patients who had been present during the fire (the dead and all patients with and without

physical injuries). The family practices identified 335 patients in their registrations. One family practice was not yet using electronic registrations, however. This led to a total of 3 practices participating. The 335 patients originally identified in family practice were distributed among participating and nonparticipating practices as follows: 286 of the survivors belonged to the participating practice and 35 to the nonparticipating practice. The 14 dead adolescents (and their families) were all registered with the participating practices. Characteristics of survivors enrolled in the nonparticipating practice (n = 35) were compared with those of survivors enrolled with the participating practices (n = 286). Victims included in the final study sample did not significantly differ from nonparticipants with respect to burn size, number of days in the hospital, gender, age, or insurance status. Victims with burn injuries had a mean total burned surface area of 14.9% (standard deviation [SD], 17.1) and spent, on average, 34.2 days in the hospital during the first 12 months after the disaster (SD, 59.3).

### Identification of Family Members of Victims

   With the help of the electronic patient registration, we identified all cohabiting family members of dead and/or surviving victims (n = 802). The disaster victims are distributed among 270 families, with 30 families being multiply affected (28 families: 2 survivors; 2 families: 1 child surviving, 1 child dead).

### Sampling of Community Control Subjects

   From the 3 participating FP practices, we selected 1) all adolescents belonging to single- or 2-parent families, within the age range of 14–20, who had *not* been present during the fire; and 2) their cohabiting family members. This results in a sample of 3722 patients distributed among 954 family units.

### Sampling of the National Reference

   According to the same criteria as the community controls, we sampled 10,230 patients from the LINH (Netherlands Information Network of General Practice) database.[26] These patients belong to 15 different communities spread throughout The Netherlands. The sample counts 2541 family units.
   All cohorts (victims, family members, community control subjects, and the national reference) are mutually exclusive. As an inclusion criterion, all patients had to be enrolled at least 12 months before the disaster to guarantee baseline data. None of the disaster victims, 2 of their family members, 49 community control subjects, and 148 patients from the national reference population were excluded as a consequence of this eligibility criterion.
   Table 1 provides the characteristics of all cohorts.

**[ TABLE 1 ]**

## Outcome Measures

   A contact is defined as any professional interchange between a patient and members of the FP practice (doctor or assistant). These contacts can be either direct (face-to-face) or indirect (eg, telephone calls, repeat prescriptions). All contacts are registered electronically. If a patient has had several entries on the same day, this is counted as one contact in our analyses. We present 2 outcomes: 1) overall utilization (all contacts, including contacts for mental health), and 2) utilization related to mental health (contacts for mental health only).

### Overall Utilization

   To obtain the annual utilization per patient, we calculated a sum score of all contacts within 1 year's time. If a patient did not seek contact with the FP practice within 1 year, the sum score for that year was zero. Patients who were enrolled less than 6 months of a year in question (ie, as a result of death or moving away) were excluded from the analysis because the estimate could be imprecise for patients with an insufficiently long observation period (community controls: 150 cases; family members: 9 cases). The annual utilization of patients who were enrolled more than 6 months of a year, but less than 12 months, was estimated based on their utilization during the months they were enrolled

(community controls: 32 cases; family members: 2 cases; victims without burns: 1 case; national reference: 81 cases). This procedure provides a valid estimate of utilization rates and has been applied earlier by Armstrong and colleagues.[27]

*Utilization Related to Mental Health*

  The FPs classified a patient's health problem according to the International Classification of Primary Care (ICPC). The ICPC is an internationally endorsed classification system that is compatible to the International Classification of Diseases, 10th Revision.[28] Mental health problems are defined as listed in the P ("psychologic") and Z ("social") chapter of the ICPC. Data on utilization related to mental health are available for victims and community control subjects only.

## Covariates

  Covariates include variables that could possibly confound the relationship between exposure and utilization such as age, gender, and insurance status.[29–33] The last variable can be used as an indicator for socioeconomic status, because privately insured patients have a higher income than publicly insured patients (only 40% of the Dutch population have private insurance; approximately 60% of the population are insured through a compulsory insurance for any citizen with an annual income below a specific level).

## Analysis

  Patient characteristics are compared using one-way analysis of variance or $\chi^2$ tests (Table 1). For both outcome measures, overall utilization and utilization related to mental health problems, the unadjusted mean annual utilization and the percentage of patients with zero utilization are presented in Table 2. The distribution of utilization is heavily right-skewed and resembles a Poisson distribution. The mean and variance of the number of contacts per year are very different. We therefore fitted Poisson regression models that allow for overdispersion. The models in Tables 3 and 4 each compare the utilization of 2 groups. The models in Tables 5 and 6 focus on family members only and try to answer the question whether living with a burned child or being bereaved has an impact on utilization. All analyses were carried out with the MLwiN software package. Multilevel modeling was chosen because it accounts for the dependency of observations in our study.[34,35]

**[ TABLE 2]**
**[ TABLE 3 ]**
**[ TABLE 4 ]**
**[ TABLE 5 ]**

  The models 4 and 6 (Table 3) are 4-level models (level 1: measurement occasion, level 2: patient, level 3: family, level 4: practice). All other models are 3-level models. They are based on 3 practices only. In this case, practice was not modeled as a level but instead entered as a dummy variable. To get stable estimates for model 1 (Table 6), we also ignored the family level. For one model, we were not able to get estimates at all (a model equivalent to model 3, Table 6, but then for adolescent family members). It is therefore not reported. All models control for the influence of age, gender, and insurance status in the fixed part of the model (coefficients not displayed in tables). The 4 years of the study (2000, 2001, 2002, and 2003) are dummy-coded, with 2000 (the year prefire) as the reference category.

