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Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm

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TITLE PAGE

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ABSTRACT

Objectives To describe healthcare providers' symptoms evoked by patient safety incidents, the duration of these symptoms, and the association with the degree of patient harm caused by the incident.

Design Cross-sectional survey.

Setting 32 Dutch hospitals that participate in the "Peer Support Collaborative".

Participants 4369 health care providers (1619 doctors and 2750 nurses) involved in a patient safety incident (PSI) at any time during their career.

Interventions: All doctors and nurses working in direct patient care in the 32 participating hospitals were invited via e-mail to participate in an online survey.

Primary and secondary outcome measures Prevalence of symptoms, symptom duration and its relationship with the degree of patient harm.

Results In total 4369 respondents were involved in a PS. Of these, 462 reported having been involved in a PSI with permanent harm or death during the last 6 months. This had a personal, professional impact as well as impact on effective teamwork requirements. The impact of a PSI increased when the degree of patient harm was more severe. The most common symptom was hypervigilance. The three most common symptoms related to teamwork, were having doubts about knowledge and skill, feeling unable to provide quality care and feeling uncomfortable within the team. PSI with permanent harm or death was related to eight-fold higher likelihood of provider-related symptoms lasting for more than one month and nine-fold lasting longer than six months compared to symptoms reported when the PSI caused no harm.

Conclusion The impact of PSI remains an underestimated problem. The higher the degree of harm, the longer the symptoms last. Future studies should evaluate how these data can be integrated in evidence-based support systems.

KEYWORDS

"Patient Safety", "Stress, Psychological", "Health Personnel/psychology", "Hospitals", "Peer support"

STRENGTHS AND LIMITATIONS

- This study explores an underinvestigated area in the field of patient safety and quality care: duration of health care provider second victim symptoms in the aftermath of a patient safety incident and its relationship with the degree of patient harm.
- The very large sample size (n = 6508) as well as the large number of included Dutch hospitals (n = 32) representing a cross section of urban/rural, small/large, (non)academic, and (non)teaching hospitals.
- In this study the prevalence of symptoms was based on dichotomous questions (Present or absent) and not evaluated by means of validated questionnaires.
- This study is based on data of approximately one third (n = 32) of all Dutch hospitals. The results are not representative for all the health care organizations in the Netherlands or anywhere else in the world.
- Response bias is an inherent limitation related to surveys, as also pertains to the study now reported, as well as recall bias since the self-reported presence or absence of symptoms was purely based on the respondents' recollection.

INTRODUCTION

It is estimated that Patient Safety Incidents (PSI) occur in at least 1 out of 7 hospitalized patients.[1] This mostly includes incidents that cause no harm (near misses) but also incidents with temporary harm, permanent harm or death (adverse events).[2] In addition to the tremendous impact on patients and their family (first victims), the well-being of involved healthcare providers (second victims) may also be significantly affected.[3] Moreover, PSI may harm the reputation of the healthcare department and entire organization (third victims) and reduce trust in healthcare providers in general.[4]

Recent studies indicate that almost 80% of healthcare professionals have been involved in a near miss or adverse event at least once in their career and report to be emotionally affected by this.[5, 6] The psychological impact depends on individual, situational and organisational aspects and affects both personal well-being and professional functioning.[7-9] Anxiety, fear, guilt, distress, frustration, anger and feeling insufficient are the most frequently cited symptoms.[10, 11] In addition, health care providers report a significant work-home interference, greater risk of burnout and higher intention to leave the job.[12]

More and more hospitals realise that they have role in providing an institutional support system to meet second victims needs.[11, 13-15] Healthcare professionals involved in a PSI may have an increased likelihood to develop post-traumatic stress disorder (PTSD).[13] One of the criteria for PTSD, based on the latest criteria set by the Diagnostic and Statistical Manual of Mental Disorders (DSM 5), is that the symptoms last for more than one month.[14] Current literature is lacking in information on duration of symptoms suffered by second victims. This hinders the development of evidence-based institutional support programs. This study aims to describe the prevalence and duration of health care provider self-reported symptoms evoked by PSI, and the association between these symptoms and the degree of patient harm caused by the incident.

METHODS

Setting

This study was conducted at 32 hospitals in the Netherlands that participate in the “Peer Support Collaborative”. The 32 hospitals represent approximately one third of all Dutch

hospitals and comprise a variety of large and small, rural and urban, (non)-teaching and (non)-academic hospitals. These hospitals are amongst the first group of Dutch hospitals who expressed the wish to implement an organisational peer support program for second victims in the aftermath of a PSI, patient complaint or lawsuit. This collaborative aims to determine the needs of their second victims and to define a peer support program that fits their specific organisational patient safety culture and now reports their first insights. As part of the activities of the Collaborative each hospital distributed a standard questionnaire amongst their doctors and nurses in order to determine their specific needs.

Participants

Three rounds of data collection were conducted depending on the year of enrolment of the participating hospital in the peer support Collaborative. Ten hospitals conducted the survey between 14th April and 15th June 2016, nine hospitals between 1st February and 30th March 2017 and 13 hospitals between 2nd June 2018 and 23rd November 2018. All doctors and nurses working in direct patient care in the 32 participating hospitals were invited via e-mail to participate in an online survey under the auspices of the KU Leuven. Respondents could only participate once. The online survey was available during four weeks. The contact person participating in the peer support collaborative of each hospital distributed the web survey in his or her hospital and one e-mail reminder was sent to all doctors and nurses in the third week of the study period. Participation was entirely voluntary, and confidentiality and anonymity were guaranteed.

Measurements

The questionnaire contained four distinct parts. The first part pertained to respondent demographics (profession, years of experience, years of work experience in this hospital, type of ward (surgical of non-surgical) and gender). The second part surveyed the presence or absence of personal involvement in PSI (during the entire career and during the previous 6 months) and the degree of harm (impact of PSI on the patient) (no harm, temporary harm, permanent harm and death). Third, personal involvement and symptoms related to the PSI were measured. These 11 symptoms were selected based on a literature research.[8] Response categories for the duration of the symptoms were “none”, “some hours”, “a day”, “a week”, “a month”, “2-6 months”, “6-12 months” and “more than 1 year”.

Statistics

Demographic variables are reported and descriptive data as well as the recollection of the degree of PSI related patient harm during the entire career and during the previous 6 months. Recollection of the presence or absence of symptoms perceived in the aftermath of a PSI are represented in individual prevalence ratios. This ratio indicates whether the specific symptom lasted for more than 1 month and for more than 6 months, and their prevalence pertaining to PSI with no patient harm, temporary harm, permanent harm and death. We opted to use prevalence ratios as these are less prone to overestimate associations compared with using odds ratios.[15] Descriptive analyses and prevalence ratios were produced using SAS v9.4.

Patient and public involvement

There was no patient or public involvement in this study.

RESULTS

6508 participants in 32 participating hospitals completed the questionnaire. In total 4369 respondents (1619 doctors and 2750 nurses) reported that they had been involved in a PSI at least once during their career and choose to completely fill out the questions regarding symptoms. Table 1 summarizes the demographic information.

Table 1 Demographic information

	Doctors (1619)	Nurses (2750)
Gender		
Female	898 (55.5%)	2531 (92.0%)
Years of experience (mean±SD)	11.2±8.8	18.1±12.1
Type of department		
Surgical department	540 (35.4%)	751 (29.1%)
Nonsurgical department	910 (59.8%)	1506 (58.3%)
Surgical and nonsurgical department	73 (4.8%)	327 (12.6%)

During their entire career, over half of respondents had only been involved in a PSI with no harm whereas approximately 45% had been involved in a PSI with permanent harm or with death (Table 2). During the previous 6 months 80 % of the respondents had only been involved in a PSI with no harm or temporary harm whereas one in 5 reported having been involved in a PSI with permanent harm or death. Doctors reported more involvement in PSI resulting in permanent harm or death compared to nurses.

Table 2 Prevalence for the different degree of harm (Reporting only PSI with the highest reported degree of harm).

	PSI during the entire career (n=4369)			**PSI during previous 6 months (n=2379)**		
Degree of harm	Doctors	Nurses	Overall	Doctors	Nurses	Overall
No harm	197 (12.2%)	911 (33.1%)	1108 (25.4%)	342 (36.6%)	865 (59.9%)	1207 (50.7%)
Temporary harm	372 (23.0%)	936 (34.0%)	1308 (29.9%)	313 (33.5%)	397 (27.5%)	710 (29.8%)
Permanent harm	363 (22.4%)	293 (10.7%)	656 (15.0%)	128 (13.7%)	66 (4.6%)	194 (8.2%)
Death	687 (42.4%)	610 (22.2%)	1297 (29.7%)	152 (16.3%)	116 (8.0%)	268 (11.3%)

Symptoms

Figure 1 depicts an overview of the 11 symptoms and their frequency of occurrence. The most frequently reported symptom was hypervigilance which bothered 53.0% of the respondents for more than one month. In frequency of occurrence this was followed by doubts about knowledge and skill (27.0%), stress (25.8%), shame (24.7%), flashbacks (23.3%), fear (19.0%), feeling unable to provide quality care (15.6%), feeling uncomfortable within team (15.5%), avoiding risks (13.0%), feeling unhappy and dejected (12.5%) and difficulty sleeping (10.8%). Prevalence of symptoms with a duration of more than six months were respectively hypervigilance (23.6%), flashbacks (8.7%), shame (8.2%), doubts about knowledge and skill (8.1%), stress (6.8%), fear (6.3%), feeling unable to provide quality care (4.8%), avoiding risks (4.5%), feeling uncomfortable within team (4.2%), difficulty sleeping (2.8%) and feeling unhappy and dejected (2.6%). Of note, in total, 3.7% of the responding doctors and 4.0% of the nurses reported never having had any symptom while a significant portion of these providers were personally involved in PSI resulting in permanent harm or death.

Table 3 depicts an overview of the different symptoms which persisted for more than one month for each degree of harm. The impact of a PSI with temporary harm, permanent harm and death are more profound than a PSI with no harm, showing up to two, three, four and eight-fold symptom prevalence. While the reported symptoms demonstrate to have a personal impact (difficulty sleeping, fear, stress, shame etc.) organizations need also be aware that some symptoms have also an impact on the teamwork, patient safety and ability to provide quality care. E.g. 27% of the respondents mentioned that they have doubts about knowledge and skill for more than one month, 15.6% feel unable to provide quality care and 15.5% feel uncomfortable within their team.

