Clinical Science

Acute traumatic stress among surgeons after major surgical complications

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Surgical complications; Adverse events; Traumatic stress; Psychological well-being

Abstract

BACKGROUND: Patient harm resulting from medical treatment may be a traumatic experience for health care staff. This study examined surgeons’ levels of traumatic stress in the aftermath of the most recent major complication that happened in their patients’ care and its relationship with surgeons’ coping strategies, causal attributions, and perceived institutional culture around surgical complications.

METHODS: Forty-seven general and vascular surgeons from 3 National Health Service Trusts in London, UK completed a questionnaire assessing the aforementioned variables (64.4% response rate).

RESULTS: One-third of the participants reported traumatic stress of clinical concern 1 month after the incident. The use of self-distraction (P < .05) and being a general surgeon (P < .05) were predictive of traumatic stress of clinical concern in multiple logistic regression analysis.

CONCLUSIONS: Some surgeons may experience acute traumatic stress after serious surgical complications. The extent to which this is of clinical concern is associated with their use of self-distraction as well as the clinical setting. Health care organizations need to attend to surgeons’ psychological needs in the aftermath of serious adverse events.

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Despite health care professionals’ best intentions, patients sometimes experience harm, which is caused by their medical treatment. Studies around the world suggest that the rates of adverse events in secondary care lie between 8% and 12% of hospital admissions. 1-11 Patients may suffer both physical and psychological trauma after adverse events that result in serious harm. 12 However, the emotional toll of serious adverse events on health care staff may also be quite severe, especially when incidents are preventable and lead to significant patient injuries. 12 Health care professionals have been called the “second victims” of adverse events in health care. 13 A small number of early studies have shown profound emotional effects for doctors who are involved in serious adverse events, such as fear, guilt, anger, embarrassment, humiliation, or even anxiety and depression symptoms. 14-17

One of the highest risk areas for serious medical harm is the operating room. 2,18 A retrospective review of 15,000
nonpsychiatric discharges from a sample of representative hospitals in Utah and Colorado found that 66% of all adverse events were surgical and 54% among them were preventable. Among all surgical adverse events, 5.6% resulted in death, accounting for 12.2% of all hospital deaths in Utah and Colorado. A survey study of surgeons found that having been involved in a preventable surgical adverse event was associated with significantly lower mental quality of life, higher levels of burnout, and higher risk of screening positive for depression. Reported errors were also related to lower career satisfaction.

Another possible consequence of surgeons’ involvement in serious surgical adverse events is the experience of traumatic stress, as “causing death or severe harm to another” is one of the core aspects of traumatic incidents. Recently, an exploratory interview study on surgeons’ experiences of surgical complications found that many surgeons reported feelings of guilt, fear, and a tendency to become vigilant and risk-averse in the aftermath of surgery that went wrong. Such reactions are commonly encountered among individuals who are diagnosed with post-traumatic stress disorder (PTSD), which is a syndrome associated with the experience of traumatic events involving 3 clusters of symptoms: (a) re-experiencing the event; (b) avoiding reminders of it; and (c) experiencing increased hyperarousal. However, to date there are no data on health care professionals’ experience of traumatic stress as a result of their involvement in adverse events that cause patient harm.

Little attention has also been paid to the mechanisms that mediate or moderate the psychological impact of adverse events on health care professionals. An exploratory interview study identified a number of individual-, incident-, and institution-related factors that may contribute to the severity of surgeons’ reactions to surgical adverse events. One key factor of surgeons’ postincident well-being was their ways of coping with the stress of complications. Most surgeons admitted that discussing serious complications with peers or deconstructing them to identify learning lessons helped them deal with incidents. Another important determinant of surgeons’ reactions to surgical adverse events was reported to be the extent to which surgeons saw themselves as responsible for the event. When surgeons felt that the incident occurred because of their own decisions or practices they tended to experience stronger emotional reactions. This finding is in line with earlier studies, which have shown that an internal locus of causality is associated with more PTSD symptoms, especially when the traumatic stressor is perceived as controllable. Finally, the aforementioned qualitative study found that the existence of blame as opposed to a supportive institutional culture exacerbates the psychological impact of these incidents on surgeons. A negative social environment (eg, indifference, criticism, or blame) is often a significant predictor of the development of PTSD.

In this study, we are interested in exploring surgeons’ levels of acute traumatic stress in the aftermath of major surgical complications and its potential predictors. We hypothesized that surgeons’ acute traumatic stress in the aftermath of serious surgical complications will be predicted by the ways in which surgeons cope with the stress of the incident, the perceived locus and controllability of the causes that led to the complication, and their perceptions of the institutional culture around surgical complications.