**[ TABLE 6 ]**

## RESULTS

## Descriptive Analysis

  Table 2 provides descriptive statistics on each cohort's annual utilization and the percentage of patients with zero utilization per year. The year 2000, the year before the fire, provides the baseline for all comparisons. Differences in utilization at baseline can be noted in the different comparison groups. Furthermore, in both victims with and without burns, a strong increase in number of contacts can be seen during the first year after the fire (2001). Victims with burns contact their FP approximately 4

times more often than before the fire and victims without burns approximately 1.5 times. In children who belong to the same age group, a slight increase from 2000 to 2001 can be observed. In the adult group, the same is the case in community control subjects and the national reference group. Adult family members of fire victims contact their FP on average one time more often per year than before the disaster. In community control subjects and the national reference group, the increase is minimal: 0.2 and 0.1 contacts per year. In addition, in adult family members of disaster victims, the rate of patients who have zero utilization (those who do not contact the FP practice) drops from 11.2% to 7.2% during the year 2001. In the other 2 groups (community and national reference), the percentage roughly remains at the same level. Changes in utilization related to mental health can be observed, too. After the fire, the mean utilization for mental health increases in both victims with and without burns, whereas the mean utilization of community control subjects (adult and adolescent) remains stable in the course of the 4 years. The percentage of patients with zero utilization for mental health declines in all groups after the fire with the exception of adult community control subjects.

## Multivariate Results

In a second step, the unadjusted utilization data as presented in Table 2 are submitted to statistical testing. The results (incidence rate ratios, 95% confidence intervals, $\chi^2$ values, degrees of freedom, and *P* values for contrasts) are displayed in Tables 3, 4, 5, and 6. All models compare each year after the fire with the year before the fire; the interaction terms indicate whether the risk for contacting the FP is higher in patients belonging to this group than in patients belonging to the comparison group during the year in question, holding all other variables in the equation constant.

## Overall and Mental Health Utilization

In the year 2001, the risk for contacting the FP for victims with burns is 2.43 times the risk for victims without burns (95% confidence interval [CI], 1.98 –2.99). In 2002, this is 1.61 (95% CI, 1.29 – 2.01), and in 2003, it is 1.60 (95% CI, 1.26 –2.02) (Table 3, model 1).

When looking at utilization related to mental health (model 1, Table 4), it turns out that in both victims with and victims without burns, in each year after the fire, utilization for mental health is higher than before the fire (year 2001: incidence rate ratio [IRR], 7.68; 95% CI, 3.66 –16.09; year 2002: IRR, 3.71; 95% CI, 1.57– 8.76; year 2003: IRR, 3.82; 95% CI, 1.46 –9.99). The interaction terms do not contribute to the model significantly, indicating that victims with and victims without burns do not differ in respect to their utilization for mental health-related problems.

Victims without burns and adolescent community control subjects both show an increase in utilization in the years 2001, 2002, and 2003 (model 2, Table 3). In the year 2001, however, the risk for contacting the FP for victims without burns is 1.55 times the risk for adolescent community control subjects (IRR, 1.55; 95% CI, 1.35–1.78). In addition, in 2001, victims without burns contact the FP more often for mental health-related problems than adolescent community control subjects (IRR, 4.54; 95% CI, 1.69 –12.20) (model 2, Table 4).

Adolescent family members of victims do not differ from adolescent community control subjects in respect to overall utilization and utilization for mental health during the 3 years after the fire (model 3, Table 3). In both groups, however, overall utilization (year 2001: IRR, 1.09; 95% CI, 1.05–1.15; year 2002: IRR, 1.28; 95% CI, 1.21–1.34; year 2003: IRR, 1.25; 95% CI, 1.18 –1.31) and utilization for mental health (year 2001: IRR, 1.58; 95% CI, 1.14 –2.19; year 2002: IRR, 2.05; 95% CI, 1.44 –2.94; year 2003: IRR, 2.05; 95% CI, 1.45–2.89; model 3, Table 4) are significantly higher than in 2000.

Model 4 (Table 3) compares adolescent community control subjects with adolescent patients who do not belong to a community that has been affected by a disaster (national reference). Again, in both groups, we see that during the years after the fire utilization is higher than in 2000. In addition, for adolescent community control subjects, the risk for contacting the FP increases by a factor of 1.17 (95% CI, 1.10 –1.24) in 2002. In 2001 and 2003, the risk is the same for adolescent community control subjects and adolescents belonging to the national reference population.

Model 5 (Table 3) compares adult family members and adult community control subjects. In adult family members, in 2001, the risk for contacting the FP increases by a factor of 1.13 (95% CI, 1.03– 1.24) as compared with adult community control subjects. Moreover, there are significant differences in risk between the groups in respect to utilization related to mental health problems (model 4, Table 5). During all 3 years postfire, adult family members are more likely to contact their FP for mental health problems than adult community control subjects. The risk ratio is higher during the first year

post-fire than in the second and third year (year 2001: IRR, 3.63; 95% CI, 2.31–5.72; year 2002: IRR, 1.89; 95% CI, 1.16 –3.09; year 2003: IRR, 1.82; 95% CI, 1.08 –3.07).

   Model 6 (Table 3), finally, compares adult community control subjects with adult patients who do not belong to a community that has been affected by a disaster (national reference). Two of the 3 interaction terms are significant, indicating that in 2002 (IRR, 1.06; 95% CI, 1.00 –1.11) and 2003 (IRR, 1.07; 95% CI, 1.01–1.13), the groups differ in respect to their annual utilization. The risk ratios are very close to 1, however, indicating that the association is not very strong.