Table 3 Overview of symptoms persisting longer than one month

	Doctors (n=1619)		Nurses (n=2750)	
	Prevalence no. (%)	Prevalence ratio (95% CI)	Prevalence no. (%)	Prevalence ratio (95% CI)
Hypervigilance				
No harm	85 (43.2%)	Reference	433 (47.5%)	Reference
Temporary harm	170 (45.7%)	1.06 (0.87, 1.29)	485 (51.8%)	1.09 (0.99, 1.20)
Permanent harm	208 (57.3%)	1.33 (1.11, 1.60)*	162 (55.3%)	1.16 (1.03, 1.32)*
Death	409 (59.5%)	1.38 (1.16, 1.64)*	365 (59.8%)	1.26 (1.15, 1.38)*
Doubts about knowledge and skill				
No harm	43 (21.8%)	Reference	138 (15.2%)	Reference
Temporary harm	102 (27.4%)	1.26 (0.92, 1.72)	184 (19.7%)	1.30 (1.06, 1.59)*
Permanent harm	152 (41.9%)	1.92 (1.43, 2.57)*	76 (25.9%)	1.71 (1.34, 2.19)*
Death	319 (46.4%)	2.13 (1.61, 2.80)*	165 (27.1%)	1.79 (1.46, 2.18)*
Stress				
No harm	32 (16.2%)	Reference	122 (13.4%)	Reference
Temporary harm	84 (22.6%)	1.39 (0.96, 2.01)	170 (18.2%)	1.36 (1.10, 1.68)*
Permanent harm	131 (36.1%)	2.22 (1.57, 3.14)*	84 (28.7%)	2.14 (1.68, 2.73)*
Death	308 (44.8%)	2.76 (1.99, 3.83)*	198 (32.5%)	2.42 (1.98, 2.96)*
Shame				

No harm	33 (16.8%)	Reference	139 (15.3%)	Reference
Temporary harm	87 (23.4%)	1.40 (0.97, 2.00)	187 (20.0%)	1.31 (1.07, 1.60)*
Permanent harm	132 (36.4%)	2.17 (1.55, 3.05)*	75 (25.6%)	1.68 (1.31, 2.15)*
Death	279 (40.6%)	2.42 (1.75, 3.35)*	149 (24.4%)	1.60 (1.30, 1.97)*
Flashbacks				
No harm	22 (11.2%)	Reference	111 (12.2%)	Reference
Temporary harm	52 (14.0%)	1.25 (0.78, 2.00)	182 (19.4%)	1.60 (1.28, 1.98)*
Permanent harm	97 (26.7%)	2.39 (1.56, 3.68)*	83 (28.3%)	2.32 (1.81, 2.99)*
Death	240 (34.9%)	3.13 (2.08, 4.70)*	229 (37.5%)	3.08 (2.52, 3.77)*
Fear				
No harm	23 (11.7%)	Reference	94 (10.3%)	Reference
Temporary harm	39 (10.5%)	0.90 (0.55, 1.46)	150 (16.0%)	1.55 (1.22, 1.98)*
Permanent harm	88 (24.2%)	2.08 (1.36, 3.18)*	63 (21.5%)	2.08 (1.56, 2.79)*
Death	211 (30.7%)	2.63 (1.76, 3.93)*	161 (26.4%)	2.56 (2.03, 3.23)*
Avoiding risks				
No harm	6 (5.3%)	Reference	42 (6.7%)	Reference
Temporary harm	23 (10.1%)	1.93 (0.81, 4.59)	57 (8.9%)	1.33 (0.91, 1.95)
Permanent harm	48 (24.4%)	4.63 (2.05, 10.48)*	25 (13.0%)	1.93 (1.21, 3.09)*
Death	104 (24.9%)	4.74 (2.14, 10.51)*	63 (14.9%)	2.21 (1.53, 3.20)*
Unhappy and dejected				
No harm	9 (7.9%)	Reference	25 (4.0%)	Reference
Temporary harm	18 (7.9%)	1.00 (0.47, 2.16)	56 (8.8%)	2.19 (1.39, 3.46)*
Permanent harm	40 (20.3%)	2.57 (1.30, 5.10)*	26 (13.5%)	3.38 (2.00, 5.71)*
Death	117 (28.1%)	3.55 (1.86, 6.78)*	63 (14.9%)	3.72 (2.38, 5.81)*
Uncomfortable within team				
No harm	10 (8.8%)	Reference	46 (7.4%)	Reference
Temporary harm	26 (11.5%)	1.31 (0.65, 2.61)	82 (12.9%)	1.74 (1.24, 2.46)*
Permanent harm	54 (27.4%)	3.12 (1.66, 5.89)*	31 (16.2%)	2.19 (1.43, 3.35)*
Death	115 (27.6%)	3.14 (1.70, 5.80)*	75 (17.7%)	2.41 (1.70, 3.40)*
Difficulty sleeping				
No harm	3 (2.6%)	Reference	23 (3.7%)	Reference

Temporary harm	11 (4.9%)	1.84 (0.52, 6.47)	50 (7.8%)	2.13 (1.31, 3.44)*
Permanent harm	31 (15.7%)	5.98 (1.87, 19.12)*	27 (14.1%)	3.82 (2.24, 6.50)*
Death	94 (22.5%)	8.57 (2.77, 26.54)*	68 (16.1%)	4.36 (2.76, 6.88)*
Unable to provide quality care				
No harm	8 (7.0%)	Reference	41 (6.6%)	Reference
Temporary harm	21 (9.3%)	1.32 (0.60, 2.88)	85 (13.3%)	2.03 (1.42, 2.89)*
Permanent harm	46 (23.4%)	3.33 (1.63, 6.80)*	39 (20.3%)	3.09 (2.06, 4.65)*
Death	106 (25.4%)	3.62 (1.82, 7.21)*	95 (22.5%)	3.42 (2.42, 4.83)*

* P<0.05

Table 4 presents symptoms that lasted more than 6 months following the most severe PSI that was recollected by the respondent. The impact of PSI with temporary harm, permanent harm and death are more profound than a PSI with no harm, showing up to two, three, four, five, six, seven and nine fold prevalence of symptoms. Hypervigilance is the symptom with remained the most constant, and independent of the degree of harm.

Table 4 Overview of symptoms which persisting longer than six months

	Doctors (n=1619)		Nurses (n=2750)	
	Prevalence no. (%)	Prevalence ratio (95% CI)	Prevalence no. (%)	Prevalence ratio (95% CI)
Hypervigilance				
No harm	30 (15.2%)	Reference	206 (22.6%)	Reference
Temporary harm	52 (14.0%)	0.92 (0.61, 1.39)	206 (22.0%)	0.97 (0.82, 1.15)
Permanent harm	77 (21.2%)	1.39 (0.95, 2.05)	88 (30.0%)	1.33 (1.07, 1.64)*
Death	182 (26.5%)	1.74 (1.22, 2.47)*	191 (31.3%)	1.38 (1.17, 1.64)*
Doubts about knowledge and skill				
No harm	5 (2.5%)	Reference	25 (2.7%)	Reference
Temporary harm	19 (5.1%)	2.01 (0.76, 5.31)	52 (5.6%)	2.02 (1.27, 3.23)*
Permanent harm	47 (13.0%)	5.10 (2.06, 12.62)*	25 (8.5%)	3.11 (1.81, 5.33)*
Death	114 (16.6%)	6.54 (2.71, 15.78)*	69 (11.3%)	4.12 (2.64, 6.44)*
Stress				
No harm	4 (2.0%)	Reference	32 (3.5%)	Reference
Temporary harm	15 (4.0%)	1.99 (0.67, 5.90)	49 (5.2%)	1.49 (0.96, 2.30)
Permanent harm	29 (8.0%)	3.93 (1.40, 11.03)*	26 (8.9%)	2.53 (1.53, 4.17)*
Death	84 (12.2%)	6.02 (2.24, 16.21)*	57 (9.3%)	2.66 (1.75, 4.05)*
Shame				
No harm	6 (3.1%)	Reference	33 (3.6%)	Reference
Temporary harm	21 (5.7%)	1.85 (0.76, 4.52)	67 (7.2%)	1.98 (1.32, 2.97)*
Permanent harm	35 (9.6%)	3.17 (1.36, 7.40)*	31 (10.6%)	2.92 (1.82, 4.68)*
Death	99 (14.4%)	4.73 (2.11, 10.62)*	65 (10.7%)	2.94 (1.96, 4.42)*
Flashbacks				
No harm	7 (3.6%)	Reference	32 (3.5%)	Reference
Temporary harm	17 (4.6%)	1.29 (0.54, 3.05)	68 (7.3%)	2.07 (1.37, 3.12)*
Permanent harm	30 (8.3%)	2.33 (1.04, 5.20)*	31 (10.6%)	3.01 (1.87, 4.85)*
Death	94 (13.7%)	3.85 (1.82, 8.16)*	103 (16.9%)	4.81 (3.28, 7.05)*
Fear				

No harm	3 (1.5%)	Reference	25 (2.7%)	Reference
Temporary harm	8 (2.2%)	1.41 (0.38, 5.26)	48 (5.1%)	1.87 (1.16, 3.00)*
Permanent harm	26 (7.2%)	4.70 (1.44, 15.34)*	24 (8.2%)	2.98 (1.73, 5.14)*
Death	79 (11.5%)	7.55 (2.41, 23.66)*	62 (10.2%)	3.70 (2.35, 5.83)*
Avoiding risks				
No harm	1 (0.9%)	Reference	13 (2.1%)	Reference
Temporary harm	8 (3.5%)	4.02 (0.51, 31.73)	25 (3.9%)	1.88 (0.97, 3.64)
Permanent harm	13 (6.6%)	7.52 (0.99, 56.76)	8 (4.2%)	2.00 (0.84, 4.75)
Death	33 (7.9%)	9.02 (1.25, 65.25)*	27 (6.4%)	3.06 (1.60, 5.87)*
Unhappy and dejected				
No harm	2 (1.8%)	Reference	3 (0.5%)	Reference
Temporary harm	2 (0.9%)	0.50 (0.07, 3.52)	11 (1.7%)	3.59 (1.01, 12.79)*
Permanent harm	7 (3.6%)	2.03 (0.43, 9.59)	5 (2.6%)	5.42 (1.31, 22.46)*
Death	30 (7.2%)	4.10 (0.99, 16.90)	15 (3.6%)	7.38 (2.15, 25.32)*
Uncomfortable within team				
No harm	1 (0.9%)	Reference	8 (1.3%)	Reference
Temporary harm	7 (3.1%)	3.52 (0.44, 28.23)	21 (3.3%)	2.57 (1.15, 5.75)*
Permanent harm	10 (5.1%)	5.79 (0.75, 44.62)	10 (5.2%)	4.06 (1.63, 10.15)*
Death	36 (8.6%)	9.84 (1.36, 71.01)*	26 (6.2%)	4.79 (2.19, 10.49)*
Difficulty sleeping				
No harm	1 (0.9%)	Reference	5 (0.8%)	Reference
Temporary harm	2 (0.9%)	1.00 (0.09, 10.96)	13 (2.0%)	2.54 (0.91, 7.09)
Permanent harm	6 (3.1%)	3.47 (0.42, 28.48)	8 (4.2%)	5.20 (1.72, 15.71)*
Death	26 (6.2%)	7.11 (0.98, 51.82)	18 (4.3%)	5.31 (1.99, 14.19)*
Unable to provide quality care				
No harm	1 (0.9%)	Reference	10 (1.6%)	Reference
Temporary harm	7 (3.1%)	3.52 (0.44, 28.23)	26 (4.1%)	2.54 (1.24, 5.23)*
Permanent harm	9 (4.6%)	5.21 (0.67, 40.58)	16 (8.3%)	5.20 (2.40, 11.27)*
Death	27 (6.5%)	7.38 (1.01, 53.74)*	39 (9.2%)	5.75 (2.90, 11.40)*

* P<0.05

DISCUSSION

The impact of PSI on healthcare professionals remains an underestimated problem. This study adds relevant information on the prevalence and (long-lasting) duration of several self-reported symptoms and their relation with the degree of patient harm. Almost half of the respondents reported their involvement in a PSI resulting in permanent harm or death at least once during their entire career. While one in five reported involvement in a PSI resulting in permanent harm or death during the previous six months. Those latter 462 healthcare professionals were particularly at risk for poor well-being and reduced professional functioning during those previous six months as they were involved in a PSI with such serious sequelae. More than half of all respondents suffered hypervigilance for more than one month, while almost one in four suffered more than six months. The prevalence ratio for all symptoms increased with a higher degree of patient harm. Interestingly, this was also true for all symptoms; except for feeling unhappy and dejected and difficulty sleeping; six months after being involved in a PSI compared to one month.