Methods

Participants

Participants were recruited from a series of general and vascular surgical audit meetings in 3 National Health Service (NHS) hospitals in London, UK. At the end of each meeting, surgeons were provided with a hard or an electronic copy of the questionnaire. Reminder e-mails were sent twice. The completion of the survey was kept anonymous. In total, 73 surgeons were asked to participate in the study; 54 completed the survey. Seven respondents did not meet the inclusion criteria of having experienced at least 1 major surgical complication in their practice; therefore, the analysis included data from 47 surgeons (64.4% response rate). Ethical approval was obtained from the North West London Research Ethics Committee 1 ethics committee.

Measures

The participants were asked to complete the questionnaire in relation to their most recent major surgical complication, to control for biases that would operate if participants could choose any incident. Surgeons were asked to report the recency (1 = in the last month, 2 = in the last 3 months, 3 = in the last 6 months, and 4 = in the last year) and severity of the incident (1 = the patient died, 2 = the patient developed morbidity with lasting disability, and 3 = the patient developed morbidity but recovered fully). They were also asked whether they had been involved in legal proceedings as a result of it (yes or no). Acute traumatic stress was assessed with the Impact of Events (IES) scale. IES includes 7 items on intrusive thoughts (eg, “I thought about it when I didn’t mean to”) and 8 items on avoidance behaviors (eg, “I tried to remove it from memory”) assessed on a 4-point scale (0 = not at all, 1 = rarely, 3 = sometimes, 5 = often). A cutoff point of 19 has been suggested to indicate traumatic stress of clinical concern. The participants rated the extent to which they experienced each of the symptoms during the first month after the incident, which is the time frame associated with acute traumatic stress.

The perceived locus and perceived controllability of the causes that led to the reported complication were assessed on continuous scales ranging from 1 (“all to do with you/ completely controllable by you”) to 7 (“all to do with others or external factors/completely uncontrollable by you”). Surgeons’ ways of coping with the stress of the complication were measured the Brief-COPE inventory, which assesses the use of various coping strategies known to be relevant to effective and ineffective coping (eg, self-
distraction, active coping, denial, substance use, use of emotional or instrumental support) in relation to a specified event. Each coping strategy is assessed by 2 items on a 4-point scale (1 = I haven’t been doing this at all, 2 = I have been doing this a little bit, 3 = I have been doing this a medium amount, 4 = I have been doing this a lot). The institutional culture around surgical complications was measured with the “punitive response to error” scale of the Hospital Survey on Patient Safety Culture. This scale includes 3 items, (eg, “staff feel like their mistakes are held against them”), which are assessed on a 5-point Likert-type scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The items were modified to reflect the surgical context (eg, “staff” was replaced with “surgeons”, “mistakes” was replaced with “complications”).

The following participant characteristics were also assessed: age, gender, NHS organization, nationality, relationship status, whether the participants had children, surgical specialty, clinical position, hours of clinical work per week, and whether they held an academic position.

Statistical analysis

The data were analyzed using IBM SPSS Statistics for Windows, Version 20.0. Descriptive statistics and frequencies were used to summarize the study variables. Nonparametric tests were used as most of the variables did not meet the assumption of normality (Mann-Whitney tests, Spearman rank order correlations). Chi-square tests were used to assess the levels of one categorical variable against the levels of another categorical variable. Hierarchical multiple logistic regression analysis was used to assess the factors that predicted surgeons scoring above the cutoff point for traumatic stress of clinical concern (ie, IES total score above 19). Factors that were significantly associated with traumatic stress of clinical concern in univariate analyses were entered in the regression analysis. Diagnostic statistics indicated that the assumption of no multicollinearity was met.

Results

Most respondents specialized in general surgery (60%). Most respondents were also surgical trainees (60%). The mean number of years in their clinical position was 6.2 (standard deviation [SD] = 5.9 years; range = .35 to 35 years), whereas the mean number of hours of clinical work per week was 50 (SD = 17.7 hours; range = 0 to 72 hours). Half of the participants (49%) held an academic position. Most respondents were male (77%), British (77%), and married (68%). Their mean age was 38.5 years (SD = 7.7 years; range = 27 to 64 years), and 55% of them had children. Most participants’ most recent major surgical complication happened in the previous 3 months (54%), 17% between 3 and 6 months ago, and 17% more than 6 months ago. In most cases, the patient developed morbidity but eventually recovered (41%). Twenty-eight percent of the complications led to patient morbidity with lasting disability, whereas 18% led to patient death.