## Effects of Living With a Burned Family Member and Bereavement

   According to model 1 and 3 (Table 5), living with a victim with burns does not affect overall utilization of adolescent family members, and it does not affect their utilization for mental health-related problems. Model 2 (Table 5) indicates, however, that, in 2001, the risk for contacting the FP in bereaved adolescent family members is 1.56 times the risk in those who are not bereaved (IRR, 1.56; 95% CI, 1.03–2.36). In the following years, no differences are found between bereaved and nonbereaved adolescent family members. Like in the adolescent group, it does not seem to matter whether an adult family member lives with a victim who suffers from burns; none of the interaction terms contribute significantly to the models (model 1, Table 5; model 1, Table 6). Bereavement, however, is associated with higher general utilization rates during 2001 (IRR, 1.88; 95% CI, 1.35–2.63; model 4, Table 5). In addition, being bereaved seems to affect the risk for contacting the family practitioner for problems related to mental health; as model 3 (Table 6) indicates, in 2001, in the bereaved, the risk for contacting the FP for mental health related problems is 8.69 times the risk of those adult family members who are not bereaved (95% CI, 2.10 –35.92). In 2002, this is 5.51 (95% CI, 1.11–27.35).


## DISCUSSION

   The aim of our study was to quantify the number of contacts in primary health care after a catastrophic fire and to identify determinants of utilization. It was hypothesized that exposure to trauma would lead to increased primary care utilization. Exposure was assumed to be highest in those who had been trapped in the pub, because they experienced life threat and witnessed others being burned or dying. Furthermore, it was hypothesized that the event would also have an impact on the primary care utilization rates of family members of victims because they are part of the victim's support system.

   We presented 2 outcome measures: overall primary care utilization and, more specifically, primary care utilization for mental health-related problems. During the 3 years after the fire, the risk for contacting the FP for victims with burns was higher than for victims without burns. Although utilization for mental health problems increased in both groups when compared with the year before the fire, both groups did not differ from each other in respect to their utilization for mental health problems. In our study, those victims who had been present during the fire and who had not been injured had significantly more contacts with their FP than adolescents from the same community who had not been trapped in the pub. This was true for the first year post-disaster. In addition, during the first year after the fire, victims without burns were 4.54 times more likely to contact the FP for mental health problems than adolescent community control subjects. To conclude, the presence of physical injuries alone does not determine increased primary care utilization after a disaster.

   We also compared the utilization rates of adolescent community control subjects with a national reference population. This comparison revealed that in all years, in both groups, utilization had increased when compared with the year before the fire. Both groups did not differ from each other, however, except from a small difference in the second year after the fire. Another study on the same disaster indicates that adolescents in Volendam reported more substance abuse, and more emotional and behavioral problems in the aftermath of the fire than control subjects outside the community.[36] Effects substantially decreased after 12 months after the disaster.[37] Adolescents are generally healthy and rarely seek help from their FP for behavioral or emotional problems.[38] This might explain why no effect is found in our study.

   To shed light on the impact the fire had on the family level, the parents and siblings of disaster victims were studied. It was assumed that as a result of traumatic experiences involving the entire support system of the victim, increased utilization would be shifted across several individuals. In our

study, this seems to apply to the bereaved. In parents, the effect is limited to the first 2 years after the fire, and it levels off in the third year. In siblings, bereavement seems to impact utilization during the first year after the fire only. Generally spoken, the effect is larger in size for parents of victims than for siblings of victims. In parents, the association is even stronger for mental health-related problems.

Furthermore, it was expected that the impact on utilization would be higher in family members of adolescents with burns when compared with family members of adolescents without burns because we assumed a higher burden of care and more distress in these families. This hypothesis was not supported by the current data, neither for primary care utilization in general nor for mental health utilization in the primary care context in particular. Possibly, it is insufficient to simply distinguish those families who live with a burn victim from those who do not without shedding light on the consequences of burns from a psychologic perspective.

Finally, an increase of utilization was also observed in families from the same community who did not live with a disaster victim. A similar time trend was observed in patients belonging to communities who had not been exposed to the disaster. The observed increase in community control subjects can thus not be ascribed to the effects of living in a community that has been affected by a fire catastrophe.

The presence of baseline data, the presence of 2 control groups (national reference and community control subjects), and the long follow-up period make this study unique in the field of disaster research and, equally, in the field of utilization studies.[10,39] In studies based on interviews or questionnaires, nonresponse can be a problem. Here, this source of bias is ruled out because it is based on already existing registrations of FPs. Study groups are therefore more comprehensive than in other types of studies and loss to follow up is minimized.

The use of existing registrations of family practitioners also has its limitations. It was determined which patients had been exposed to the fire, but the subjective experience of individuals was not measured. Individuals may vary considerably in how they experience the fire and its consequences, and their subjective experience may be an important moderator in the care-seeking process. In addition, other types of research are needed to clarify the psychologic mechanisms that link trauma and health.

The data for this study were collected in a healthcare system that builds on the gatekeeping role of FPs. Our results thus generalize to other highly regulated primary care systems (ie, health maintenance organizations or other European countries with "gatekeeping" systems). Because approximately 90% of Dutch patients' health problems are addressed in family practice,[40] our data supply a comprehensive account of healthcare utilization. On the other hand, the study does not account for treatment that was provided outside the primary care setting. Victims with burns, in particular, have been treated in specialist care, leading to an underestimation of effects in this group.