The results reported are in line with previous prevalence reports pertaining to emotional responses.[6, 8, 16] We found that in addition to earlier publications reporting symptoms such as anxiety, flashback and insomnia, that hypervigilance was the most universally reported symptom (80%). A recent study of 5782 physician mothers found that involvement in a mistake was associated with higher reported burnout.[16] The psychological impact of PSI on the healthcare professional is thought to be similar to that characterizing PTSD.[17] We therefore choose a cut-off set at one month based on the criteria set by DSM-5 for PTSD.[14] Suffering symptoms longer than one month, let alone six months, has a profound impact on health care providers professional and personal life. As personal testimonials reveal health care providers can not provide the quality of care that is needed and they are at risk of being involved in future PSI's.[18]

Healthcare professionals may, at some point, find themselves in a vicious circle. As health care workers involved in PSI are at risk of diminished personal well-being and reduced professional performance adequate institutional and peer support are more and more considered essential components in alleviating the personal and professional impact on these second victims. Health care organizations need more awareness that some of the symptoms, such as doubts

about knowledge and skill, feeling unable to provide quality care, feeling uncomfortable with the team, may seriously impact team performance, patient safety and the provision of quality care. Organizations should therefore play a pro-active role in providing immediate support to healthcare professionals involved in a PSI and should not wait until the healthcare professional gets depressed, develops a burnout or quits the job. The risk of not responding to a PSI in a timely and effective manner can have a significant impact on the involved healthcare professional as well as organisations alike. It can lead to absence of healing, loss of trust, no learning and improvement while it may also increase the likelihood of law suits and patient complaints.[4] Perceptions of second victimness, turnover intentions and absenteeism may be less severe when the healthcare organizations culture is characterized by a non-punitive response to errors. Such non-punitive response may encourage supportive interactions, openness to discuss error and thus mitigate the negative effects of PSI.[17] A recent study amongst Dutch gynaecologists showed that 60% of respondents deemed the current hospital support services after an adverse event insufficient. Two-thirds reported that their department or hospital lacked a support protocol or strategy and they were close to unanimous in preferring support from direct colleagues.[19]

Well-being and Joy In Work receive important attention nowadays in medical journals.[20-24] Well-being in physicians and other healthcare professionals has a direct link with patient outcomes. In general, healthcare may need to focus more on positive dimensions like work engagement and enjoy unexpected small positive experiences like Mangomoment a movement recently described by our department and now getting international attention.[23] The results of this study emphasize that the Triple Aim a framework that describes an approach to optimizing health system performance is expanded to a Quadruple aim. Meaning that next to enhancing patient experience, improving population health and reducing costs, improving the work life of health care providers is added to optimize health system performance.[25] To improve Joy in Work, it is now time for action by senior leaders, managers and healthcare providers alike.

The large sample size (n=6508) as well as the large number of included Dutch hospitals (n=32) strengthen this report. However, there are also some limitations. Even though the participating hospitals vary in size, location and function, the results may not be representative for all hospitals in the Netherlands. In order to keep the questionnaire concise

and little time consuming, we did not make use of extensive validated questionnaires but choose a dichotomous (present or absent) variable to record the symptoms. Since we rely on the recollection and perception of the respondents the data may be subject to recollection bias.

Future studies should focus on how organisations best embed the support of healthcare professionals involved in PSI in their vision, mission and policy regarding patient safety and quality care efforts. Specifically, longitudinal studies focusing on the duration of the symptoms may help in making the current support systems more evidence-based. Future work should also include a screening method in order to individualize institutional and peer support in the aftermath of a PSI. More data are needed in order to identify which actions should be taken to reduce the duration of the symptoms for those who suffer longer than expected. We also need to understand more about the degree of well-being of those healthcare providers, involved in a PSI resulting in permanent harm or death, reporting no symptoms at all.

CONCLUSION

In conclusion, the majority of doctors and nurses in approximately one third of Dutch hospitals involved in a PSI at least once during their career and who choose to participate in this study report having suffered several symptoms in the aftermath of the PSI. Some of these symptoms lasted longer than one month while others, eg hypervigilance, even lasted longer than six months. Attention should be given on how to cope with these symptoms as they profoundly affect personal well-being, professional performance as well as teamwork-related efforts directly influencing patient safety and the provision of quality care.

AUTHOR CONTRIBUTIONS

Conception and design of the study: KV, SL, MP and GZ. Acquisition of the data: SL, EC and GZ. Analysis and interpretation of the data: KV, DS, LB and EC. Drafting of the manuscript: DS, LS, LB, ZG and KV. All authors critically revised the manuscript for intellectual content and approved the final version.

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COMPETING INTERESTS

None declared

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DATA SHARING STATEMENT

No data are available.

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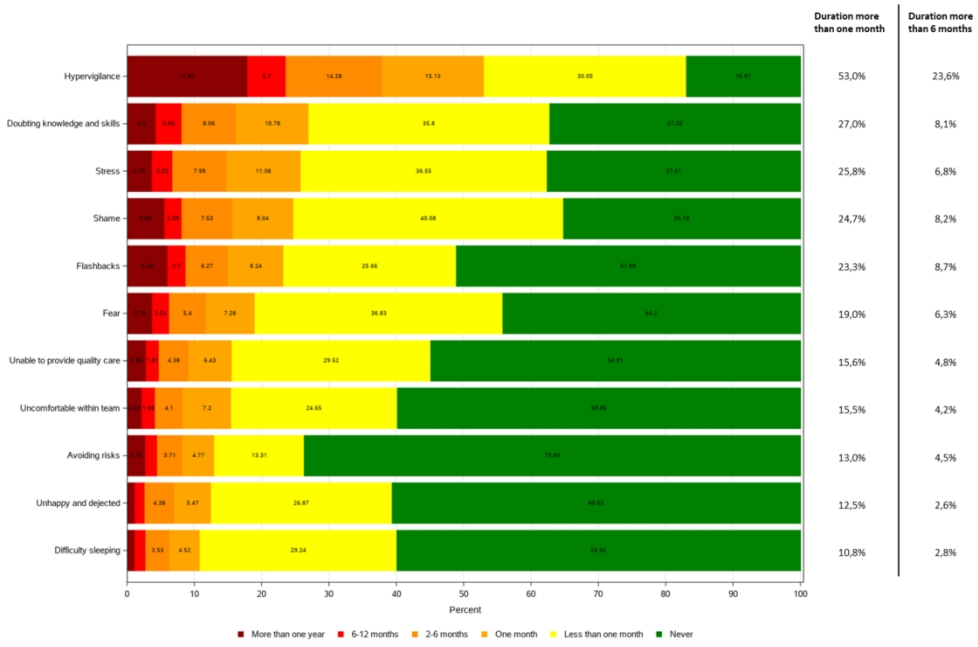
FIGURE LEGENDS

Figure 1 Symptoms in the aftermath of PSI



Symptoms in the aftermath of PSI

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

von Elm E, Altman DG, Egger M, Pocock SJ, Gotzsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies.

		Reporting Item	Page Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	3
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	3
Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	#3	State specific objectives, including any prespecified hypotheses	6
Study design	#4	Present key elements of study design early in the paper	6-7
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	7
	#7	Clearly define all outcomes, exposures, predictors, potential	7

		confounders, and effect modifiers. Give diagnostic criteria, if applicable	
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	7
Bias	#9	Describe any efforts to address potential sources of bias	7
Study size	#10	Explain how the study size was arrived at	n/a
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	7
Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8
	#12b	Describe any methods used to examine subgroups and interactions	8
	#12c	Explain how missing data were addressed	n/a
	#12d	If applicable, describe analytical methods taking account of sampling strategy	n/a
	#12e	Describe any sensitivity analyses	n/a
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	8
	#13b	Give reasons for non-participation at each stage	8
	#13c	Consider use of a flow diagram	n/a
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	8
	#14b	Indicate number of participants with missing data for each variable of interest	8
Outcome data	#15	Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable.	9
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted	10-14

		estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
	#16b	Report category boundaries when continuous variables were categorized	n/a
	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	10-14
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	10-14
Key results	#18	Summarise key results with reference to study objectives	15
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	16-17
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	15-16
Generalisability	#21	Discuss the generalisability (external validity) of the study results	16
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	18

This checklist was completed on 28. January 2019 using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai

BMJ Open

Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm: a cross-sectional study in the Netherlands

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Keywords:	Patient safety, Stress, psychological, Health personnel/psychology, Hospitals, peer support

TITLE PAGE

Title of article: Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm: a cross-sectional study in the Netherlands

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Keywords: “Patient Safety”, “Stress, Psychological”, “Health Personnel/psychology”, “Hospitals”, “Peer support”

ABSTRACT

Objectives To describe healthcare providers' symptoms evoked by patient safety incidents, the duration of these symptoms, and the association with the degree of patient harm caused by the incident.

Design Cross-sectional survey.

Setting 32 Dutch hospitals that participate in the "Peer Support Collaborative".

Participants 4369 health care providers (1619 doctors and 2750 nurses) involved in a patient safety incident (PSI) at any time during their career.

Interventions: All doctors and nurses working in direct patient care in the 32 participating hospitals were invited via e-mail to participate in an online survey.

Primary and secondary outcome measures Prevalence of symptoms, symptom duration and its relationship with the degree of patient harm.

Results In total 4369 respondents were involved in a PSI and completely filled in the questionnaire. Of these, 462 reported having been involved in a PSI with permanent harm or death during the last 6 months. This had a personal, professional impact as well as impact on effective teamwork requirements. The impact of a PSI increased when the degree of patient harm was more severe. The most common symptom was hypervigilance (53.0%). The three most common symptoms related to teamwork, were having doubts about knowledge and skill (27.0%), feeling unable to provide quality care (15.6%) and feeling uncomfortable within the team (15.5%). PSI with permanent harm or death was related to eight-fold higher likelihood of provider-related symptoms lasting for more than one month and nine-fold lasting longer than six months compared to symptoms reported when the PSI caused no harm.

Conclusion The impact of PSI remains an underestimated problem. The higher the degree of harm, the longer the symptoms last. Future studies should evaluate how these data can be integrated in evidence-based support systems.

KEYWORDS

"Patient Safety", "Stress, Psychological", "Health Personnel/psychology", "Hospitals", "Peer support"

STRENGTHS AND LIMITATIONS

- This study explores an underinvestigated area in the field of patient safety and quality care: duration of health care provider second victim symptoms in the aftermath of a patient safety incident and its relationship with the degree of patient harm.
- The very large sample size (n = 6508) as well as the large number of included Dutch hospitals (n = 32) representing a cross section of urban/rural, small/large, (non)academic, and (non)teaching hospitals.
- In this study the prevalence of symptoms was based on dichotomous questions (Present or absent) and not evaluated by means of validated questionnaires.
- This study is based on data of approximately one third (n = 32) of all Dutch hospitals. The results are not representative for all the health care organizations in the Netherlands or anywhere else in the world.
- Response bias is an inherent limitation related to surveys, as also pertains to the study now reported, as well as recall bias since the self-reported presence or absence of symptoms was purely based on the respondents' recollection.

INTRODUCTION

It is estimated that Patient Safety Incidents (PSI) occur in at least 1 out of 7 hospitalized patients.[1] This mostly includes incidents that cause no harm (near misses) but also incidents with temporary harm, permanent harm or death (adverse events).[2] In addition to the tremendous impact on patients and their family (first victims), the well-being of involved healthcare providers (second victims) may also be significantly affected.[3] Although there is criticism on the term second victims, no alternative term is available.[4] Moreover, PSI may harm the reputation of the healthcare department and entire organization (third victims) and reduce trust in healthcare providers in general.[5]

Recent studies indicate that almost 80% of healthcare providers involved in a near miss or adverse event at least once in their career and report being emotionally affected by this.[6, 7] The psychological impact depends on individual, situational and organisational aspects and affects both personal well-being and professional functioning.[8-10] Anxiety, fear, guilt, distress, frustration, anger and feeling insufficient are the most frequently cited symptoms.[11, 12] In addition, health care providers report a significant work-home interference, greater risk of burnout and higher intention to leave the job.[13]

More and more hospitals realise that they have a role in providing an institutional support system to meet second victims needs.[12, 14-16] Healthcare professionals involved in a PSI may have an increased likelihood developing post-traumatic stress disorder (PTSD).[14] One of the criteria for PTSD, based on the latest criteria set by the Diagnostic and Statistical Manual of Mental Disorders (DSM 5), is that the symptoms last for more than one month.[15] Current literature is lacking in information on duration of symptoms suffered by second victims. This hinders the development of evidence-based institutional support programs. This study aims to describe the prevalence and duration of health care provider self-reported symptoms evoked by PSI, and the association between these symptoms and the degree of patient harm caused by the incident.

METHODS

Setting

This study was conducted at 32 hospitals in the Netherlands that participate in the "Peer Support Collaborative". The 32 hospitals represent approximately one third of all Dutch hospitals and comprise a variety of large and small, rural and urban, (non)-teaching and (non)-academic hospitals. These hospitals are amongst the first group of Dutch hospitals who expressed the wish to implement an organisational peer support program for second victims in the aftermath of a PSI, patient complaint or lawsuit. This collaborative aims to determine the needs of their second victims and to define a peer support program that fits their specific organisational patient safety culture and now reports their first insights. As part of the activities of the Collaborative each hospital distributed a standard questionnaire amongst their doctors and nurses in order to determine their specific needs.

