

BMJ Open Psychological impact and recovery after involvement in a patient safety incident: a repeated measures analysis

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ABSTRACT

Objective: To examine individual, situational and organisational aspects that influence psychological impact and recovery of a patient safety incident on physicians, nurses and midwives.

Design: Cross-sectional, retrospective surveys of physicians, midwives and nurses.

Setting: 33 Belgian hospitals.

Participants: 913 clinicians (186 physicians, 682 nurses, 45 midwives) involved in a patient safety incident.

Main outcome measures: The Impact of Event Scale was used to retrospectively measure psychological impact of the safety incident at the time of the event and compare it with psychological impact at the time of the survey.

Results: Individual, situational as well as organisational aspects influenced psychological impact and recovery of a patient safety incident. Psychological impact is higher when the degree of harm for the patient is more severe, when healthcare professionals feel responsible for the incident and among female healthcare professionals. Impact of degree of harm differed across clinicians. Psychological impact is lower among more optimistic professionals. Overall, impact decreased significantly over time. This effect was more pronounced for women and for those who feel responsible for the incident. The longer ago the incident took place, the stronger impact had decreased. Also, higher psychological impact is related with the use of a more active coping and planning coping strategy, and is unrelated to support seeking coping strategies. Rendered support and a support culture reduce psychological impact, whereas a blame culture increases psychological impact. No associations were found with job experience and resilience of the health professional, the presence of a second victim support team or guideline and working in a learning culture.

Conclusions: Healthcare organisations should anticipate on providing their staff appropriate and timely support structures that are tailored to the healthcare professional involved in the incident and to the specific situation of the incident.

INTRODUCTION

Improving the work life of healthcare providers is increasingly seen as a critical aspect of

Strengths and limitations of this study

- This paper adds new knowledge on the factors associated with psychological distress resulting from involvement in patient safety incidents.
- This paper is one of the first to provide quantitative data on the recovery of second victims.
- This paper includes a timely question, a large population and the use of standardised and validated questionnaires.
- The study was not prospective but instead asked participants to think back and report on a past event, and then their current state which increases the chance that confounding might affect the observed associations.
- This study was limited to physicians, nurses and midwives, whereas other hospital workers may also be disturbed by stressful patient-related events.

optimising health system performance. This entails an expansion from the widely used triple aim—enhancing patient experiences, improving population health and reducing costs—to a quadruple aim.¹ One element that has strong impact on the work life of healthcare providers is known as ‘second victimhood’.² Second victims are healthcare professionals who experience difficulties to cope with their emotions after a patient safety incident (PSI), medical error or adverse event. They are said to ‘suffer in silence’, and their emotional state has negative implications for patient safety and safety culture.^{3–7}

Surveys show that up to 50% of all hospital workers become a second victim at least once in their career.^{3 4} Being involved in an incident can affect the quality of subsequent patient care to some extent.^{1 8–11} Second victims experience both a professional and personal impact.^{4 5 12} They suffer, for example, from loss of self-confidence, fear of litigation or reputation damage, guilt, anger and fear.^{4 8 13} Some studies find that the psychological impact of a PSI on healthcare

professionals depends on the degree of harm for the patient,^{14 15} while other research shows that second victims experience similar reactions, no matter what happened.^{9 16} Extant research shows that a number of other situational, individual and organisational factors may influence the impact of an incident.⁹ An important situational factor next to patient harm is the healthcare professional's sense of responsibility for the particular incident. Individual factors include gender, profession, experience, personal resources and coping strategies. The presence of a support team, protocol or guideline, organisational culture and forms of rendered support are the examples of organisational factors. Edrees and Federico³ recently expressed the need for research that investigates the relation with organisational culture.

It is of healthcare institutions' best interest to reduce the negative consequences of PSIs on healthcare professionals. Although many fail to do so effectively,^{7 17 18} there are some organisations that have set a second victim support programme in place.^{3 19–22} Currently, the mechanisms of such support programmes are however largely activated only when healthcare professionals already express second victim symptoms after having been involved in an incident. A missing element in managerial practice is to understand and anticipate on factors that are likely to influence the psychological impact and recovery from a PSI. Tailored and timely support would potentially buffer the likelihood of health professionals becoming second victims or guide the recovery process.

The aim of this study is to describe physicians', nurses' and midwives' psychological impact and recovery from a PSI and to examine which specific factors are likely to influence impact and recovery. Findings are for a multicenter study of physicians', nurses' and midwives' reports on the psychological impact of a PSI at the time of the incident and at the time of the survey. First, we determine which situational and individual aspects influence the psychological impact and the recovery process after involvement in a PSI. Second, we examine which organisational aspects, as perceived by healthcare professionals, reduce the psychological impact and stimulate the recovery process.

METHODS

Hospital and healthcare professional samples

An online survey of 24 118 physicians, nurses and midwives in 33 Belgian hospitals was undertaken between May and December 2014. Hospitals were selected in two phases. First, we randomly selected 30 hospitals from a sample of all Flemish (Dutch-speaking) hospitals (N=156), proportionally stratified by hospital type (acute, psychiatric and rehabilitation hospitals) and size (<600 beds is small, >600 beds is large). We sampled from each strata at the same rate.²³ A total of 26 hospitals agreed to participate in the study (87% response rate). In addition, seven hospitals that were not selected at random participated on a voluntary basis. An

invitation email containing an embedded link to the survey was sent to all physicians (N=4696), nurses (N=18 441) and midwives (N=981) in these hospitals, for a total of 24 118 invitees. Follow-up emails were sent after 2 and 4 weeks. Participation was voluntary and informed consent was assumed if the survey was completed. Ethical approval was obtained from the Ethics Committee of KU Leuven (ML10363).

