

The physician's Achilles heel—surviving an adverse event

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ABSTRACT

Background Of hospitalized patients in Canada, 7.5% experience an adverse event (AE). Physicians whose patients experience AEs often become second victims of the incident. The present study is the first to evaluate how physicians in Canada cope with AEs occurring in their patients.

Methods Survey participants included oncologists, surgeons, and trainees at the Foothills Medical Centre, Calgary, AB. The surveys were administered through REDCap (Research Electronic Data Capture, version 9.0: REDCap Consortium, Vanderbilt University, Nashville, TN, U.S.A.). The Brief COPE (Coping Orientation to Problems Experienced) Inventory, the IES-R (Impact of Event Scale–Revised), the Causal Dimension Scale, and the Institutional Punitive Response scale were used to evaluate coping strategies, prevalence of post-traumatic stress, and institutional culture with respect to AEs.

Results Of 51 responses used for the analysis, 30 (58.8%) came from surgeons and 21 (41.2%) came from medical specialists. On the IES-R, 54.9% of respondents scored 24 or higher, which has been correlated with clinically concerning post-traumatic stress. Individuals with a score of 24 or higher were more likely to report self-blame ($p = 0.00026$) and venting ($p = 0.042$). Physicians who perceive institutional support to be poor reported significant post-traumatic stress ($p = 0.023$). On multivariable logistic regression modelling, self-blame was associated with an IES-R score of 24 or higher ($p = 0.0031$). No significant differences in IES-R scores of 24 or higher were observed between surgeons and non-surgeons ($p = 0.15$).

The implications of AEs for physicians, patients, and the health care system are enormous. More than 50% of our respondents showed emotional pathology related to an AE. Higher levels of self-blame, venting, and perception of inadequate institutional support were factors predicting increased post-traumatic stress after a patient AE.

Conclusions Our study identifies a desperate need to establish effective institutional supports to help health care professionals recognize and deal with the emotional toll resulting from AEs.

Key Words Adverse events

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INTRODUCTION

Adverse events (AEs) that arise during patient care can result not only in lasting morbidity for the patient, but often lasting and serious implications for the physician. Adverse events are defined as unintended complications leading to injury, disability, or death¹. In Canada, approximately 7.5% of hospitalized patients experience an AE; the incidence worldwide ranges from 8% to 12%^{1,2}. Despite use by institutions of systemic safety checks to lower the rate of AEs,

such events will never fully be eliminated, and physicians will remain vulnerable because many decisions have to be made without knowing the definitive outcome. A physician whose patient experiences an AE often becomes the second victim of the incident³. Almost invariably such events trigger a substantial emotional response, eliciting feelings of shame, guilt, fear, panic, shock, and humiliation^{4,5}. That emotional response often has a significant negative impact on the professional performance and personal life of the affected individual^{6,7}.

In recent years, the emotional toll that physicians—and indeed all health care workers—experience after a patient AE has begun to be recognized. The current literature focuses on the incidences of AEs and on improving systems to prevent AEs from happening. To date, however, the literature documenting consistent effective strategies to deal with the emotional trauma that a patient AE causes is very limited. Many health care providers initially experience a stage of internal and external turmoil, followed by feelings of re-enactment, inadequacy, and self-isolation⁶. The negative feelings often intensify when patients experience worse outcomes, such as disability or death, often resulting in a compromise of care. Furthermore, Shanafelt and Noseworthy⁸ reported that a significant number of doctors experience burnout as a result of patient AEs, which in turn contributes to more AEs.

Physicians move on from patient AEs in 3 different ways: they quit, they survive, or they thrive⁶. Quitting and surviving carry significant costs both for the individual and for the system. First, physicians might require lengthy time off or might switch institutions or withdraw from practice, which can leave the institution understaffed and require that other staff work extended hours. That pressure in turn makes the remaining physicians more vulnerable to patient AEs^{9,10}.

Second, a physician might continue to work at a performance level similar to that before the incident without appearing to be substantially affected by the patient AE. But external appearances might be inconsistent with internal feelings, and thus many physicians turn to maladaptive coping mechanisms such as substance abuse, addiction, and in some cases, even suicide^{7,11–13}. It is crucial to address the latter subgroup, because internalizing feelings could have lasting negative effects on an individual's professional and personal life.