Finally, it should not be assumed that each type of trauma or disaster will lead to similar changes in utilization. Persons can experience trauma on an individual level (such as life-threatening injuries or sexual assault) or the experience can be shared by a group as in the case of disasters. Although disasters share important generic characteristics (eg, sudden onset, life threat, exposure to death and dying), they also vary along a number of specific dimensions (eg, type of injuries inflicted, degree of loss of property). Victims may belong to the same community as is the case here or they may stem from different areas like in transportation accidents. Findings from this study probably apply best to 1) manmade disasters that 2) occur in a community context and 3) have a one-time impact (no ongoing threat over a long period of time). To conclude, more systematic investigations of the full range of disasters are needed to determine the general impact of disaster and trauma on healthcare utilization.

## TABLES

**TABLE 1.** Patient Characteristics at Baseline

| | Victims | | | Adolescents | | | | Adults | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | With Burns (n = 162) | Without Burns (n = 124) | | Family of Victims (n = 303) | Community (n = 1966) | National Reference (n = 5616)[‖] | | Family of Victims (n = 499) | Community (n = 1756) | National Reference (n = 4614)[‖] | |
| Gender | | | | | | | | | | | |
| Male (%) | 107 (66.0) | 66 (53.2) | *[†] | 166 (54.8) | 1068 (54.3) | 2994 (53.3) | NS[†] | 238 (47.7) | 841 (47.9) | 2191 (47.5) | NS[†] |
| Female (%) | 55 (34.0) | 58 (46.8) | | 137 (45.2) | 898 (45.7) | 2622 (46.7) | | 261 (52.3) | 261 (52.1) | 2423 (52.5) | |
| Mean age (SD) | 16.9 (2.1) | 17.8 (2.9) | **[‡] | 16.2 (5.0) | 16.2 (4.6) | 15.9 (4.5) | **[‡] | 46.2 (4.6) | 46.7 (4.8) | 46.5 (5.1) | *[‡] |
| Insurance | | | | | | | | | | | |
| Private (%) | 34 (21.0) | 22 (17.7) | NS[†] | 117 (38.6) | 700 (35.6) | 2408 (42.9) | ***[†] | 195 (39.1) | 773 (44.0) | 1829 (39.6) | **[†] |
| Public (%) | 128 (79.0) | 102 (82.3) | | 186 (61.4) | 1266 (64.4) | 3208 (57.1) | | 304 (60.9) | 983 (56.0) | 2785 (60.4) | |
| Burns[§] (%) | 0 (0.0) | 9 (7.3) | | 169 (55.8) | — | — | | 277 (55.5) | — | — | |
| Bereaved[¶] (%) | 2 (1.2) | 0 (0.0) | | 14 (4.6) | — | — | | 27 (5.4) | — | — | |

[†]$\chi^2$ test.
[‡]Analysis of variance.
[§]Person lives with a burned victim.
[¶]Person has lost a family member as a result of the fire.
[‖]Source: National Information Network of GPs (LINH).
*Significant at $P < 0.05$.
**Significant at $P < 0.01$.
***[†]Significant at $P < 0.001$.
NS indicates not significant; SD, standard deviation.

**TABLE 2.** Unadjusted Mean Annual Utilization (Q1; Q3)* for Primary Care and Percentage of Patients With Zero Utilization in Victims, Family Members of Victims, Community Control Subjects, and a National Reference Population[†]

| | Victims | | Adolescents | | | Adults | | |
|---|---|---|---|---|---|---|---|---|
| | With Burns | Without Burns | Family of Victims | Community | National Reference | Family of Victims | Community | National Reference |
| Mean utilization (overall) | | | | | | | | |
| 2000 | 3.2 (1; 5) | 4.6 (2; 6) | 3.2 (1; 5) | 3.0 (1; 4) | 3.1 (0; 4) | 5.3 (2; 7) | 4.8 (1; 7) | 5.9 (1; 8) |
| 2001 | 13.2 (6; 18) | 7.7 (4; 10) | 3.8 (1; 6) | 3.3 (1; 5) | 3.3 (0; 5) | 6.2 (2; 9) | 5.0 (1; 7) | 6.0 (1; 8) |
| 2002 | 7.5 (3; 10) | 6.6 (4; 9) | 4.5 (1; 6) | 3.9 (1; 5) | 3.4 (0; 5) | 6.2 (2; 9) | 5.2 (2; 7) | 6.1 (1; 8) |
| 2003 | 6.9 (3; 9) | 6.2 (1; 8) | 4.3 (1; 7) | 3.8 (1; 5) | 3.7 (0; 5) | 6.7 (3; 9) | 5.7 (2; 8) | 6.5 (2; 9) |
| Percent with zero utilization (overall) | | | | | | | | |
| 2000 | 21.6 | 8.9 | 19.5 | 22.4 | 29.0 | 11.2 | 13.7 | 16.5 |
| 2001 | 2.5 | 1.6 | 18.5 | 22.0 | 27.2 | 7.2 | 15.0 | 16.2 |
| 2002 | 4.9 | 3.2 | 12.6 | 16.7 | 27.6 | 10.0 | 14.0 | 15.5 |
| 2003 | 1.9 | 3.3 | 14.3 | 22.0 | 25.5 | 7.1 | 14.8 | 15.3 |
| Mean utilization (mental) | | | | | | | | |
| 2000 | 0.0 (0; 0) | 0.1 (0; 0) | 0.0 (0; 0) | 0.1 (0; 0) | — | 0.2 (0; 0) | 0.2 (0; 0) | — |
| 2001 | 0.4 (0; 0) | 0.5 (0; 0) | 0.1 (0; 0) | 0.1 (0; 0) | — | 0.6 (0; 0) | 0.2 (0; 0) | — |
| 2002 | 0.2 (0; 0) | 0.3 (0; 0) | 0.1 (0; 0) | 0.1 (0; 0) | — | 0.3 (0; 0) | 0.2 (0; 0) | — |
| 2003 | 0.2 (0; 0) | 0.3 (0; 0) | 0.1 (0; 0) | 0.1 (0; 0) | — | 0.3 (0; 0) | 0.2 (0; 0) | — |
| Percent with zero utilization (mental) | | | | | | | | |
| 2000 | 98.8 | 92.7 | 97.4 | 96.7 | — | 89.2 | 88.5 | — |
| 2001 | 79.6 | 66.1 | 91.1 | 94.4 | — | 76.2 | 88.0 | — |
| 2002 | 89.5 | 85.5 | 96.0 | 94.4 | — | 85.5 | 89.0 | — |
| 2003 | 86.4 | 89.4 | 94.7 | 94.5 | — | 86.5 | 90.4 | — |
| Number included in analyses | | | | | | | | |
| 2000 | 162 | 124 | 303 | 1966 | 5616 | 499 | 1756 | 4614 |
| 2001 | 162 | 124 | 303 | 1965 | 5613 | 499 | 1752 | 4614 |
| 2002 | 162 | 124 | 301 | 1944 | 5438 | 498 | 1735 | 4543 |
| 2003 | 162 | 123 | 300 | 1908 | 5277 | 496 | 1712 | 4477 |