Data included surveys of 1755 healthcare professionals (7% response rate) of which 378 were physicians (8% response rate), 1294 were nurses (7% response rate) and 83 were midwives (8% response rate). The overall response rate varied from 1% to 35% at the hospital level. Response rates did not significantly differ between hospitals that were randomly selected or participated voluntarily. Out of 1755 respondents, 913 were still employed in the hospital where they had experienced their most memorable incident (important for associations with organisational culture) and fully completed the main instrument to measure psychological impact. [Table 1](#) displays participants' demographic data and experiences with PSIs witnessed on the ward on the one hand and personally involved in on the other hand, within their entire career and within the past 12 months. Respondents elaborated on their most memorable incident and described what happened. Classification of PSIs was based on The Conceptual Framework for the International Classification for Patient Safety (2009).²⁴ Incident type 'medication and intravenous fluids' was most common (35.5%), followed by incidents within the clinical process or procedure (34.4%) and patient or staff behaviour (12%). See [table 2](#) for more details.

Key measures

The survey included a number of demographic variables and an assessment of experiences with PSIs. A PSI is defined as '*an event or circumstance that could have resulted, or did result, in unnecessary harm to a patient.*'²⁴ Respondents were asked to answer 'yes' or 'no' to the question whether they had witnessed a PSI on the ward or had personally been involved in one, and this during two time frames—their entire career and the past 12 months. If a respondent indicated to have been involved in an incident, personally or on the ward, he or she was asked to describe the most memorable event.

Detailed information regarding this most memorable incident was captured using internationally validated scales and customised scales developed by the research team for the purpose of this study.

Psychological impact

The 15-item Impact of Event Scale (IES)^{25 26} was used to measure the psychological impact of the PSI. The IES is one of the most widely used self-report instruments designed to assess post-traumatic stress reactions.²⁷ The IES is useful in following the trajectory of a person responding to a specific traumatic life event over a long period of time, since it can easily be used repetitively.²⁶ We therefore used the IES to capture the impact of the

Table 1 Demographic data and experiences with patient safety incidents

	Total n	Witnessed a patient safety incident on the ward				Personally involved in a patient safety incident			
		Within entire career		Within the past 12 months		Within entire career		Within the past 12 months	
		n	Per cent	n	Per cent	n	Per cent	n	Per cent
Total	913	913	100	697	76.3	762	83.5	348	38.1
Type of hospital									
Acute	772	770	84.3	581	63.6	643	70.4	287	31.4
Psychiatric	113	113	12.4	96	10.5	105	11.5	55	6.0
Rehabilitation	28	27	3.0	20	2.2	14	1.5	6	0.7
Age									
<25 years	40	40	4.4	36	3.9	28	3.1	21	2.3
25–34 years	186	186	20.4	161	17.6	159	17.4	83	9.1
35–44 years	247	247	27.1	194	21.2	211	23.1	10	1.1
45–54 years	304	303	33.2	215	23.5	245	26.8	98	10.7
>54 years	136	134	14.7	91	10.0	119	13.0	45	4.9
Gender									
Male	253	253	27.7	194	21.2	217	23.8	100	11.0
Female	660	657	72.0	503	55.1	545	59.7	248	27.2
Profession									
Physician	186	186	20.4	127	13.9	165	18.1	78	8.5
Nurse	682	679	74.4	531	58.1	561	61.4	252	27.6
Midwife	45	45	4.9	39	4.3	36	3.9	18	2.0
Experience									
<6 months	3	3	0.3	1	0.1	2	0.2	1	0.1
6 months–1 year	15	15	1.6	15	1.6	9	1.0	10	1.1
1–3 years	43	43	4.7	38	4.2	28	3.1	19	2.1
3–5 years	71	71	7.8	67	7.3	61	6.7	36	3.9
5–10 years	101	101	11.1	82	9.0	88	9.6	46	5.0
10–15 years	137	137	15.0	108	11.8	122	13.4	49	5.4
15–20 years	116	116	12.7	93	10.2	97	10.6	46	5.0
>20 years	389	386	42.3	263	28.8	323	35.4	126	13.8
In training									
No	875	872	95.5	667	73.1	730	80.0	333	36.5
Yes	38	38	4.2	30	3.3	32	3.5	15	1.6
Management position									
No	571	568	64.9	435	51.8	471	53.8	213	24.3
Yes	304	304	34.7	232	26.5	259	29.6	120	13.7

most memorable adverse event at two points in time: a retrospective measure of impact at the time of the incident and a measure of impact at the time of the survey. Example items include, 'I thought about it when I didn't mean to' and 'I tried not to talk about it'. IES response categories are 'not at all', 'rarely', 'sometimes' and 'often', and are coded as 0, 1, 3 and 5, respectively. From an overall sum score between 0 and 75, several cut-off points on this continuum have been suggested in the literature to distinguish potential post-traumatic stress disorder (PTSD) cases from non-cases.²⁸ An overall IES score of ≥ 19 is considered the most appropriate screener for the prediction of PTSD,^{27 29 30} however, in this study we apply the IES score as a continuous variable.