Physicians who successfully overcome a patient AE continue to thrive. Those individuals manage to effectively cope with the AE by finding personal forgiveness and learning to adjust their practice to avoid similar events from happening in the future¹⁴.

A study conducted by Pinto *et al.*² identified some of the factors that contribute to post-traumatic stress in American surgeons. We adopted the measures used by those authors, but used a validated cut-off for post-traumatic stress that has been tested in cohorts of survivors of arsenic poisoning, the Great Hanshin–Awaji earthquake, and the sarin attack in the Tokyo Metro¹⁵. To our knowledge, the present study is the first to evaluate the experiences of Canadian surgical and medical specialists after a patient AE.

METHODS

Participants

Survey participants included specialists and trainees working in oncology and surgery at the Foothills Medical Centre, Calgary, AB. Potential participants were contacted by e-mail and sent the instructions, with a link to the survey. Reminder e-mail messages were sent twice. The surveys were administered through REDCap (Research Electronic Data Capture, version 9.0: REDCap Consortium, Vanderbilt University, Nashville, TN, U.S.A.), and responses

were kept anonymous¹⁶. Only participants who had experienced at least 1 major patient complication during their practice were considered for analysis. Participants who had not experienced any major patient complications were excluded from the analysis.

Surveys were sent to 150 staff surgical oncologists, medical oncologists, radiation oncologists, gynecologic oncologists, hematologists, and palliative care physicians, and to 40 oncology trainees. Of 57 surveys returned (30%), 3 were incomplete, and 3 were excluded because the responder had not experienced a patient AE. Of the remaining 51 surveys used for the analysis, 6 (11.8%) had been completed by trainees.

Ethics approval for the study was obtained from the University of Calgary Conjoint Health Research Ethics Board.

Measures

Psychometric measures from Pinto *et al.*² were adopted and modified. Participants were consented to participate in the survey through REDCap. Participants were asked to provide level of training, age, sex, relationship status (single, relationship, married), specialty (surgical oncology, medical oncology, radiation oncology, gynecologic oncology, other), hours of work per week, recency of the patient AE (<1 month, last 3 months, last 6 months, last year, more than 1 year), and complications resulting for the patient after the AE (patient died, patient developed morbidity with lasting disability, patient developed morbidity and recovered). Lastly, any involvement with legal proceedings after the patient AE was also requested.

Post-traumatic stress was assessed using the IES-R (Impact of Event Scale–Revised), which includes 7 items about intrusive thoughts and 8 items about avoidance behaviors. Participants rated the extent to which they experienced each symptom during the first month after the incident. Responses are scored as not at all (0), rarely (1), sometimes (3) or often (5). A score of 24 or higher was previously shown to be associated with post-traumatic stress symptoms of clinical concern¹⁵. Additionally, the perceived locus of controllability for each cause that led to the reported AE was evaluated on a continuous scale ranging from 1 (all to do with you or completely controllable by you) to 7 (all to do with other or external factor or completely uncontrollable by you). The Brief COPE (Coping Orientation to Problems Experienced) Inventory was used to assess coping strategies¹⁷. The Inventory evaluates 14 coping strategies (active coping, planning, positive reframing, acceptance, humour, religion, emotional support, instrumental support, self-distraction, denial, venting, substance abuse, behavioral disengagement, and self-blame). Each strategy included 2 items and was evaluated on a continuous 4-point scale (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). A modified Institutional Punitive Response scale was used to evaluate our local institutional culture with respect to patient AEs. The scale includes 3 items (Physicians feel that their complications are held against them, Physicians feel that adequate institutional support exists for the staff to help deal with AEs, and Our institution's procedures and systems are good at preventing complications from

happening) that are assessed using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Analysis

Survey responses are reported as means and medians with standard deviations and interquartile ranges. For group comparisons, we used the Wilcoxon rank-sum test (also called the Mann-Whitney *U*-test). For categorical responses we used the Fisher exact test. We then fit a multivariable logistic regression using the survey questions that were significant in univariable models. The statistical analysis was conducted using the R software application (version 3.5.2: The R Foundation for Statistical Computing, Vienna, Austria).

