Posttraumatic stress disorder in a medical setting

The physician, patient and partner triad

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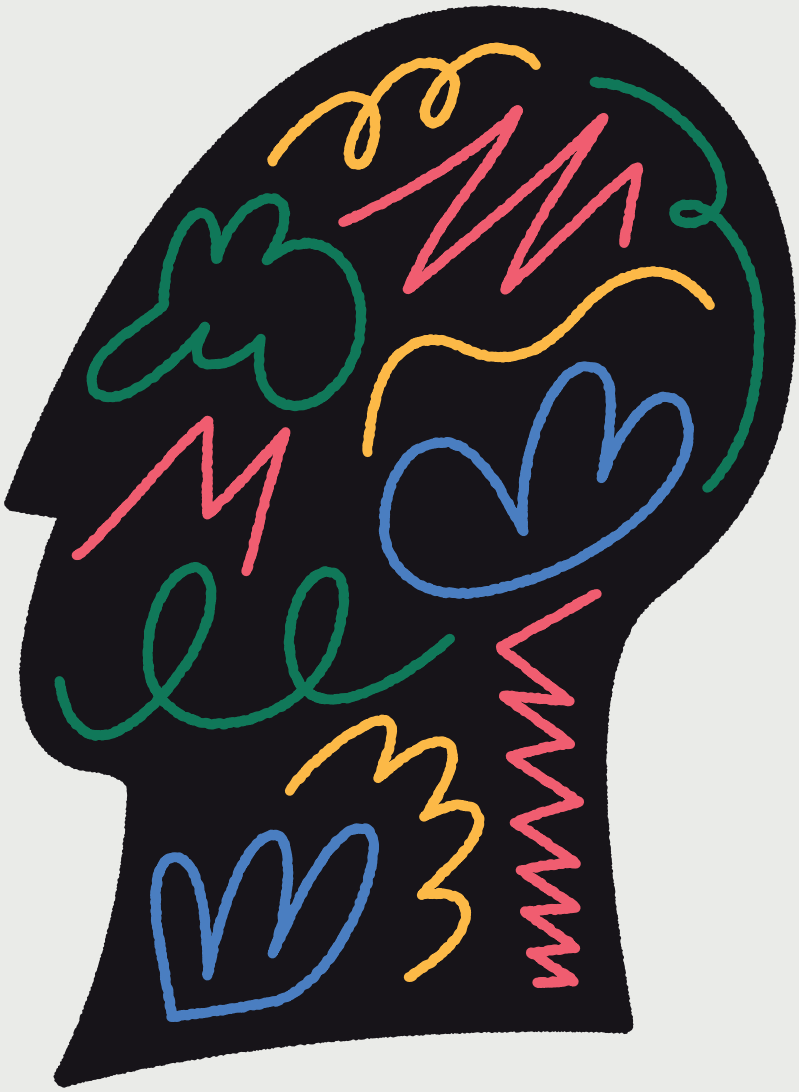

Karel WF Scheepstra

THE PHYSICIAN, PATIENT AND PARTNER TRIAD

Karel WF Scheepstra

Colophon

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Posttraumatic stress disorder in a medical setting:

The physician, patient and partner triad

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Contents

1.

GENERAL INTRODUCTION

Introduction

Posttraumatic stress disorder (PTSD) is a debilitating disorder that can develop in anyone present or exposed to a psychotraumatic event (PTE).[1] Symptoms of PTSD include re-experiencing the event (e.g. flashbacks or nightmares), negative emotions and cognitions, avoidance of stimuli related to the PTE and hyperarousal.[2] The life time prevalence of PTSD in the Netherlands is 7.4%.[3] Occupations with frequent exposure to PTEs are at risk for PTSD, such as fire fighters, police officers and military personnel. But also health care workers are at risk, as life-threatening emergencies, severe illness, grief and death are daily practice when working in the hospital. In fact, anyone exposed to stressful details of medical practice is at risk, including the patient and bystanders. This is called the posttraumatic triad of patient, partner and caregiver. This thesis aims to explore these hospital based PTEs and its consequences, in different contexts within this triad.

Part 1: Physician well-being

1.1 Burn-out, depression and anxiety

Even though medical doctors have years of training and experience, medical practice can be accompanied by a high emotional burden. Working hours are long, the work environment is demanding, PTEs are common and work-life integration (WLI) is often unbalanced.[4] It is generally known that it is not uncommon for doctors to suffer from the three Ds: drinking, drugs and depression.[5–10] The mental health burden is high, as tremendous numbers of burn-out, depression and physician suicide have been described in literature for decades.[11–13]

Recent literature estimates the prevalence of depressive symptoms in resident doctors is around 28.8% [14] and between 10.3 to 29% in medical

specialists.[10,15–17] Burn-out is prevalent as well, with 2.6 to 11.8% suffering from full blown burn-out and 25.0 to 60.1% having burn-out complaints.[4] Compared to the general population, there is 1.15 to 4 times more suicide among physicians. [18] In the United States 28 to 40 in 100.000 physicians die yearly by suicide, compared to 12.3 per 100.000 in the general population. [19] Even though there is an increase in awareness with peer-support and professional performance programs and training or therapy options during residency, [20,21] physician burn-out and suicide rates remain alarmingly high. [4,19,22]

Besides personal suffering, mentally unfit physician also pose a threat to the quality of care. Recent reviews and meta-analyses show that physician burn-out is associated with more patient incidents, low professionalism and low patient satisfaction. [23,24] Ruitenburg et al. performed a survey in an academic hospital and reported that around 4% of physicians deemed themselves unfit for their work, even though they were working. [17] It is clear that the occupational stress experienced by physicians is comparable to that of other occupations such as fire fighters, rescue workers, military and police personnel.[25–27], however support remains underdeveloped compared to these professions.[12,28]

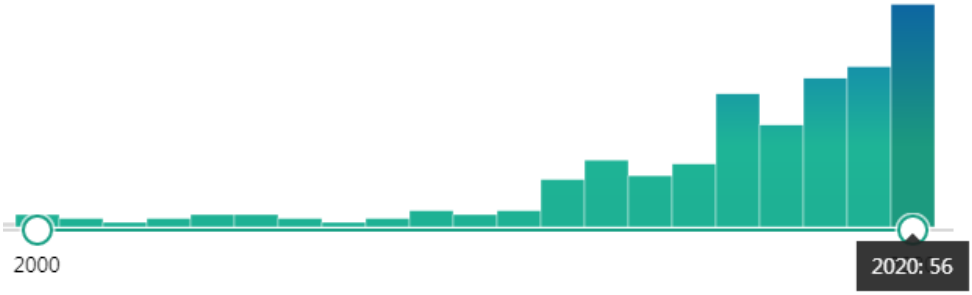
1.2 Posttraumatic stress disorder and 'second victim' phenomenon

In 2000, Wu described traumatized physicians as 'second victims', implying that anyone present, exposed or involved in a severe medical incident or after a medical error, may experience negative consequences in some way. [29] The definition of second victims however differs, as the negative impact may take many forms. Some physicians develop mental health problems as a result of an adverse event, such as burn-out, depression, anxiety or PTSD, but other consequences can be financial, legal or social problems. Depending on the definition, the prevalence of second victims is reported to vary between 10.4% and 43.3% in both surgical and non-surgical physicians. [30,31]

The point prevalence of posttraumatic stress symptoms among physicians ranges between 3.8% and 15.0%. [17,32–36] However the methods used to determine traumatic stress vary. A meta-analysis from 2011 that included 10 studies until 2009, found a positive relationship between critical incidents and post-traumatic stress symptoms in health care professionals, with small to medium effect sizes (−.26 to .68). Not much is known about the determinants or predictors for developing posttraumatic stress (PTS) symptoms in physicians. Braquehais et al. showed that female physicians were significantly more likely to suffer from mood and anxiety disorders compared to men, however concerning PTSD not much data is available. [37] One study among trauma surgeons showed the opposite, where male gender was associated with more PTSD. [33] For the current ongoing COVID-19 pandemic and its enormous strain on physician well-being worldwide, it must be noted that 6 of the 10 studies from this 2011 meta-analysis were on 'treating SARS-patients' and showed elevated risk for developing depression, anxiety and PTSD. [38] A more recent meta-analysis including 19 studies on hospital health care workers, shows that mental health disorders are common following a pandemic (COVID-19 or SARS). [39]

Fortunately, over the last few years there is an increase in awareness of traumatic stress among health care workers. There is growth in peer-support- and physician well-being programs in hospitals and health institutes and there is an increase in quality literature on the relevance of physician well-being, also in high impact journals. [12,24] Figure 1 shows an increase in publications over the last 20 years.

Figure 1. 20 years of literature on the 'Second Victim' phenomenon



Searchterm 'second victim' in PubMed in October 2020. An increase in publications is seen mainly from 2010 onwards. The term was first used by Wu in 2000 in two manuscripts. The COVID-19 outbreak has led to a significant increase of papers on physician well-being as well, as of October 2020 56 papers were published.

1.3 Aims part 1

Part 1 describes our Work related Adverse and Traumatic Events Research (WATER) studies, in which we studied depression, anxiety, PTSD and coping and support after PTEs among several medical specialties. The goal of the studies of part 1 was to answer the following questions:

What are the prevalence rates of depression, anxiety and PTSD among Dutch psychiatrists (chapter 2), pediatricians (chapter 3), gynecologists (chapter 4) and orthopedic surgeons (chapter 5)?

How prevalent are potential traumatic events in the workplace and what is the opinion of physicians concerning coping and support after such events (chapters 2 – 5)?

What are clinical and occupational consequences of potential traumatic events and traumatic stress (chapter 5)?

Part 2: Posttraumatic stress disorder after severe post-partum hemorrhage.

2.1 Posttraumatic stress in a medical setting

PTSD was first described and is best known in relation to war traumas in veterans. However, as described earlier, traumatic stress can be the result of any PTE and is also frequently seen as a result of severe illness or a medical situation. For example, a near death experience during cardiac arrest (cardiac-disease-induced PTSD) or traumatic childbirth can both lead to PTS symptoms.[40,41] PTSD in a medical setting is common and is described after burns, cardiac arrest, resuscitation, hemorrhage and stroke, miscarriage, childbirth, abortion, intensive care admission, HIV infection or awareness under anesthesia. Patients at intensive care units (ICUs) with acute respiratory failure or septic shock show the highest prevalence of PTSD. [42,43] Clinically relevant posttraumatic stress disorder symptoms occur in around 20% of critical illness survivors post-ICU, at 1-year follow-up. [44] As described earlier, the posttraumatic triad includes the patient and physician, but also bystanders such as partners, relatives or family. For example, 33.1% of family members of ICU patients [45] and 40% of relatives present during an out-of-hospital cardiac arrest, develop PTS symptoms.[46]

2.2 PTSD in women after traumatic childbirth

Approximately 30% of women report to have experienced giving birth as traumatic. [47–49] PTSD prevalence rates in women as a result of traumatic childbirth is estimated between 0 and 5.9% worldwide, and between 1 and 3% in Western countries. [50–52] A large study in the Netherlands showed a 1.2% incidence rate, which is around 2,000 women each year. [41]

There are multiple risk factors for developing PTSD after childbirth and they are generally divided in three groups: patient characteristics, obstetrics and

childbirth situation. Patient characteristics include personality traits and mental health during pregnancy. Main predictors are a history of PTSD or depression, a peripartum depression and severe fear of childbirth (FoC). Obstetric risk factors include obstetric complications, such as a painful delivery, pre-eclampsia (PE), preterm premature rupture of membranes (PPROM), an emergency birth intervention and neonatal complications. [41,52–57] Childbirth situation includes the factors in which childbirth has taken place and the way the patient has experienced this. A lack of social support, both by family or health care providers, an experience of powerlessness or loneliness during delivery, and peritraumatic dissociation increase the risk to develop PTSD. [52,53,58–60] Also subthreshold PTSD or posttraumatic stress (PTS) symptoms after traumatic birth may have significant long term effects on patients and for example on attachment styles, partner and family bonding, fear of childbirth and refraining of further family expansion. [61,62]

Concerning PTSD in women after post-partum hemorrhage (PPH), a recent systematic review on seven studies reported no clear evidence that PPH is a risk factor for developing PTSD. This was concluded due to the low number of studies, heterogeneous design and quality and different definitions of PPH with varying cut-offs (between 500 mL and 1500 mL). [63] In none of these studies the golden standard for diagnosing PTSD (CAPS-5) was used. Two of the reviewed studies suggested there likely is an association between emergency hysterectomy and PTSD or PTS symptoms. [64,65]

2.3 PTSD in partners after traumatic childbirth

Only a handful of studies are available exploring obstetrical and patient characteristic risk factors for PTSD in partners. Although there is a lack of good qualitative and quantitative studies, the prevalence of PTSD in men attending childbirth is estimated between 0 and 5% six weeks postpartum.[66] One Dutch study showed that symptoms of depression and PTSD during the pregnancy experienced by the woman, give a higher risk of the partner

developing PTSD and depression after birth complications. [41] Another study showed more prevalent PTS symptoms, but not PTSD, in fathers of infants with very low birth weight. [67]

2.4 Aims part 2

Part 2 of this thesis describes our Identification of Parents in Distress (IPAD) study, which investigated the prevalence of posttraumatic stress and PTSD after severe postpartum hemorrhage. In the studies of the second part, the goal was to answer the following questions:

Is severe PPH of more than 2000 mL blood loss a risk factor for developing PTS symptoms or PTSD (chapter 7)?

What is the prevalence of PTSD among partners that witness severe PPH (chapter 8)?

What are predictive factors for developing PTS symptoms or PTSD within the PPH group (chapter 7)?

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PART ONE

Psychotrauma in physicians

2.

EXPLORING THE IMPACT OF WORK-RELATED POTENTIAL TRAUMATIC EVENTS AMONG DUTCH PSYCHIATRISTS

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ABSTRACT

Psychiatrists are frequently exposed to work-related potential traumatic events (PTEs). A survey was sent to the members of the Dutch Society of Psychiatrists of which 250 questionnaires were eligible for analysis. At least one work-related PTE was reported by 196 (78.4%) of the respondents, of which 177 described the PTE. Witnessing or experiencing verbal aggression (29.2%), physical violence (29.2%) or completed suicide (26.8%) were the most common PTEs. This survey implies that it is the rule rather than the exception that psychiatrists experience work-related PTEs, often with a significant emotional impact. The majority of respondents considered current support as insufficient.

1. Introduction

Psychiatrists are frequently exposed to potential traumatic events (PTE) during their work, which makes the mental health profession one with occupational health hazards. [1,2] A Dutch nationwide study on violence towards employees with a public task, showed that mental health workers experience the most aggression and violent incidents in the workplace. This study also showed significantly more work-related burn-out complaints among those that experienced such incidents.[3] Nowadays there is more awareness of physicians being at risk of developing posttraumatic stress due to exposure to critical incidents or repeated exposure to aversive details. These insights resulted in a paradigm: focusing on the mental health of physicians instead of solely on first victims; the patient and their family. In 2000, Albert Wu was the first to describe healthcare professionals being exposed to potential traumatic events on the work floor as "second victims".[4,5]

Mental health care settings have long been associated to a specific and long-standing emotional burden, eventually determining professional stress and burnout in psychiatrists. [6,7] Psychiatrists deal with different adverse events compared to other physicians due to the nature of their profession and patients; violence and (auto) aggression are common symptoms of psychiatric disorders.[3,8] Previous research found that 21% reported having been stalked by patients [9] and that patient suicide is a major source of stress for many psychiatrists.[10,11] Recent cross-sectional studies report a high prevalence of depressive symptoms (34.4%) and severe burn-out (36.7%) in psychiatrists and psychiatrists in training (residents).[12,13] A large Finnish study reported suicidal tendencies (thoughts, planning and attempts) in 31% of male psychiatrists [14], other studies showed suicide rates are higher compared to other specialties.[6,15]

In a recent survey among psychiatric staff in Canada, 16% of the respondents showed significant posttraumatic stress symptoms [16]. However, the literature on posttraumatic stress and the consequences of PTEs among psychiatrists is sparse. As potential psychotraumatic adverse events are common in mental health care, it is of utmost importance to investigate which events are perceived as impactful and whether support is organized. a recent review shows that unfit physicians may jeopardize patient care, as burn-out is associated with an increased risk of patient safety incidents, low professionalism and reduced patient satisfaction. [17] Therefore, the goal of this study was to explore PTEs experienced by Dutch (resident) psychiatrists and investigate coping, support and the relation to job satisfaction.

2. Methods

2.1 Population and procedure

Over a 3-month period, an invitation containing an anonymous link to a questionnaire (SurveyMonkey®) was sent via a newsletter to the members of the Dutch Society of Psychiatry. One reminder was sent after 4 weeks. Not all psychiatrists receive the newsletter, it is therefore difficult to conclude what the response rate is..[18,19] Medical ethical approval was obtained from the Medical Ethics Committee United (MEC-U; number W18.096).