Situational factors

Respondents were asked to answer 'yes' or 'no' to the question whether they felt personally responsible for the

(most memorable) PSI and whether this happened in the hospital where they are currently working. To indicate the time since the event, options were given from 'less than 3 months ago' to 'more than 20 years ago'. Degree of harm indicates the patient outcome due to the PSI. Response categories were 'none' (thus a no harm incident or near miss), 'mild', 'moderate', 'severe' or 'death of the patient'.

Individual factors

Demographic variables included gender, profession and professional experience. To indicate professional experience, response options were from 'less than 6 months' to 'more than 20 years'.

To measure coping skills after being involved in an adverse event, the Brief Committee on Publication Ethics (COPE)³¹ was used. The Brief COPE is a shortened form of the COPE inventory³² and consists of 16

Table 2 Type of most memorable patient safety incident experienced by participants

Type of patient safety incident	n	Per cent
Medication/intravenous fluids	324	35.5
Clinical process/procedure	314	34.4
Staff/patient behaviour	110	12
Patient accidents eg, falls	70	7.7
Blood/blood products	32	3.5
Clinical administration	17	1.9
Medical device/equipment	10	1.1
Nutrition	9	1
Oxygen/gas/vapour	7	0.8
Infrastructure/building/fixtures	4	0.4
Resources/organisational management	3	0.3
Documentation	2	0.2
Unclear	11	1.2

items that measure different behaviours and cognitive activities one might engage in coping with stress. An example item is 'I take action to try to make the situation better'. In the current study, respondents were asked to rate each item on a 5-point scale anchored between (almost) never and (almost) always, to indicate the degree to which they typically used each strategy to deal with stress after an adverse event.

Personal resources such as self-efficacy, resilience and optimism were assessed by eight items. These items are work adjusted and shortened from the Life Orientation Test (LOT).³³ Sample items are 'I can always manage to solve difficult problems at work if I try hard enough' and 'With respect to my work, I always look on the bright side'. The participants answered using a five-point Likert scale (1: 'strongly disagree' to 5: 'strongly agree').

Organisational factors

A hospital-level measure of availability of a peer support team or support protocol was surveyed by a yes or no question from the hospital contact persons.¹⁷

To measure the support received in the aftermath of the PSI, we included items from prior qualitative studies by our research team (own unpublished work). Participants were asked to score the following items: 'I received information on what happened and how this could happen', 'I received information on what to do next and what would happen next (for me, for the patient, for the hospital)' and 'I received extra guidance at the workplace'. Respondents were asked to score these items on a 4-point scale: 'not applicable', 'no', 'partially', 'yes'.²⁴

Organisational culture was surveyed by eight items of the Hospital Survey on Patient Safety Culture,^{34 35} which examines patient safety culture from a hospital staff perspective. Respondents were asked to rate each item on a 5-point scale (1: 'strongly disagree' to 5: 'strongly agree'). An example item is 'Staff feels like their mistakes are held against them'.

Analysis

We first evaluated measurement invariance³⁶ of the IES factor solution across participant's retrospective responses on psychological impact at the time of the incident and at the time of the survey. We applied progressively more stringent constraints in multiple group confirmatory factor analysis^{36 37} using Mplus 7.1. A one-dimensional solution including all 15 IES items showed evidence of configural (invariant factor loading pattern), metric (invariant factor loadings) and scalar invariance (invariant factor intercepts) of the factor solution, which means that IES scores can be compared across time points.³⁸

Second, we used SAS software version 9.4 to fit a series of multilevel models for IES repeated measures on healthcare workers nested in hospitals.³⁹ A first model included only time as an explanatory variable to examine recovery in psychological impact. Second, the effect of situational, individual and organisational aspects on overall psychological impact and recovery was examined for each aspect separately. Only aspects showing statistical significance on psychological impact and/or recovery were retained for further analysis. Third, we examined which situational and individual aspects jointly influence overall psychological impact and recovery. Fourth, we explored which organisational aspects, as perceived by healthcare professionals, are jointly associated with overall psychological impact and recovery, while controlling for statistically significant situational and individual aspects.

RESULTS

Psychological impact and recovery after a PSI

The overall mean IES score for all participants was 17.72 at the time of the incident and 8.99 at the time of the survey. There was a significant decrease in IES scores between the retrospectively measured score and the score at the time of the survey.

Situational factors, individual factors and psychological impact

The significant decrease in IES scores remained after adjusting for all other fixed effects of situational and individual factors in the model ($\beta=-15.07$, $p<0.0001$).