RESULTS

Of the 51 surveys analyzed, 30 (58.8%) were returned by surgeons; 5 (9.8%), from medical oncologists; 5 (9.8%), from radiation oncologists; and 11 (21.6%), from other specialties including palliative care and hematology. The surgical responses included surgical oncologists, gynecologic oncologists, and orthopedic surgical oncologists. Of the 51 responders, 33 (64.7%) were men, 45 (88.2%) were on staff, 40 (78.4%) were married, and 7 (14%) were in a relationship.

In 19 cases (37.3%), the patients had developed morbidity but recovered; in 18 (35.3%), the patients had developed a lasting morbidity; and in 14 (27.5%), the patient had died. After the patient's AE, 11 physicians (21.6% of all respondents) were involved in legal proceedings. In 36 cases (70.6%), the AE had occurred more than 1 year earlier.

Of the 51 respondents, 13 (25.5%) were less than 40 years of age, and 38 (74.5%) were 40 years of age or older. For 25 respondents (49%), work occupied 40–59 hours per week; 3 (5.88%) worked less than 39 hours per week; and 23 (45.1%) worked more than 60 hours per week. Table I shows complete descriptive statistics for the study variables.

Of the 51 respondents, 54.9% scored 24 or more on the IES-R (correlating with clinically concerning post-traumatic stress¹⁵). The Wilcoxon rank-sum test showed that respondents who scored 24 or more on the IES-R were significantly more likely to use self-blame ($p = 0.00026$) and venting ($p = 0.042$) as coping strategies. No other coping strategies were statistically significant. Compared with respondents having a score on the IES-R of less than 24, those with a score of 24 or more were more likely to believe that institutional support was inadequate ($p = 0.023$). By Fisher exact test, no significant differences were evident between demographic variables such as age, sex, severity of the AE, and legal involvement and the development of post-traumatic stress. Also, no differences in IES-R scores of 24 or more were evident between the medical and surgical oncologists ($p = 0.15$).

Table II presents complete descriptive statistics for the variables, with direct comparisons between the subgroups scoring less than 24 or 24 or more on the IES-R. Further Wilcoxon rank-sum testing comparing the surgical and nonsurgical specialists showed that surgeons appear to perceive the locus of the causes that led to the incident ($p = 0.0031$) and the controllability of the causes that led to

TABLE I Descriptive statistics of coping strategies, causal attributions, and punitive response from 51 survey respondents

Variable	Mean	Range
<i>Impact of Event Scale-Revised^a</i>		
Intrusion	15.73±9.27	0–35
Avoidance	11.49±7.46	0–29
Total score	27.22±15	0–62
Self-distraction	3.92±1.98	2–8
Active coping	5.49±1.83	2–8
Denial	2.14±0.49	2–4
Substance abuse	2.31±0.76	2–5
Emotional support	3.98±1.75	2–8
Instrumental support	3.9±1.75	2–8
Behavioral disengagement	2.61±1.02	2–6
Venting	3.37±1.51	2–8
Positive reframing	4.24±1.87	2–8
Planning	5.53±1.96	2–8
Humor	2.39±1.02	2–6
Acceptance	6.8±1.18	3–8
Religion	3.28±1.71	2–8
Self-blame	4.43±1.63	2–8
<i>Causal Dimension Scale^b</i>		
Locus of cause	3.45±1.51	1–7
Controllability of cause	3.39±1.74	1–7
<i>Institutional Punitive Response scale^c</i>		
Complications held against physicians	3.76±0.95	1–5
Adequate institutional support	2.24±0.99	1–5
Institution adequate at preventing errors	2.51±1.01	1–4

^a Higher number indicates more frequent use of coping strategy.

^b Higher number indicates external locus of cause and uncontrollability of cause.

^c Higher number indicates agreement.

the incident ($p = 0.017$) to be mostly controllable by them. Controllability of the locus and the causes of the event was not associated with a score of 24 or more on the IES-R. The factors that were associated with such a score were entered in a hierarchical multiple logistic regression analysis of the occurrence of acute traumatic stress of clinical concern (IES-R ≥ 24). Self-blame was entered first and found to be statistically significant ($p = 0.0031$). Adding venting and perception of institutional support yielded no predictive value to the development of post-traumatic stress (Table III). Of the 51 respondents, 28 (54.9%) disagreed or strongly disagreed that our institution was good at preventing complications, 31 (60.8%) disagreed or strongly disagreed that adequate institutional support exists for staff to help deal with patient AEs, and 38 (74.5%) felt that their patient's complications are held against them.