2.2 Measurements

The questionnaire consisted of questions about sociodemographics, work-environment, PTEs (A criterion PTSD; definition PTE according to the DSM-IV), support and coping (supplement 1: questionnaire). The Trauma Screening Questionnaire (TSQ)[20] was added, a validated screening instrument for PTSD. The TSQ is a 10-item screening instrument corresponding to a provisional diagnosis of PTSD according to the DSM-IV. A

cut-off value of 6 or higher was used, which is validated for the Dutch population with a sensitivity of 0.94, specificity of 0.56 and Cronbach's alphas from 0.71 to 0.91.[21] Only respondents who answered 'yes' to experiencing a PTE at least four weeks ago completed the TSQ.

2.3 Statistical Analysis

Statistical analysis was performed using JASP version 10.2. Described incidents (Q23) were categorized and coded, and independently classified into these categories by KS and EvL. The overall inter-rater agreement was calculated with Cohen's kappa (κ). Demographic data and multiple choice questions were analyzed using descriptive statistics and exported as frequency tables and bar charts. When a 4 likert scale was used, this was recoded to agree (agree, strongly agree) or disagree (disagree, strongly disagree) and presented as such.

3. Results

3.1 Population characteristics

A total of 250 questionnaires were completed, which gives a conservative estimate (7.6%) of the response rate, since not all members of the society (n=3288) received the newsletter. The respondents were mainly female (63.6%) and attending psychiatrists (78.5%). The median age was between 50 and 60 years and the median years in practice was between 15 to 20 years (supplement 2: demographics).

3.2 Potential traumatic events and posttraumatic stress

When asked whether one had ever experienced a work-related PTE, as defined as criterion A of PTSD, 196 (78.4%) of the respondents reported at least one PTE. Of those respondents, 177 described the incident as they were

asked to do in their own words (table 1), the others left it blank or were not able to go into details about the incident, e.g. because of privacy. The PTEs were categorized, with a strong average inter-rater agreement (Cohen's κ: 0.78, 0.62 – 1.00). 86 respondents (34.4%) experienced the PTE more than four weeks ago, thereby meeting criterion A and F (the potentially traumatized group). Of this potentially traumatized group, eight respondents (3.2% of total, 9.3% of potentially traumatized group) met criteria for probable PTSD according the DSM-IV. Seven of them were attending psychiatrists and five were male. Most reported posttraumatic stress (PTS) symptoms in the potentially traumatized group (n=86) were hyperarousal (30.2%), sleeping difficulties (24.4%) and intrusive thoughts about the PTE (22.0%). When asked whether they recognize work-related posttraumatic symptoms from an earlier period of their life, an additional 20 respondents reported at least six PTS symptoms related to their PTE. Nine of them reported that the symptoms lasted longer than six months

The most commonly reported PTEs (question 23) were physical violence, verbal aggression (including death threats) and completed suicide, as shown in table 1. 73 respondents (29.2%) experienced or witnessed severe physical violence, 17 (6.8%) were physically injured after a violent incident. Verbal aggression was also common, with 29.2% having been verbally threatened, mostly death threats (78.1%). 67 (26.8%) of all respondents described a completed suicide that was experienced as potentially psychotraumatic. 17 physicians (6.8%) were present when their patient committed suicide or found their body afterwards. Five (2.0%) physicians were stalked (by phone or physically), seven (2.8%) were held hostage by their patient, four during house visits and three at the in- or outpatient clinic. Table 1 also shows several quotes from respondents.

Table 1: Described potential traumatic events and quotes

Potential traumatic event	(Q23)	Quotes
Physical violence	73 (29.2%)	'An aggressive incident during my pregnancy had the most impact. The patient threatened me by putting a knife on my belly.'
With (severe) injury	17 (6.8%)	
Sexual assault	6 (2.4%)	
Verbal aggression	73 (29.2%)	'A father of a patient threatened me when I refused make a prescription for non-indicated medication for his son.'
Death threats	57 (22.8%)	
Completed suicide	67 (26.8%)	'I found a patient at the inpatient clinic, after he had hung himself. I went to the funeral and the unbelief and grief of this young household and family was imprinted in my memory for a long time.'
Present or found	17 (6.8%)	
Suicide attempt	18 (7.2%)	'A suicidal patient was on the roof with me and the nurses, and the patient tried to jump and take one of the nurses with her.'
Present or found	11 (4.4%)	
Held hostage	7 (2.8%)	´I was physically assaulted by a patient and held hostage within my own office.´
Ambulatory	4 (1.6%)	
Out/inpatient clinic	3 (1.2%)	'A patient had poured over gasoline over a colleague psychiatrist and was holding a lighter, threatening to kill him/her. I heard yelling and went to offer help.'
Stalking	5 (2.0%)	´I was stalked via e-mail, with messages calling me a whore. There was a wall nearby my office with awful messages about me painted on it.´
Patient resuscitation	5 (2.0%)	'I was involved in multiple patient resuscitations, and one patient had severe third degree burns after setting fire on him/herself.'
Arson	4 (1.6%)	
All values shown as: n (%)		

3.3 Support, coping and clinical consequences

72.7% of the respondents considered current support to be insufficient after a PTE, however 48.7% did have a support protocol. Protocols consisted mostly of discussing the PTE with the team (71.9%) and peer-support from direct colleagues (64.5%). 9.4% reported that there was no support at all. 86% think that the employer or clinic is obligated to provide some form of support after a PTE.

When asked how psychiatrists cope with PTEs, 82.8% found support from colleagues, 78.4% initiated an event analysis with the team and 67.9% found support from friends and family. A significant number (8.4%) cope by drinking more alcohol and 1.9% by taking new (unspecified) medication. Only 5.2% sought professional psychological support. When asked where one had learned coping, 70.8% stated when working as an attending, 44.7% during intervision groups, 43.5% during learning therapy and 11.5% reported to never having learnt coping.

After being exposed to a PTE, 29.6% reported to have (temporarily) adjusted their work. Most commonly by consulting a colleague when in doubt (36.0%), working less hours (34.2%) and stopping doing shifts (28.0%). 20 respondents (8%) have seriously considered giving up their job at some point in their career. Most common reasons for this were: high workload (68.6%), bad work-life interaction (WLI, 58.8%), bureaucracy (51.0%), clerical burdens (49.1%) and high responsibility (42.2%). 'Because of a PTE' was in the tenth place (20.6%).

4. Discussion

4.1 Main findings

The vast majority of respondents (78.4%) reported having experienced a work-related PTE during their work and eight (3.2%) screened positive for PTSD. In line with previous studies [10,11,22], physical violence, verbal aggression and completed suicide were the most common work-related PTEs.

4.2 Impact and support

PTEs were commonly (20.6%) described as a reason to consider giving up practice as a psychiatrist, but interestingly only on the tenth place. The impact is experienced as stressful, but it is possibly assumed as part of the

job. However, almost a third of those that experienced a PTE report to have (temporarily) adjusted their work after such an incident. Also, more than half of the respondents report not having or not knowing about a support protocol or support program in situ and 73% considered current support insufficient. Studies have shown that peer-support programs may have a beneficial effect on physician well-being [23], however this survey implies that such programs are often not available or easily accessible for psychiatrists. Further research into what type of support mental health institutes or hospitals offer is important. We suggest that all work-environments where PTEs are common should offer some form of formalized support.

4.3 Coping

Interestingly, the majority learned coping during Balint groups or learning therapy, forms of therapy that are rarely used in other medical specialties.[24] In the Dutch psychiatrist training program, Balint groups and individual counselling (mentorate or learning therapy) are offered throughout all years of training. Some hospitals do offer groups for other medical specialist trainees and it is increasingly popular among young physicians. This research shows the importance of such a facilitation during medical training and beyond, as it is perceived as a valuable tool to learn coping.

This national survey implies that it is the rule rather than the exception that Dutch psychiatrists experience PTEs at work, with a significant emotional impact and clinical consequences. The majority of respondents considered current support as insufficient and learned coping during intervision or learning therapy.

4.4 Strengths and limitations

Over the past decades, several studies have been done regarding the mental health of physicians. However, studies on PTEs and posttraumatic stress

among psychiatrists are sparse, especially combined with information on coping, support and consequences. This study used criterion A for a provisional diagnosis of PTSD unlike other studies, giving a more realistic prevalence of posttraumatic stress. The reported rates of PTSD should be interpreted with caution however, because of the possible conservative response. Moreover, the TSQ used is a screening instrument and only indicative of PTSD. This manuscript was mainly written to give insight into the nature of PTEs, coping and support.

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Conflict of interest

All authors reported no potential conflict of interest.

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OCCUPATIONAL WELL-BEING IN PEDIATRICIANS – A SURVEY ABOUT WORK-RELATED POSTTRAUMATIC STRESS, DEPRESSION, AND ANXIETY

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ABSTRACT

The objective of this study was to study mental health, coping, and support after work-related adverse events among pediatricians. Physicians are frequently exposed to adverse events. It makes them at risk for posttraumatic stress disorder (PTSD), depression, and anxiety disorders. Besides the personal impact, physicians could pose a threat towards patients, as mental health problems are associated with medical errors.

A questionnaire was sent to all members of the Pediatric Association of The Netherlands in October 2016. The questionnaire focused on adverse events, coping, and support. The Hospital Anxiety and Depression Scale and the Trauma Screening Questionnaire were included for evaluation of anxiety, depression, and posttraumatic stress. Four hundred ten questionnaires (18.9%) were eligible for analysis. Seventy-nine % (n = 325) of the respondents experienced adverse events, with 'missing a diagnosis' having the most emotional impact and 'aggressive behavior' as the most common adverse event. Nine (2.2%) pediatricians scored above the cut-off value on the Trauma Screening Questionnaire, indicative of PTSD. In total, 7.3% (n = 30) and 14.1% (n = 58) scored above the cut-off values in the Hospital Anxiety and Depression Scale, indicative of depression and anxiety. Only 26.3% reported to have a peer support protocol available for emotional support following adverse events.

Conclusion: Pediatricians experience a considerable amount of adverse and potentially traumatizing events associated with significantly higher mental health problems compared to the general high-income population. Aggression towards pediatricians seems to be a common problem. Protocolled (peer) support should be implemented.

1. Introduction

Physicians are frequently exposed to adverse events, such as medical errors, patient safety incidents, violence and complaints. Adverse events may lead to mental health problems including posttraumatic stress disorder (PTSD).[1,2] Apart from this personal impact, diminished occupational well-being among physicians is linked to decreased professionalism, more medical errors and poorer patient outcomes.[3–6] The Canadian Medical Education Directives for Specialists 2015 (CanMEDS 2015) specify that physicians should take responsibility for their own health and well-being and that of their colleagues in order to provide optimal patient care.[7] Therefore it is important to identify which events are risk factors for physicians to develop mental health problems. Furthermore, it is important to know what kind of support is needed to cope with these events.

The one-year prevalence of mood disorders (major depression, bipolar disorder and dysthymia) amongst Dutch citizens with a high income is 3.0% and the one-year prevalence of anxiety disorders is 6.0%.[8] In physicians, the prevalence of both depression and anxiety disorders can be as high as 29% and 24%, respectively.[9,10] Also, physicians have an elevated risk of developing PTSD as they are more frequently exposed to adverse events during their career.[11] Pediatricians experience repetitive stress when dealing with sick children and their emotional and desperate parents, which may be extra stressful compared to other specialties.[12] Physicians' way of coping and their personal resilience might be important in preventing depression, anxiety and PTSD. Therefore, the aim of this study was to examine work-related stressors and associated mental health problems in pediatricians as well as their ways of coping and received emotional support in their institute.

2. Materials and Methods

A cross-sectional questionnaire was conducted with members of the Pediatric Association of The Netherlands (NVK). Among the members of the NVK are residents, attending, non-practicing and retired pediatricians. At the time of the questionnaire there were 2160 members in total. All members received an invitation from the NVK for an online questionnaire and three reminders over the course of a three-month period from October 2016. The questionnaire was sent through SurveyMonkey® using an anonymous (non-traceable) link.

The questionnaire consisted of 56 questions and contained two validated screening instruments, the Trauma Screening Questionnaire (TSQ) and the Hospital Anxiety and Depression Scale (HADS, Appendix 1).[13–16] The first draft of the questionnaire was reviewed by members of the Childbirth and Psychotrauma Research (CAPTURE) group of the hospital OLVG in Amsterdam, the Netherlands, as well as by MdV. Furthermore, this questionnaire was conducted with gynecologists in 2014 and with orthopedic surgeons in 2016.[17] The questionnaires were kept very similar to make it possible to compare the different specialties.

The TSQ is a ten-item screening instrument based on items from the PTSD Symptom Scale - Self Report and has five items concerning re-experiencing and five items concerning arousal. Answers can be 'yes' or 'no'.[18] The cut-off score indicative of PTSD symptoms is six.[14,15] Only respondents who answered 'yes' to experiencing a traumatic event at least four weeks ago filled out the TSQ. Within four weeks after an adverse event, an acute stress reaction might trigger complaints comparable to those found with PTSD. However, if the complaints exist for more than four weeks, the complaints are more likely to be due to PTSD.

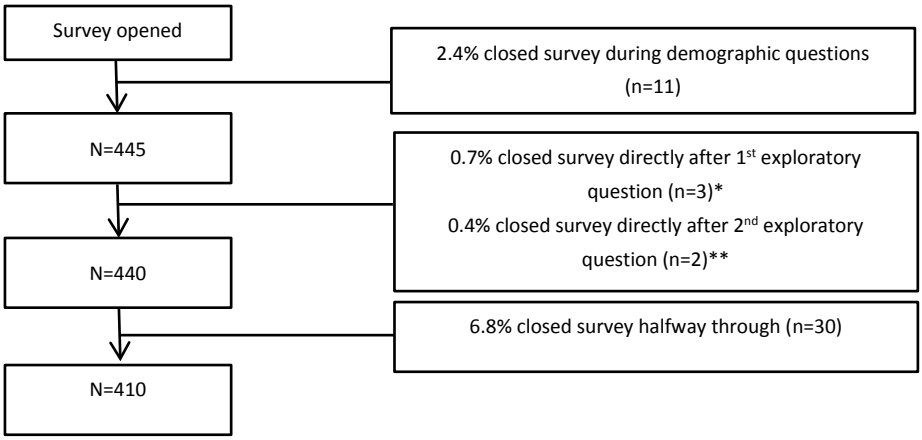
The HADS is a 14-item screening instrument for depression and anxiety, where both subscales contain seven questions each. Each question contains an answer consisting of a four-point Likert scale. The cut-off value of the Dutch version for clinically relevant depressive symptoms (HADS-D) or anxiety symptoms (HADS-A) is equal to or bigger than eight. The total HADS cut-off value for psychological distress is equal to or bigger than 12.

Further questions were added to the questionnaire to explore demographics (age, employment, working experience, sub-specialism), assess adverse events at work, way of coping with adverse events and how pediatricians learned to cope, satisfaction with current support and if and how the current support system should change (Appendix 1).

Statistical analysis was performed with IBM Statistical Package for the Social Sciences (SPSS, version 22). Only completed questionnaires were analyzed. Open questions were categorized by two independent contributors (GY and EJ), the overall inter-rater agreement was calculated with Cohen's kappa. Demographic data and multiple-choice questions were analyzed using descriptive statistics and P-values were calculated with binomial tests. Differences in categorical outcomes between residents and attending physicians were tested with either Chi-square tests (χ^2) or Fisher's exact. In continuous data, independent T- or Mann-Whitney U tests were used. A two-sided p-value of 0.05 or smaller was considered statistically significant.

This study was exempted from ethical approval by the Medical Research Ethics Committees United (MEC-U), and registered under the number W18.096.

Figure 1 - Inclusion diagram



* 1st exploratory question: What do you perceive as traumatic/stressful on the work-floor?
** 2nd exploratory question: How do you cope with such traumatic/stressful events?

3. Results

3.1 Population characteristics

A total of 456 questionnaires (21.1%) was completed, of which 410 questionnaires (18.9%) were eligible. Figure 1 shows the inclusion diagram.

Table 1 shows the baseline characteristics of the respondents, compared with the members of the NVK, the reference group. Gender and the amount of residents were comparable between respondents and the reference group, however, there were more attending pediatricians, less retired pediatricians and less pediatricians with a management function in our sample (Table 1). Table 2 shows the baseline characteristics divided in the subgroups resident, attending, retired and non-practicing. Selected quotes of the respondents are added in Table 3 to visualize the events they experience as adverse, divided in aggression by parents and death of a patient.

3.2 Work-related stressors

The following events were experienced as high emotional impact stressors at work by the respondents (multiple answers possible): missing a diagnosis (71.2%, n=292), suspicion of child abuse (49.3%, n=202), doubts about making the right decision (48.3%, n=198), death of a patient (38.0%, n=156) and critically ill children (26.3%, n=108; Figure 2). Almost 80% (n=325) of the respondents indicated they actually perceived an event as an adverse event, of which 277 described this event. Aggressive behavior of parents towards the physician was most commonly named as an adverse event (42.5%, n = 118).