Table 3 shows that PSIs resulting in moderate harm ($\beta=6.75$, $p=0.0001$), severe harm ($\beta=10.69$, $p<0.0001$) or death ($\beta=9.78$, $p<0.0001$) are systematically associated with higher psychological impact on the health professional compared with incidents that do not result in harm for the patient. On the other hand, with increasing harm (moderate: $\beta=-5.94$, $p<0.0001$; severe: $\beta=-4.95$, $p=0.0059$; death: $\beta=-6.30$, $p<0.0001$), the decrease in IES score also tends to be stronger. Descriptive findings suggested further exploration across professional groups. As such, we tested for differences across nurses and physicians for each combination of levels of time and degree of harm. Midwives could not

Table 3 Individual and situational characteristics and Impact of Event Scale score: descriptive findings and findings from repeated measures analyses

	n	IES score			Multiple model for individual and situational characteristics jointly			
		Then	Now	Mean	Main effect		X time	
					Estimate (SE)	p Value	Estimate (SE)	p Value
Intercept					20.06 (5.12)	0.0005		
Time		17.72	8.99	13.36	-15.07 (3.54)	<0.0001		
<i>Situational characteristics</i>								
Level of harm for patient								
None	182	13.55	8.46	11.01	0		0	
Mild	216	15.01	7.43	11.22	1.57 (1.75)	0.3671	-2.45 (1.34)	0.0682
Moderate	208	19.11	8.55	13.83	6.75 (1.77)	0.0001	-5.94 (1.36)	<0.0001
Severe	81	22.27	12.23	17.25	10.69 (2.33)	<0.0001	-4.95 (1.79)	0.0059
Death	226	20.74	10.14	15.44	9.78 (1.79)	<0.0001	-6.30 (1.37)	<0.0001
Time of incident								
<3 months ago	78	12.91	11.26	12.08	-4.87 (3.08)	0.1134	9.88 (2.36)	<0.0001
3–6 months ago	62	11.98	8.68	10.33	-1.76 (2.99)	0.0369	9.35 (2.49)	0.0002
6 months–1 year ago	83	16.36	10.98	13.67	-2.22 (3.00)	0.4603	6.60 (2.31)	0.0043
1–3 years ago	204	17.11	9.05	13.08	-3.71 (2.60)	0.1547	5.15 (2.00)	0.0101
3–5 years ago	110	17.62	7.77	12.70	-4.88 (2.84)	0.0860	4.41 (2.19)	0.0440
5–10 years ago	140	20.39	9.11	14.75	-1.03 (2.71)	0.7036	2.56 (2.08)	0.2186
10–15 years ago	106	20.61	8.08	14.34	-1.07 (2.78)	0.6995	0.85 (2.14)	0.6899
15–20 years ago	70	20.44	8.16	14.30	-0.85 (3.02)	0.7779	1.10 (2.32)	0.6358
>20 years ago	59	19.59	7.56	13.58	0		0	
Sense of responsibility								
No	464	13.92	7.64	10.78	0		0	
Yes	449	21.63	10.38	16.01	7.43 (1.18)	<0.0001	-4.44 (0.91)	<0.0001
<i>Individual characteristics</i>								
Personal characteristics								
Gender								
Male	253	15.34	7.87	11.60	-5.61 (1.35)	<0.0001	3.93 (1.03)	0.0001
Female	660	18.63	9.41	14.02	0		0	
Profession								
Physician	186	20.17	9.17	14.67	-0.38 (2.90)	0.8951	-0.71 (2.22)	0.7491
Nurse	682	16.85	8.82	12.84	-2.79 (2.65)	0.2928	2.15 (2.03)	0.2898
Midwife	45	20.64	10.76	15.70	0		0	
Experience								
<6 months	3	28.33	23.00	25.67	—*	—	—	—
6 months–1 year	15	10.13	4.80	7.47	—	—	—	—
1–3 years	43	11.21	5.74	8.48	—	—	—	—
3–5 years	71	15.96	8.75	12.35	—	—	—	—
5–10 years	101	18.35	8.42	13.38	—	—	—	—
10–15 years	137	18.29	8.89	13.59	—	—	—	—
15–20 years	116	17.80	9.36	13.58	—	—	—	—
>20 years	389	18.96	9.63	14.30	—	—	—	—
Personal resources								
Self-efficacy								
Low	39	23.33	9.44	16.38	0		0	
Average	604	18.80	9.46	14.13	-2.70 (2.64)	0.3070	3.67 (2.03)	0.0705
High	114	16.21	8.65	12.43	-4.51 (3.09)	0.1459	5.47 (2.38)	0.0215
Resilience								
Low	24	19.88	9.79	14.83	—*	—	—	—
Average	500	19.37	10.10	14.74	—	—	—	—
High	233	16.97	7.64	12.30	—	—	—	—
Optimism								
Low	95	26.37	13.42	19.89	0		0	
Average	523	17.80	9.10	13.45	-6.52 (1.80)	0.0003	2.76 (1.38)	0.0467
High	139	16.55	7.42	11.99	-7.13 (2.26)	0.0016	1.48 (1.74)	0.0571

Continued

Table 3 Continued

	n	IES score			Multiple model for individual and situational characteristics jointly				
		Then	Now	Mean	Main effect		X time		
					Estimate (SE)	p Value	Estimate (SE)	p Value	
Coping strategies									
Support seeking									
Low†	473	17.61	9.37	13.49	–*	–	–	–	–
High	440	17.83	8.58	13.20	–	–	–	–	–
Active coping and planning									
Low†	518	15.09	7.69	11.39	0		0		
High	395	21.15	10.69	15.92	4.62 (1.15)	<0.0001	–1.68 (0.88)		0.0571

*Experience, resilience and support seeking coping strategies were not statistically significant on psychological impact and/or recovery and therefore not included in the multiple model.