*Q1: 25th percentile, Q3: 75th percentile.
[†]Source: National Information Network of GPs (LINH).

**TABLE 3.** Poisson Regression Analysis With Group Membership Predicting Annual Primary Care Utilization, Controlling for Age, Gender, and Insurance Status*

| Utilization (overall) | Victims With vs. Victims Without Burns[†] | | | Victims Without Burns vs. Adolescent Community Control Subjects[‡] | | | Adolescent Family Members vs. Adolescent Community Control Subjects[§] | | | Adolescent Community Control Subjects vs. National Reference (adolescents)[‖] | | | Adult Family Members vs. Adult Community Control Subjects[¶] | | | Adult Community Control Subjects vs. National Reference (adults)** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | | Model 5 | | | Model 6 | | |
| | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | |
| Group | 0.75 | 0.60 | 0.93 | **1.34** | 1.13 | 1.59 | 1.00 | 0.88 | 1.14 | 0.95 | 0.75 | 1.21 | 1.07 | 0.97 | 1.18 | 0.84 | 0.67 | 1.05 |
| 2001[††] | **1.70** | 1.46 | 1.97 | **1.10** | 1.05 | 1.15 | **1.09** | 1.05 | 1.15 | **1.05** | 1.02 | 1.08 | 1.04 | 0.99 | 1.09 | 1.02 | 0.99 | 1.04 |
| 2002[††] | **1.45** | 1.24 | 1.71 | **1.27** | 1.21 | 1.33 | **1.28** | 1.21 | 1.34 | **1.08** | 1.05 | 1.12 | **1.10** | 1.05 | 1.15 | **1.03** | 1.01 | 1.06 |
| 2003[††] | **1.36** | 1.14 | 1.61 | **1.24** | 1.17 | 1.31 | **1.25** | 1.18 | 1.31 | 1.18 | 1.14 | 1.22 | **1.20** | 1.14 | 1.26 | **1.11** | 1.08 | 1.14 |
| Group*2001 | **2.43** | 1.98 | 2.99 | **1.55** | 1.35 | 1.78 | 1.11 | 0.98 | 1.25 | 1.05 | 0.99 | 1.11 | **1.13** | 1.03 | 1.24 | 1.02 | 0.97 | 1.08 |
| Group*2002 | **1.61** | 1.29 | 2.01 | 1.14 | 0.97 | 1.34 | 1.12 | 0.99 | 1.28 | **1.17** | 1.10 | 1.24 | 1.06 | 0.97 | 1.17 | **1.06** | 1.00 | 1.11 |
| Group*2003 | **1.60** | 1.26 | 2.02 | 1.10 | 0.92 | 1.31 | 1.09 | 0.95 | 1.25 | 1.05 | 0.99 | 1.12 | 1.05 | 0.95 | 1.16 | **1.07** | 1.01 | 1.13 |
| **Contrasts** | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P |
| Group*2001/Group*2002 | 24.22 | 1.00 | 0.00 | 20.72 | 1.00 | 0.00 | 0.05 | 1.00 | 0.82 | 17.75 | 1.00 | 0.00 | 1.70 | 1.00 | 0.19 | 1.64 | 1.00 | 0.20 |
| Group*2002/Group*2003 | 0.01 | 1.00 | 0.92 | 0.29 | 1.00 | 0.59 | 0.24 | 1.00 | 0.62 | 16.76 | 1.00 | 0.00 | 0.09 | 1.00 | 0.77 | 0.25 | 1.00 | 0.62 |

*Significant incidence rate ratios (IRRs) are printed in bold (alpha = 5%).
[†]Dummy variable; reference category is victims without burns.
[‡]Dummy variable; reference category is adolescent community control subjects.
[§]Dummy variable; reference category is adolescent community control subjects.
[¶]Dummy variable; reference category is adult community control subjects.
[‖]Dummy variable; reference category is the national reference (adolescents).
**Dummy variable; reference category is the national reference (adults).
[††]Dummy variable; reference category is year 2000 (prefire).
CI indicates confidence interval.