Table 1 summarizes descriptive information on the study variables. One-third of the participants scored above the IES cutoff point of 19 (n = 17; 36.2%), which indicates traumatic stress of clinical concern.

There was a significant positive correlation between the use of self-distraction and acute traumatic stress (r = .48; P = .002). Mann-Whitney tests also showed that respondents who scored above the cutoff point for acute traumatic stress of clinical concern reported significantly more frequent use of self-distraction (median = 3.5) than those who scored below the cutoff point (median = 2.0; U = 278.5; P = .006). No other coping strategies were significantly correlated with acute traumatic stress scores or with scoring above the cutoff point for acute traumatic stress of clinical concern. There was also a marginally significant positive relationship between perceptions of a punitive institutional response to complications and acute traumatic stress (r = .31; P = .047). Surgical specialty was also significantly associated with acute traumatic stress of clinical concern with 53.6% of the general surgeons scoring above the cutoff point for traumatic stress of clinical concern compared with only 15.4% of the vascular surgeons (chi-square [2; n = 41] = 5.33; P = .021). There were no significant relationships between acute traumatic stress and perceived locus or controllability of the causes of the complication, the recency or severity of the incident, or the participants’ characteristics.

The factors that were significantly associated with acute traumatic stress of clinical concern (ie, surgical specialty, use of self-distraction, and punitive institutional response) were entered in a hierarchical multiple logistic regression analysis on the occurrence of acute traumatic stress of clinical concern (total IES score above 19). Surgical specialty was entered first. Being a general surgeon significantly predicted the occurrence of acute traumatic stress of clinical concern (b = −2.04; standard error [SE] = .87; P = .019). The addition of self-distraction use significantly improved the prediction of the occurrence of acute traumatic stress of clinical concern (b = 1.08; SE = .469; P = .021), whereas surgical specialty continued to be a significant predictor. Surgeons’ perceived institutional response to surgical complications was added in the last step but did not make any significant contribution, whereas surgical specialty and the use of self-distraction continued to significantly predict the outcome (Table 2). In summary, practicing general surgery and more frequent use of self-distraction in the aftermath of surgeons’ most recent major surgical complication significantly predicted scoring above the cutoff point for acute traumatic stress of clinical concern.

Comment

This is the first study to our knowledge that assessed surgeons’ (or any other health care professionals’)
traumatic stress in the aftermath of serious adverse events. A striking finding was that one-third of the participants scored above the cutoff point for traumatic stress of clinical concern during the first month after the incident. This percentage is suggestive of the high emotional burden that major adverse events often cause on clinical staff.

This study also sought to explore if surgeons’ ways of coping, their perceptions of the locus and controllability of the causes of the incident, and their perceptions of the institutional culture predicted their experience of acute traumatic stress in the aftermath of their most recent major complication. Self-distraction was the only coping strategy that was used significantly more frequently by participants who experienced acute traumatic stress of clinical concern and was also an independent predictor of traumatic stress of clinical concern in the logistic regression analysis. This is in agreement with literature, which suggests that suppression of thoughts related to a traumatic incident is associated with higher PTSD symptoms.28,34,35 Institutions’ punitive response to surgical adverse events was also significantly associated with the experience of traumatic stress in the univariate analysis. The existence of blame and the lack of institutional support for staff in the aftermath of adverse events is a common finding.25,36 This study provides preliminary evidence on the existence of a negative relationship between the existence of institutional blame and surgeons’ well-being in the aftermath of serious complications, although the lack of significant contribution of this factor in the regression analysis indicates that this relationship warrants further investigation. Finally, contrary to our hypothesis, there was not a significant relationship between surgeons’ perceptions of the locus and controllability of the causes of the reported complication and acute traumatic stress. This contradicts existing qualitative evidence, which suggests that higher perceived responsibility for adverse events is associated with higher distress in health care professionals.22,37