†Low is score \leq median; high is score $>$ median.
IES, Impact of Event Scale.

be included in this specific analysis because of the low number of participants. Overall, when patients had died after the occurrence of a PSI, nurses' remaining psychological impact at the time of the survey was significantly higher than that of physicians (F value=4.91, $p=0.0268$). Physicians retrospectively measured scores were higher than those of nurses when patients experienced moderate harm after the occurrence of a PSI ($F=7.08$, $p=0.0079$). For all other combinations of levels of time and consequence of the event, there was no significant difference among these professional groups.

Generally speaking, the longer ago the incident took place, the stronger the IES score had decreased between the retrospectively measured score and the score at the time of the survey. Feeling personally responsible for the incident is associated with a higher overall IES score ($\beta=7.43$, $p<0.0001$), but the psychological impact among those who indicated a sense of responsibility has decreased significantly more ($\beta=-4.44$, $p<0.0001$), indicating a stronger recovery process. Female healthcare professionals experience a significantly higher impact after a PSI than males ($\beta=5.61$, $p<0.0001$), but again the recovery is stronger ($\beta=-3.93$, $p=0.0001$). The use of personal resources, such as optimism (average: $\beta=-6.52$, $p=0.0003$; high: $\beta=-7.13$, $p=0.0016$), has a significantly negative association with psychological impact. Highly self-efficient respondents experience a slower recovery ($\beta=5.47$, $p=0.0215$). There was no association between the resilience of the health professional and the psychological impact nor recovery from a PSI. Respondents who use active coping and planning strategies tend to experience a significantly higher psychological impact ($\beta=4.62$, $p<0.0001$).

Organisational strategies to reduce the psychological impact and stimulate the recovery process

In total, 11 hospitals reported having a support team for second victims in place and 14 hospitals reported having a support protocol at their disposal. Descriptive results

in table 4 indicate that these do not influence psychological impact or recovery, which was confirmed in regression analysis. The rendered support and organisational culture do however have an effect on the psychological impact of the incident. Respondents scoring the organisational culture above median as one of support and respect, experience a lower psychological impact ($\beta=-3.98$, $p=0.0012$). Respondents scoring the organisational culture above median as one characterised by blame, experience a higher psychological impact ($\beta=3.39$, $p=0.0036$). Support under the form of information concerning what happened ($\beta=-6.16$, $p=0.0027$), information concerning what to do after the incident ($\beta=-4.77$, $p=0.0072$) and extra guidance at the workplace ($\beta=4.61$, $p=0.0387$) are all associated with significantly lower IES scores only when it was fully received, not when it was only partially received. No significant associations were found between these organisational strategies and recovery.

DISCUSSION

In this multicentre study, we examined the impact of individual, situational and organisational aspects on psychological impact and recovery of a PSI on clinicians. Psychological impact significantly decreases between the time of the incident and the time of the survey. Situational characteristics that influence the impact are sense of responsibility and degree of harm. Severe harm leaves the biggest impact, more so than death of the patient. Individual characteristics also influence the impact. Women, users of an active coping and planning strategy and respondents who score low on optimism, experience a higher impact. The fact that women react more strongly is in line with other studies.^{4 14 16 40 41} Also in general psychology women tend to react stronger to stress situations.²⁶ On the other hand, women show a better evolution between the retrospective measure of impact and impact at the time of the survey. No effect

Table 4 Organisational characteristics and Impact of Event Scale score: descriptive findings and findings from repeated measures analyses

	IES score	Multiple model for organisational characteristics							
		n	Then	Now	Mean	Main effect		X time	
						Estimate (SE)	p Value	Estimate (SE)	p Value
<i>Support team/protocol</i>									
Support team available									
No	682	17.51	8.89	13.20	–*	–	–	–	
Yes	231 (=11 org.)	18.33	9.26	13.80	–	–	–	–	
Protocol or guideline available									
No	619	17.47	9.05	13.26	–*	–	–	–	
Yes	294 (=14 org.)	18.24	8.86	13.55	–	–	–	–	
<i>Culture</i>									
Culture of support and respect									
Low†	633	18.66	9.86	14.26	0		0		
High	280	15.58	7.02	11.30	–3.98 (1.23)	0.0012	0.78 (0.96)	0.4167	
Learning culture									
Low†	675	18.09	9.43	13.76	–*	–	–	–	
High	238	16.66	7.72	12.19	–	–	–	–	
Blame culture									
Low†	580	15.62	7.64	11.63	0		0		
High	333	21.37	11.34	16.35	3.39 (1.16)	0.0036	–0.89 (0.91)	0.3257	
<i>Support received</i>									
Information concerning what happened									
Not applicable	108	8.87	5.94	7.41	–		–		
No	74	25.24	14.41	19.82	0		0		
Partly	154	24.73	11.90	18.32	–1.93 (2.23)	0.3876	–0.47 (1.77)	0.7890	
Yes	450	17.74	8.48	13.11	–6.16 (2.05)	0.0027	1.65 (1.62)	0.3088	
Information concerning what to do									
Not applicable	134	10.51	5.72	8.12	–		–		
No	117	24.77	12.97	18.87	0		0		
Partly	155	22.67	11.03	16.85	–2.10 (1.93)	0.2778	0.33 (1.53)	0.8296	
Yes	380	17.88	8.84	13.36	–4.77 (1.77)	0.0072	2.42 (1.40)	0.0841	
Extra guidance at the workplace									
Not applicable	418	14.80	6.82	10.81	–		–		
No	194	24.51	12.99	18.75	0		0		
Partly	80	25.28	13.20	19.24	–1.52 (2.25)	0.4977	0.28 (1.79)	0.8761	
Yes	93	17.78	10.00	13.89	–4.61 (2.22)	0.0387	2.06 (1.76)	0.2438	