TABLE II Descriptive statistics by Impact of Events Scale–Revised (IES-R) Scale subgroup

Variable	Score on the IES-R Scale						P Value
	<24 (n=23)			≥24 (n=28)			
	Mean	Median	IQR	Mean	Median	IQR	
<i>IES-R Scale</i>							
Intrusion	8±4.2	8	6	22.07±7.23	21	12	1.22×10 ⁻⁰⁸
Avoidance	6.61±4.13	6	3.5	15.5±7.23	14	8.25	3.65×10 ⁻⁰⁶
Total score	14.61±5.98	14	9	37.57±11.87	37	16.5	1.13×10 ⁻⁰⁹
<i>Coping Strategies</i>							
Self-distraction	3.52±1.88	2	3	4.25±2.03	4	3.25	0.15
Active coping	5.3±1.82	6	2	5.64±1.85	6	3.25	0.57
Denial	2.09±0.42	2	0	2.18±0.55	2	0	0.43
Substance abuse	2.3±0.82	2	0	2.32±0.72	2	0	0.73
Emotional support	3.78±1.73	4	2.5	4.14±1.78	4	2.5	0.46
Instrumental support	3.74±1.81	4	2	4.04±1.71	4	3.25	0.46
Behavioral disengagement	2.48±0.85	2	0.5	2.71±1.15	2	1	0.47
Venting	2.96±1.4	2	2	3.71±1.54	4	2	0.042
Positive reframing	4±1.6	4	3	4.43±2.08	4	3.25	0.62
Planning	5.17±1.9	5	3	5.82±2	6	4	0.22
Humor	2.52±1.2	2	0	2.29±0.85	2	0	0.48
Acceptance	6.65±1.27	6	2	6.93±1.12	7	2	0.45
Religion	2.86±1.36	2	1.75	3.61±1.91	3	2.25	0.14
Self-blame	3.52±1.31	3	1.5	5.18±1.49	5	2	0.00026
<i>Causal Dimension Scale</i>							
Locus of cause	3.7±1.72	3	2	3.25±1.32	3	1.25	0.41
Controllability of cause	3.52±2	3	3.5	3.29±1.54	3	2.25	0.74
<i>Punitive Response Scale</i>							
Complications held against physicians	3.57±1.08	4	1	3.93±0.81	4	0	0.27
Adequate institutional support	2.52±0.79	3	1	2±1.09	2	1.25	0.023
Institution adequate at preventing errors	2.57±0.99	2	1	2.46±1.04	2	1	0.71

IQR = 25%–75% interquartile range.

DISCUSSION

To our knowledge, the present study is the first to use a previously validated cut-off (≥24) on the IES-R to evaluate the prevalence of clinically significant post-traumatic stress in any physician cohort after a patient AE. Our results show that 54.9% of respondents scored above the cut-off of 24 on the IES-R for post-traumatic stress. That cut-off was previously validated in a cohort experiencing extensive post-traumatic stress from arsenic poisoning, the Hanshin–Awaji earthquake, and the sarin attack in the Tokyo Metro¹⁵. In fact, 31.4% of our respondents scored 33 or more on the IES-R: the cut-off for a probable diagnosis of post-traumatic stress disorder in a study of veterans of the

Vietnam War¹⁸. Those numbers indicate that a significant proportion of our physicians are immensely affected after a patient AE. We recognize that physicians working in the field of oncology deal with a life-threatening disease that can often be incurable. Medical, radiation, and surgical intervention in this area of medicine has higher risks for patients and certainly contributes to more frequent AEs.

Our study also aimed to examine whether certain coping strategies, perceptions of the locus of controllability of the causes of the incident, and perceptions of the institutional culture predicted the development of clinically significant post-traumatic stress. Our findings show that higher levels of self-blame and venting are used by individuals with clinically significant levels of post-traumatic

TABLE III Multivariable logistic regression model

Variable	OR estimate	95% Confidence limits		p Value
		Lower	Upper	
(Intercept)	0.076	0.0028	1.36	0.097
Self-blame	2.17	1.36	3.88	0.0031
Venting	1.16	0.73	1.90	0.53
Institutional support	0.63	0.30	1.26	0.19

OR = odds ratio.