**TABLE 4.** Poisson Regression Analysis With Group Membership Predicting Annual Primary Care Utilization for Problems Related to Mental Health, Controlling for Age, Gender, and Insurance Status*

| Utilization (overall) | Victims With vs. Victims Without Burns[†] | | | Victims Without Burns vs. Adolescent Community Control Subjects[‡] | | | Adolescent Family Members vs. Adolescent Community Control Subjects[§] | | | Adult Family Members vs. Adult Community Control Subjects[¶] | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | |
| | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | |
| Group | 0.17 | 0.04 | 0.75 | 1.45 | 0.53 | 4.00 | 0.80 | 0.35 | 1.84 | 0.70 | 0.45 | 1.10 |
| 2001[‖] | **7.68** | 3.66 | 16.09 | **1.57** | 1.15 | 2.16 | **1.58** | 1.14 | 2.19 | 0.89 | 0.71 | 1.11 |
| 2002[‖] | **3.71** | 1.57 | 8.76 | **2.05** | 1.45 | 2.89 | **2.05** | 1.44 | 2.94 | 0.88 | 0.70 | 1.11 |
| 2003[‖] | **3.82** | 1.46 | 9.99 | **2.02** | 1.43 | 2.86 | **2.05** | 1.45 | 2.89 | 0.83 | 0.65 | 1.06 |
| Group*2001 | 3.82 | 0.78 | 18.62 | **4.54** | 1.69 | 12.20 | 1.82 | 0.74 | 4.46 | **3.63** | 2.31 | 5.72 |
| Group*2002 | 4.47 | 0.83 | 24.15 | 1.67 | 0.51 | 5.40 | 0.91 | 0.33 | 2.56 | **1.89** | 1.16 | 3.09 |
| Group*2003 | 4.38 | 0.74 | 25.99 | 1.59 | 0.49 | 5.14 | 1.27 | 0.48 | 3.33 | **1.82** | 1.08 | 3.07 |
| **Contrasts** | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P |
| Group*2001/Group*2002 | 0.16 | 1.00 | 0.69 | 5.76 | 1.00 | 0.02 | 3.05 | 1.00 | 0.08 | 5.12 | 1.00 | 0.02 |
| Group*2002/Group*2003 | 0.00 | 1.00 | 0.97 | 0.01 | 1.00 | 0.92 | 0.68 | 1.00 | 0.41 | 0.00 | 1.00 | 0.96 |

*Significant incidence rate ratios (IRRs) are printed in bold (alpha = 5%).
[†]Dummy variable; reference category is victims without burns.
[‡]Dummy variable; reference category is adolescent community control subjects.
[§]Dummy variable; reference category is adolescent community control subjects.
[¶]Dummy variable; reference category is adult community control subjects.
[‖]Dummy variable; reference category is year 2000 (prefire).
CI indicates confidence interval.

**TABLE 5.** Adolescent and Adult Family Members: Living With a Victim With Burns and Having Lost a Family Member as a Result of the Fire as Determinants of Annual Primary Care Utilization; Poisson Regression Analysis Controlling for Age, Gender, and Insurance Status*

| | Adolescent Family Members | | | | | | Adult Family Members | | | | | |
| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | |
| Utilization (overall) | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Burns[†] | 0.91 | 0.73 | 1.14 | — | — | — | 1.01 | 0.85 | 1.18 | | | |
| Bereaved[‡] | — | — | — | 1.14 | 0.69 | 1.87 | — | — | — | 1.08 | 0.76 | 1.53 |
| 2001[§] | **1.32** | 1.14 | 1.54 | 1.18 | 1.05 | 1.32 | **1.24** | 1.10 | 1.40 | **1.12** | 1.03 | 1.22 |
| 2002[§] | **1.40** | 1.18 | 1.65 | 1.45 | 1.29 | 1.64 | **1.25** | 1.10 | 1.42 | **1.15** | 1.05 | 1.26 |
| 2003[§] | **1.33** | 1.12 | 1.59 | 1.38 | 1.22 | 1.56 | **1.32** | 1.16 | 1.51 | **1.26** | 1.15 | 1.38 |
| Burns*2001 | 0.84 | 0.68 | 1.04 | — | — | — | 0.92 | 0.78 | 1.08 | — | — | — |
| Burns*2002 | 1.05 | 0.83 | 1.32 | — | — | — | 0.88 | 0.74 | 1.05 | — | — | — |
| Burns*2003 | 1.03 | 0.81 | 1.32 | — | — | — | 0.92 | 0.77 | 1.10 | — | — | — |
| Bereav*2001 | — | — | — | **1.56** | 1.03 | 2.36 | — | — | — | **1.88** | 1.35 | 2.63 |
| Bereav*2002 | — | — | — | 0.75 | 0.44 | 1.29 | — | — | — | 1.28 | 0.88 | 1.86 |
| Bereav*2003 | — | — | — | 0.68 | 0.38 | 1.21 | — | — | — | 1.09 | 0.74 | 1.61 |
| **Contrasts** | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P |
| Burns*2001/Burns*2002 | 3.06 | 1.00 | 0.08 | — | — | — | 0.20 | 1.00 | 0.65 | — | — | — |
| Burns*2002/Burns*2003 | 0.02 | 1.00 | 0.88 | — | — | — | 0.28 | 1.00 | 0.60 | — | — | — |
| Bereav*2001/Bereav*2002 | — | — | — | 7.59 | 1.00 | 0.01 | — | — | — | 5.08 | 1.00 | 0.02 |
| Bereav*2002/Bereav*2003 | — | — | — | 0.14 | 1.00 | 0.71 | — | — | — | 1.03 | 1.00 | 0.31 |

*Significant incidence rate ratios (IRRs) are printed in bold (alpha = 5%).
[†]Person lives with a victim with burns (yes/no).
[‡]Person has lost a family member as a result of the fire (yes/no).
[§]Dummy variable; reference category is year 2000 (prefire).
CI indicates confidence interval.