Participants

Three rounds of data collection were conducted depending on the year of enrolment of the participating hospital in the peer support Collaborative. Ten hospitals conducted the survey between 14th April and 15th June 2016, nine hospitals between 1st February and 30th March 2017 and 13 hospitals between 2nd June 2018 and 23rd November 2018. All doctors and nurses working in direct patient care in the 32 participating hospitals were invited via e-mail to participate in an online survey under the auspices of the KU Leuven. Respondents could only participate once. The online survey was available during four weeks. The contact person participating in the peer support collaborative of each hospital distributed the web survey in his or her hospital and one e-mail reminder was sent to all doctors and nurses in the third week of the study period. According to the regulations in Dutch hospitals, in the survey it was mentioned that filling in the questionnaire implied informed consent to participate. Participation was entirely voluntary, and confidentiality and anonymity were guaranteed.

Measurements

The questionnaire contained four distinct parts. The first part pertained to respondent demographics (profession, years of experience, years of work experience in this hospital, type of ward (surgical of non-surgical) and gender). The second part surveyed the presence or absence of personal involvement in PSI (during the entire career and during the previous 6 months) and the degree of harm (impact of PSI on the patient) (no harm, temporary harm,

permanent harm and death). This parted started with more information about what a PSI is and the difference with a not-patient safety related dramatic event. Third, personal involvement and symptoms related to the PSI were measured. These 11 symptoms were selected based on a literature research.[9] Response categories for the duration of the symptoms were “none”, “some hours”, “a day”, “a week”, “a month”, “2-6 months”, “6-12 months” and “more than 1 year”. The questionnaire was based on previous research [13, 17-19] and redesigned by the participating hospitals during a meeting of the peer support network.

Statistics

Only completely filled in questionnaires were included in the analysis, except for the prevalence rate. Demographic variables are reported and descriptive data as well as the recollection of the degree of PSI related patient harm during the entire career and during the previous 6 months. Recollection of the presence or absence of symptoms perceived in the aftermath of a PSI are represented in individual prevalence ratios. This ratio indicates whether the specific symptom lasted for more than 1 month and for more than 6 months, and their prevalence pertaining to PSI with no patient harm, temporary harm, permanent harm and death. We opted to use prevalence ratios as these are less prone to overestimate associations compared with using odds ratios.[16] Descriptive analyses and prevalence ratios were produced using SAS v9.4. This manuscript is compliant to the STROBE recommendations.

Patient and public involvement

There was no patient or public involvement in this study.

RESULTS

6508 participants in 32 participating hospitals completed the questionnaire. In total 5572 respondents (1938 doctors and 3634 nurses) reported that they had been involved in a PSI at least once during their career (85.6%) and 4369 (1619 doctors and 2750 nurses) choose to completely fill out the questions regarding symptoms and were included in this study. Table 1 summarizes the demographic information of the 4369 respondents.

Table 1 Demographic information

	Doctors (1619)	Nurses (2750)
Gender		
Female	898 (55.5%)	2531 (92.0%)
Years of experience (mean±SD)	11.2±8.8	18.1±12.1
Type of department		
Surgical department	540 (35.4%)	751 (29.1%)
Nonsurgical department	910 (59.8%)	1506 (58.3%)
Surgical and nonsurgical department	73 (4.8%)	327 (12.6%)

During their entire career, over half of respondents had only been involved in a PSI with no harm whereas approximately 45% had been involved in a PSI with permanent harm or with death (Table 2). During the previous 6 months 80 % of the respondents had only been involved in a PSI with no harm or temporary harm whereas one in 5 reported having been involved in a PSI with permanent harm or death. Doctors reported more involvement in PSI resulting in permanent harm or death compared to nurses.

Table 2 Prevalence for the different degree of harm (Reporting only PSI with the highest reported degree of harm).

	PSI during the entire career (n=4369)			**PSI during previous 6 months (n=2379)**		
Degree of harm	Doctors	Nurses	Overall	Doctors	Nurses	Overall
No harm	197 (12.2%)	911 (33.1%)	1108 (25.4%)	342 (36.6%)	865 (59.9%)	1207 (50.7%)
Temporary harm	372 (23.0%)	936 (34.0%)	1308 (29.9%)	313 (33.5%)	397 (27.5%)	710 (29.8%)
Permanent harm	363 (22.4%)	293 (10.7%)	656 (15.0%)	128 (13.7%)	66 (4.6%)	194 (8.2%)
Death	687 (42.4%)	610 (22.2%)	1297 (29.7%)	152 (16.3%)	116 (8.0%)	268 (11.3%)

Symptoms

Figure 1 depicts an overview of the 11 symptoms and their frequency of occurrence. The most frequently reported symptom was hypervigilance which bothered 53.0% of the respondents for more than one month. In frequency of occurrence this was followed by doubts about knowledge and skill (27.0%), stress (25.8%), shame (24.7%), flashbacks (23.3%), fear (19.0%),

feeling unable to provide quality care (15.6%), feeling uncomfortable within team (15.5%), avoiding risks (13.0%), feeling unhappy and dejected (12.5%) and difficulty sleeping (10.8%). Prevalence of symptoms with a duration of more than six months were respectively hypervigilance (23.6%), flashbacks (8.7%), shame (8.2%), doubts about knowledge and skill (8.1%), stress (6.8%), fear (6.3%), feeling unable to provide quality care (4.8%), avoiding risks (4.5%), feeling uncomfortable within team (4.2%), difficulty sleeping (2.8%) and feeling unhappy and dejected (2.6%). Of note, in total, 3.7% of the responding doctors and 4.0% of the nurses reported never having had any symptom while a significant portion of these providers were personally involved in PSI resulting in permanent harm or death.

Table 3 depicts an overview of the different symptoms which persisted for more than one month for each degree of harm. The impact of a PSI with temporary harm, permanent harm and death are more profound than a PSI with no harm, showing up to two, three, four and eight-fold symptom prevalence. While the reported symptoms demonstrate a personal impact (difficulty sleeping, fear, stress, shame etc.) organizations need also be aware that some symptoms also have an impact on the teamwork, patient safety and ability to provide quality care. E.g. 27% of the respondents mentioned that they have doubts about knowledge and skill for more than one month, 15.6% feel unable to provide quality care and 15.5% feel uncomfortable within their team.

Table 3 Overview of symptoms persisting longer than one month

	Doctors (n=1619)		Nurses (n=2750)	
	Prevalence no. (%)	Prevalence ratio (95% CI)	Prevalence no. (%)	Prevalence ratio (95% CI)
Hypervigilance				
No harm	85 (43.2%)	Reference	433 (47.5%)	Reference
Temporary harm	170 (45.7%)	1.06 (0.87, 1.29)	485 (51.8%)	1.09 (0.99, 1.20)
Permanent harm	208 (57.3%)	1.33 (1.11, 1.60)*	162 (55.3%)	1.16 (1.03, 1.32)*
Death	409 (59.5%)	1.38 (1.16, 1.64)*	365 (59.8%)	1.26 (1.15, 1.38)*
Doubts about knowledge and skill				
No harm	43 (21.8%)	Reference	138 (15.2%)	Reference
Temporary harm	102 (27.4%)	1.26 (0.92, 1.72)	184 (19.7%)	1.30 (1.06, 1.59)*
Permanent harm	152 (41.9%)	1.92 (1.43, 2.57)*	76 (25.9%)	1.71 (1.34, 2.19)*
Death	319 (46.4%)	2.13 (1.61, 2.80)*	165 (27.1%)	1.79 (1.46, 2.18)*
Stress				
No harm	32 (16.2%)	Reference	122 (13.4%)	Reference
Temporary harm	84 (22.6%)	1.39 (0.96, 2.01)	170 (18.2%)	1.36 (1.10, 1.68)*
Permanent harm	131 (36.1%)	2.22 (1.57, 3.14)*	84 (28.7%)	2.14 (1.68, 2.73)*
Death	308 (44.8%)	2.76 (1.99, 3.83)*	198 (32.5%)	2.42 (1.98, 2.96)*
Shame				

No harm	33 (16.8%)	Reference	139 (15.3%)	Reference
Temporary harm	87 (23.4%)	1.40 (0.97, 2.00)	187 (20.0%)	1.31 (1.07, 1.60)*
Permanent harm	132 (36.4%)	2.17 (1.55, 3.05)*	75 (25.6%)	1.68 (1.31, 2.15)*
Death	279 (40.6%)	2.42 (1.75, 3.35)*	149 (24.4%)	1.60 (1.30, 1.97)*
Flashbacks				
No harm	22 (11.2%)	Reference	111 (12.2%)	Reference
Temporary harm	52 (14.0%)	1.25 (0.78, 2.00)	182 (19.4%)	1.60 (1.28, 1.98)*
Permanent harm	97 (26.7%)	2.39 (1.56, 3.68)*	83 (28.3%)	2.32 (1.81, 2.99)*
Death	240 (34.9%)	3.13 (2.08, 4.70)*	229 (37.5%)	3.08 (2.52, 3.77)*
Fear				
No harm	23 (11.7%)	Reference	94 (10.3%)	Reference
Temporary harm	39 (10.5%)	0.90 (0.55, 1.46)	150 (16.0%)	1.55 (1.22, 1.98)*
Permanent harm	88 (24.2%)	2.08 (1.36, 3.18)*	63 (21.5%)	2.08 (1.56, 2.79)*
Death	211 (30.7%)	2.63 (1.76, 3.93)*	161 (26.4%)	2.56 (2.03, 3.23)*
Avoiding risks				
No harm	6 (5.3%)	Reference	42 (6.7%)	Reference
Temporary harm	23 (10.1%)	1.93 (0.81, 4.59)	57 (8.9%)	1.33 (0.91, 1.95)
Permanent harm	48 (24.4%)	4.63 (2.05, 10.48)*	25 (13.0%)	1.93 (1.21, 3.09)*
Death	104 (24.9%)	4.74 (2.14, 10.51)*	63 (14.9%)	2.21 (1.53, 3.20)*
Unhappy and dejected				
No harm	9 (7.9%)	Reference	25 (4.0%)	Reference
Temporary harm	18 (7.9%)	1.00 (0.47, 2.16)	56 (8.8%)	2.19 (1.39, 3.46)*
Permanent harm	40 (20.3%)	2.57 (1.30, 5.10)*	26 (13.5%)	3.38 (2.00, 5.71)*
Death	117 (28.1%)	3.55 (1.86, 6.78)*	63 (14.9%)	3.72 (2.38, 5.81)*
Uncomfortable within team				
No harm	10 (8.8%)	Reference	46 (7.4%)	Reference
Temporary harm	26 (11.5%)	1.31 (0.65, 2.61)	82 (12.9%)	1.74 (1.24, 2.46)*
Permanent harm	54 (27.4%)	3.12 (1.66, 5.89)*	31 (16.2%)	2.19 (1.43, 3.35)*
Death	115 (27.6%)	3.14 (1.70, 5.80)*	75 (17.7%)	2.41 (1.70, 3.40)*
Difficulty sleeping				
No harm	3 (2.6%)	Reference	23 (3.7%)	Reference

Temporary harm	11 (4.9%)	1.84 (0.52, 6.47)	50 (7.8%)	2.13 (1.31, 3.44)*
Permanent harm	31 (15.7%)	5.98 (1.87, 19.12)*	27 (14.1%)	3.82 (2.24, 6.50)*
Death	94 (22.5%)	8.57 (2.77, 26.54)*	68 (16.1%)	4.36 (2.76, 6.88)*
Unable to provide quality care				
No harm	8 (7.0%)	Reference	41 (6.6%)	Reference
Temporary harm	21 (9.3%)	1.32 (0.60, 2.88)	85 (13.3%)	2.03 (1.42, 2.89)*
Permanent harm	46 (23.4%)	3.33 (1.63, 6.80)*	39 (20.3%)	3.09 (2.06, 4.65)*
Death	106 (25.4%)	3.62 (1.82, 7.21)*	95 (22.5%)	3.42 (2.42, 4.83)*

* P<0.05

Table 4 presents symptoms that lasted more than 6 months following the most severe PSI that was recollected by the respondent. The impact of PSI with temporary harm, permanent harm and death are more profound than a PSI with no harm, showing up to two, three, four, five, six, seven and nine fold prevalence of symptoms. Hypervigilance is the symptom which remained the most constant, and independent of the degree of harm.