Table 1 - Baseline characteristics respondents and NVK

	Responding pediatricians (n=410)	Composition of membership NVK* (n= 2160)	P-value
Gender			
Male	134 (32.7)	759 (35.1)	0.17
Female	276 (67.3)	1402 (64.9)	0.17
Position			
Resident	74 (18.0)	377 (17.5)	0.41
Attending physician	307 (74.9)	1307 (60.5)	<0.001
Retired	23 (5.6)	254 (11.8)	<0.001
Non-practicing	6 (1.5)	222 (10.3)	<0.001
Age (in years)			
20-29	19 (4.6)	-	
30-39	108 (26.3)	-	
40-49	115 (28.0)	-	
50-59	110 (26.8)	-	
60-69	46 (11.2)	-	
≥70	12 (2.9)	-	
Years in practice			
≤ 5	40 (9.8)	-	
6-10	71 (17.3)	-	
11-15	57 (13.9)	-	
16-20	79 (19.3)	-	
21-25	57 (13.9)	-	
26-30	49 (12.0)	-	
>30	57 (13.9)	-	

All values shown in: n (%), P-values calculated with binomial tests.
- : unknown, * : non-respondents plus respondents.
NVK: Pediatric Association of the Netherlands

Table 2 - Baseline characteristics in subgroups

	Total (n=410)	Resident (n=74)	Attending (n=307)	Retired (n=23)	Non-practicing (n=6)
Gender					
Male	134 (32.7)	11 (14.9)	103 (33.6)	16 (69.6)	4 (50.0)
Female	276 (67.3)	63 (85.1)	204 (66.4)	7 (30.4)	4 (50.0)
Age (in years)					
20-29	19 (4.6)	19 (25.7)	0 (0)	0 (0)	0 (0)
30-39	108 (26.3)	55 (74.3)	53 (17.3)	0 (0)	0 (0)
40-49	115 (28.0)	0 (0)	114 (37.1)	0 (0)	1 (16.7)
50-59	110 (26.8)	0 (0)	106 (34.5)	0 (0)	4 (66.7)
60-69	46 (11.2)	0 (0)	34 (11.1)	12 (52.2)	0 (0)
≥70	12 (2.9)	0 (0)	0 (0)	11 (47.8)	1 (16.7)
Years in practice					
≤ 5	40 (9.8)	37 (50.0)	3 (1.0)	0 (0)	0 (0)
6-10	71 (17.3)	40 (50.0)	34 (11.1)	0 (0)	0 (0)
11-15	57 (13.9)	0 (0)	56 (18.2)	0 (0)	1 (16.7)
16-20	79 (19.3)	0 (0)	76 (24.8)	2 (8.7)	1 (16.7)
21-25	57 (13.9)	0 (0)	54 (17.6)	1 (4.3)	2 (33.3)
26-30	49 (12.0)	0 (0)	47 (15.3)	1 (4.3)	1 (16.7)
>30	57 (13.9)	0 (0)	37 (12.1)	19 (82.6)	1 (16.7)
Complaints at disciplinary board*	46 (11.2)	1 (1.4)	39 (12.7)	4 (17.4)	2 (33.3)

All values shown in: n (%)

* : pediatricians who received complaints at the disciplinary board.

Table 3 - Quotes of pediatricians

Aggression	'During two periods in my career I was stalked, they phoned me, also during the night, either hanging up or telling me they knew where my family lived.' 'We admitted a physically abused patient whose parents had severe psychiatric problems. I reported them to the Child Care and Protection Board and afterwards there were letters in the room of the patient telling me something would happen to me. These parents even went to my parents' house.' 'I was held hostage twice, once by a desperate father, once by a drug-addicted father.' 'I was threatened by parents during cardiopulmonary resuscitation, they kept yelling at me: 'You killed my child!'.' 'I was threatened by parents with a gun after a patient died.' 'At the outpatient clinic there was a big, strong father who grabbed me by the throat and pushed me in the corner'
Death of a patient	'The death of a patient due to a mistake with medication.' 'The sudden death of a neonate whom I treated for half a year. It was hard to keep control during resuscitation and it took a long time for me to regain confidence during acute situations.'

	'A neonate who could not be intubated by anyone and who died.' 'The sudden death of a neonate whom I treated for half a year. It was hard to keep control during resuscitation and it took a long time for me to regain confidence during acute situations.' 'I sent a neonate with mild respiratory complaints back home. A day later he was presented with severe cardiomyopathy and despite maximum resuscitation at the ER, he died'. 'Failed resuscitation of a neonate when my supervisor was not present.' 'The death of a toddler due to drowning when my own children were toddlers. The parallelism and vulnerability had a huge emotional impact.'

Question 23: Can you briefly describe the adverse event(s)?
* : these quotes are selected from all the answers.

3.3 Posttraumatic stress disorder

Table 4 shows the outcomes of the TSQ. Among the respondents, 79.3% experienced an adverse event at work, of which 34.9% (n=143) reported having experienced this event during their work more than four weeks ago. The mean score of the TSQ was significantly lower in the group of participants where a peer-support protocol was present for adverse events (0.77±1.06) compared to the group where no protocol was present or where it was not used (1.62±2.10, P=.02).

3.4 Depression and anxiety

Outcomes of the HADS are shown in Table 4. Attending pediatricians have significantly more depressive symptoms according to the HADS-D compared to residents (P=.03).

3.5 Coping

The most common coping strategies after adverse events were (multiple answers possible): seeking support from colleagues (86.1%, n=353), seeking support from friends and family (73.2%, n=300), seeking some other form of distraction (32.7%, n=134) or doing sports (22.4%, n=92). Respondents learned their coping strategies (multiple answers possible) during residency (58.3%, n=239), as an attending (55.1%, n=226), during clerkships (20.2%, n=83) and 21.0% (n=86) reported to having never learnt to cope with adverse events.

Of the respondents, 41.0% (n=168) has seriously considered quitting their job at some point in their career. Most common reasons for this were (multiple answers possible): disbalance between work and private life (75.0%, n=126), high workload (68.5%, n=115), disutility (working outside of working hours; 44.6%, n=75), too much stress (38.7%, n=65) and too much responsibility (37.5%, n=63). (Figure 3) Furthermore, 6.6% (n=27) considered quitting because of a complaint to the disciplinary board.

Table 4 - HADS and TSQ scores

	Total (n=410)	Resident (n=74)	Attending (n=307)	Retired (n=23)	Non-practicing (n=6)	P-value
Experienced PTE at work	325 (79.3)					
Depression						
HADS-D score above cut-off	30 (7.3)	1 (1.4)	27 (8.8)	1 (4.3)	1 (16.7)	0.03
Anxiety						
HADS-A score above cut-off	58 (14.1)	9 (12.2)	47 (15.3)	0 (0)	2 (33.3)	0.49
Combined anxiety & depression						
Combined HADS score above cut-off	79 (19.3)	13 (17.6)	63 (20.5)	1 (4.3)	2 (33.3)	0.57
PTSD						
Traumatic experience (Criterion A)	143 (34.9)	23 (31.1)	111 (36.2)	7 (30.4)	2 (33.3)	
TSQ score above cut-off [+]	9 (6.3)	2 (8.7)	6 (5.4)	1 (14.3)	0 (0.0)	0.63

All values shown in: n (%)

P-value is $\chi 2$ test between residents and attending

[+] Measurements based on: total n=143, resident n=23, attending n=111, retired n=7, non-practicing n=2

HADS: Hospital Anxiety and Depression Scale; HADS-D: Hospital Anxiety and Depression Scale – Depression; HADS-A: Hospital Anxiety and Depression Scale – Anxiety; TSQ: Trauma Screening Questionnaire

Six per cent (n=26) of the respondents admitted they were dealing with adverse events by drinking more alcohol and 1.2% (n=5) by taking new medication. Professional psychological help was sought by 9.8% (n=44) and 16.1% (n=66) stifled emotions.

After being exposed to a work-related adverse event, 18.5% (n=76) of the respondents adjusted their work. Most common ways to do this were (multiple answers possible): performing more diagnostic tests (51.9%, n=40), calling a colleague earlier (36.4%, n=28), work less (33.8%, n=26) and starting

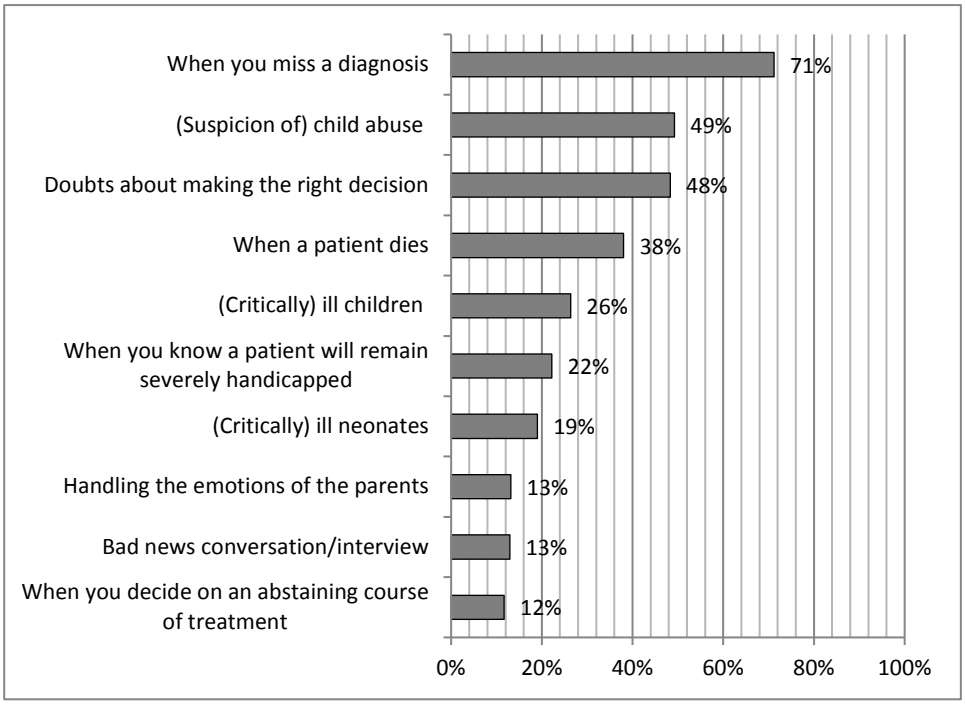
treatment faster (20.8%, n=16). Over time, 40.5% (n=166) of the respondents reported to have become more defensive.

3.6 Support

Of the respondents, 26.3% (n=108) indicated there was a protocol for support in case of an adverse event in their current working environment, 34.2% indicated there was no protocol, the remainder did not know whether there was a protocol. Furthermore, 50.2% (n=206) thought a culture change is necessary concerning coping with adverse events. When asked what the standardized support system involved (multiple answers possible), respondents indicated that discussing the situation with the present team (71.2%, n=292) and self-initiated peer support with direct colleagues (64.9%, n=266) were used. Of the respondents, 16.3% (n=67) indicated there was no support system at all and 41.5% (n=170) confided there is not enough opportunity to discuss adverse events and express emotions.

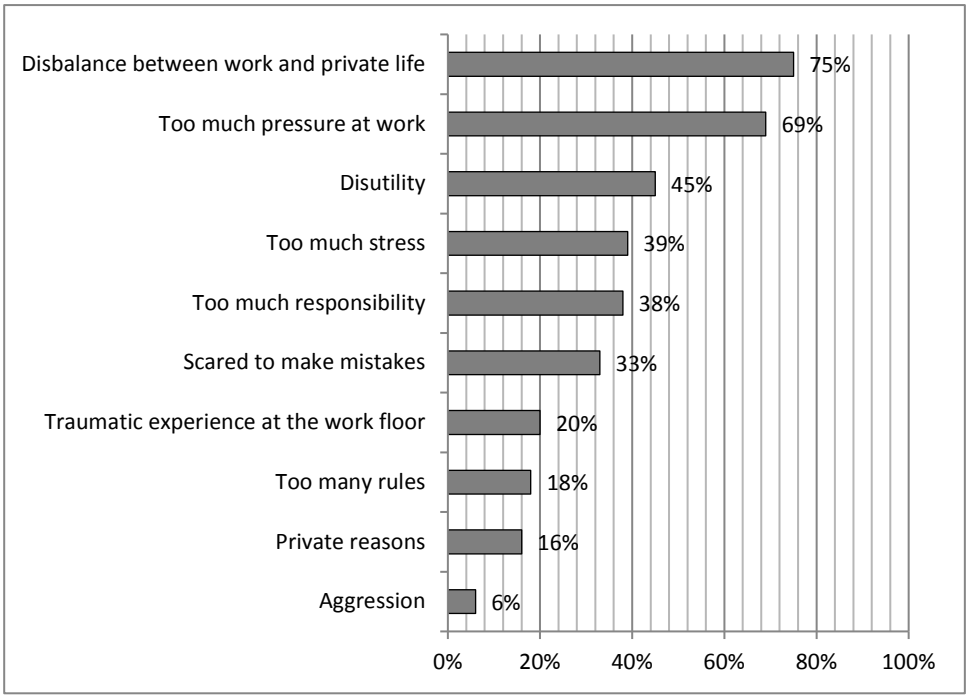
According to the respondents, the preferred form of support would be (multiple answers possible): discussing the situation with the present team (76.3%, n=313), peer-support from direct colleagues (72.0%, n=295) and professionally organized peer-support (43.2%, n=178). Even though 28.5% (n=117) would prefer to get help from a psychologist or coach, only 9.8% (n=40) actually sought out this kind of help.

Figure 2 - What pediatricians consider to be an adverse event at work



Top 10 events pediatricians describe as an adverse event (n=410), multiple answers possible

Figure 3 - Possible reasons to stop working as a pediatrician



Top 10 possible reasons pediatricians describe to stop working (n=168). Multiple answers possible

4. Discussion

The aim of this study was to examine work-related stressors and associated mental health problems in pediatricians as well as their ways of coping and received emotional support in their institute. First of all, among pediatricians, work related stressors during their career were high. Suspicion of child abuse and critically ill children are two topics that distinguish pediatricians from other specialties and why this specific specialty can have high emotional burden. Notable is the high prevalence of aggressive behavior towards pediatricians, as stated in the quotes. Therefore, we think it is necessary to not only develop a better support system after an adverse event, but to also implement ways to teach pediatricians to cope with aggression. For example,

certain training programs (conflict management and de-escalation (CMD)) focus on how to cope with aggression.[19,20] Another stressor may be a complaint to the disciplinary board. This has a high impact on psychological well-being and is associated with defensive practice.[21] More than half of the pediatricians who received a complaint at the disciplinary board seriously considered quitting their job. More work-years corresponded with a higher chance to receive a complaint. Whether the non-practicing group stopped working because of complaints at the disciplinary board, cannot be answered because of the small numbers. The amount pediatricians who received a complaint to the disciplinary board is low compared to gynecologists.[17]

The point-prevalence of PTSD in the Netherlands is 1.3%, making that the point-prevalence of work-related PTSD is expected to be even lower.[8] In our questionnaire, when pediatricians experienced a traumatic event, we found a high point-prevalence of symptoms indicative of work-related PTSD (2.2%). However, compared to the study of Ruitenburg et al., who found a prevalence of PTSD complaints of 15% in hospital physicians, the percentage we found seems low. Nonetheless, the study of Ruitenburg et al. used a much lower threshold than is normally used to assess PTSD complaints and does not use Criterion A.[10] Furthermore, we found more respondents with depressive and anxiety symptoms as compared to one-year prevalences found in the general Dutch high-income population.[8]

After experiencing an adverse event, a little over a quarter of all respondents indicated there was a protocol regarding adverse events, but over half of the respondents do think a culture change is needed. Therefore, pediatricians have the need for a better support system. When more than half of the pediatricians perceive that care surrounding adverse events is not sufficient, this could lead to unnecessary stress. Physicians might experience more barriers than non-physicians to seek out professional help for mental health problems due to their fear of losing their license, denial of problems and

embarrassment.[22] When physicians are unfit, this may have a negative impact on their practice, [23] whereas occupational well-being can positively contribute to patient satisfaction and the quality of interpersonal aspects of care.6 In this questionnaire, coping strategies applied by the pediatricians were similar to coping strategies of gynecologists in the study by Baas et al.[17] Almost 20% of the respondents adjusted their job and 40% seriously considered quitting their job completely. This is consistent with the findings of Hawkins et al., who also found physicians reduce work hours, retire or quit medicine altogether because of a high work strain. Reported alcohol use to cope with adverse events seems to be quite low in our respondents with only 6%, especially since Hyman et al. found percentages of 6% (daily use) up to 25% (occasional use) of substances. [24]

Thus far, little research has been done on this topic, specifically concerning mental health problems in relation to institutional or peer support. This study, which included validated questionnaires, allowed for detailed data collection. Allowing respondents to fill out examples of their experiences, gives further insight in the way they experience their problems.

Limitations of the study are the response rate, with 18.9% lower than the average e-mail response rate of 25%-30%.[25] Reasons for the low response rate could be the heavy workload of pediatricians, but also the fact that the questionnaire was spread through a non-personal email account from the NVK, which people may not always read. With 410 completed questionnaires, however, we have a representative cohort comparable to the reference group. Another limitation is the risk of participation bias, because as with any questionnaire, pediatricians who are involved with this topic are more likely to participate. Concerning depression and anxiety, screening rates are generally an overestimation, especially when using self-report questionnaires. However, these are point prevalences, so when

compared to 12 month prevalences it can be an underestimation. Furthermore, depression and anxiety are not merely work-related.