*A support team, protocol or guideline and learning culture were not statistically significant on psychological impact and/or recovery and therefore not included in the multiple model.

†Low is score \leq median; high is score $>$ median.

IES, Impact of Event Scale; org, organisation.

was found for resilience of the health professional. Resilience is considered key to sustainability of the healthcare workforce⁴² and therefore in theory highly important after involvement in a PSI. Further research will be needed to investigate the importance of resilience. In most research the impact of PSIs are studied among either nurses^{43–45} or physicians.^{3 14 16 46} In this study, we compared the IES scores from both professions and noticed that nurses react the way one would arguably suspect: they experience the biggest impact after an incident that results in death, followed by incidents with severe, moderate, mild and no harm. Physicians experience the biggest impact after an incident with severe harm, followed by moderate harm, death, mild and no harm. This can be explained by the nature of the work of physicians and their ultimate responsibility for the patient.^{47 48} There is however also disagreement in the literature as to whether the impact depends on the severity of the event^{14 15} or whether second victims experience similar reactions, no matter what happened.^{9 16} Organisational aspects included measures of support teams and protocols, culture and support received. The percentage of hospitals in this study (14 out of 33 hospitals) that claim to have a support protocol in place is comparable with previous research.¹⁷ There was no association between having an organisational peer support programme or guideline in place and the impact of and recovery from the event. One would tend to conclude that organisational support systems or protocols are of no use, yet previous research has shown that not all organisations that report to have a support programme in place, actually have one.¹⁷ In the USA and the UK, several programmes have been set up to support second victims,^{5 20 22 49} which are considered (but not proven) useful.²⁰ Further research on this matter is urgently needed. A blame culture, in contradiction to a culture of support and respect, is devastating for the psychological impact of a PSI on clinicians. Leaders should teach staff how to investigate and debrief following a PSI in a way that does not incur blame, by cultivating an environment of performance improvement instead of punishment to prevent blame-related distress.^{50 51} Support in the form of information on what exactly happened, information on what to do next and extra guidance in the workplace has a positive association with the impact of the incident. When respondents fully agree that they have received the previously discussed forms of organisational support, only then is there a significant difference in IES scores. Partial support does not meet the needs of second victims. These results add to the list of other helpful support initiatives such as talking to peers¹⁸ or non-judgmental colleagues.⁹

Other factors may have contributed to the impact of and recovery from the incident, such as patient characteristics (eg, demographics, procedures, diagnoses) or incident characteristics (eg, origin, discovery, reporting, legal consequences).^{24 47} Mitigating factors

such as apologies to the patient, effective communication from staff and leaders, and effective protocols were not investigated.^{17 24} Also, whereas this study was limited to a survey among physicians, nurses and midwives, studies with sufficiently large sample size should be designed to obtain information from other hospital workers, such as pharmacists, who may also be disturbed by stressful patient-related events. Although the type of the most memorable event was clear, it was unclear if this was the first major incident, or an event reflecting an accumulation of previous incidents or near misses. It is unknown how this affects impact and recovery, and personal resources and coping strategies. Owing to the low response rate, we have to recognise that we can only estimate the minimal prevalence rate of experiences with PSIs. Since no post hoc diagnosis of findings could be performed, it is unclear whether non-response bias occurred. The main interest is however not in describing prevalence or in the comparison of organisations—for which possible non-response would clearly be a threat—but in estimating associations between psychological impact and several factors. It seems unlikely that scores for those who did not respond would alter the direction or magnitude of this association much, as our sample consists of nurses, physicians and midwives with very different demographic characteristics and various degrees of psychological impact. On the other hand, non-response bias may have occurred particularly in our comparison of findings across physicians, nurses and midwives. The low response rate can be due to increased response burden or because it is still considered a taboo subject. Although we cannot be sure of causality because the data are cross sectional, two time periods were embedded into the questionnaire which allowed us to analyse the data as if they were longitudinal. Unmeasured distress could have occurred between the two time periods and influence psychological impact at the time of the survey. Therefore results of this study should be interpreted as associations rather than causation. Also, we have to be aware that participants may have exaggerated or minimised the incident (recall bias). However, looking at the evolution of the IES scores over time, [table 3](#) shows a logical and progressive decrease of the IES score with more time that has passed since the incident. This supports the contention that respondents were able to reproduce the factual impact of the event over time. Serembus and colleagues describe that the memory of error stays with professionals for many years, often in high detail.⁵² It can be difficult for respondents to distinguish PSIs from adverse reactions (*'unexpected harm resulting from a justified action where the correct process was followed for the context in which the event occurred'* (ref. ²⁴, p. 23)). To prevent these from being included, all descriptions of the most memorable events were checked and non-PSIs (eg, work accidents, needle stick injuries) were deleted from the study sample. It is plausible that adverse reactions and near misses can trigger the same emotions as PSIs, which

needs further research. In our analysis, we corrected for time since the incident, type of hospital, gender, profession and experience. However, some potential confounding variables could not be evaluated, such as the health of the respondent at the time of completion.