Table 4 Overview of symptoms which persisting longer than six months

	Doctors (n=1619)		Nurses (n=2750)	
	Prevalence no. (%)	Prevalence ratio (95% CI)	Prevalence no. (%)	Prevalence ratio (95% CI)
Hypervigilance				
No harm	30 (15.2%)	Reference	206 (22.6%)	Reference
Temporary harm	52 (14.0%)	0.92 (0.61, 1.39)	206 (22.0%)	0.97 (0.82, 1.15)
Permanent harm	77 (21.2%)	1.39 (0.95, 2.05)	88 (30.0%)	1.33 (1.07, 1.64)*
Death	182 (26.5%)	1.74 (1.22, 2.47)*	191 (31.3%)	1.38 (1.17, 1.64)*
Doubts about knowledge and skill				
No harm	5 (2.5%)	Reference	25 (2.7%)	Reference
Temporary harm	19 (5.1%)	2.01 (0.76, 5.31)	52 (5.6%)	2.02 (1.27, 3.23)*
Permanent harm	47 (13.0%)	5.10 (2.06, 12.62)*	25 (8.5%)	3.11 (1.81, 5.33)*
Death	114 (16.6%)	6.54 (2.71, 15.78)*	69 (11.3%)	4.12 (2.64, 6.44)*
Stress				
No harm	4 (2.0%)	Reference	32 (3.5%)	Reference
Temporary harm	15 (4.0%)	1.99 (0.67, 5.90)	49 (5.2%)	1.49 (0.96, 2.30)
Permanent harm	29 (8.0%)	3.93 (1.40, 11.03)*	26 (8.9%)	2.53 (1.53, 4.17)*
Death	84 (12.2%)	6.02 (2.24, 16.21)*	57 (9.3%)	2.66 (1.75, 4.05)*
Shame				
No harm	6 (3.1%)	Reference	33 (3.6%)	Reference
Temporary harm	21 (5.7%)	1.85 (0.76, 4.52)	67 (7.2%)	1.98 (1.32, 2.97)*
Permanent harm	35 (9.6%)	3.17 (1.36, 7.40)*	31 (10.6%)	2.92 (1.82, 4.68)*
Death	99 (14.4%)	4.73 (2.11, 10.62)*	65 (10.7%)	2.94 (1.96, 4.42)*
Flashbacks				
No harm	7 (3.6%)	Reference	32 (3.5%)	Reference
Temporary harm	17 (4.6%)	1.29 (0.54, 3.05)	68 (7.3%)	2.07 (1.37, 3.12)*
Permanent harm	30 (8.3%)	2.33 (1.04, 5.20)*	31 (10.6%)	3.01 (1.87, 4.85)*
Death	94 (13.7%)	3.85 (1.82, 8.16)*	103 (16.9%)	4.81 (3.28, 7.05)*
Fear				

No harm	3 (1.5%)	Reference	25 (2.7%)	Reference
Temporary harm	8 (2.2%)	1.41 (0.38, 5.26)	48 (5.1%)	1.87 (1.16, 3.00)*
Permanent harm	26 (7.2%)	4.70 (1.44, 15.34)*	24 (8.2%)	2.98 (1.73, 5.14)*
Death	79 (11.5%)	7.55 (2.41, 23.66)*	62 (10.2%)	3.70 (2.35, 5.83)*
Avoiding risks				
No harm	1 (0.9%)	Reference	13 (2.1%)	Reference
Temporary harm	8 (3.5%)	4.02 (0.51, 31.73)	25 (3.9%)	1.88 (0.97, 3.64)
Permanent harm	13 (6.6%)	7.52 (0.99, 56.76)	8 (4.2%)	2.00 (0.84, 4.75)
Death	33 (7.9%)	9.02 (1.25, 65.25)*	27 (6.4%)	3.06 (1.60, 5.87)*
Unhappy and dejected				
No harm	2 (1.8%)	Reference	3 (0.5%)	Reference
Temporary harm	2 (0.9%)	0.50 (0.07, 3.52)	11 (1.7%)	3.59 (1.01, 12.79)*
Permanent harm	7 (3.6%)	2.03 (0.43, 9.59)	5 (2.6%)	5.42 (1.31, 22.46)*
Death	30 (7.2%)	4.10 (0.99, 16.90)	15 (3.6%)	7.38 (2.15, 25.32)*
Uncomfortable within team				
No harm	1 (0.9%)	Reference	8 (1.3%)	Reference
Temporary harm	7 (3.1%)	3.52 (0.44, 28.23)	21 (3.3%)	2.57 (1.15, 5.75)*
Permanent harm	10 (5.1%)	5.79 (0.75, 44.62)	10 (5.2%)	4.06 (1.63, 10.15)*
Death	36 (8.6%)	9.84 (1.36, 71.01)*	26 (6.2%)	4.79 (2.19, 10.49)*
Difficulty sleeping				
No harm	1 (0.9%)	Reference	5 (0.8%)	Reference
Temporary harm	2 (0.9%)	1.00 (0.09, 10.96)	13 (2.0%)	2.54 (0.91, 7.09)
Permanent harm	6 (3.1%)	3.47 (0.42, 28.48)	8 (4.2%)	5.20 (1.72, 15.71)*
Death	26 (6.2%)	7.11 (0.98, 51.82)	18 (4.3%)	5.31 (1.99, 14.19)*
Unable to provide quality care				
No harm	1 (0.9%)	Reference	10 (1.6%)	Reference
Temporary harm	7 (3.1%)	3.52 (0.44, 28.23)	26 (4.1%)	2.54 (1.24, 5.23)*
Permanent harm	9 (4.6%)	5.21 (0.67, 40.58)	16 (8.3%)	5.20 (2.40, 11.27)*
Death	27 (6.5%)	7.38 (1.01, 53.74)*	39 (9.2%)	5.75 (2.90, 11.40)*

* P<0.05

DISCUSSION

The impact of PSI on healthcare professionals remains an underestimated problem. This study adds relevant information on the prevalence and (long-lasting) duration of several self-reported symptoms and their relation with the degree of patient harm. Almost half of the respondents reported their involvement in a PSI resulting in permanent harm or death at least once during their entire career, while one in five reported involvement in a PSI resulting in permanent harm or death during the previous six months. Those latter 462 healthcare professionals were particularly at risk for poor well-being and reduced professional functioning during those previous six months as they were involved in a PSI with such serious sequelae. More than half of all respondents suffered hypervigilance for more than one month, while almost one in four suffered more than six months. The prevalence ratio for all symptoms increased with a higher degree of patient harm. Interestingly, this was also true for all symptoms; except for feeling unhappy and dejected and difficulty sleeping; six months after being involved in a PSI compared to one month.

The results reported are in line with previous prevalence reports pertaining to emotional responses.[7, 9, 20] We found that in addition to earlier publications reporting symptoms such as anxiety, flashback and insomnia, that hypervigilance was the most universally reported symptom (80%). A recent study of 5782 physician mothers found that involvement in a mistake was associated with higher reported burnout.[20] The psychological impact of PSI on the healthcare professional is thought to be similar to that characterizing PTSD.[21] We therefore choose a cut-off set at one month based on the criteria set by DSM-5 for PTSD.[15] Suffering symptoms longer than one month, let alone six months, has a profound impact on health care providers' professional and personal life. As personal testimonials reveal health care providers can not provide the quality of care that is needed and they are at risk of being involved in future PSI's.[22]

Healthcare professionals may, at some point, find themselves in a vicious circle. As health care workers involved in PSI are at risk of diminished personal well-being and reduced professional performance adequate institutional and peer support are more and more considered essential components in alleviating the personal and professional impact on these second victims. Health care organizations need more awareness that some of the symptoms, such as doubts

about knowledge and skill, feeling unable to provide quality care, feeling uncomfortable with the team, may seriously impact team performance, patient safety and the provision of quality care. Organizations should therefore play a pro-active role in providing immediate support to healthcare professionals involved in a PSI and should not wait until the healthcare professional gets depressed, develops burnout or quits the job. The risk of not responding to a PSI in a timely and effective manner can have a significant impact on the healthcare professional involved and organisations alike. It can lead to absence of healing, loss of trust, no learning and improvement while it may also increase the likelihood of lawsuits and patient complaints.[5] Perceptions of second victimness, turnover intentions and absenteeism may be less severe when the healthcare organization's culture is characterized by a non-punitive response to errors. Such non-punitive response may encourage supportive interactions, openness to discuss error and thus mitigate the negative effects of PSI.[21] A recent study amongst Dutch gynaecologists showed that 60% of respondents deemed the current hospital support services after an adverse event insufficient. Two-thirds reported that their department or hospital lacked a support protocol or strategy and they were close to unanimous in preferring support from direct colleagues.[23]

Well-being and Joy In Work receive important attention nowadays in medical journals.[24-28] Well-being in physicians and other healthcare professionals has a direct link with patient outcomes. In general, healthcare may need to focus more on positive dimensions like work engagement and enjoy unexpected small positive experiences like Mangomoment a movement recently described by our department and now getting international attention.[27] The results of this study emphasize that the Triple Aim a framework that describes an approach to optimizing health system performance is expanded to a Quadruple aim, meaning that next to enhancing patient experience, improving population health and reducing costs, improving the work life of health care providers is added to optimize health system performance.[29] To improve Joy in Work, it is now time for action by senior leaders, managers and healthcare providers alike.

The large sample size (n=6508) as well as the large number of Dutch hospitals (n=32) included strengthen this report. However, there are also some limitations. First, even though the participating hospitals vary in size, location and function, the results may not be representative for all hospitals in the Netherlands. Second, the questionnaire was distributed

in several ways (by email, by intranet, by chairman of departments) and this implies that no response rate can be calculated. Third, in order to keep the questionnaire concise and little time consuming, we did not make use of extensive validated questionnaires but choose a dichotomous (present or absent) variable to record the symptoms. Last, since we rely on the recollection and perception of the respondents the data may be subject to recollection bias.

Supporting healthcare professionals in the aftermath of a PSI is an important challenge for healthcare professionals, managers, board members, and policy makers. It should be part of the overall quality management system. For example there should be more awareness about the emotional impact, building a professional support system and improve the notification of the available support mechanisms. This should results in better quality of care to patients and their family as only healthcare professional who are feeling well and supported by colleagues and boards, are able to provide high-quality of care. As the involved patients and family are the main victims of these serious clinical adverse events, all involved clinicians and managers should focus on the needs of these first victims. Open communication on the event and openness about the improvement initiatives should support the safety climate and overall quality of healthcare.

Future studies should focus on how organisations best embed the support of healthcare professionals involved in PSI in their vision, mission and policy regarding patient safety and quality care efforts. Specifically, longitudinal studies focusing on the duration of the symptoms may help in making the current support systems more evidence-based. Future work should also include a screening method in order to individualize institutional and peer support in the aftermath of a PSI. More data are needed in order to identify which actions should be taken to reduce the duration of the symptoms for those who suffer longer than expected. We also need to understand more about the degree of well-being of those healthcare providers involved in a PSI resulting in permanent harm or death, reporting no symptoms at all.

CONCLUSION

In conclusion, the majority of doctors and nurses in approximately one third of Dutch hospitals involved in a PSI at least once during their career and who chose to participate in this study report having suffered several symptoms in the aftermath of the PSI. Some of these symptoms lasted longer than one month while others, eg hypervigilance, even lasted longer than six

months. Attention should be given to how to cope with these symptoms as they profoundly affect personal well-being, professional performance as well as teamwork-related efforts directly influencing patient safety and the provision of quality care.

AUTHOR CONTRIBUTIONS

Conception and design of the study: KV, LS, MP and GGZ. Acquisition of the data: LS, EC and GGZ. Analysis and interpretation of the data: KV, DS, LB and EC. Drafting of the manuscript: DS, LS, LB, GGZ and KV. All authors critically revised the manuscript for intellectual content and approved the final version.

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COMPETING INTERESTS

None declared

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DATA SHARING STATEMENT

All data relevant to the study are included in the article or uploaded as supplementary information.