In conclusion, work-related stressors in Dutch pediatricians are high and can subsequently lead to posttraumatic stress disorder. Parental aggression towards pediatricians seems to be a common problem, something that should be addressed, for example with CMD training programs.[19] In this study, the amount of pediatricians with PTSD complaints was higher compared to prevalences found in the general population and the same applies to depression and anxiety symptoms. There is no national standardized support after adverse events for pediatricians, while other occupations where there is an occupational hazard do have such support (e.g. in the police, military, firefighters). It is advised that evidence based support (e.g. peer support) after adverse events is protocolled and education on coping strategies is implemented, to improve mental well-being of pediatricians.

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4.

WORK-RELATED ADVERSE EVENTS LEAVING THEIR MARK: A CROSS-SECTIONAL STUDY AMONG DUTCH GYNECOLOGISTS

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ABSTRACT

Purpose: Background: Health care professionals who are frequently coping with traumatic events have an increased risk of developing a posttraumatic stress disorder. Research among physicians is scarce, and obstetrician-gynecologists may have a higher risk. Work-related traumatic events and posttraumatic stress disorder among obstetricians-gynecologists (ObGyn) and the (desired) type of support were studied.

Methods: A questionnaire was emailed to all members of the Dutch Society of Obstetrics and Gynecology, which included residents, attending, retired and non-practicing ObGyn. The questionnaire included questions about personal experiences and opinions concerning support after work-related events, and a validated questionnaire for posttraumatic stress disorder.

Results: The response rate was 42.8% with 683 questionnaires eligible for analysis. 12.6% of the respondents have experienced a work-related traumatic event, of which 11.8% met the criteria for current posttraumatic stress disorder. This revealed an estimated prevalence of 1.5% obstetricians-gynecologists with current posttraumatic stress disorder. 12% reported to have a support protocol or strategy in their hospital after adverse events. The most common strategies to cope with emotional events were: to seek support from colleagues, to seek support from family or friends, to discuss the case in a complication meeting or audit and to find distraction. 82% would prefer peer-support with direct colleagues after an adverse event.

Conclusions: This survey implies that work-related events can be traumatic and subsequently can lead to posttraumatic stress disorder. There is a high prevalence rate of current posttraumatic stress disorder among ObGyn Often there is no standardized support after adverse events. Most ObGyn prefer peer-support with direct colleagues after an adverse event. More awareness must be created during medical training and organized support must be implemented.

1. Background

Professionals frequently coping with traumatic events have an increased risk of developing a posttraumatic stress disorder (PTSD). Groups at risk include military personnel, rescue workers, police, firefighters, and ambulance personnel. Similarly, hospital physicians cope with events such as severe illness, life-threatening situations and death frequently. [1,2] However, research about traumatic events and PTSD among hospital physicians is scarce, and as a result the effects of work-related traumatic events may be underestimated. Overall, mental health problems in health care professionals may jeopardize the safety and quality of health care provided, with decreased productivity, [3] high collateral costs, [4] and medical errors.[5–7] Fortunately, the importance of physicians own mental health to foster optimal patient care is emphasized as a new competency in the CanMEDS framework. [8] The widely used CanMEDS framework was developed to define the necessary competencies for physicians. It provides a comprehensive foundation for medical education and practice for many (future) physicians in a dozen countries. Obstetrician-Gynecologists (ObGyns) may be at increased risk of experiencing traumatic events since pregnancy and childbirth are expected to be joyful times, but can include severe complications, including stillbirth or maternal death with high emotional impact on the physician, midwife or nurse. [9–13]

1.1 Posttraumatic stress disorder

Whereas many types of work-related events can be marked as adverse, not all adverse events are traumatic. A traumatic event according to DSM-IV (Diagnostic and Statistical Manual of Mental Disorders) [14] is to experience or directly witness actual or threatened death, serious injury or a threat to the physical integrity of themselves or others. Furthermore, it was obligatory

that the response involved intense fear, helplessness or horror. In the recently published fifth version of the DSM[15] this last criterion is removed, since it proved to have no utility in predicting the onset of PTSD. In particular, professionals did not always have these emotions at time of the event, while they did develop PTSD symptoms. [16] Furthermore, in the DSM-5, criterion A4 is added, specifically concerning professionals who have never been in direct danger, but can learn about consequences of traumatic events as part of their job. [16]

Not all who experience a traumatic event develop PTSD: 80% of the general Dutch population will experience at least one traumatic event during their life, with a lifetime prevalence rate of PTSD being 7.4%. [17] A traumatic event can lead to a period of posttraumatic stress symptoms with intrusions, avoidance, negative cognitions and mood, and hyperarousal, but often these symptoms decline. When these symptoms last for at least one month, and lead to significant impairment in social, occupational or other important areas of functioning, PTSD can be diagnosed. [15] Risk factors for developing PTSD after experiencing a traumatic event include female gender, poor social support, prior trauma exposure, prior mental disorder and continuing stressors. [18]

1.2 Second victims

In 2000, the term second victim was introduced to address the impact of work-related adverse events on health care professionals. [19] Second victims can be defined as “healthcare providers who are involved in an unanticipated adverse patient event, in a medical error and/or a patient related injury and become victimized in the sense that the provider is traumatized by the event”. [19] The reported prevalence of second victims among health care providers varies from 10.4% to 46%. [20–24] The second victim can have continued emotional distress, leading to a posttraumatic stress disorder.

Studies about traumatic events and PTSD among health care professionals in general have low response rates and show a widely varying prevalence of PTSD or PTS-symptoms. [25] Studies among midwives, labor ward nurses and obstetricians reported a prevalence of moderate to severe work-related PTS-symptoms of 26-36%, with the most frequently reported traumatic events being fetal demise/neonatal death, shoulder dystocia (obstetric emergency during vaginal delivery that requires additional obstetric manoeuvres to deliver the fetus after the head has been born. It is associated with perinatal morbidity and mortality), and infant rescusitation. [26–28]

1.3 Support and coping after adverse events

It is unknown how many Dutch hospitals have implemented support strategies for health care professionals, but the absence of these strategies in many high risk specialties, such as anesthesiology is experienced as a common problem. [29] In addition, there is a low likelihood of a physician asking for help, due to perceived barriers (doubts about confidentiality, fear of negative impact on career, stigma, [30] a low awareness of support options and time constraints. [31]

More is known about the coping strategies of health care professionals after adverse events. The five most common coping mechanisms among American obstetricians are: asking support from a colleague, asking support from family or friends, exercising or performing hobbies, writing a formal case report or undertaking religious activities. [9] Other research supports this finding that physicians mainly wish for peer-support from colleagues after adverse events. [31]

1.4 Aim of the study

The aim of this study was to study the prevalence of work-related traumatic events (according to the DSM-IV A-criterion for posttraumatic stress

disorder) among ObGyns, and to describe the prevalence of PTSD among ObGyns. Furthermore, we explored the current coping and professional support after work-related adverse events and the desired type of support. It was hypothesized that work-related events could be traumatic and lead to PTSD among ObGyns and current coping and support would be considered insufficient.

2. Material and methods

2.1 Population and procedure

The current study used the membership database of the Dutch Society of Obstetrics & Gynecology (NVOG). Permission to access and use this non-public database was granted by the NVOG. This database includes all resident and attending ObGyns in the Netherlands, as well as retired and non-practicing ObGyns. Of the 1596 members, 1578 members with a registered email address were included, which equals 98.9% of the NVOG population. Since the database did not differentiate between retired and non-practicing ObGyns, we considered all non-working ObGyns younger than 60 years into ObGyns with other jobs, and non-working ObGyns older than 60 years as retired. The link to the questionnaire was sent by email using an anonymous (non-traceable) link. All physicians received an invitation to participate in March 2014 by email, and two reminders during a 7.5 week period. The survey was piloted among a small group of resident and attending ObGyns for face validity, after which no substantial changes were made.

2.2 Measurements

The survey consisted of 32 questions, starting with demographics (5 questions), personal experiences about work-related adverse events, coping and support provided (12 questions), desired support (2 questions) and one statement question. Lastly, when a work-related traumatic event was

experienced during their career (PTSD-criterion A according to DSM-IV, 2 questions), at least once and more than four weeks ago, they also completed the Trauma Screening Questionnaire (TSQ). [32] The TSQ is a validated 10-item screening instrument corresponding to a provisional diagnosis of PTSD according to the DSM-IV14. The Dutch psychometric properties are validated with Cronbach's alphas from 0.71 to 0.91. A cut-off value of 6 or higher was used. [33] The original Dutch questionnaire and the English translation are included as additional files to this manuscript. The survey was part of a larger questionnaire among ObGyns about mental health after work-related adverse events.

2.3 Statistical analysis

Descriptive and statistical analyses were performed with SPSS 18.0 for Windows. For the 4-point Likert scale questions, median scores for central tendency, interquartile range (IQR, 25%-75%) and frequencies for distribution were calculated. Independents t-tests (for continuous variables) or Fisher's exact tests (for categorical variables) were used to compare subgroups. All variables are reported with numbers (%) or mean ± standard deviation. A p-value of less than .05 was considered statistically significant. Open answers were independently categorized by two authors (KS and MB), and subsequently analyzed by two independent assessors(KS, MS). Any disagreement was discussed until consensus was achieved. The overall interrater reliability was moderate, with Cohen's kappa's of 0.44 or higher. [34]

3. Results

3.1 Respondent and population characteristics

Table 1 shows the characteristics of the respondents (n=683) and reference population. The sample was found to be a good representation of the NVOG members, as the response rates in the subgroups (age, gender, level of

training) corresponded to the overall NVOG population. Of all the residents (n=394), 184 (47.8%) responded, so the highest response rate was among residents, followed by attending ObGyns (45.7%). Retired and non-practicing ObGyns had a response rate of 25.3%. The majority of the respondents were female (65.3%), with a varying distribution among the subgroups. The percentages varied from 85% female residents to 14% female among retired ObGyns. This distribution corresponded to the tendency of having an increasing amount of young female medical doctors in the Netherlands. Work experience in obstetrics and gynecology ranged from 0.5 to 46.0 years. The respondent demographics are shown in table 2.

Table 1: Demographic characteristics of respondents and NVOG population

Variable	Respondents (N=683)	NVOG population (N=1596)
ObGyn		
Resident	184 (26.9)	394 (24.7)
Attending	442 (64.7)	975 (61.1)
Non-practicing	21 (3.1)	18 (1.1)*
Retired	36 (5.3)	209 (13.1)*
Gender		
Male	237 (34.7)	663 (41.5)
Female	446 (65.3)	933 (58.5)
Age		
25-34	155 (22.7)	329 (21.2)
35-44	211 (30.9)	433 (27.9)
45-54	152 (22.3)	339 (21.8)
55-64	115 (16.8)	258 (16.6)
65 and older	50 (7.3)	194 (12.5)
Years in practice		
Mean ± SD	17.4 ± 10.7	Unknown
Range	0.5-46	Unknown
Complaints at disciplinary board	144 (21.1)	Unknown

All variables are in number (%), or mean ± standard deviation.*Calculated numbers. The NVOG did not differentiate between retired and not-practicing ObGyns. We counted ObGyns younger than 60 years as non-practicing, older than 60 years as retired. Note. NVOG = Dutch Society of Obstetrics & Gynecology. ObGyns= Obstetrician-gynecologists.

3.2 Posttraumatic stress disorder

The outcomes of the TSQ are shown in table 3. 86 (12.6%) of the respondents reported having experienced at least one traumatic event during their work as an ObGyn and thereby met DSM-IV criterion A. One of them did not continue answering the TSQ, leading to 85 respondents completing the TSQ. 10 (11.8%) subjects screened positive for a current PTSD diagnosis. This equaled a prevalence of 1.5% among all ObGyns, and 1.4% among the ObGyns that are currently practicing (residents and attending). Among the remaining 75 ObGyns without current PTSD who did experience a traumatic event, 60.0% reported having experienced multiple work related PTS-symptoms earlier in their career. The sample size was not large enough to perform subgroup analysis on PTSD or PTS-symptoms earlier in life. The most commonly reported adverse events were neonatal death, maternal death, severe neonatal and maternal complications, patient aggression or violence towards healthcare professionals, medical errors and interpersonal conflicts with colleagues. Twenty-one respondents mentioned they did not wish to describe the traumatic event because of fear of loss of anonymity, three were not applicable (did not describe an event).

Table 2: Demographic variables per subgroup

	Total (*n*=683)	Resident (*n*=184)	Attending (*n*=442)	Non-practicing (*n*=21)	Retired (*n*=36)
Gender					
Male	237 (34.7)	27 (14.7)	165 (37.3)	14 (66.7)	31 (86.1)
Female	446 (65.3)	157 (85.3)	277 (62.7)	7 (33.3)	5 (13.9)
Age					
25-34	155 (22.7)	146 (79.3)	9 (2.0)	0	0
35-44	211 (30.9)	38 (20.7)	169 (38.2)	1 (4.8)	3 (8.3)
45-54	152 (22.3)	0	149 (33.7)	3 (14.3)	0
55-64	115 (16.8)	0	107 (24.2)	6 (28.6)	2 (5.6)
65 and older	50 (7.3)	0	8 (1.8)	11 (52.4)	31 (86.1)
Years in practice Mean ± SD	17.4 ± 10.7	5.3 ± 2.4	20.6 ± 8.3	29.5 ± 9.3	32.4 ± 7.9
Complaints at the disciplinary board	144 (21.1)	3 (1.6)	118 (26.7)	8 (38.1)	15 (41.7)

All variables are in number (%), or mean ± standard deviation.

Table 3: Posttraumatic stress disorder measurements

	Total (n=683)	Practicing (n=626)		Not practicing (n=57)	
		Resident (n=184)	Attending (n=442)	Other job (n=21)	Retired (n=36)
PTSD					
DSM-IV criterion A (%)	86 (12.6)	14 (7.6)	67 (15.2)	3 (14.3)	3 (8.3)
Above cut-off* (%)	10 (1.5)	1 (7.1)	8 (12.1)	0 (0.0)	1 (33.3)

All variables are in number (%) of mean ± standard deviation.

* Measured with a TSQ cut-off value of 6 or higher. TSQ was completed by n=85.

Note. DSM-IV = Diagnostic and Statistical Manual of Mental Disorders. PTSD = Posttraumatic Stress Disorder. TSQ = Trauma Screening Questionnaire.

3.3 Work-related emotional stressors

Of all ObGyns, 230 (33.7%) have at some point considered leaving their medical profession. The most common reasons were a high workload, varying shifts, high responsibility, work/life imbalance, conflicts with colleagues, new interests and work culture related problems. 21.1% reported having faced a complaint at the disciplinary board, and this percentage increased with years in practice: 1.6% of the residents, 26.7% of the attending, 38.1% of the non-practicing and 41.7% of the retired ObGyns (table 2). The group that had considered leaving the profession had a significantly higher PTSD prevalence rate (0.7% vs 3.0%, p=0.01).

Respondents experienced the following events as high emotional impact stressors: missing a diagnosis (64.3%), doubting a medical decision (44.5%), life-threatening moments (43.2%), death of a patient (37.6%), feeling they could not help the patient (24.3%), bad news conversations (16.1%) (figure 1). Other stressors reported (23.1%) included severe complications, conflicts with colleague, patient and disciplinary board complaints, discontented patients and patient aggression or violence.

3.4 Coping

The most commonly used coping strategies after emotional events (figure 2) were gaining support from colleagues (87.4%), gaining support from family or friends (72.2%), discussing the case in a complication meeting or audit (42.6%), finding distraction (33.8%) and practicing sports or other hobbies (26.4%). Among the respondents, 5.1% increased their use of alcohol, drugs and/or nicotine and 1.5% used medication they normally would not use. Furthermore, 0.6% gave up practicing as an ObGyn as a result of emotional stressors. When asked where they learned their coping strategies, 53% reported never having formally learned, 22.5% during a peer support group, 10.5% during specialist training, 4.8% during medical school, 4.8% during

additional specialist courses and 33.8% learned through other ways. With the statement that there is room to express emotions on the ward or within their department after experiencing an emotional event, 80.8% agreed. Not many ObGyns (4.8%) agreed with the statement that having sleepless nights due to an adverse event means that you are not made to be an ObGyn. One in two ObGyns (55.2%) of the respondents have become more defensive in their decision making and 24.4% changed their work habits as a result of adverse events (e.g. no longer doing nightshifts, not performing surgery alone or no longer performing vaginal breech deliveries).

3.5 Current and desired support

Of all ObGyns, 410 (60.0%) thought the current support services after adverse events are insufficient. Of these 410 respondents, 255 (62.3%) reported that their department or hospital has no support protocol or strategy, 105 (25.7%) were not aware whether there is a protocol and 49 (12.0%) do have a protocol. When asked about preferences for support after an adverse event, most ObGyns (82.0%) would prefer peer support from direct colleagues. 29.9% would like support from a professional (psychologist or counsellor), 22.3% would prefer peer support from indirect colleagues (non-ObGyn physicians) and 10% would like to have a buddy appointed. 86.1% stated that the culture concerning the support after adverse events should change.