**TABLE 6.** Adolescent and Adult Family Members: Living With a Victim With Burns and Having Lost a Family Member as a Result of the Fire as Determinants of Annual Primary Care Utilization for Problems Related to Mental Health; Poisson Regression Analysis Controlling for Age, Gender, and Insurance Status*

| | Adolescent Family Members | | | Adult Family Members | | | | | |
| | Model 1 | | | Model 2 | | | Model 3 | | |
| Utilization (mental) | IRR | 95% CI | | IRR | 95% CI | | IRR | 95% CI | |
|---|---|---|---|---|---|---|---|---|---|
| Burns[†] | 0.65 | 0.15 | 2.89 | 1.15 | 0.53 | 2.50 | | | |
| Bereaved[‡] | | | | | | | 0.80 | 0.16 | 4.03 |
| 2001[§] | **3.34** | 1.03 | 10.86 | **2.60** | 1.47 | 4.60 | **2.05** | 1.44 | 2.92 |
| 2002[§] | 3.04 | 0.78 | 11.89 | 1.12 | 0.59 | 2.12 | 1.22 | 0.81 | 1.83 |
| 2003[§] | 2.20 | 0.56 | 8.72 | 1.72 | 0.86 | 3.42 | 1.13 | 0.68 | 1.86 |
| Burns*2001 | 0.96 | 0.18 | 5.15 | 1.11 | 0.52 | 2.37 | — | — | — |
| Burns*2002 | 0.67 | 0.10 | 4.62 | 1.39 | 0.60 | 3.21 | — | — | — |
| Burns*2003 | 1.87 | 0.28 | 12.48 | 0.52 | 0.20 | 1.32 | — | — | — |
| Bereav*2001 | — | — | — | — | — | — | **8.69** | 2.10 | 35.92 |
| Bereav*2002 | — | — | — | — | — | — | **5.51** | 1.11 | 27.35 |
| Bereav*2003 | — | — | — | — | — | — | 4.46 | 0.60 | 33.38 |
| **Contrasts** | $\chi^2$ | df | P | $\chi^2$ | df | P | $\chi^2$ | df | P |
| Burns*2001/burns*2002 | 0.30 | 1.00 | 0.58 | 0.67 | 1.00 | 0.41 | — | — | — |
| Burns*2002/burns*2003 | 5.57 | 1.00 | 0.02 | 6.90 | 1.00 | 0.01 | — | — | — |
| Bereav*2001/bereav*2002 | — | — | — | — | — | — | 1.53 | 1.00 | 0.22 |
| Bereav*2002/bereav*2003 | — | — | — | — | — | — | 0.08 | 1.00 | 0.78 |

*Significant incidence rate ratios (IRRs) are printed in bold (alpha = 5%).
[†]Person lives with a victim with burns (yes/no).
[‡]Person has lost a family member as a result of the fire (yes/no).
[§]Dummy variable; reference category is year 2000 (prefire).
CI indicates confidence interval.

# REFERENCES

1. Norris FH. Psychosocial consequences of disaster. *PTSD Research Quarterly.* 2002;13:1– 8.
2. Noji EK. The nature of disaster: general characteristics and public health effects. In: Noji EK, ed. *The Public Health Consequences of Disaster.* New York: Oxford University Press; 1997:3–20.
3. Yzermans CJ, Donker GA, Kerssens JJ, et al. Health problems of victims before and after disaster: a longitudinal study in general practice. *Int J Epidemiol.* 2005;34:810–819.
4. Norris FH, Friedman MJ, Watson PJ, et al. 60,000 disaster victims speak: Part I. An empirical review of the empirical literature, 1981– 2001. *Psychiatry.* 2002;65:207–239.

5. Schnurr PP, Green BL. Understanding relationships among trauma, posttraumatic stress disorder, and health outcomes. In: Schnurr PP, ed. *Trauma and Health: Physical Health Consequences of Exposure to Extreme Stress*. Washington, DC: American Psychological Association; 2004:247–275.

6. Walker EA, Newman E, Koss MP. Costs and health care utilization associated with traumatic experiences. In: Schnurr PP, ed. *Trauma and Health: Physical Health Consequences of Exposure to Extreme Stress*. Washington, DC: American Psychological Association; 2004:43– 69.

7. Williams R, Zyzanski SJ, Wright AL. Life events and daily hassles and uplifts as predictors of hospitalization and outpatient visitation. *Soc Sci Med*. 1992;34:763–768.

8. Donker GA, Yzermans CJ, Spreeuwenberg P, et al. Symptom attribution after a plane crash: comparison between self-reported symptoms and GP records. *Br J Gen Pract*. 2002;52:917–922.

9. van Vugt AB. [Disaster medicine: lessons from Enschede and Volendam.] *Ned Tijdschr Geneeskd*. 2001;145:2309 –2312.

10. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry*. 2002;65:240 –260.