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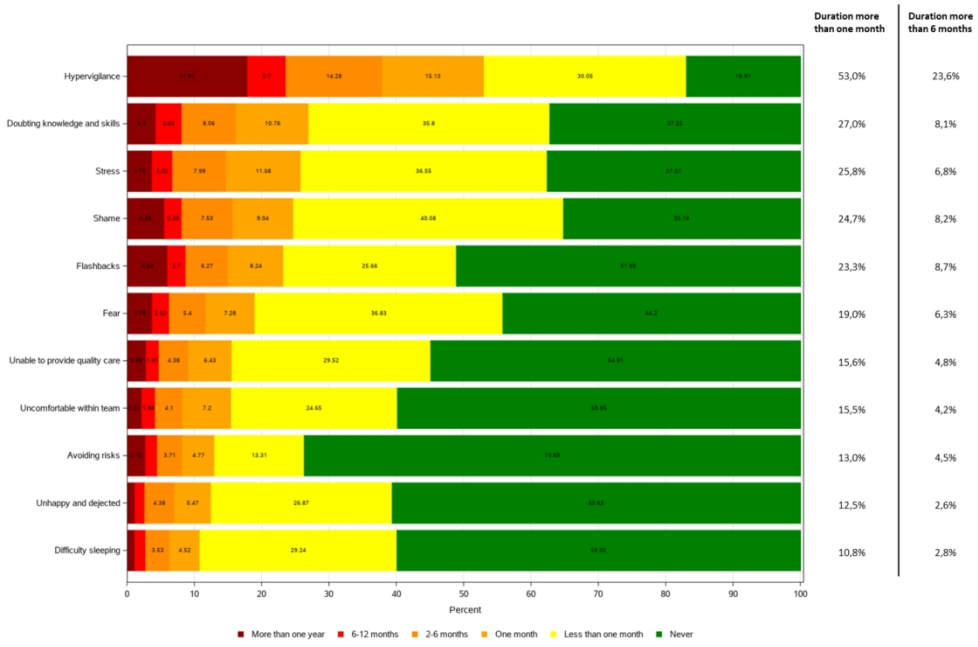
FIGURE LEGENDS

Figure 1 Symptoms in the aftermath of PSI



Symptoms in the aftermath of PSI

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

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In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1, 3
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	3

Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	#3	State specific objectives, including any prespecified hypotheses	6
Study design	#4	Present key elements of study design early in the paper	6-7
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	7
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	7
Bias	#9	Describe any efforts to address potential sources of bias	7
Study size	#10	Explain how the study size was arrived at	n/a
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	7

Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8
	#12b	Describe any methods used to examine subgroups and interactions	8
	#12c	Explain how missing data were addressed	7
	#12d	If applicable, describe analytical methods taking account of sampling strategy	n/a
	#12e	Describe any sensitivity analyses	n/a
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	8
	#13b	Give reasons for non-participation at each stage	8
	#13c	Consider use of a flow diagram	n/a
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	8
	#14b	Indicate number of participants with missing data for each variable of interest	8
Outcome data	#15	Report numbers of outcome events or summary measures.	9

		Give information separately for exposed and unexposed groups if applicable.	
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-14
	#16b	Report category boundaries when continuous variables were categorized	n/a
	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	10-14
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	10-14
Key results	#18	Summarise key results with reference to study objectives	15
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	16-17
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	15-16
Generalisability	#21	Discuss the generalisability (external validity) of the study results	16
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which	18

the present article is based

BMJ Open

Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm: a cross-sectional study in the Netherlands

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TITLE PAGE

Title of article: Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm: a cross-sectional study in the Netherlands

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Keywords: “Patient Safety”, “Stress, Psychological”, “Health Personnel/psychology”, “Hospitals”, “Peer support”

ABSTRACT

Objectives To describe health care providers' symptoms evoked by patient safety incidents, the duration of these symptoms, and the association with the degree of patient harm caused by the incident.

Design Cross-sectional survey.

Setting 32 Dutch hospitals that participate in the "Peer Support Collaborative".

Participants 4369 health care providers (1619 doctors and 2750 nurses) involved in a patient safety incident (PSI) at any time during their career.

Interventions: All doctors and nurses working in direct patient care in the 32 participating hospitals were invited via e-mail to participate in an online survey.

Primary and secondary outcome measures Prevalence of symptoms, symptom duration and its relationship with the degree of patient harm.

Results In total 4369 respondents were involved in a PSI and completely filled in the questionnaire. Of these, 462 reported having been involved in a PSI with permanent harm or death during the last 6 months. This had a personal, professional impact as well as impact on effective teamwork requirements. The impact of a PSI increased when the degree of patient harm was more severe. The most common symptom was hypervigilance (53.0%). The three most common symptoms related to teamwork, were having doubts about knowledge and skill (27.0%), feeling unable to provide quality care (15.6%) and feeling uncomfortable within the team (15.5%). PSI with permanent harm or death was related to eight-fold higher likelihood of provider-related symptoms lasting for more than one month and nine-fold lasting longer than six months compared to symptoms reported when the PSI caused no harm.

Conclusion The impact of PSI remains an underestimated problem. The higher the degree of harm, the longer the symptoms last. Future studies should evaluate how these data can be integrated in evidence-based support systems.

KEYWORDS

"Patient Safety", "Stress, Psychological", "Health Personnel/psychology", "Hospitals", "Peer support"

STRENGTHS AND LIMITATIONS

- This study explores an underinvestigated area in the field of patient safety and quality care: duration of health care provider second victim symptoms in the aftermath of a patient safety incident and its relationship with the degree of patient harm.
- The very large sample size (n = 6508) as well as the large number of included Dutch hospitals (n = 32) representing a cross section of urban/rural, small/large, (non)academic, and (non)teaching hospitals.
- In this study the prevalence of symptoms was based on dichotomous questions (Present or absent) and not evaluated by means of validated questionnaires.
- This study is based on data of approximately one third (n = 32) of all Dutch hospitals. The results are not representative for all the health care organizations in the Netherlands or anywhere else in the world.
- Response bias is an inherent limitation related to surveys, as also pertains to the study now reported, as well as recall bias since the self-reported presence or absence of symptoms was purely based on the respondents' recollection.

INTRODUCTION

It is estimated that Patient Safety Incidents (PSI) occur in at least 1 out of 7 hospitalized patients.[1] This mostly includes incidents that cause no harm (near misses) but also incidents with temporary harm, permanent harm or death (adverse events).[2] In addition to the tremendous impact on patients and their family (first victims), the well-being of involved health care providers (second victims) may also be significantly affected.[3] Although there is criticism on the term second victims, no alternative term is available.[4] Moreover, PSI may harm the reputation of the health care department and entire organization (third victims) and reduce trust in health care providers in general.[5]

Recent studies indicate that almost 80% of health care providers are involved in a near miss or adverse event at least once in their career and that they were emotionally affected.[6, 7] The psychological impact depends on individual, situational and organisational aspects and affects both personal well-being and professional functioning.[8-10] Anxiety, fear, guilt, distress, frustration, anger and feeling insufficient are the most frequently cited symptoms.[11, 12] In addition, health care providers report a significant work-home interference, greater risk of burnout and higher intention to leave the job.[13]

More and more hospitals realise that they have a role in providing an institutional support system to meet second victims needs.[12, 14-16] Health care professionals involved in a PSI may have an increased likelihood developing post-traumatic stress disorder (PTSD).[14] One of the criteria for PTSD, based on the latest criteria set by the Diagnostic and Statistical Manual of Mental Disorders (DSM 5), is that the symptoms last for more than one month.[15] Current literature is lacking in information on duration of symptoms suffered by second victims. This hinders the development of evidence-based institutional support programs. This study aims to describe the prevalence and duration of health care provider self-reported symptoms evoked by PSI, and the association between these symptoms and the degree of patient harm caused by the incident.

METHODS

Setting

This study was conducted at 32 hospitals in the Netherlands that participate in the "Peer Support Collaborative". The 32 hospitals represent approximately one third of all Dutch hospitals and comprise a variety of large and small, rural and urban, (non)-teaching and (non)-academic hospitals. These hospitals are amongst the first group of Dutch hospitals who expressed the wish to implement an organisational peer support program for second victims in the aftermath of a PSI, patient complaint or lawsuit. This collaborative aims to determine the needs of their second victims and to define a peer support program that fits their specific organisational patient safety culture and now reports their first insights. As part of the activities of the Collaborative each hospital distributed a standard questionnaire amongst their doctors and nurses in order to determine their specific needs.

Participants

Three rounds of data collection were conducted depending on the year of enrolment of the participating hospital in the peer support Collaborative. Ten hospitals conducted the survey between 14th April and 15th June 2016, nine hospitals between 1st February and 30th March 2017 and 13 hospitals between 2nd June 2018 and 23rd November 2018. All doctors and nurses working in direct patient care in the 32 participating hospitals were invited via e-mail to participate in an online survey under the auspices of the KU Leuven. Respondents could only participate once. The online survey was available during four weeks. The contact person participating in the peer support collaborative of each hospital distributed the web survey in his or her hospital and one e-mail reminder was sent to all doctors and nurses in the third week of the study period. According to the regulations in Dutch hospitals, in the survey it was mentioned that filling in the questionnaire implied informed consent to participate. Participation was entirely voluntary, and confidentiality and anonymity were guaranteed.

Measurements

The questionnaire contained four distinct parts. The first part pertained to respondent demographics (profession, years of experience, years of work experience in this hospital, type of ward (surgical of non-surgical) and gender). The second part surveyed the presence or absence of personal involvement in PSI (during the entire career and during the previous 6 months) and the degree of harm (impact of PSI on the patient) (no harm, temporary harm,

permanent harm and death). This parted started with more information about what a PSI is and the difference with a not-patient safety related dramatic event. Third, personal involvement and symptoms related to the PSI were measured. These 11 symptoms were selected based on a literature research.[9] Response categories for the duration of the symptoms were “none”, “some hours”, “a day”, “a week”, “a month”, “2-6 months”, “6-12 months” and “more than 1 year”. The questionnaire was based on previous research [13, 17-19] and redesigned by the participating hospitals during a meeting of the peer support network.

Statistics

Only completely filled in questionnaires were included in the analysis, except for the prevalence rate. Demographic variables are reported and descriptive data as well as the recollection of the degree of PSI related patient harm during the entire career and during the previous 6 months. Recollection of the presence or absence of symptoms perceived in the aftermath of a PSI are represented in individual prevalence ratios. This ratio indicates whether the specific symptom lasted for more than 1 month and for more than 6 months, and their prevalence pertaining to PSI with no patient harm, temporary harm, permanent harm and death. We opted to use prevalence ratios as these are less prone to overestimate associations compared with using odds ratios.[16] Descriptive analyses and prevalence ratios were produced using SAS v9.4. This manuscript is compliant to the STROBE recommendations.

Patient and public involvement

There was no patient or public involvement in this study.

RESULTS

6508 participants in 32 participating hospitals completed the questionnaire. In total 5572 respondents (1938 doctors and 3634 nurses) reported that they had been involved in a PSI at least once during their career (85.6%) and 4369 (1619 doctors and 2750 nurses) choose to completely fill out the questions regarding symptoms and were included in this study. Table 1 summarizes the demographic information of the 4369 respondents.

Table 1 Demographic information

	Doctors (1619)	Nurses (2750)
Gender		
Female	898 (55.5%)	2531 (92.0%)
Years of experience (mean±SD)	11.2±8.8	18.1±12.1
Type of department		
Surgical department	540 (35.4%)	751 (29.1%)
Nonsurgical department	910 (59.8%)	1506 (58.3%)
Surgical and nonsurgical department	73 (4.8%)	327 (12.6%)

During their entire career, over half of respondents had only been involved in a PSI with no harm whereas approximately 45% had been involved in a PSI with permanent harm or with death (Table 2). During the previous 6 months 80 % of the respondents had only been involved in a PSI with no harm or temporary harm whereas one in 5 reported having been involved in a PSI with permanent harm or death. Doctors reported more involvement in PSI resulting in permanent harm or death compared to nurses.

Table 2 Prevalence for the different degree of harm (Reporting only PSI with the highest reported degree of harm).