4. Discussion

In this large-scale study with a good response rate, our work-related PTSD prevalence among ObGyns (1.5%) is comparable to the general prevalence rate of current PTSD in the Netherlands (1.3%). [17] However, this common prevalence is mostly not work-related, and with this in mind we conclude the work-related prevalence of PTSD among ObGyns is high compared to the

general Dutch population. On the other hand, our estimated prevalence rate is low compared to other studies on prevalence rates of posttraumatic stress among health care professional in general (10.4-43.3%) [7,21–24] and labor and delivery ward personnel (32-36%).[25–27] However, a variety in definitions, questionnaires, stressor criterions, countries and professions is making comparison of results difficult. For instance, only one research group tried to determine a presumptive diagnosis of PTSD instead of posttraumatic stress in general, by applying the DSM-IV symptomcluster criteria to the Secondary Traumatic Stress Scale. [25,27] It is needless to say that ObGyns who did not meet full criteria for PTSD may still have significant impairment, and it is important to look beyond a DSM-diagnosis.

Among the ObGyns without current PTSD who did experience a traumatic event, 59.2% report having experienced multiple work-related PTS-symptoms earlier in their career. Unfortunately, due to the retrospective aspect of this study, we cannot differentiate between physiological adaption, an Acute Stress Disorder or previous PTSD. Nonetheless, we conclude that psychological distress after a work-related adverse event is common.

While the CanMEDS framework is used during medical training in the Netherlands, the current study implies that coping and support are not learned during specialist training. Of the Dutch ObGyns, 60% think that the current support strategies are insufficient and only 12% reports that support services are available in their hospital/department. This corresponds to recent studies in which the institutional support for hospital-based physicians or nurses is considered low, and most support was to be expected from colleagues, family and friends. [35–38]. With strong social support being an important protective factor for PTSD and gathering social support being a common coping mechanism in our sample, the role of educating health care professionals to support their colleagues after adverse events is crucial.

As a consequence of adverse events, ObGyns may become more defensive, adjust their work conditions and consider quitting their profession. One third of all Dutch ObGyns considered giving up gynecological practice, which is higher than findings from prior research (1 in 10). [9] However, in the present study the questions about considering giving up practicing did not differentiate between this being due to experiencing adverse events or because of other reasons. The results of this current study confirmed self-medication with (increased use of) drugs, nicotine and/or medication after experiencing an adverse event as a coping style used by some physicians after experiencing an adverse work-related event. [23,39]

In accordance with prior research,[31] situations described as high emotional impact are not necessarily the most extreme cases. Some physicians experience (multiple) minor complications as traumatic, whereas others experience disciplinary complaints or conflicts with colleagues as more stressful. We consider work conflicts and patient aggression or violence as work-related adverse events as well. These may concern all health care professionals and we therefore emphasize some form of support or guidance after such events as well.

4.1 Strengths and limitations

One of the strengths of this study includes the large sample size (n=683), as well as a high response rate of 42.8%. Although a recent study among Danish obstetricians and midwives about feelings and concerns after traumatic childbirth reached an even high response rate (59%), [40] our response rate is considerably higher than some previous studies (5-16%). [26–28] There are also several limitations to this study. Since avoidance is inherent to PTSD and may lead to non-response, the PTSD-prevalence of 1.5% may be an underestimation. Due to the anonymous design of the study, a non-responder analysis was not possible. Secondly, PTSD criterion A was measured according to DSM-IV, in which experiencing intense fear,

helplessness or horror right after the event was still required for a PTSD-diagnosis. In the DSM-5 this criterion has been removed, which is of particular interest since during work-related traumatic events there is often 'the professional kicking in', and emotions are postponed or neglected. This could have led to underdiagnosing traumatic events and thereby work-related PTSD. Another limitation is that a clinical interview is necessary for diagnosing PTSD, and therefore the prevalence rate in our study is an estimated prevalence.

4.2 Implications and recommendations

For future research, we would advise to include questions about the time that has passed since the traumatic event, and to include possible confounders for developing PTSD after experiencing a traumatic event,[41] which could help identifying and supporting high-risk individuals. If possible, a longitudinal design would be of great interest.

We suggest that all hospitals increase awareness among residents and attending physicians, and standardized support after adverse events should be implemented. Also, education on coping strategies should be expanded in medical training, to optimize peer support by colleagues.

Lastly, we suggest further evaluation of the most effective support methods and the effect on quality and safety of health care. We stimulate exploration of this topic among other medical specialties as well, since adverse events concern most health care professionals.

5. Conclusion

This is the first large-scale study about work-related adverse events, coping, support and PTSD among Dutch ObGyns. Findings imply that there is a substantial group of ObGyns who experienced at least one work-related

traumatic event (according to the DSM-IV criteria for PTSD), and that this can lead to work-related PTSD. As hypothesized, it was found that respondents consider the support after adverse events to be insufficient, and coping is not learned during medical and specialist training. There is potential for a change of culture, and creating a professional peer support system.

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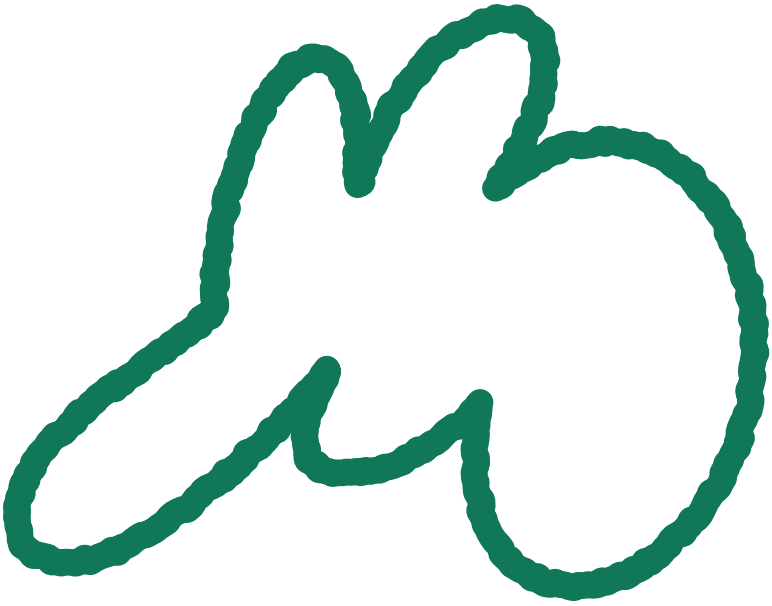
5.

POTENTIAL TRAUMATIC EVENTS IN THE WORKPLACE AND DEPRESSION, ANXIETY AND POSTTRAUMATIC STRESS; A STUDY COMPARING DUTCH GYNECOLOGISTS, PEDIATRICIANS AND ORTHOPEDIC SURGEONS



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ABSTRACT

Objective: To compare the prevalence of work-related potential traumatic events, support protocols and mental health symptoms across Dutch gynaecologists, orthopaedic surgeons and paediatricians.

Design: Cross-sectional study, supplementary analysis of combined data.

Setting: Nationwide survey between 2014 and 2017.

Participants: An online questionnaire was sent to all Dutch gynaecologists, orthopaedic surgeons and paediatricians, including resident physicians (4959 physicians). 1374 questionnaires were eligible for analysis, corresponding with a response rate of 27.7%.

Outcome measures: Primary outcome measures were the prevalence of work-related potential traumatic events (PTEs), depression, anxiety, psychological distress and traumatic stress, measured with validated screening instruments (Hospital Anxiety and Depression Scale, HADS; Trauma Screening Questionnaire, TSQ). Secondary outcomes were the association of mental health and defensive practice to traumatic events and support protocols.

Results: Of the respondents, 20.8% experienced a work-related potential traumatic event at least four weeks ago. Prevalence rates indicative of depression, anxiety or posttraumatic stress disorder (PTSD) were 6.4%, 13.6% and 1.5% respectively. Depression (9.2% vs. 5.2%, $p=0.019$), anxiety (18.2% vs. 8.2%, $p<0.001$) and psychological distress (22.8% vs. 12.5%, $p<0.001$), were significantly more prevalent in female compared to male attendings. The absence of a support protocol was significantly associated with more probable PTSD ($p=0.022$). Those who witnessed a PTE, reported more defensive work changes (28.0% vs 20.5%, $p=0.007$) and those with probable PTSD considered to quit medical work more often (60.0% vs. 35.8%, $p=0.032$).

Conclusion: Physicians are frequently exposed to potential traumatic events with high emotional impact over the course of their career. Lacking a support protocol after adverse events was associated with more posttraumatic stress. Adverse events were associated with considering to quit medical practice and a more defensive practice. More awareness must be created for the mental health of physicians as well as for the implementation of a well-organised support system after potential traumatic events.

1. Introduction

Physicians are frequently exposed to medical adverse events, such as life-threatening situations, illnesses, grief, death, and patient violence and aggression. Dealing with such events makes the medical profession one with occupational health hazards, comparable with fire fighters, rescue workers, military and police personnel.[1–3] The support for physicians is, however, underdeveloped in most areas of the medical profession compared to other professions.[4,5] It is generally assumed that health care providers have adequate coping mechanisms to deal with such work stressors. However, adequate coping mechanisms do not warrant successful coping with severe potential traumatic events. Our previous work showed that most gynaecologists, paediatricians and midwives experience support and protocols after work-related potential traumatic events as insufficient. [6,7] Dutch gynaecologists reported that development of coping strategies with work-related stressors are neither taught during graduate nor in specialist training.[8] Physician health is one of the competencies described in the CanMEDS framework used in Dutch medical education.[9] This framework recognises that, to provide optimal patient care, physicians must take responsibility for their own well-being and that of their colleagues. Several hospitals have started peer-support programmes, as this was shown to help physicians dealing with adverse events.[10]

1.1 Depression, anxiety and posttraumatic stress disorder

Major depressive disorder (MDD) is a common affective disorder that is characterised by a depressed mood and/or loss of pleasure.[11] A review on the epidemiology of mental disorders in Europe described a one-year prevalence of 6.9% in the general population[12]; the Nemesis-2 study showed a one-year prevalence of mood disorders of 3.0% among Dutch citizens with

a high income.[13] A meta-analysis on depressive symptoms and MDD among resident physicians showed high prevalence rates (20.9% to 43.2%).[14] Fewer studies were done on depressive symptoms among medical specialists, showing prevalence rates from 10.3 to 28.0%.[15–18] A recent literature review showed that as many as 40 per 100,000 physicians die by suicide each year in the United States of America, more than double the rate of the general population.[19]

Anxiety disorders include many different disorders, ranging from a specific phobia to a generalised anxiety disorder. The one-year prevalence for anxiety disorders in the Netherlands is 6.0% among citizens with a high income and 10.1% among citizens with a low income.[13]

PTSD is a highly debilitating disorder that can develop after exposure to a psychotraumatic event.[20] Symptoms of PTSD include intrusions, avoidance of stimuli related to the trauma, alterations in cognition or mood, and hyperarousal. The point prevalence of posttraumatic stress symptoms among physicians ranges between 3.8% and 15.0.[15,21–25]

The main objective of this supplementary analysis was to compare the prevalence of potential traumatic events (PTEs) and related mental health disorders between a large group of gynaecologists, paediatricians and orthopaedic surgeons. Additionally, this study investigates potential traumatic events and clinical practice related consequences. Combining the data of previous work allows us to gain statistical power to explore the association between support protocols and mental health symptoms in a larger group.

2. Methods

2.1 Population and procedure

Each physician received one invitation for an online questionnaire (supplementary file 1) and two reminders over a period of 8 weeks. The questionnaire was sent through Thesistools® or Surveymonkey®, creating an anonymous (non-traceable) e-mail link. The questionnaire was sent to 1589 gynaecologists, 2160 paediatricians and 1210 orthopaedic surgeons, with a total of 4959 physicians, including residents. The invitation to participate in the questionnaire for the gynaecologists was sent in 2014, orthopaedic surgeons in 2016 and paediatricians in 2017. This is an additional analysis of combining data of previous work.

The membership databases of the Dutch Society of Obstetrics & Gynaecology (NVOG), Dutch Society of Orthopaedic Surgeons (NOV) and the Dutch Society of Paediatricians (NvK) were used for the invitation. Registration as a medical specialist or resident in one of these societies is obligatory and therefore most Dutch medical specialists in these fields were contacted. These databases contained residents, attending, retired and non-practicing physicians.

This study was exempted from ethical approval by the Medical Research Ethics Committees United (MEC-U), and registered under numbers W17.169 and W18.096.

2.2 Patient and public involvement

Engagement with the described medical societies was vital to ensure participation and a high response rate. The qualitative questions were piloted among several medical specialists of each specific medical specialty.

2.3 Measurements

The instruments included the Hospital Anxiety and Depression Scale (HADS) and the Trauma Screening Questionnaire (TSQ) as validated screening instruments. The HADS is a screening instrument for depression and anxiety with 14 items (4-point likert scale), where the subscales contain seven questions each. The cut-off value of the Dutch version of the depression (HADS-D) and anxiety subscale (HADS-A) is equal to or higher than eight. The total HADS cut-off value for general distress is equal or higher than 12, corresponding to clinically relevant psychological distress; this is a rather non-specific but sensitive measurement to screen for mental disorders.[26] Cut-off scores were used according to these validation studies. The sensitivity and specificity for both HADS-A and HADS-D are approximately 0.80, with Cronbach's alphas for HADS-A from 0.68 to 0.93 (mean 0.83) and for HADS-D from 0.67 to 0.90, in different populations. [27]

The TSQ is a ten-item screening instrument for a probable diagnosis of PTSD according to the DSM-IV, with a sensitivity of 0.94 and specificity of 0.56 when using a cut-off of equal to six or higher. The Dutch psychometric properties are validated with Cronbach's alphas from 0.71 to 0.91.[28] Only respondents who answered 'yes' to experiencing a work-related traumatic event at least four weeks ago were asked to fill out the TSQ.

Additionally, the survey contained questions about demographics, personal experiences, coping and support strategies after adverse events in the workplace. Regarding the latter, multiple-choice options were given as well as an open field where respondents were able to add their individual answers or comment on their experience. These qualitative questions were piloted among several medical specialists of all three medical specialties, to increase face value of the questions. To quantify the number of PTEs and previous posttraumatic stress symptoms, questions were added based on the criteria

of the diagnosis of PTSD in the DSM-IV (questions 22 and 35, supplementary file 1).

2.4 Statistical analysis

Statistical analysis was performed using IBM Statistical Package for the Social Sciences (SPSS) version 22 and JASP version 0.8.5.1. Demographic data and multiple-choice questions were analysed using descriptive statistics and exported as frequency tables and bar charts. Differences in outcomes (in various groups) for categorical variables were tested using either a Chi-squared test or a Fisher's exact test where applicable. A two-sided p-value equal to or less than 0.05 was considered statistically significant. A multivariable logistic regression analysis was performed to estimate the effects of age, work-experience, gender and position on the likelihood that participants develop mental health outcomes, a p-value equal to or less than 0.05 was considered statistically significant. Multiple testing corrections were not performed.

3. Results

A total of 1374 questionnaires were collected with a response rate of 27.7%. Table 1 shows the respondents characteristics by specialty. The majority of the orthopaedic surgeons were male (85.6%) while in the other specialties the majority were female. In all specialties most of the respondents (62.3 – 74.9%) were attending physicians, as seen in table 1. The gender and position distributions were compared with the membership databases of the societies, and for none of the specialties the distribution in the sample was significantly different from the population. The orthopaedic surgeons reported to have had the most complaints at a disciplinary board (29.8%). One hundred eight (26.3%) paediatricians reported to have a support

protocol, whereas only 18.8% of the orthopaedic surgeons and 15.8% of the gynaecologists reported to have a protocol after adverse events.

Table 1: Respondent characteristics

	Total (n=4959)	Gynaecologists (n=1589)	Orthopaedic surgeons (n=1210)	Paediatricians (n=2160)
Response rate	27.7	48.9	21.3	29.8
Gender				
Male	44.9	34.7	85.6	32.7
Female	55.1	65.3	14.4	67.3
Position				
Resident	23.0	26.9	20.9	18.0
Attending	67.2	64.7	62.3	74.9
Retired	7.1	5.4	13.4	5.6
Non-practicing	2.6	3.0	3.4	1.5
Years in practice				
≤ 5	12.4	14.3	12.0	9.8
6-10	18.6	19.0	19.5	17.3
11-15	15.8	17.7	14.0	13.9
16-20	14.3	11.6	13.4	19.3
21-25	12.4	12.8	9.2	13.9
26-30	11.3	9.5	14.4	12.0
>30	15.1	14.7 *	17.5	13.9
Complaints disciplinary board	19.9	21.0	29.8	11.2
Support protocol				
Yes	19.6	15.8	18.8	26.3
No	42.4	52.7	30.1	34.1
I do not know	38.0	31.4	51.0	39.5

All values shown as %
*=2 missing

Outcomes of the HADS and TSQ by specialty are shown in table 2. Eighty eight (6.4%) respondents scored above the cut-off value for depression and one hundred and eighty eight (13.6%) respondents scored above the cut-off value for anxiety. Two hundred and thirty six (17.1%) scored above the cut-off value of the total HADS, corresponding to clinically relevant psychological distress. When comparing specialties, there is no significant difference in depression. However, looking at the prevalence of anxiety, the orthopaedic surgeons scored significantly lower compared to both gynaecologists (15.8% vs. 8.2%, $\chi 2$,$p<0.01$) and paediatricians (14.1% vs. 8.2%, $\chi 2$, $p<0.05$). Also psychological distress was significantly lower compared to gynaecologists (18.2% vs. 12.0%, $\chi 2$, $p<0.05$) and paediatricians (19.3% vs. 12.0%, $\chi 2$,$p<0.01$).