Proactive and reactive actions supported by the organisation and its leadership are needed to reduce the severity of the psychological impact of PSIs and markedly speed clinicians' healing process. Starting at the recruitment stage, effective screening should be routinely conducted to identify clinicians at risk, assessing personal resources and coping strategies that were found to affect impact and recovery in this study. Junior clinicians should be made familiar with the topic of second victims. They should have the opportunity to openly discuss PSIs as well as near misses with senior clinicians acting as coaches. These peer review meetings should take place routinely rather than only being incident based, provide clear information concerning what happened and what to do, acknowledge learning opportunities and be non-confrontational.

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- ▶ Substantial contributions to the conception or design of the work or the acquisition, analysis, or interpretation of data for the work; and
- ▶ Drafting the work or revising it critically for important intellectual content; and
- ▶ Final approval of the version to be published; and
- ▶ Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

	Criteria 1		Analysis and interpretation of data	Criteria 2		Criteria 3	
	Conception and design	Acquisition of data		Drafting	Revising	Approval	Agreement for accountability
EVG	x	x	x	x	x	x	x
LB	x	x	x	x	x	x	x
MP	x			x	x	x	x
ME	x		x		x	x	x
WS	x		x	x	x	x	x
KV	x		x	x	x	x	x

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REFERENCES

1. Bodenheimer T, Sinsky C. From triple to quadruple aim: care of the patient requires care of the provider. *Ann Fam Med* 2014;12:573–6.
2. Wu AW. Medical error: the second victim. The doctor who makes the mistake needs help too. *BMJ* 2000;320:726–7.
3. Edrees H, Federico F. Supporting clinicians after medical error. *BMJ* 2015;350:h1982.
4. Seys D, Wu AW, Van Gerven E, et al. Health care professionals as second victims after adverse events: a systematic review. *Eval Health Prof* 2013;36:135–62.
5. Scott SD, Hirschinger LE, Cox KR, et al. The natural history of recovery for the healthcare provider "second victim" after adverse patient events. *Qual Saf Health Care* 2009;18:325–30.
6. Stewart K, Lawton R, Harrison R. Supporting "second victims" is a system-wide responsibility. *BMJ* 2015;350, h2341.
7. Conway J, Federico F, Stewart K, et al. *Respectful management of serious clinical adverse events*. IHI Innovation Series white paper. Cambridge, MA: Institute for Healthcare Improvement 2011. <http://www.IHI.org>.
8. Dekker S. *Second victim: error, guilt, trauma and resilience*. New York: CRC Press, 2013.
9. Ullström S, Sachs MA, Hansson J, et al. Suffering in silence: a qualitative study of second victims of adverse events. *BMJ Qual Saf* 2014;23:325–31.
10. Edrees HH, Paine LA, Feroli ER, et al. Health care workers as second victims of medical errors. *Pol Arch Med Wewn* 2011;121:101–8.
11. West CP, Huschka MM, Novotny PJ, et al. Association of perceived medical errors with resident distress and empathy: a prospective longitudinal study. *JAMA* 2006;296:1071–8.
12. Hall LW, Scott SD. The second victim of adverse health care events. *Nurs Clin N Am* 2012;47:383–93.
13. Seys D, Scott S, Wu A, et al. Supporting involved health care professionals (second victims) following an adverse health event: a literature review. *Int J Nurs Stud* 2013;50:678–87.
14. Harrison R, Lawton R, Stewart K. Doctors' experiences of adverse events in secondary care: the professional and personal impact. *Clin Med* 2014;14:585–90.
15. Muller D, Ornstein K. Perceptions of and attitudes towards medical errors among medical trainees. *Med Educ* 2007;41:645–52.
16. 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.
17. Van Gerven E, Seys D, Panella M, et al. Involvement of health-care professionals in an adverse event: the role of management in supporting their workforce. *Pol Arch Med Wewn* 2014;124:312–20.
18. Burlison JD, Scott SD, Browne EK, et al. The second victim experience and support tool: validation of an organizational resource for assessing second victim effects and the quality of support resources. *J Patient Saf*. Published Online First: 26 Aug 2014. doi:10.1097/PTS.000000000000129.
19. Scott SD. Three-Tiered Emotional Support System Generates Positive Feedback From Providers Who Become "Second Victims" of an Unanticipated Clinical Event. Agency for Healthcare Research and Quality: Innovations Exchange. 2010.
20. Wu AW, Steckelberg RC. Medical error, incident investigation and the second victim: doing better but feeling worse? *BMJ Qual Saf* 2012;21:267–70.
21. Krzan KD, Merandi J, Morvay S, et al. Implementation of a 'second victim' program in a pediatric hospital. *Am J Health Syst Pharm* 2015;72:563–7.
22. Pratt S, Kenney L, Scott SD, et al. How to develop a second victim support program: a toolkit for health care organizations. *Jt Comm J Qual Patient Saf* 2012;38:235–40.
23. Deneckere S, Euwema M, Lodewijckx C, et al. Better interprofessional teamwork, higher level of organized care, and lower risk of burnout in acute healthcare teams using care pathways: a cluster randomized controlled trial. *Med Care* 2013;51:99–107.
24. World Health Organization. The Conceptual Framework for the International Classification for Patient Safety. Version 1.1. Final Technical Report. 2009.
25. Thompson CV, Suggett N, Fellows J. Must "second victims" always be in the wrong? *BMJ* 2015;350:h2331.
26. Horowitz M, Wilner N, Alvarez W. Impact of event scale: a measure of subjective stress. *Psychosom Med* 1979;41:209–18.
27. Wohlfarth TD, van den Brink W, Winkel FW, et al. Screening for posttraumatic stress disorder: an evaluation of two self-report scales among crime victims. *Psychol Assess* 2003;15:101–9.
28. Joseph S. Psychometric evaluation of Horowitz's impact of event scale: a review. *J Trauma Stress* 2000;13:101–13.