	PSI during the entire career (n=4369)			**PSI during previous 6 months (n=2379)**		
Degree of harm	Doctors	Nurses	Overall	Doctors	Nurses	Overall
No harm	197 (12.2%)	911 (33.1%)	1108 (25.4%)	342 (36.6%)	865 (59.9%)	1207 (50.7%)
Temporary harm	372 (23.0%)	936 (34.0%)	1308 (29.9%)	313 (33.5%)	397 (27.5%)	710 (29.8%)
Permanent harm	363 (22.4%)	293 (10.7%)	656 (15.0%)	128 (13.7%)	66 (4.6%)	194 (8.2%)
Death	687 (42.4%)	610 (22.2%)	1297 (29.7%)	152 (16.3%)	116 (8.0%)	268 (11.3%)

Symptoms

Figure 1 depicts an overview of the 11 symptoms and their frequency of occurrence. The most frequently reported symptom was hypervigilance which bothered 53.0% of the respondents for more than one month. In frequency of occurrence this was followed by doubts about knowledge and skill (27.0%), stress (25.8%), shame (24.7%), flashbacks (23.3%), fear (19.0%),

feeling unable to provide quality care (15.6%), feeling uncomfortable within team (15.5%), avoiding risks (13.0%), feeling unhappy and dejected (12.5%) and difficulty sleeping (10.8%). Prevalence of symptoms with a duration of more than six months were respectively hypervigilance (23.6%), flashbacks (8.7%), shame (8.2%), doubts about knowledge and skill (8.1%), stress (6.8%), fear (6.3%), feeling unable to provide quality care (4.8%), avoiding risks (4.5%), feeling uncomfortable within team (4.2%), difficulty sleeping (2.8%) and feeling unhappy and dejected (2.6%). Of note, in total, 3.7% of the responding doctors and 4.0% of the nurses reported never having had any symptom while a significant portion of these providers were personally involved in PSI resulting in permanent harm or death.

Table 3 depicts an overview of the different symptoms which persisted for more than one month for each degree of harm. The impact of a PSI with temporary harm, permanent harm and death are more profound than a PSI with no harm, showing up to two, three, four and eight-fold symptom prevalence. While the reported symptoms demonstrate a personal impact (difficulty sleeping, fear, stress, shame etc.) organizations need also be aware that some symptoms also have an impact on the teamwork, patient safety and ability to provide quality care. E.g. 27% of the respondents mentioned that they have doubts about knowledge and skill for more than one month, 15.6% feel unable to provide quality care and 15.5% feel uncomfortable within their team.

Table 3 Overview of symptoms persisting longer than one month

	Doctors (n=1619)		Nurses (n=2750)	
	Prevalence no. (%)	Prevalence ratio (95% CI)	Prevalence no. (%)	Prevalence ratio (95% CI)
Hypervigilance				
No harm	85 (43.2%)	Reference	433 (47.5%)	Reference
Temporary harm	170 (45.7%)	1.06 (0.87, 1.29)	485 (51.8%)	1.09 (0.99, 1.20)
Permanent harm	208 (57.3%)	1.33 (1.11, 1.60)*	162 (55.3%)	1.16 (1.03, 1.32)*
Death	409 (59.5%)	1.38 (1.16, 1.64)*	365 (59.8%)	1.26 (1.15, 1.38)*
Doubts about knowledge and skill				
No harm	43 (21.8%)	Reference	138 (15.2%)	Reference
Temporary harm	102 (27.4%)	1.26 (0.92, 1.72)	184 (19.7%)	1.30 (1.06, 1.59)*
Permanent harm	152 (41.9%)	1.92 (1.43, 2.57)*	76 (25.9%)	1.71 (1.34, 2.19)*
Death	319 (46.4%)	2.13 (1.61, 2.80)*	165 (27.1%)	1.79 (1.46, 2.18)*
Stress				
No harm	32 (16.2%)	Reference	122 (13.4%)	Reference
Temporary harm	84 (22.6%)	1.39 (0.96, 2.01)	170 (18.2%)	1.36 (1.10, 1.68)*
Permanent harm	131 (36.1%)	2.22 (1.57, 3.14)*	84 (28.7%)	2.14 (1.68, 2.73)*
Death	308 (44.8%)	2.76 (1.99, 3.83)*	198 (32.5%)	2.42 (1.98, 2.96)*
Shame				

No harm	33 (16.8%)	Reference	139 (15.3%)	Reference
Temporary harm	87 (23.4%)	1.40 (0.97, 2.00)	187 (20.0%)	1.31 (1.07, 1.60)*
Permanent harm	132 (36.4%)	2.17 (1.55, 3.05)*	75 (25.6%)	1.68 (1.31, 2.15)*
Death	279 (40.6%)	2.42 (1.75, 3.35)*	149 (24.4%)	1.60 (1.30, 1.97)*
Flashbacks				
No harm	22 (11.2%)	Reference	111 (12.2%)	Reference
Temporary harm	52 (14.0%)	1.25 (0.78, 2.00)	182 (19.4%)	1.60 (1.28, 1.98)*
Permanent harm	97 (26.7%)	2.39 (1.56, 3.68)*	83 (28.3%)	2.32 (1.81, 2.99)*
Death	240 (34.9%)	3.13 (2.08, 4.70)*	229 (37.5%)	3.08 (2.52, 3.77)*
Fear				
No harm	23 (11.7%)	Reference	94 (10.3%)	Reference
Temporary harm	39 (10.5%)	0.90 (0.55, 1.46)	150 (16.0%)	1.55 (1.22, 1.98)*
Permanent harm	88 (24.2%)	2.08 (1.36, 3.18)*	63 (21.5%)	2.08 (1.56, 2.79)*
Death	211 (30.7%)	2.63 (1.76, 3.93)*	161 (26.4%)	2.56 (2.03, 3.23)*
Avoiding risks				
No harm	6 (5.3%)	Reference	42 (6.7%)	Reference
Temporary harm	23 (10.1%)	1.93 (0.81, 4.59)	57 (8.9%)	1.33 (0.91, 1.95)
Permanent harm	48 (24.4%)	4.63 (2.05, 10.48)*	25 (13.0%)	1.93 (1.21, 3.09)*
Death	104 (24.9%)	4.74 (2.14, 10.51)*	63 (14.9%)	2.21 (1.53, 3.20)*
Unhappy and dejected				
No harm	9 (7.9%)	Reference	25 (4.0%)	Reference
Temporary harm	18 (7.9%)	1.00 (0.47, 2.16)	56 (8.8%)	2.19 (1.39, 3.46)*
Permanent harm	40 (20.3%)	2.57 (1.30, 5.10)*	26 (13.5%)	3.38 (2.00, 5.71)*
Death	117 (28.1%)	3.55 (1.86, 6.78)*	63 (14.9%)	3.72 (2.38, 5.81)*
Uncomfortable within team				
No harm	10 (8.8%)	Reference	46 (7.4%)	Reference
Temporary harm	26 (11.5%)	1.31 (0.65, 2.61)	82 (12.9%)	1.74 (1.24, 2.46)*
Permanent harm	54 (27.4%)	3.12 (1.66, 5.89)*	31 (16.2%)	2.19 (1.43, 3.35)*
Death	115 (27.6%)	3.14 (1.70, 5.80)*	75 (17.7%)	2.41 (1.70, 3.40)*
Difficulty sleeping				
No harm	3 (2.6%)	Reference	23 (3.7%)	Reference

Temporary harm	11 (4.9%)	1.84 (0.52, 6.47)	50 (7.8%)	2.13 (1.31, 3.44)*
Permanent harm	31 (15.7%)	5.98 (1.87, 19.12)*	27 (14.1%)	3.82 (2.24, 6.50)*
Death	94 (22.5%)	8.57 (2.77, 26.54)*	68 (16.1%)	4.36 (2.76, 6.88)*
Unable to provide quality care				
No harm	8 (7.0%)	Reference	41 (6.6%)	Reference
Temporary harm	21 (9.3%)	1.32 (0.60, 2.88)	85 (13.3%)	2.03 (1.42, 2.89)*
Permanent harm	46 (23.4%)	3.33 (1.63, 6.80)*	39 (20.3%)	3.09 (2.06, 4.65)*
Death	106 (25.4%)	3.62 (1.82, 7.21)*	95 (22.5%)	3.42 (2.42, 4.83)*

* P<0.05

Table 4 presents symptoms that lasted more than 6 months following the most severe PSI that was recollected by the respondent. The impact of PSI with temporary harm, permanent harm and death are more profound than a PSI with no harm, showing up to two, three, four, five, six, seven and nine fold prevalence of symptoms. Hypervigilance is the symptom which remained the most constant, and independent of the degree of harm.

Table 4 Overview of symptoms persisting longer than six months

	Doctors (n=1619)		Nurses (n=2750)	
	Prevalence no. (%)	Prevalence ratio (95% CI)	Prevalence no. (%)	Prevalence ratio (95% CI)
Hypervigilance				
No harm	30 (15.2%)	Reference	206 (22.6%)	Reference
Temporary harm	52 (14.0%)	0.92 (0.61, 1.39)	206 (22.0%)	0.97 (0.82, 1.15)
Permanent harm	77 (21.2%)	1.39 (0.95, 2.05)	88 (30.0%)	1.33 (1.07, 1.64)*
Death	182 (26.5%)	1.74 (1.22, 2.47)*	191 (31.3%)	1.38 (1.17, 1.64)*
Doubts about knowledge and skill				
No harm	5 (2.5%)	Reference	25 (2.7%)	Reference
Temporary harm	19 (5.1%)	2.01 (0.76, 5.31)	52 (5.6%)	2.02 (1.27, 3.23)*
Permanent harm	47 (13.0%)	5.10 (2.06, 12.62)*	25 (8.5%)	3.11 (1.81, 5.33)*
Death	114 (16.6%)	6.54 (2.71, 15.78)*	69 (11.3%)	4.12 (2.64, 6.44)*
Stress				
No harm	4 (2.0%)	Reference	32 (3.5%)	Reference
Temporary harm	15 (4.0%)	1.99 (0.67, 5.90)	49 (5.2%)	1.49 (0.96, 2.30)
Permanent harm	29 (8.0%)	3.93 (1.40, 11.03)*	26 (8.9%)	2.53 (1.53, 4.17)*
Death	84 (12.2%)	6.02 (2.24, 16.21)*	57 (9.3%)	2.66 (1.75, 4.05)*
Shame				
No harm	6 (3.1%)	Reference	33 (3.6%)	Reference
Temporary harm	21 (5.7%)	1.85 (0.76, 4.52)	67 (7.2%)	1.98 (1.32, 2.97)*
Permanent harm	35 (9.6%)	3.17 (1.36, 7.40)*	31 (10.6%)	2.92 (1.82, 4.68)*
Death	99 (14.4%)	4.73 (2.11, 10.62)*	65 (10.7%)	2.94 (1.96, 4.42)*
Flashbacks				
No harm	7 (3.6%)	Reference	32 (3.5%)	Reference
Temporary harm	17 (4.6%)	1.29 (0.54, 3.05)	68 (7.3%)	2.07 (1.37, 3.12)*
Permanent harm	30 (8.3%)	2.33 (1.04, 5.20)*	31 (10.6%)	3.01 (1.87, 4.85)*
Death	94 (13.7%)	3.85 (1.82, 8.16)*	103 (16.9%)	4.81 (3.28, 7.05)*
Fear				