Table 2: Depression, anxiety, psychological distress and PTSD by specialty

	Total (n=1374)	Gynaecologists (n=672)	Orthopaedic Surgeons (n=292)	Paediatricians (n=410)
Depression	6.4	6.5	4.8	7.3
Anxiety	13.6	15.8	8.2	14.1
Psychological distress	17.1	18.2	12.0	19.3
PTSD				
PTE ≥ 4 weeks ago	20.8	12.8	19.5	34.9
PTS symptoms earlier	13.4	8.2	8.6	25.4
TSQ	1.5	1.5	0.3	2.2

All values shown in % scored above HADS or TSQ cut off
Abbreviations: Potential Traumatic Event (PTE); Trauma Screening Questionnaire (TSQ); Hospital Anxiety and Depression Scale (HADS); Posttraumatic stress (PTS); Posttraumatic stress disorder (PTSD).

As seen in table 3, no significant difference was found between male and female residents in rates of depression, anxiety and psychological distress. When comparing gender among attendings, the rates of depression (5.2% vs.

9.2%, p=0.019), anxiety (8.2% vs. 18.2%, p<0.001) and the total HADS (12.5·0% vs. 22.8%, p<0.001) were significantly higher among female attendings.When comparing among all respondents, the prevalence rates of anxiety (10.1% vs. 18.7%, p<0.001) and psychological distress (14.2% vs. 22.3%, p<0.001) were significantly higher among female physicians There were no differences in primary outcomes when comparing residents with attendings.

Table 3: Depression, anxiety and psychological distress by position and gender

	Total (n=1240)	Depression	p	Anxiety	p	Psycho-logical distress	p
Gender							
Male	40.8	5.5	0.075	10.1	**<0.001**	14.2	**<0.001**
Female	59.2	8.2		18.7		22.3	
Position							
Resident	25.4	4.7	0.112	17.1	0.125	18.4	0.887
Attending	74.6	7.4		13.6		18.1	
Residents							
Male	25.6	3.7	0.346	13.6	0.053	14.8	0.058
Female	74.4	5.1		18.3		19.6	
Attending							
Male	45.9	5.2	**0.008**	8.2	**<0.001**	12.5	**<0.001**
Female	54.1	9.2		18.2		22.8	

All values shown as % scored above cut-off HADS
All differences were analysed using χ^2
Abbreviations: Hospital Anxiety and Depression Scale (HADS)Abbreviations: Hospital Anxiety and Depression Scale (HADS)

Turning to the results of the logistic regression analysis, there was a significant increase in the prevalence of depression in the groups with more years in practice (OR 2.95, p=0.030, 95% CI 1.11 – 7.80, supplementary file 2), but not with increased age. We found a significant decrease in the prevalence of anxiety with more years in practice (OR 0.33, p=0.001, 95% CI 0.17 - 0.64, supplementary file 2). The highest rate of respondents with a score above the cut-off value for anxiety were found among physicians with 6-10 years in practice (supplementary file 2).

3.1 Posttraumatic stress disorder

Two hundred eighty six respondents (20.8%) reported having experienced at least one potential traumatic event (PTE) during their work, at least four weeks ago, thereby meeting DSM-IV criterion A and E. Of these respondents, 183 reported recognising posttraumatic stress (PTS) symptoms after this event (13.4% of the total group, 64.3% of the potentially traumatised group) and 20 screened positive for probable PTSD (1.5% of the total group, 7.0% of the potentially traumatised group, table 2). Of the paediatricians 34.9% reported having experienced a PTE at least four weeks ago. This is significantly higher than the percentages of the gynaecologists (12.8%, $\chi 2$, $p<0.001$) and orthopaedic surgeons (19.5%, $\chi 2$, $p<0.001$), as seen in table 2. When comparing the prevalence of probable PTSD, the paediatricians had a significant higher prevalence compared to the orthopaedic surgeons (2.2% vs. 0.3%, $\chi 2$, $p=0.041$). Both paediatricians and gynaecologists report to recognise more PTS symptoms. When comparing gender and position (resident vs. attending, table 4), residents are less likely to have experienced a PTE (16.8% vs. 22.6%, $p=0.030$) and thus also report significantly fewer PTS symptoms earlier (7.9% vs. 15.6%, $p<0.001$).

Table 4: Posttraumatic stress outcomes by position (resident vs. attending) and gender

	Total (n=1240)	PTE	p	PTS symptoms earlier	p	PTSD	p
Gender							
Male	40.8	21.3	0.878	11.3	**0.044**	1.2	0.516
Female	59.2	21.0		15.3		1.6	
Position							
Resident	25.4	16.8	**0.030**	7.9	**<0.001**	0.9	0.391
Attending	74.6	22.6		15.6		1.6	
Residents							
Male	25.6	21.0	0.245	4.9	0.246	0.0	0.306
Female	74.4	15.3		8.9		1.3	
Attending							
Male	45.9	21.4	0.377	12.5	**0.006**	1.4	0.371
Female	54.1	23.6		18.2		1.8	

All values shown as %, PTSD is shown as scored above cut-off TSQ.
All differences were analysed using $\chi 2$.
Abbreviations: Potential Traumatic Event (PTE); Hospital Anxiety and Depression Scale (HADS); Posttraumatic stress (PTS); Posttraumatic stress disorder (PTSD).

The highest rate of probable PTSD was found among attendings (n=15, 1.6%) compared to three of the residents (0.9%). When comparing gender, male and female physicians report the same number of PTEs, but female physicians are more likely to report earlier PTS-symptoms (15.3% vs. 11.3%, p=0.044).

Those who witnessed a PTE, reported significantly more defensive work changes after an incident (28.0% vs 20.5%, p=0.007). Respondents who recognised PTS-symptoms after an incident considered quitting medical work more often (42.6% vs. 29.2%, p=0.029). Those with current probable PTSD significantly considered quitting medical work more often (60.0% vs. 35.8%, p=0.032).

When evaluating the presence of a support protocol, this was found not to influence the primary mental health outcomes, except for probable PTSD.

Participants who responded that there was no support protocol at their work-place after an adverse event, were significantly more likely to report probable PTSD after a PTE (p=0.022).

4. Discussion

4.1 Depression and anxiety

This additional analysis combined data from previous work to compare the point prevalence rates of probable depression, anxiety, psychological distress, work-related PTE and PTSD among gynaecologists, orthopaedic surgeons and paediatricians. It is part of the Work-related Adverse and Traumatic Events Research (WATER) and this paper combines the results of previous studies [6,8], to gain statistical power and show differences between support protocols, specialties, gender and position. Our point prevalence rates of depression (6.4%) and anxiety (13.6%), are high compared to 12-month prevalence rates of mood disorders (3.0%) and anxiety (6.0%) in high income populations in the Netherlands, and compared to European 12-month prevalence rate of anxiety (6.4%).[12,13] The point prevalence rates in this study are comparable to American 12-month general prevalence rates of depression (6.7%) and anxiety (18.1%).[29,30] This indicates that physicians are more depressed and anxious compared to the general population and the population with high income in the Netherlands. This high prevalence is in line with current literature, where even higher prevalence rates for depression and anxiety were found among medical students, residents and specialists.[14,15,31] One of the relevant findings of this study is the high prevalence of psychological distress (17.6%). Scoring above this cut-off is not specific for one diagnosis, but does indicate a high level of distress and a risk for potential unfit physicians. We found a significant increase in the prevalence of depression corresponding with more years in practice. Furthermore, this study showed a significantly higher prevalence of

depression and anxiety among female compared to male attendings. This finding correlates with previous study results,[32] where prevalence rates for depression and anxiety were higher among British female doctors compared to males. These findings are also in line with epidemiologic data on the gender distribution of mood and anxiety disorders in the general population.[12,13] This finding is relevant, because of the feminization of medical specialties globally, and an increase in female physicians of 1.0 to 2.0 % each year in the last ten years in the Netherlands.[33] These results may implicate that a change is needed in support after adverse events, that is sensitive to the increase in women working in the field of medicine.

4.2 Posttraumatic stress disorder

In this sample, 285 respondents (20.8%) reported to have experienced a potential traumatic event (PTE) that took place longer than four weeks ago. This is within the range of the estimated prevalence of second victims of 10.4% and 43.3%, reported by Seys et al.[34] Our prevalence for work-related PTSD (1.5%) is slightly higher, compared to the general Dutch prevalence of PTSD (1.2%).[35] The Dutch prevalence of only work-related PTSD is not known, however assumed to be lower. Of the potential traumatised respondents, 7.0% screened positive for PTSD, which is comparable to other occupations with mental health hazards, such as police officers after critical police incidents (7.0%).[36]

One of the key findings of this supplementary analysis, is that after experiencing a PTE, the absence of a support protocol is significantly associated with more probable PTSD (p=0.022). This once again shows the importance of support protocols and implicates that a well perceived support system may prevent posttraumatic stress complaints. This survey did however not explore the types of support protocols (e.g. debriefing versus peer-support) in place, as they may differ across hospitals and even within one hospital across specialties. Therefore nothing can be concluded of the

type of support protocol that may help prevent PTS symptoms. However, some form of formalised support may lead to seeking- and finding professional help earlier. Studies have shown that the threshold to look for professional mental health as a physician is high. Physicians report a reluctance to seek care, due to barriers such as too little time, fear of losing their medical license and stigma.[37] A (semi) compulsory support protocol after a PTE could potentially increase awareness, lower this threshold and guide physicians in need towards professional support or treatment. Debriefing and hospital based peer-support have shown useful and effective after PTEs in several small studies. [10,38] Also, this awareness of more workplace support may lead to perceiving adverse events less psychotraumatic, however having a support protocol was not correlated with less PTEs.

Of the residents who filled out the TSQ, three screened positive for PTSD (all female respondents). These findings are in line with the known gender distribution, as women are more likely to develop PTSD than men.[39] Other studies found higher prevalence rates of PTSD (i.e. Joseph[21] = 15%, Mills[24] = 11.9%, Ruitenburg[15] =15%, and Shi[22] = 3.8%), but they used different (non-) validated screening instruments and methods. None of these screening instruments assessed when the PTE happened (for a diagnosis of PTSD this needs to be at least four weeks ago), meaning that their respondents may not meet criterion A of PTSD and could also be suffering from acute stress symptoms. Furthermore, these studies did not assess whether the potential event was work-related, so these numbers show general PTSD prevalence rates which are usually higher.

Studies have shown that dysfunctional coping can predict complicated grief and PTSD severity.[40,41] Thus, it is important to educate physicians about coping mechanisms and stress management techniques to prevent adverse mental health conditions.[42] With social support being an important

protective factor for PTSD(Olff, 2012), the role of educating health care professionals to address this problem and support their colleagues in peer-support groups is crucial.[10]

3.3 Job related consequences of depression, anxiety, adverse events and PTSD

This study shows that physicians consider quitting their job more often, after having experienced PTS-symptoms in the past or currently suffering from probable PTSD. Experiencing a PTE is also associated with more defensive medical practice. When looking at the prevalence of complaints at a disciplinary board, the orthopaedic surgeons reported the most complaints (table 1). This may be due to the higher amount of elective work they do, which usually leads to more dissatisfied patients, compared to emergency work. More complaints was not associated with considering quitting work or increased rates of depression, anxiety or psychological distress.

3.4 Strengths

Little research has been done on PTSD in physicians, in particular with regard to mental health in relation to social and occupational functioning and clinical practice related consequences. We incorporated the A and E criterion in our probable PTSD diagnosis, therefore our prevalence is more likely to reflect the real prevalence of PTSD. Also, this study included a large number (n=1374) of physicians, which made it possible to analyse gender, position and age differences. The overall response rate among gynaecologists was high (42.9%), followed by the orthopaedic surgeons (29%) and the paediatricians (18.9%).

3.5 Limitations

There are several limitations to this study. The population of this study is limited to three specialties and one country in Europe and thus it is difficult to translate these results to physicians worldwide. However, it is known that working conditions and related stress levels are comparable with the rest of Europe and North-America. Also, prevalence rates reported in this study are possibly not comparable to other studies on mental health, as many different samples and measurements are used in mental health studies. Furthermore, avoidance is one of the key symptoms of PTSD and can therefore lead to non-response and non-completion of the survey, as it may trigger symptoms of PTSD. Therefore the prevalence rates found in psychotrauma studies are often an underestimation of the PTSD-prevalence. On the other hand, this self-selection bias may also lead to overrepresentation of physicians with strong opinions. One suggestion to decrease this non-completion bias, is to give respondents the opportunity to finish the survey at a later time point and receive a reminder. The overall response rate was 27.7%, which is slightly higher than the average response rate for email surveys (25.0%)[44] and comparable to similar surveys in this field [45]. Due to the low numbers of PTSD, it was not possible to correlate the type of adverse event with more PTSD. Furthermore, the HADS and TSQ are validated screening instruments, however they only give an estimate of the prevalence rates of probable disorders as they do not cover all the symptom domains of the disorders. Only the prevalence of PTSD is work-related, the numbers for depression and anxiety are general prevalence rates.

4. Conclusion

Physicians are often exposed to PTEs over the course of their career with potentially high emotional impact. The prevalence rates for probable depression (6.4%) and anxiety (13.6%) were higher among physicians,

compared to the general population with high income in the Netherlands. The point prevalence of clinical psychological distress was 19.0% and of probable PTSD was 1.5%. Female physicians are significantly more prone to develop depressive- and anxiety disorders than their male colleagues. PTEs were associated with more defensive practice and dissatisfaction about work. And importantly, the absence of a support protocol was associated with more probable PTSD. This once again shows the importance of support protocols and implicates that a well perceived support system, such as peer support and debriefings, may prevent posttraumatic stress complaints and unfit physicians.

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PART TWO

Posttraumatic stress disorder after severe post-partum hemorrhage

6.

POST-TRAUMATIC STRESS DISORDER IN WOMEN AND THEIR PARTNERS, FOLLOWING SEVERE POST-PARTUM HEMORRHAGE: A STUDY PROTOCOL FOR A PROSPECTIVE COHORT STUDY

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ABSTRACT

Background: Posttraumatic stress disorder is a Trauma- and Stressor-Related Disorder resulting from exposure to an event that is considered as traumatic. It is recognized in relation to traumatic childbirth that both patient, partner and health-care provider can develop a posttraumatic stress disorder. The most important risk factors in women are depression during the pregnancy, fear of childbirth, severe pre-eclampsia, preterm premature rupture of membranes, and severe neonatal complications. The prevalence rate in women in Western countries is estimated between 1 and 3%. The prevalence in partners witnessing childbirth is unknown. Posttraumatic stress disorder in relation to severe postpartum hemorrhage, in either women or partners, has not been extensively researched yet.

Methods/design: This is a prospective cohort study in a hospital setting, with the objective to evaluate whether women and their partners have a higher risk to develop a posttraumatic stress disorder or symptoms, following a severe postpartum hemorrhage of 2.0 l or more, compared to a control group. The primary outcome variable is diagnosis of posttraumatic stress disorder. Secondary outcome variables are posttraumatic symptoms according to the posttraumatic stress disorder criteria, psychiatric co-morbidities and seeking psychological help. A total of at least 130 women and 130 partners, must be included according to power calculations. Patients, partners and controls are selected in eight hospitals through complication registers. They are asked to complete a digital questionnaire four to six weeks after delivery, to screen for a posttraumatic stress disorder or symptoms. Participants with scores above cut off values are asked to participate in a telephone interview. For secondary outcomes, risk factors will be evaluated by multivariable analysis.

Discussion: This study is designed to give insight into the frequency of posttraumatic stress disorder and posttraumatic stress symptoms following a severe postpartum hemorrhage, both in patients and their partners. We strive to minimize the non-response bias, a common problem in this type or research, through early and active participant recruitment. Trial registration: NL50273.100.14.