29. Thekdi SM, Milbury K, Spelman A, *et al.* Posttraumatic stress and depressive symptoms in renal cell carcinoma: association with quality of life and utility of single-item distress screening. *Psychooncology* 2015;11:1477–84.
30. Skogstad L, Hem E, Sandvik L, *et al.* Nurse-led psychological intervention after physical traumas: a Randomized Controlled Trial. *J Clin Med Res* 2015;7:339–47.
31. Carver CS. You want to measure coping but your protocol is too long: consider the Brief COPE. *Int J Behav Med* 1997;4:92–100.
32. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Social Psychol* 1989;56:267–83.
33. Scheier MF, Carver CS. Optimism, coping and health: assessment and implications of generalized outcome expectancies. *Health Psychol* 1985;4:219–47.
34. Sorra JS, Nieva VF. *Hospital Survey on Patient Safety Culture. (Prepared by Westat, under Contract No. 290-96-0004). AHRQ Publication No. 04-0041.* Rockville, MD: Agency for Healthcare Research and Quality, 2004.
35. Vlayen A, Hellings J, Claes N, *et al.* A nationwide Hospital Survey on Patient Safety Culture in Belgian hospitals: setting priorities at the launch of a 5-year patient safety plan. *BMJ Qual Saf* 2012;21:760–7.
36. Meredith W. Measurement invariance, factor analysis and factorial invariance. *Psychometrika* 1993;58:525–43.
37. Chen FF. Sensitivity of goodness of fit indexes to lack of measurement invariance. *Struct Equ Modeling* 2007;14:464–504.
38. Horn JL, McArdle JJ. A practical and theoretical guide to measurement invariance in aging research. *Exp Aging Res* 1992;18:117–44.
39. Bauer DJ, Gottfredson NC, Dean D, *et al.* Analyzing repeated measures data on individuals nested within groups: accounting for dynamic group effects. *Psychol Methods* 2013;18:1–14.
40. Kaldjian LC, Forman-Hoffman VL, Jones EW, *et al.* Do faculty and resident physicians discuss their medical errors? *J Med Ethics* 2008;34:717–22.
41. Wu AW, Folkman S, McPhee SJ, *et al.* Do house officers learn from their mistakes? *JAMA* 1991;265:2089–94.
42. Epstein RM, Krasner MS. Physician resilience: what it means, why it matters, and how to promote it. *Acad Med* 2013;88:301–3.
43. Arndt M. Nurses' medication errors. *J Adv Nurs* 1994;19:519–26.
44. Meurier CE, Vincent CA, Parmar DG. Nurses' responses to severity dependent errors: a study of the causal attributions made by nurses following an error. *J Adv Nurs* 1998;27:349–54.
45. Schelbred AB, Nord R. Nurses' experiences of drug administration errors. *J Adv Nurs* 2007;60:317–24.
46. Shanafelt TD, Balch CM, Dyrbye L, *et al.* Special Report: suicidal ideation among American surgeons. *Arch Surg* 2011;146:54–62.
47. Mira JJ, Carrillo I, Lorenzo S, *et al.* The aftermath of adverse events in Spanish primary care and hospital health professionals. *BMC Health Serv Res* 2015;15:151.
48. Lewis EJ, Baernholdt M, Hamric AB. Nurses' experience of medical errors: an integrative literature review. *J Nurs Care Qual* 2013;28:153–61.
49. Scott SD, Hirschinger LE, Cox KR, *et al.* Caring for our own: deploying a systemwide second victim rapid response team. *Jt Comm J Qual Patient Saf* 2010;36:233–40.
50. Woodward HI, Lemer C, Wu AW. An end to the witch hunts: responding to the defenders of blame and shame. A commentary on Collins, Block, Arnold and Christakis. *Soc Sci Med* 2009;69:1291–3.
51. Davidson JE, Agan DL, Chakedis S, *et al.* Workplace blame and related concepts: an analysis of three case studies. *Chest* 2015;148:543–9.
52. Serembus JF, Wolf ZR, Youngblood N. Consequences of fatal medication errors for healthcare providers: a secondary analysis study. *Med Surg Nursing* 2001;10:193–201.