stress. That finding is supported by studies indicating an association between self-blame and post-traumatic stress disorder^{19,20}. Inappropriate levels of self-blame appear to prolong the emotional turmoil experienced by health care providers, which increases the likelihood of becoming a second victim of the event. Interestingly, studies have also indicated that people with post-traumatic stress disorder often use excessive venting as a maladaptive coping mechanism^{21,22}. Although occasional venting can be healthy, habitual venting can lead to rumination practices, which derail steps to actively address and cope with the underlying issue^{21,22}. Surgeons perceived the locus of the causes that led to the incident to be mostly controllable by them. That observation is in keeping with the fact that surgical specialists are operating directly on patients, and complications, if any, often occur rapidly during or immediately after the operation. Despite the potential for the increased acuity of surgical compared with medical complications, surgical specialty is not a predictor for post-traumatic stress.

The implementation of several support systems, such as mortality and morbidity rounds, psychological counselling, and peer support to help physicians cope with patient AEs have yielded mixed results. Despite such existing systems, the greatest proportion of our physician cohort did not think that our respective health care organizations provide support adequate to help them cope²³. Of the survey respondents, 60.8% felt that the support at our institution is inadequate, and 54.9% also felt that the institutional framework is inadequate in preventing complications. That finding is critical, because physicians who perceived poor institutional support are more likely to experience significant post-traumatic stress.

Unfortunately, currently established support services are often underutilized and sometimes even described to be detrimental to coping^{14,23,24}. Institutions have not recognized a need for physicians to take time off, which has been identified as a major barrier to seeking support²⁴. A promising peer support system has been set up by Brigham and Women's Hospital in Boston. It appears, in principle, to address the most important aspect of dealing with a patient AE²⁵. The program is designed to proactively reach out to the affected physician. It aims to normalize the experience and to identify factors that can be improved in the future. Successful engagement of physicians has been achieved by establishing services based on personal needs and increasing awareness of the emotional turmoil that providers face after a patient AE. Such a model has to be seriously considered as a major step forward in this area.

The literature documents a higher rate of burnout, depression, and suicide among physicians than in the general population^{12,13,26}. Our study findings clearly indicate the presence of a chronic unrecognized crisis. Physicians realize the importance of rapid recovery; however, the recovery process can last anywhere from a few days to months—and sometimes, even years⁷. Maintaining good patient relationships and obtaining helpful support from colleagues increases the likelihood of a positive emotional outcome for the health care professional and also increases confidence²⁷. In fact, insight into AEs can improve personal practice and, coupled with corrective changes within the institution, can prevent the event from happening again⁵. On the other hand, as seen in the present study, the cycle of emotional and functional damage is aggravated by a negative social environment.

To summarize, there is a need to create a positive and supportive environment. Pressure to move on must be resisted until the affected physician fully recovers from a patient AE. Currently, mentorship support with a confidential intervention appears to be promising. Further evaluation of the effectiveness of that approach will be an important next step to support widespread adoption.

The present study is limited by its cross-sectional design because of an inability to demonstrate a temporal relationship, thereby limiting any inference of causation. Furthermore, our study sample ($n = 51$) is relatively small, which did not allow us to perform a more comprehensive regression analysis or additional subgroup analyses.

CONCLUSIONS

Our study shows a significant burden of post-traumatic stress after patient AEs at our institution. The emotional turmoil caused by a patient AE is aggravated by a negative institutional environment. The development of post-traumatic stress is associated with the excessive use of self-blame and venting as coping strategies. The significant proportion of scores above the clinical cut-off for post-traumatic stress in surgeons and non-surgeons alike is concerning. Our results identify a desperate need to establish effective institutional supports that recognize and deal with the enormous burden resulting from patient AEs.

CONFLICT OF INTEREST DISCLOSURES

We have read and understood *Current Oncology's* policy on disclosing conflicts of interest, and we declare that we have none.

AUTHOR AFFILIATIONS

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REFERENCES

1. Baker GR, Norton PG, Flintoft V, *et al.* The Canadian Adverse Events Study: the incidence of adverse events among hospital patients in Canada. *CMAJ* 2004;170:1678–86.
2. Pinto A, Faiz O, Bicknell C, Vincent C. Acute traumatic stress among surgeons after major surgical complications. *Am J Surg* 2014;208:642–7.
3. Wu AW. Medical error: the second victim. The doctor who makes the mistake needs help too. *BMJ* 2000;320:726–7.
4. Wears RL, Wu AW. Dealing with failure: the aftermath of errors and adverse events. *Ann Emerg Med* 2002;39:344–6.