1. Introduction

1.1 Posttraumatic stress disorder

Posttraumatic stress disorder (PTSD) is a Trauma- and Stressor-Related Disorder resulting from exposure to an event that is considered as traumatic. PTSD symptoms are intrusion, avoidance, negative cognitions and mood, and hyperarousal, as described by the Diagnostic and Statistical Manual of Mental Disorders - 5 (DSM-5). [1] It was first described and is best known in relation to war traumas, but is also recognized in relation to any potential traumatic event. For example, it was shown that a near death experience during cardiac arrest can lead to PTSD.[2] Also, the type of exposure to the event may differ: both victims as well as spectators can develop PTSD. The life time prevalence of PTSD in the Netherlands is 7.4%.[3]

Without treatment, PTSD often does not spontaneously regress and can be a disabling disorder that may exist for years. Treatment usually starts with managing psychiatric comorbidities that may stand in way of treatment, such as substance abuse, severe depression and suicidality. [4,5] As treatment of PTSD after childbirth, cognitive behavioral psychotherapy specified on traumatic childbirth and eye movement desensitization and reprocessing therapy have shown to be effective. [6,7]

1.2 PTSD in women after traumatic childbirth

PTSD was first recognized in relation to traumatic childbirth in 1990, and the awareness has slowly increased since then. Previous studies have shown a PTSD incidence in women as a result of traumatic childbirth between 0 and 5.9% worldwide, and between 1 and 3% in Western countries. [8–10] A large study in the Netherlands showed a 1.2% incidence rate, which is around 2,000 women each year. [11]

There are multiple risk factors that may play a role in developing PTSD after childbirth. We generally divide risk factors in three categories: patient characteristics, obstetrics and childbirth situation. Patient characteristics describe personality traits and mental health throughout the pregnancy and childbirth. The most important risk factors in this group are a history of PTSD or depression, a depression during pregnancy and severe fear of childbirth.[12] Obstetric risk factors include obstetric complications, such as severe pain during the delivery, pre-eclampsia (PE), preterm premature rupture of membranes (PPROM), an emergency birth intervention and neonatal complications. [10,11,13–17]

Childbirth situation includes the variables of the situation in which childbirth has taken place and the way the patient has experienced this. A lack of social support, either by family or health care providers, an experience of powerlessness or loneliness during the delivery, and peritraumatic dissociation increase the risk to develop PTSD. [10,12,13,18,19]

1.3 PTSD in men after traumatic childbirth

As described earlier, witnesses of traumatic birth, such as partners and health care providers, also have a risk of developing PTSD and depression. [20] Traumatic birth may not only have major consequences for the patient, but also for their partners. Several studies have been done to explore obstetrical and patient characteristic risk factors in partners. Although there is a lack of good qualitative and quantitative studies, the prevalence of PTSD is estimated between 0 and 5% six weeks postpartum.[21] One Dutch study showed that symptoms of depression and PTSD during the pregnancy experienced by the woman, give a higher risk of the partner developing PTSD and depression after birth complications, such as pre-eclampsia or PPROM. However, the prevalence, risk factors and treatment for PTSD and posttraumatic stress (PTS) symptoms in partners needs further investigation. Our clinical experience is that partners often experience uncertainty and

powerlessness when confronted with a life-threatening situation of the patient or their newborn child.

1.4 Postpartum hemorrhage and PTSD

1.4.1 Mild and severe postpartum hemorrhage

The most common causes for a postpartum hemorrhage (PPH) are uterine atony, retained placenta, vaginal and cervical tears, placenta previa and coagulation deficits. [22,23] Usually, hemorrhages until 1 l are well tolerated in healthy patients. A mild PPH is defined in the Netherlands as blood loss of 1 l or more, within 24 h after vaginal birth or a caesarean delivery. Internationally other definitions are used, for example a blood loss of 0.5 l or more according to the World Health Organization,[24] or a 10% hemoglobin concentration decline.[25] The signs and symptoms as a result of a mild PPH are palpitations, lightheadedness, tachycardia, confusion, sweating and weakness. [26,27]

The definition of a severe PPH is usually blood loss of 2.0 l or more, but also differs internationally. For example, it is sometimes defined as a hemorrhage that resulted in a blood transfusion of 4 packed cells or more, or resulted in an embolization or hysterectomy. The incidence of severe PPHs in America between 1998 and 2008 was 3.0 per 1,000 deliveries.[28,29] Severe PPH can result in extremely low blood pressure, lethargy, dyspnea, anuria, and eventually collapse and death. [26,27]

1.4.2 Traumatic postpartum hemorrhage

Severe hemorrhages are often accompanied by physical symptoms,[26] and therefore more likely to be perceived as traumatic. Patients often experience severe PPH as a near-death experience, describing it as if they were slowly bleeding to death. One Dutch study explored PPHs, among other potential risk factors, and their relation to PTSD. It was not found to be a risk factor for

PTSD. This study however, also included mild hemorrhages, as they used patients with PPHs of 1 l or more. [11] Another recent study from England also explored PTSD after PPH of 1.5 l or more, and found a significant increase of post-traumatic stress symptoms.[30] There is no research on PTSD in partners that have witnessed PPH, so numbers remain unknown.

1.4.3 Posttraumatic stress after postpartum hemorrhage

In most studies, only DSM criteria for PTSD are used as end points. However, there is a group of patients that suffers from clinically relevant posttraumatic stress (PTS) symptoms that do not meet the criteria for PTSD. There is some evidence that the prevalence of significant symptoms of intrusion, avoidance and hyperarousal is high, between 9.4 and 28.9% of the women suffers from at least one of the symptoms. Risk factors for developing PTS-symptoms are similar to those of developing PTSD. [8,15]

2. Methods

2.1 Aims

A prospective evaluation in a hospital setting on the frequency of PTSD and PTS symptoms following a severe PPH of 2.0 L or more, compared to deliveries without a PPH, both in patients as well as in their partners. We hypothesize that women with a severe hemorrhage postpartum, and partners who have witnessed postpartum hemorrhage, have a higher risk of developing PTSD and PTS-symptoms as compared to controls. This study will provide insight in risk factors of traumatic childbirth, and may ultimately lead to improved screening for PTSD after childbirth.

2.2 Design

2.2.1 Selection and inclusion

This study is a prospective cohort study. Patients and controls are selected from the complication and birth registers in ten hospitals by designated investigators from each hospital. Before patients and controls leave the hospital, they are personally approached by the doctors on the ward. The patient and her partner receive a short information card, an information letter and they are asked to fill our an informed consent. They will be informed they will be invited for participation four to six weeks after birth. The address, phone number and native language of the women are available in the hospital registers. If they are English speaking patients, they will receive the letter and consent in English. A separate question is added in the consent for women that do not want to participate, asking for permission to use their medical details, so we can include their partner.

2.2.2 Digital questionnaire

Between 4 and 6 weeks postpartum, patient, partner and controls are asked through e-mail to complete a digital questionnaire. This time frame has been chosen because PTSD can only be diagnosed when the complaints exist for more than four weeks after a traumatic event. A first (1 week) and second (2 weeks) reminder will be sent to non-responders. The questionnaire we will use is the PTSD Checklist for the DSM-5 (PCL-5) with several added questions about co-morbidities such as use of alcohol, drugs and medication. This questionnaire will be available in Dutch and English. Completing it will take around 10–15 min.

2.2.3 Telephone interview

Based on the score of the digital questionnaire, patients are selected for a telephone interview. The cut-off value will be a total score of ≥11 in combination with a severity score of ≥3. This chosen cut-off is lower than the

official score for PTSD to prevent we will miss participants with posttraumatic stress symptoms. In this interview we will use the Clinician Administered PTSD Scale for the DSM-5 (CAPS-5), which will be available in Dutch and English. All interviewers are trained to perform the CAPS-5. The interview will take around 20–90 min, depending on the amount of complaints the participant has. In addition, the personal details and the ability to understand the questions are confirmed. The CAPS-5 is the gold standard for the diagnosis of PTSD, and the DSM-5 version is currently being validated in English and Dutch. During the CAPS-5 interview, we ask patients to describe the traumatic event, but we also ask about other traumatic events in the participants' history or an earlier diagnosis of PTSD. If this is the case, we will ask the participant to focus on the traumatic event during the delivery. We will continue the interview when patients were diagnosed with PTSD before, but they will be excluded from the study, since it is very hard to differentiate if the complaints are caused by the first traumatic event or by the second. It is practically not feasible to submit all patients and controls to a telephone interview, due to time limitations. Also, it is found unnecessary to do an interview when patients score below the cut off values of the PCL-5.

2.2.4 Risk factors

The medical details of the participants such as amount of blood loss, medical interventions, medical history etc. will be registered in a case report form (CRF) for every patient, partner and control. These factors will be searched for in their medical records and are obtained via the questionnaire and interview. As for the partners, limited information will be available, since they are usually not registered patients in the hospital. Therefore questions about their medical history and use of medication are added in the questionnaire.

2.3 Patient population

2.3.1 Patient groups

We will have two groups of patients; a patient group and a partner group. In the patient group we will include patients with a PPH of 2.0 l or more. In the partner group we will include the partners of these patients. This study will be performed in eight hospitals in the Amsterdam region. All PPHs will be registered as a complication in the hospital registers. Patients are thereby selected via these register databases. The aim is to select a minimum of 260 patients and 260 partners, based on the response rate and sample size calculation. With a response rate based on earlier research of approximately 50%, [11,30] we aim to have response of at least 130 patients and 130 partners.

2.3.2 Control groups

We will have two control groups; a patient-control group and a partner-control group. Control group patients are selected by selecting the following and preceding birth after a PPH, from the birth register. This is a common method for control group selection in this type of research. The partner-control consists of partners of women in the patient-control group. We expect a lower response rate compared to the patient groups and aim to select at least 260 couples.

2.3.3 In-/exclusion criteria

All participants are assessed for eligibility based on the inclusion and exclusion criteria. All patients must be 18 years of age or older. A medical history of PTSD and the inability to understand Dutch or English are used as exclusion criteria for all participants. We also accept proficient English speaking patients, because of the high number of international patients in Amsterdam. For the control group, a PPH of 0.5 l or more according to the definition of the WHO, is also used as an exclusion criterion. All other obstetric complications are accepted in all groups, because we expect the

same complications in each group. A partner or partner control can only be included in our research when the patient is also participating or when the patient is not participating, but has explicitly given permission to use her medical history of the pregnancy and delivery in the informed consent. This permission is needed, because otherwise we are not allowed to use the information of the pregnancy and delivery.

2.4 Materials

The measuring instruments are the PCL-5 and CAPS-5. The PCL-5 is an internationally used screening tool for PTSD, which focuses on a specific traumatic event. The questionnaire has undergone preliminary validation for the DSM-5 in English, and is currently being validated in Dutch. Cut off values will be used according to these validation studies. The questionnaire is a 20 item self-report tool to monitor symptom changes during and after treatment, to screen individuals for PTSD and diagnose a provisional PTSD. The rating scale of each item is from 0 to 4, described in the same order as “Not at all,” “A little bit,” “Moderately,” “Quite a bit,” and “Extremely.” A score between 0 and 80 can be obtained.31 When a participant scores 11 or higher in total and at least three or higher on any of the symptoms, they are contacted for a CAPS-5 interview.

The CAPS-5 is a 30-item questionnaire, corresponding to the DSM-5 diagnosis for PTSD. CAPS-5 symptom cluster severity scores are calculated by summing the individual item severity scores for symptoms corresponding to a given DSM-5 cluster: Criterion B (items 1–5); Criterion C (items 6–7); Criterion D (items 8–14); and, Criterion E (items 15–20). A symptom cluster score may also be calculated for dissociation by summing items 29 and 30. The rating scale of each item is from 0 to 4, described in the same order as “Absent”, “Mild/subthreshold”, “Moderate/threshold”, “Severe/markedly elevated” and “Extreme/incapacitating”. A symptom is considered present only if the corresponding item severity score is rated 2 or higher. The DSM-5 PTSD

diagnostic rule requires at least 1 criterion B item, 1 criterion C item, 2 criterion D items and 2 criterion E items, and has to meet criterion F (question 22) and G (questions 23 to 25). Patients can also be diagnosed with the dissociative subtype (questions 29 and 30).[31]

Extra questions (see Addendum 1) are added to the questionnaire (and explored during telephone interview) about duration of symptoms, functional significance, co-morbidities and search for treatment. Furthermore, questions are added to explore a medical history of PTSD, depression and use of antidepressant medication during pregnancy and complaints from hypotensive shock as a result of the PPH.

2.5 Outcomes

2.5.1 Primary outcome

The primary outcome variable is the diagnosis of PTSD based on the DSM-5 criteria.

2.5.2 Secondary outcome

The secondary outcome variables are posttraumatic stress symptoms B to E based on the DSM-5 criteria. We will also evaluate co-morbidities, such as alcohol, drug and medication abuse, and whether a participant has already searched for psychological treatment. The latter will be asked for in the questionnaire. For the secondary outcome, cut off values are used as for the primary outcome, but are graded per criterion. Patients must score two or higher on at least one B item for the outcome “intrusion”. They must score two or higher on at least one C item for the outcome “avoidance”. They must score two or higher on at least two D items for the outcome “negative cognitions and mood”. And they must score two or higher on two E items, to suffer from “hyperarousal”. They can score above the cut-off value for multiple symptoms. They can only score positive on symptoms when

duration of the symptoms is four weeks or longer, and have a functional significance due to subjective distress, impairment in social functioning or impairment in occupational functioning. Data of women and partner not coupled at first, but if possible we will perform a sub analysis to determine homogeneity in paired couples, to see if there is an association between PTSD in patients and their partners.

2.6 Data storage

All data will be made anonymous and stored in SPSS documents. Anonymizing is done by assigning all test subjects to numbers. The personal details are connected to a number in a secured document, which is only accessible to the investigators. All data is stored on secured computers.

2.7 Statistical analysis

2.7.1 Sample size

We are planning two studies of independent cases and controls with one to two controls per case. The same analysis is done for both the patient and partner groups. We hypothesize a 10% increase of prevalence in both patient and partner group compared to controls, based on numbers of other risk factors such as PE and PPROM, since these are unknown for PPH. We will use the same number for the partner group. The prevalence of PTSD in the general population is 1.2% in the Netherlands. This prior data indicates that the failure rate among controls is 0.012. If the true failure rate for patients is 0.087, we will need to study 130 patients and 130 control subjects to be able to reject the null hypothesis, that the failure rates for patients and control subjects are equal with probability (power) 0.8. The Type I error probability associated with this null hypothesis test is 0.05.

2.7.2 Data analysis

We will use an uncorrected χ2 statistic to evaluate this null hypothesis, or a Fisher's exact test in the case of smaller numbers. All categorical data will be reported in number (%) and analyzed with a χ2 analysis. All continuous data will be reported in mean ± SD and analyzed with t-test, or median (interquartile range 25–75%) and analyzed with Mann-Whitney U test when appropriate. We choose to measure association between severe PPH and PTSD. The goal is not to predict, but to answer association. For the primary outcome, a multivariable analysis is not possible due to the small number of expected PTSD patients and the number of confounders. For the secondary outcome, prevalence is expected to be higher. A multiple logistic regression-analysis is used to correct for potential risk factors. For both outcomes, a McNemar's test is done on the paired (women and partners) nominal data, to determine marginal homogeneity.

2.8 Ethical considerations

This research has ethical approval of the VCMO, the Netherlands. It is registered in the Dutch Trial Register under registration number NL50273.100.14. The risks of participating in this research are estimated very low. Serious adverse events are not expected. For anonymous questions or remarks, participants have the possibility to consult an independent doctor.

3. Discussion

There is some evidence suggesting that severe PPH is a risk factor for the development of PTSD. However, proper quantitative and qualitative studies on this topic are lacking, especially concerning partner groups. This study is designed to give insight into the frequency of PTSD and PTS symptoms following a severe PPH, both in patients as well as in their partners. Through this study, we hope to contribute to the development of an evidence-based

risk profile, in order to establish adequate screening and follow-up after traumatic childbirth.

A methodical point of discussion in this type of research is the low response rate, due to the avoiding nature of PTSD patients. Our experience is that personally informing the patient early after delivery about participation, helps increasing the response rate. Obviously, the response rate is important in all types of research, but crucial in this field, due the large non-response bias.

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7.

SEVERE POSTPARTUM HEMORRHAGE INCREASES RISK OF POSTTRAUMATIC STRESS DISORDER

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ABSTRACT

Purpose: To evaluate whether severe postpartum hemorrhage (PPH) is a risk factor for posttraumatic stress disorder (PTSD). Severe PPH can be experienced as a traumatic event. PTSD leads to negative mental health effects. Knowing risk factors for PTSD during childbirth offers opportunities for early interventions, which may prevent the development of PTSD.

Materials and methods: In this prospective study, we compared two groups of participants; women with ≥2000 mL of blood loss (severe PPH, patients) and women with ≤500 mL of blood loss (controls). Participants were screened for PTSD using the PCL-5 four to six weeks after delivery. Positive screening was followed by the CAPS-5 to diagnose PTSD.

Results: We included 187 PPH patients and 121 controls. Median PCL-5 scores were higher for PPH patients (5.0) than controls (4.0, p = 0.005). Thirteen PPH patients (7.0%) and two controls (1.7%) scored ≥32 on the PCL-5, indicative of probable PTSD (OR 4.45, 95% CI 0.99-20.06, p = 0.035). Significant more PPH patients than controls met criteria for a clinical diagnosis of PTSD on the CAPS-5 (n = 10, 5.6% vs n = 0, 0.0%; p = 0.007).

Conclusions: There is a significant and clinically relevant increased risk for developing PTSD after severe PPH. Gynecologists and midwives are advised to screen for PTSD at postpartum follow-up visits to prevent long-term negative mental health effects.