Interestingly, being a general surgeon was predictive of higher odds of experiencing traumatic stress of clinical concern both in univariate and in multivariate analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Range</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact of Events Scale*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intrusion</td>
<td>9.47 (7.30)</td>
<td>.00–27.00</td>
<td></td>
</tr>
<tr>
<td>Avoidance</td>
<td>7.75 (6.40)</td>
<td>.00–28.00</td>
<td></td>
</tr>
<tr>
<td>Total score (traumatic stress)</td>
<td>17.44 (12.17)</td>
<td>.00–55.00</td>
<td></td>
</tr>
<tr>
<td>Above 19†</td>
<td>17 (36.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below 19</td>
<td>26 (55.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>4 (8.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coping strategies‡</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-distraction</td>
<td>2.93 (1.02)</td>
<td>2.00–5.00</td>
<td></td>
</tr>
<tr>
<td>Active coping</td>
<td>4.39 (1.76)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Denial</td>
<td>2.21 (.67)</td>
<td>2.00–6.00</td>
<td></td>
</tr>
<tr>
<td>Substance use</td>
<td>2.36 (.97)</td>
<td>2.00–6.00</td>
<td></td>
</tr>
<tr>
<td>Emotional support</td>
<td>3.30 (1.56)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Instrumental support</td>
<td>4.30 (1.98)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Behavioral disengagement</td>
<td>2.39 (.81)</td>
<td>2.00–5.00</td>
<td></td>
</tr>
<tr>
<td>Venting</td>
<td>3.53 (1.56)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Position refraiming</td>
<td>3.52 (1.52)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td>4.93 (2.00)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Humor</td>
<td>2.60 (1.17)</td>
<td>2.00–7.00</td>
<td></td>
</tr>
<tr>
<td>Acceptance</td>
<td>5.45 (1.63)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td>2.30 (.74)</td>
<td>2.00–5.00</td>
<td></td>
</tr>
<tr>
<td>Self-blame</td>
<td>4.57 (1.63)</td>
<td>2.00–8.00</td>
<td></td>
</tr>
<tr>
<td>Causal attributions§</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of the causes that led to the incident</td>
<td>3.90 (1.62)</td>
<td>1.00–6.00</td>
<td></td>
</tr>
<tr>
<td>Controllability of the causes that led to the incident</td>
<td>4.01 (1.80)</td>
<td>1.00–7.00</td>
<td></td>
</tr>
<tr>
<td>Institutional punitive response to surgical adverse events</td>
<td></td>
<td></td>
<td>3.46 (.92)</td>
</tr>
</tbody>
</table>

SD = standard deviation.

*This scale includes 7 items on intrusive thoughts and 8 items on avoidance behaviors assessed on a 4-point scale (0 = not at all, 1 = rarely, 3 = sometimes, and 5 = often).
†Cut-off point for traumatic stress of clinical concern.
‡Each coping strategy was assessed with two items on a scale ranging from 1 to 4 (1 = I have not been doing this at all, 2 = I have been doing this a little bit, 3 = I have been doing this a medium amount, 4 = I have been doing this a lot).
§Causal attributions were assessed on continuous scales ranging from 1 (all to do with you or completely controllable by you) to 7 (all to do with others or external factors or completely uncontrollable by you).
||This scale includes 3 items which are assessed on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).
possible explanation is that general surgeons are less accustomed to the occurrence of stark complications such as those that often occur in vascular surgery (eg, bleeding, limb loss). A complication arising unexpectedly in a low-risk patient potentially takes a higher toll than one occurring in a high-risk patient (eg, vascular patients), as also suggested by an interview study on surgeons’ experiences of complications. The aforementioned finding highlights the importance of contextual variables such as patient risk factors and the clinical setting in explaining health care professionals’ reactions to adverse events and raises questions about the conditions that place health care professionals at higher risk for traumatic stress in the aftermath of major adverse events.

A few methodological limitations need to be taken into consideration. First, the study’s design is cross-sectional and does not allow causal inferences about the observed relationships. Second, the small sample size did not permit the inclusion of all relevant factors in the regression analysis. Only variables that were highly significantly associated with IES total scores were considered. Despite any limitations, this is the first study to our knowledge that investigated the experience of traumatic stress among surgeons (or health care professionals) who are involved in serious adverse events.

### Conclusions

In summary, the study findings suggest that a significant percentage of surgeons may experience acute traumatic stress after serious surgical complications and that the extent to which these symptoms will be of clinical concern may be dependent on their use of self-distraction as well as the clinical setting. Surgeons who use self-distraction as a coping strategy and surgeons who practice general as opposed to vascular surgery are at higher risk for experiencing acute traumatic stress of clinical concern in the aftermath of serious surgical complications. The implications of these findings for health care organizations are significant as they need to consider how best to support their staff when serious adverse events occur. For example, early training on how to cope more effectively with serious adverse events may prevent symptoms of severe traumatic distress, which could lead to further suboptimal care. Finally, there is a need for future studies with bigger samples, longitudinal designs, and the use of multivariate analyses to elucidate the prevalence of traumatic stress among health care professionals in the aftermath of serious adverse events, as well as the mediators and moderators of the traumatic impact of such incidents.

### Acknowledgment

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### References