5. Sirriyeh R, Lawton R, Gardner P, Armitage G. Coping with medical error: a systematic review of papers to assess the effects of involvement in medical errors on healthcare professionals' psychological well-being. *Qual Saf Health Care* 2010;19:e43.
6. Scott SD, Hirschinger LE, Cox KR, McCoig M, Brandt J, Hall LW. The natural history of recovery for the healthcare provider and second victim; after adverse patient events. *Qual Saf Heal Care* 2009;18:325–30.
7. Luu S, Patel P, St-Martin L, *et al.* Waking up the next morning: surgeons' emotional reactions to adverse events. *Med Educ* 2012;46:1179–88.
8. Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being. *Mayo Clin Proc* 2017;92:129–46.
9. Barger LK, Ayas NT, Cade BE, *et al.* Impact of extended-duration shifts on medical errors, adverse events, and attentional failures. *PLoS Med* 2006;3:e487.
10. Misra-Hebert AD, Kay R, Stoller JK. A review of physician turnover: rates, causes, and consequences. *Am J Med Qual* 2004;19:56–66.
11. Flaherty JA, Richman JA. Substance use and addiction among medical students, residents, and physicians. *Psychiatr Clin North Am* 1993;16:189–97.
12. Center C, Davis M, Detre T, *et al.* Confronting depression and suicide in physicians: a consensus statement. *JAMA* 2003;289:3161–6.
13. Shanafelt TD, Balch CM, Dyrbye L, *et al.* Special report: suicidal ideation among American surgeons. *Arch Surg* 2011;46:54–62.
14. WolfZR, Serembus JF, Smetzer J, Cohen H, Cohen M. Responses and concerns of healthcare providers to medication errors. *Clin Nurse Spec* 2000;14:278–87.
15. Asukai N, Kato H, Kawamura N, *et al.* Reliability and validity of the Japanese-language version of the Impact of Event Scale–Revised (IES-R-J): four studies of different traumatic events. *J Nerv Ment Dis* 2002;190:175–82.
16. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42:377–81.
17. Carver CS. You want to measure coping but your protocol's too long: consider the Brief COPE. *Int J Behav Med* 1997;4:92–100.
18. Creamer M, Bell R, Failla S. Psychometric properties of the Impact of Event Scale–Revised. *Behav Res Ther* 2003;41:1489–96.
19. Saraiya T, Lopez-Castro T. Ashamed and afraid: a scoping review of the role of shame in post-traumatic stress disorder (PTSD). *J Clin Med* 2016;5:E94.
20. Dorresteijn S, Gladwin TE, Eekhout I, Vermetten E, Geuze E. Childhood trauma and the role of self-blame on psychological well-being after deployment in male veterans. *Eur J Psychotraumatol* 2019;10:1558705.
21. Xia LX, Ding C, Hollon SD, Yi Y. Interpersonal self-support, venting coping and post-traumatic stress disorder symptoms among adolescent earthquake survivors. *Curr Psychol* 2014;34:14–25.
22. Cofini V, Carbonelli A, Cecilia MR, Binkin N, di Orio F. Post traumatic stress disorder and coping in a sample of adult survivors of the Italian earthquake. *Psychiatry Res* 2015;229:353–8.
23. Waterman AD, Garbutt J, Hazel E, *et al.* The emotional impact of medical errors on practicing physicians in the United States and Canada. *Jt Comm J Qual Patient Saf* 2007;33:467–76.
24. Hu YY, Fix ML, Hevelone ND, *et al.* Physicians' needs in coping with emotional stressors: the case for peer support. *Arch Surg* 2012;147:212–17.
25. Shapiro J, Galowitz P. Peer support for clinicians: a programmatic approach. *Acad Med* 2016;91:1200–4.
26. West CP, Dyrbye LN, Shanafelt TD. Physician burnout: contributors, consequences and solutions. *J Intern Med* 2018;283:516–29.
27. Kroll L, Singleton A, Collier J, Rees Jones I. Learning not to take it seriously: junior doctors' accounts of error. *Med Educ* 2008;42:982–90.