No harm	3 (1.5%)	Reference	25 (2.7%)	Reference
Temporary harm	8 (2.2%)	1.41 (0.38, 5.26)	48 (5.1%)	1.87 (1.16, 3.00)*
Permanent harm	26 (7.2%)	4.70 (1.44, 15.34)*	24 (8.2%)	2.98 (1.73, 5.14)*
Death	79 (11.5%)	7.55 (2.41, 23.66)*	62 (10.2%)	3.70 (2.35, 5.83)*
Avoiding risks				
No harm	1 (0.9%)	Reference	13 (2.1%)	Reference
Temporary harm	8 (3.5%)	4.02 (0.51, 31.73)	25 (3.9%)	1.88 (0.97, 3.64)
Permanent harm	13 (6.6%)	7.52 (0.99, 56.76)	8 (4.2%)	2.00 (0.84, 4.75)
Death	33 (7.9%)	9.02 (1.25, 65.25)*	27 (6.4%)	3.06 (1.60, 5.87)*
Unhappy and dejected				
No harm	2 (1.8%)	Reference	3 (0.5%)	Reference
Temporary harm	2 (0.9%)	0.50 (0.07, 3.52)	11 (1.7%)	3.59 (1.01, 12.79)*
Permanent harm	7 (3.6%)	2.03 (0.43, 9.59)	5 (2.6%)	5.42 (1.31, 22.46)*
Death	30 (7.2%)	4.10 (0.99, 16.90)	15 (3.6%)	7.38 (2.15, 25.32)*
Uncomfortable within team				
No harm	1 (0.9%)	Reference	8 (1.3%)	Reference
Temporary harm	7 (3.1%)	3.52 (0.44, 28.23)	21 (3.3%)	2.57 (1.15, 5.75)*
Permanent harm	10 (5.1%)	5.79 (0.75, 44.62)	10 (5.2%)	4.06 (1.63, 10.15)*
Death	36 (8.6%)	9.84 (1.36, 71.01)*	26 (6.2%)	4.79 (2.19, 10.49)*
Difficulty sleeping				
No harm	1 (0.9%)	Reference	5 (0.8%)	Reference
Temporary harm	2 (0.9%)	1.00 (0.09, 10.96)	13 (2.0%)	2.54 (0.91, 7.09)
Permanent harm	6 (3.1%)	3.47 (0.42, 28.48)	8 (4.2%)	5.20 (1.72, 15.71)*
Death	26 (6.2%)	7.11 (0.98, 51.82)	18 (4.3%)	5.31 (1.99, 14.19)*
Unable to provide quality care				
No harm	1 (0.9%)	Reference	10 (1.6%)	Reference
Temporary harm	7 (3.1%)	3.52 (0.44, 28.23)	26 (4.1%)	2.54 (1.24, 5.23)*
Permanent harm	9 (4.6%)	5.21 (0.67, 40.58)	16 (8.3%)	5.20 (2.40, 11.27)*
Death	27 (6.5%)	7.38 (1.01, 53.74)*	39 (9.2%)	5.75 (2.90, 11.40)*

* P<0.05

DISCUSSION

The impact of PSI on health care professionals remains an underestimated problem. This study adds relevant information on the prevalence and (long-lasting) duration of several self-reported symptoms and their relation with the degree of patient harm. Almost half of the respondents reported their involvement in a PSI resulting in permanent harm or death at least once during their entire career, while one in five reported involvement in a PSI resulting in permanent harm or death during the previous six months. Those latter 462 health care professionals were particularly at risk for poor well-being and reduced professional functioning during those previous six months as they were involved in a PSI with such serious sequelae. More than half of all respondents suffered hypervigilance for more than one month, while almost one in four suffered more than six months. The prevalence ratio for all symptoms increased with a higher degree of patient harm. Interestingly, this was also true for all symptoms; except for feeling unhappy and dejected and difficulty sleeping; six months after being involved in a PSI compared to one month.

The results reported are in line with previous prevalence reports pertaining to emotional responses.[7, 9, 20] We found that in addition to earlier publications reporting symptoms such as anxiety, flashback and insomnia, that hypervigilance was the most universally reported symptom (80%). A recent study of 5782 physician mothers found that involvement in a mistake was associated with higher reported burnout.[20] The psychological impact of PSI on the health care professional is thought to be similar to that characterizing PTSD.[21] We therefore chose a cut-off set at one month based on the criteria set by DSM-5 for PTSD.[15] Suffering symptoms longer than one month, let alone six months, has a profound impact on health care providers' professional and personal life. As personal testimonials reveal, health care providers can not provide the quality of care that is needed and they are at risk of being involved in future PSI's.[22]

Health care professionals may, at some point, find themselves in a vicious circle. As health care workers involved in PSI are at risk of diminished personal well-being and reduced professional performance adequate institutional and peer support are more and more considered essential components in alleviating the personal and professional impact on these second victims. Health care organizations need more awareness that some of the symptoms,

such as doubts about knowledge and skill, feeling unable to provide quality care, feeling uncomfortable with the team, may seriously impact team performance, patient safety and the provision of quality care. Organizations should therefore play a pro-active role in providing immediate support to health care professionals involved in a PSI and should not wait until the health care professional gets depressed, develops burnout or quits the job. The risk of not responding to a PSI in a timely and effective manner can have a significant impact on the health care professional involved and organisations alike. It can lead to absence of healing, loss of trust, no learning and improvement while it may also increase the likelihood of lawsuits and patient complaints.[5] Perceptions of second victimness, turnover intentions and absenteeism may be less severe when the health care organization's culture is characterized by a non-punitive response to errors. Such non-punitive response may encourage supportive interactions, openness to discuss error and thus mitigate the negative effects of PSI.[21] A recent study amongst Dutch gynaecologists showed that 60% of respondents deemed the current hospital support services after an adverse event insufficient. Two-thirds reported that their department or hospital lacked a support protocol or strategy and they were close to unanimous in preferring support from direct colleagues.[23]

Well-being and Joy In Work receive important attention nowadays in medical journals.[24-28] Well-being in physicians and other health care professionals has a direct link with patient outcomes. In general, health care may need to focus more on positive dimensions like work engagement and enjoy unexpected small positive experiences like Mangomoment a movement recently described by our department and now getting international attention.[27] The results of this study emphasize that the Triple Aim a framework that describes an approach to optimizing health system performance is expanded to a Quadruple aim, meaning that next to enhancing patient experience, improving population health and reducing costs, improving the work life of health care providers is added to optimize health system performance.[29] To improve Joy in Work, it is now time for action by senior leaders, managers and health care providers alike.

The large sample size (n=6508) as well as the large number of Dutch hospitals (n=32) included strengthen this report. However, there are also some limitations. First, even though the participating hospitals vary in size, location and function, the results may not be representative for all hospitals in the Netherlands. Second, the questionnaire was distributed

in several ways (by email, by intranet, by chairman of departments) and this implies that no response rate can be calculated. Third, in order to keep the questionnaire concise and little time consuming, we did not make use of extensive validated questionnaires but choose a dichotomous (present or absent) variable to record the symptoms. Last, since we rely on the recollection and perception of the respondents the data may be subject to recollection bias.

Supporting health care professionals in the aftermath of a PSI is an important challenge for health care professionals, managers, board members, and policy makers. It should be part of the overall quality management system. For example there should be more awareness about the emotional impact, building a professional support system and improve the notification of the available support mechanisms. This should result in better quality of care to patients and their family as only health care professionals who are feeling well and supported by colleagues and boards, are able to provide high-quality of care. As the involved patients and family are the main victims of these serious clinical adverse events, all involved clinicians and managers should focus on the needs of these first victims. Open communication on the event and openness about the improvement initiatives should support the safety climate and overall quality of health care.

Future studies should focus on how organisations best embed the support of health care professionals involved in PSI in their vision, mission and policy regarding patient safety and quality care efforts. Specifically, longitudinal studies focusing on the duration of the symptoms may help in making the current support systems more evidence-based. Future work should also include a screening method in order to individualize institutional and peer support in the aftermath of a PSI. More data are needed in order to identify which actions should be taken to reduce the duration of the symptoms for those who suffer longer than expected. We also need to understand more about the degree of well-being of those health care providers involved in a PSI resulting in permanent harm or death, reporting no symptoms at all.

CONCLUSION

In conclusion, the majority of doctors and nurses in approximately one third of Dutch hospitals involved in a PSI at least once during their career and who chose to participate in this study report having suffered several symptoms in the aftermath of the PSI. Some of these symptoms lasted longer than one month while others, eg hypervigilance, even lasted longer than six

months. Attention should be given to how to cope with these symptoms as they profoundly affect personal well-being, professional performance as well as teamwork-related efforts directly influencing patient safety and the provision of quality care.

AUTHOR CONTRIBUTIONS

Conception and design of the study: KV, LS, MP and GGZ. Acquisition of the data: LS, EC and GGZ. Analysis and interpretation of the data: KV, DS, LB and EC. Drafting of the manuscript: DS, LS, LB, GGZ and KV. All authors critically revised the manuscript for intellectual content and approved the final version.

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COMPETING INTERESTS

None declared

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DATA SHARING STATEMENT

All data relevant to the study are included in the article or uploaded as supplementary information.

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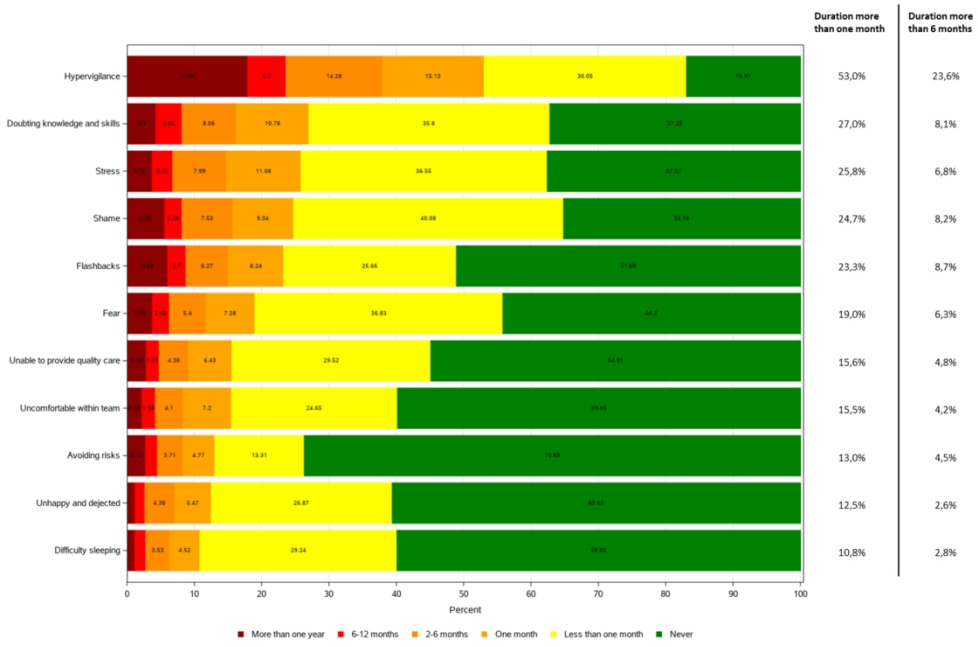
FIGURE LEGENDS

Figure 1 Symptoms in the aftermath of PSI



Symptoms in the aftermath of PSI

Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectional reporting guidelines, and cite them as:

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		Reporting Item	Page Number
Title	#1a	Indicate the study's design with a commonly used term in the title or the abstract	1, 3
Abstract	#1b	Provide in the abstract an informative and balanced summary of what was done and what was found	3

Background / rationale	#2	Explain the scientific background and rationale for the investigation being reported	6
Objectives	#3	State specific objectives, including any prespecified hypotheses	6
Study design	#4	Present key elements of study design early in the paper	6-7
Setting	#5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Eligibility criteria	#6a	Give the eligibility criteria, and the sources and methods of selection of participants.	7
	#7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	7
Data sources / measurement	#8	For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable.	7
Bias	#9	Describe any efforts to address potential sources of bias	7
Study size	#10	Explain how the study size was arrived at	n/a
Quantitative variables	#11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	7

Statistical methods	#12a	Describe all statistical methods, including those used to control for confounding	8
	#12b	Describe any methods used to examine subgroups and interactions	8
	#12c	Explain how missing data were addressed	7
	#12d	If applicable, describe analytical methods taking account of sampling strategy	n/a
	#12e	Describe any sensitivity analyses	n/a
Participants	#13a	Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable.	8
	#13b	Give reasons for non-participation at each stage	8
	#13c	Consider use of a flow diagram	n/a
Descriptive data	#14a	Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable.	8
	#14b	Indicate number of participants with missing data for each variable of interest	8
Outcome data	#15	Report numbers of outcome events or summary measures.	9

		Give information separately for exposed and unexposed groups if applicable.	
Main results	#16a	Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-14
	#16b	Report category boundaries when continuous variables were categorized	n/a
	#16c	If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	10-14
Other analyses	#17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	10-14
Key results	#18	Summarise key results with reference to study objectives	15
Limitations	#19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias.	16-17
Interpretation	#20	Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence.	15-16
Generalisability	#21	Discuss the generalisability (external validity) of the study results	16
Funding	#22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which	18

the present article is based