11. Ritter PL, Stewart AL, Kaymaz H, et al. Self-reports of health care utilization compared to provider records. *J Clin Epidemiol*. 2001;54:136–141.

12. Stange KC, Zyzanski SJ, Smith TF, et al. How valid are medical records and patient questionnaires for physician profiling and health services research? A comparison with direct observation of patients visits. *Med Care*. 1998;36:851– 867.

13. Roberts RO, Bergstralh EJ, Schmidt L, et al. Comparison of selfreported and medical record health care utilization measures. *J Clin Epidemiol*. 1996;49:989 –995.

14. Figley CR. *Burnout in Families: The Systemic Costs of Caring*. Boca Raton, FL: CRC Press; 1998.

15. Van Loey NE, Van Son MJ. Psychopathology and psychological problems in patients with burn scars: epidemiology and management. *Am J Clin Dermatol*. 2003;4:245–272.

16. Mancuso MG, Bishop S, Blakeney P, et al. Impact on the family: psychosocial adjustment of siblings of children who survive serious burns. *J Burn Care Rehabil*. 2003;24:110 –118.

17. Shelby J, Sullivan J, Groussman M, et al. Severe burn injury: effects on psychologic and immunologic function in noninjured close relatives. *J Burn Care Rehabil*. 1992;13:58–63.

18. Meyer WJ, Blakeney P, Moore P, et al. Parental well-being and behavioral adjustment of pediatric survivors of burns. *J Burn Care Rehabil*. 1994;15:62– 68.

19. Rizzone LP, Stoddard FJ, Murphy JM, et al. Posttraumatic stress disorder in mothers of children and adolescents with burns. *J Burn Care Rehabil*. 1994;15:158 –163.

20. Watkins PN, Cook EL, May SR, et al. Postburn psychologic adaptation of family members of patients with burns. *J Burn Care Rehabil*. 1996;17:78 –92.

21. Barnes MF. Understanding the secondary traumatic stress of parents. In: Figley CR, ed. *Burnout in Families: The Systemic Costs of Caring. Innovations in Psychology*. 1998:75– 89.

22. Rubin SS, Malkinson R. Parental response to child loss across the life cycle: clinical and research perspectives. In: Stroebe MS, ed. *Handbook of Bereavement Research: Consequences, Coping, and Care*. 2001:219– 240.

23. Hall M, Irwin M. Physiological indices of functioning in bereavement. In: Stroebe MS, ed. *Handbook of Bereavement Research: Consequences, Coping, and Care.* 2001:473– 492.

24. Spratt ML, Denney DR. Immune variables, depression, and plasma cortisol over time in suddenly bereaved parents. *J Neuropsychiatry Clin Neurosci*. 1991;3:299 –306.

25. Okkes IM, Groen A, Oskam SK, et al. Advantages of long observation in episode-oriented electronic patient records in family practice. *Methods Inf Med*. 2001;40:229 –235.

26. Landelijk Informatienetwerk Huisartsenzorg. Feiten en cijfers over huisartsenzorg in Nederland [LINH web site]. Verheij RA, Jabaaij L, Abrahamse H, et al. Available at: http://www.linh.nl. Accessed June 24, 2005.

27. Armstrong MA, Midanik LT, Klatsky AL. Alcohol consumption and utilization of health services in a health maintenance organization. *Med Care*. 1998;36:1599 –1605.

28. Hofmans-Okkes IM, Lamberts H. The International Classification of Primary Care (ICPC): new applications in research and computer-based patient records in family practice. *Fam Pract*. 1996;13:294 –302.

29. Kersnik J, Svab I, Vegnuti M. Frequent attenders in general practice: quality of life, patient satisfaction, use of medical services and GP characteristics. *Scand J Prim Health Care*. 2001;19:174 –177.

30. Neal RD, Wickenden G, Cottrell D, et al. The use of primary, secondary, community and social care by families who frequently consult their general practitioner. *Health Soc Care Community*. 2001;9:375–382.

31. Heywood PL, Blackie GC, Cameron IH, et al. An assessment of the attributes of frequent attenders to general practice. *Fam Pract.* 1998;15: 198–204.

32. Scaife B, Gill P, Heywood P, et al. Socio-economic characteristics of adult frequent attenders in general practice: secondary analysis of data. *Fam Pract.* 2000;17:298 –304.

33. Bergh H, Marklund B. Characteristics of frequent attenders in different age and sex groups in primary health care. *Scand J Prim Health Care.* 2003;21:171–177.

34. Goldstein H. *Multilevel Models in Education and Social Research.* Oxford: Oxford University Press; 1987.

35. Snijder TB, Bosker R. *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling.* Thousand Oaks, CA: Sage; 1999.

36. Reijneveld SA, Crone MR, Verhulst FC, et al. The effect of a severe disaster on the mental health of adolescents: a controlled study. *Lancet.* 2003;362:691– 696.

37. Reijneveld SA, Crone MR, Schuller AA, et al. The changing impact of a severe disaster on the mental health and substance misuse of adolescents: follow-up of a controlled study. *Psychol Med.* 2005;35:367–376.

38. Zwaanswijk M, Verhaak PF, van der EJ, et al. Consultation for and identification of child and adolescent psychological problems in Dutch general practice. *Fam Pract.* 2005;22:498 –506.

39. Eisenberg JM. Physician utilization: the state of research about physicians' practice patterns. *Med Care.* 2002;40:1016 –1035.

40. van der Lei J, Duisterhout JS, Westerhof HP, et al. The introduction of computer-based patient records in The Netherlands. *Ann Intern Med.* 1993;119:1036 –1041.