1. Introduction

Severe postpartum hemorrhage (PPH) is a serious complication and the leading cause of maternal deaths worldwide. Unfortunately, incidence rates are increasing.1 According to the WHO, PPH is defined as ≥500 ml of blood loss in the first 24 h after giving birth.(WHO, 2012) Severe PPH of ≥2000 ml will lead to significant physical complaints and patients often describe this experience as very traumatic with high emotional impact. [2,3]

Posttraumatic stress disorder (PTSD) is a trauma and stressor-related disorder that may develop in response to experiencing a traumatic event.[4–6] Symptoms of PTSD include re-experiencing, avoidance, negative alterations in cognitions and mood and hyperarousal.[7] The prevalence rate of PTSD associated with childbirth is estimated between 0.9–4.9%, but up to half of the patients who meet criteria for PTSD remain unrecognized.[8–11] Known risk factors for PTSD encompassing pregnancy and childbirth can be divided into obstetric, psychological and situational factors. Examples are: history of PPH, previous trauma, depression during pregnancy, premature delivery, premature rupture of membranes, preeclampsia, assisted delivery, cesarean section, and low hemoglobin levels postpartum. [2,8,12–14] Obstetric complications and interventions are a major risk factor for the development of postpartum PTSD.[8] Many studies have focused on emergency cesarean sections, assisted vaginal deliveries and prematurity. [15,16] Given the potential life threatening situation for the woman in case of a major postpartum hemorrhage, we hypothesized that this could potentially also be an important risk factor. However, literature supporting this hypothesis was thus far lacking.[17] The only systematic review found that all studies concerning this subject used different definitions of PPH. Furthermore, in all studies different primary outcomes and different measurements to assess PTSD were used and thus no conclusions can be drawn.[2,16–20] Subthreshold

PTSD (or partial, subclinical or subsyndromal PTSD) is widely defined as having symptoms of PTSD but below the threshold for diagnosis, but thus far there is no definitive definition. Subthreshold PTSD can cause negative mental health effects similar to PTSD.[21]

If severe PPH increases the risk for developing PTSD this offers clear opportunities for prevention and early interventions. PTSD can be screened soon after the event and (online) support can be offered or patients can be referred to specialized care.[22] Treatment options include trauma-focused cognitive behavioral therapy (CBT) and eye movement desensitization and reprocessing (EMDR).[23–25] Early screening and intervention may prevent the development of severe posttraumatic stress, potentially avoiding negative effects in both the parent and the child (i.e. problems in the child's socio-emotional, cognitive, language and brain development).[11,26,27] Furthermore, symptoms of PTSD can overlap with symptoms of postpartum depression (PPD) and thus PPD can be wrongly diagnosed.[28]

This is the first study to have used a viable and severe cutoff for postpartum hemorrhage. Also, in contrast to previous research, this study uses the golden standard for screening and clinically diagnosing PTSD according to the DSM-5.

The purpose of this study was to answer if severe PPH is a risk factor for developing PTSD.

2. Methods

2.1 Materials and Methods

In this multicenter prospective cohort study (IPAD-study; Identification of PArents in Distress), we compared patients with severe PPH (≥2000 ml of blood loss) to controls (≤500 ml of blood loss). We performed the same

prospective cohort study with partners of patients which is published elsewhere.[29] Participants were recruited from eight hospitals in the Amsterdam region, the Netherlands. Two tertiary (university) hospitals and six secondary (general) hospitals included patients and were involved in data collection (respectively Amsterdam UMC, locations University of Amsterdam and Vrije Universiteit Amsterdam, Amsterdam and OLVG East and West (previous St Lucas Andreas Hospital), Amsterdam; Spaarne Gasthuis, Haarlem and Hoofddorp; Westfriesgasthuis, Hoorn; Flevoziekenhuis, Almere). Patients were included from February 2015 until June 2017. Demographic and delivery-related data were collected from patients' hospital files. Blood loss was measured according to standardized protocols in different hospitals, with the national guideline advising to weigh the blood loss rather than estimating it. We defined a cutoff value of 2000 ml of blood loss or more because of the physical impact of such an amount of blood loss, such as experiencing tachycardia, hypotension and dizziness.

In the Netherlands, the prevalence of PTSD in the general postpartum population is 1.2%.12 The sample size of the study was calculated using a significance level of 0.05 and power of 80%. The expected prevalence in the control group is 0.012, the expected prevalence in the PPH group 0.087 (7.5% absolute difference). This resulted in a required number of patients of 130 per group. Our study protocol has been published elsewhere.[30] Patients were not involved in the development of the trial.

The study was approved by the institutional and/or national research committee (MEC-U (Medical Research Ethics Committees United) and the Medical Ethics Committees of each participating hospital, Clinical Trial Registration: NL50273.100.14).

2.2 Procedures

A flow diagram is added to give an overview of the timeline of the study (Figure 1). If severe PPH occurred, this patient and two controls were asked to participate in the study. Controls were defined as the following and preceding birth after the patient with PPH. We selected two controls for each PPH patient because of the experience of lower inclusion rates of controls due to the fact that controls may be dismissed soon after the delivery.

Exclusion criteria were: (1) history of PTSD; (2) age <18; (3) language other than English or Dutch (Table 1). All participants received verbal and written information of the study and provided written informed consent.

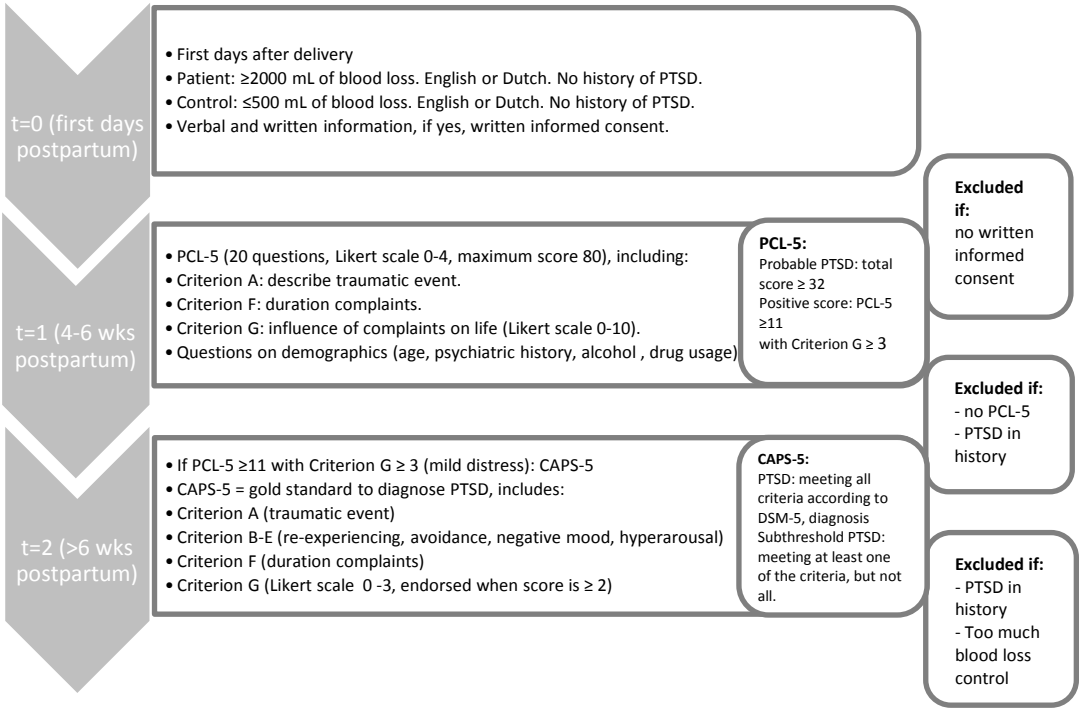
Between four to six weeks postpartum, the digital version of the PCL-5 was sent to all participants to screen for probable PTSD. Positive screening on the PCL-5 was followed by the CAPS-5 for diagnosis of (subthreshold) PTSD

Table 1 In- and exclusion criteria

	PPH patients	**Controls**
Inclusion criteria	Severe PPH (≥ 2000 mL)* Any type of delivery All complications of delivery*** Gestational age ≥ 16 weeks	No PPH** (≤500 mL) Any type of delivery All complications of delivery*** Gestational age ≥ 16 weeks
Exclusion criteria	Medical history of PTSD ≤ 18 years Inability to speak or write Dutch	Medical history of PTSD ≤ 18 years Inability to speak or write Dutch

* No matter the cause (atonia, retention placentae, coagulation disorder, rupture etc.)
** As defined by the World Health Organization (WHO)
*** I.e. hypertensive disorders, congenital abnormalities, premature rupture of membranes etc.
PPH: postpartum hemorrhage, as recorded in patients' files (either estimated or weighted); PTSD: posttraumatic stress disorder

Figure 1 Flow diagram of timeline



Flow diagram of the timeline of the study containing exclusion criteria to clarify the order of events.

2.3 Assessment of probable PTSD

The PCL-5 is a 20-item self-report tool that assesses the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) symptoms of PTSD, namely B Criterion (re-experiencing), C Criterion (avoidance), D Criterion (negative alterations in cognitions and mood) and E Criterion (hyperarousal). [7,13] Respondents indicated how much they have been bothered by each PTSD symptom in the past month on a five-point Likert scale, ranging from 0–4. In the PCL-5, a score of ≥32 is indicative of probable PTSD (Figure 1).[7,31,32] The maximum score of the PCL-5 is 80.

Questions were added in the digital questionnaire alongside the PCL-5 to explore the traumatic event (Criterion A), duration (Criterion F), functional significance (Criterion G, eleven-point Likert Scale, 0–10), co-morbidities, participants' search for treatment, depression, and use of antidepressant medication during pregnancy (Appendix 1).

It was not feasible to conduct the CAPS-5 with all participants, and thus, prior to the study, we excluded participants with low symptom levels on the PCL-5 who were unlikely to meet criteria for a PTSD diagnosis according to the CAPS-5. To be included, a sensitive-based cutoff was set, using a PCL-5 score of ≥11, with a self-reported severity score of ≥3 (ranging 0–10), as to not miss any participants with potential (subthreshold) PTSD.=

2.4 Assessment of (subthreshold) PTSD

Participants with positive screening on the PCL-5, were asked to participate in a telephone interview in which the CAPS-5 questionnaire was administered. We conducted telephone interviews to increase the participation and response rate. It is known that patients with PTSD avoid situations or places that may trigger flashbacks, such as hospitals. Also, young parents have less time and energy to participate in an extensive clinical interview.

The CAPS-5 is the gold standard for diagnosing PTSD and is a 30-item structured interview.[33] In addition to assessing the DSM-5 PTSD symptoms, questions target the onset and duration of symptoms, subjective distress, impact of symptoms on social and occupational functioning, overall response validity, overall PTSD severity, and specifications for the dissociative subtype.[31,33,34] PTSD was diagnosed when a participant scores at least one B Criterion, one C Criterion, two D Criterion, two E Criterion, and when Criterion F and G are met, according to DSM-5. The assessor combines information about the intensity and frequency of each item and scored accordingly. Clinical

researchers were officially trained to conduct the CAPS-5. Blind assessment was not possible, due to the fact that Criterion A had to be known to conduct the CAPS-5.

2.5 Outcome measures

Our primary outcome measures were: probable PTSD, diagnosis of PTSD and subthreshold PTSD. Probable PTSD was diagnosed when a participant scored ≥32 on the PCL-5.

PTSD was diagnosed when a participant met the DSM-5 criteria according to the CAPS-5 (Figure 1), or when PTSD was clinically diagnosed postpartum and treated by a psychiatrist or psychologist (as indicated by the participants).

Participants met criteria for subthreshold PTSD when a participant met at least one of the abovementioned criteria for PTSD according to the CAPS-5, but not all, in combination with a Criterion G score of ≥2 (Figure 1).

When the CAPS-5 interview revealed a history of PTSD, participants were excluded from participation. Participants were also excluded when other exclusion criteria were met, even if the PCL-5 had already been completed (Figure 1). When PTSD was diagnosed, participants were referred to their general practitioner, who arranged further referral to a specialized psychologist, which is standard procedure in the Netherlands.

2.6 Statistical analysis

The primary outcome of this study was whether severe PPH is a risk factor for developing PTSD. Dichotomous data were compared using Chi-square analysis ($\chi 2$) or Fisher's exact test where applicable. Continuous data were compared either with t-tests or Mann-Whitney U tests. All tests were two-tailed and $p < 0.05$ denoted significance. Bonferroni correction was not performed since this is an explorative study and there was a restricted

number of planned comparisons.[35] Data were analyzed using the Statistical Package for the Social Sciences (SPSS, Version 22).

Multivariable logistic regression analysis as foreseen in the protocol paper was not possible due to the small number of participants with PTSD.30 Therefore, univariable logistic regression was used for the association between the known risk factors for PTSD (history of PPH, depression during pregnancy, premature delivery, premature rupture of membranes, preeclampsia, assisted delivery, and cesarean section). Since the postpartum hemoglobin levels were not known in most of the controls, we could not perform any analyses with this variable. These univariable logistic regression analyses were performed with the data of the participants (PPH patients and controls) who were diagnosed with PTSD in our study combined with the data of the participants diagnosed with PTSD by a psychologist, but who did not want to have the CAPS-5 administered (n = 13). The remaining 12 participants (eight PPH patients and four controls) who were lost to follow up after the PCL-5 and did not disclose whether they were diagnosed with and treated for PTSD, were excluded in these analyses.

3. Results

3.1 Baseline characteristics

We received a total of 270 informed consents from PPH patients and 176 from controls. The PCL-5 was completed by 70.4% (n = 190) of the PPH patients and 74.4% (n = 131) of the controls. Of these participants, three PPH patients and ten controls had to be excluded based on the exclusion criteria (PTSD in their history or too much blood loss in controls). Accordingly, the data of 187 PPH patients and 121 controls were analyzed (Figure 2a,b).

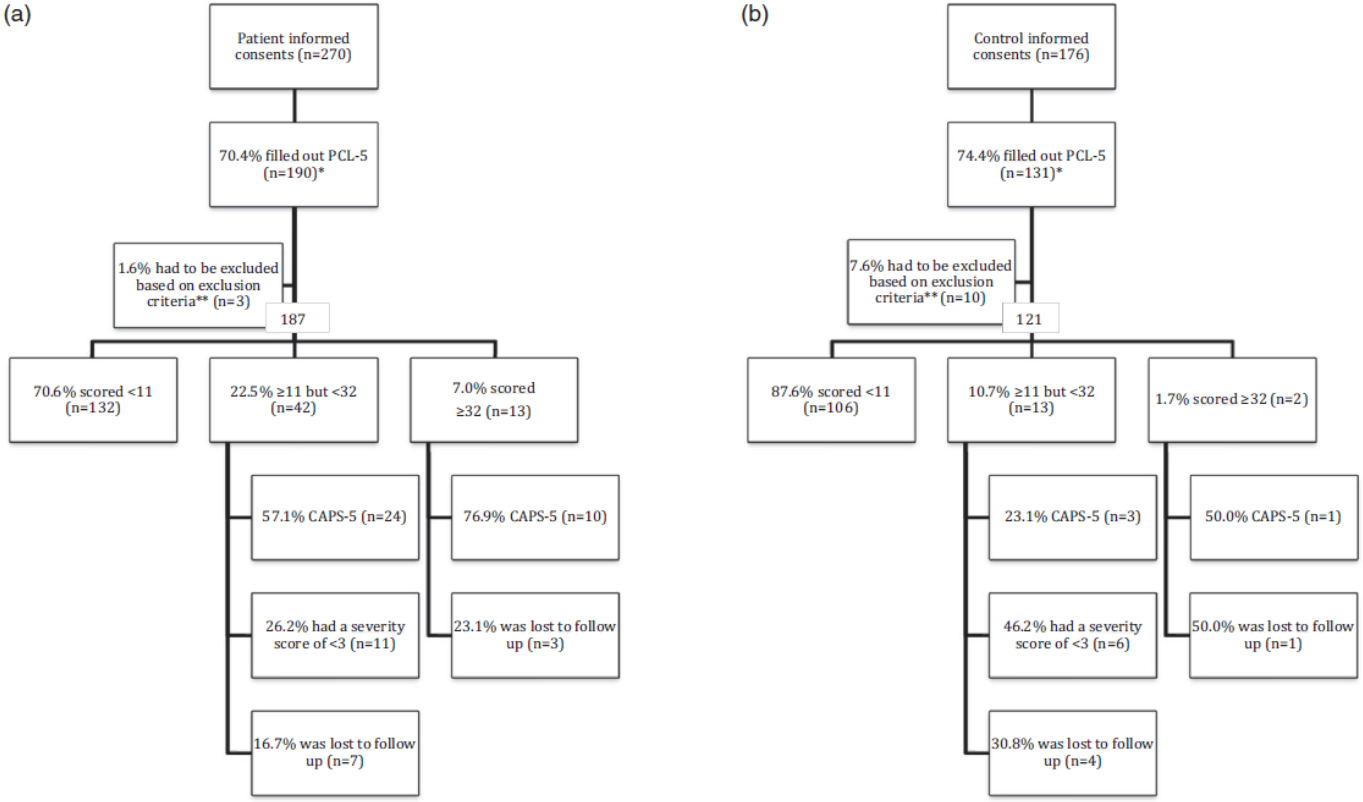
Table 2 presents an overview of the baseline characteristics of the participants. Primiparity (54.5% vs 66.1%), mean birthweight (3563 grams vs

3332 grams), pain relief during delivery (43.3% vs 57.0%), history of PPH (15.5% vs 3.3%), average duration of third stage of labor (45 min vs 9 min) and average duration of hospitalization (3 vs 2 days) differed significantly between PPH patients and controls. Shortest duration of pregnancy was 31 + 5 weeks. Baseline characteristics were comparable with the whole group who gave informed consent (Supporting information–Table 1).

3.2 PCL-5 and CAPS-5

In total, 22.5% of PPH patients (n = 42) and 10.7% of the controls (n = 13) scored between 11 and 32 on the PCL-5. Seven percent of PPH patients (n = 13) and 1.7% of the controls (n = 2)) scored ≥32, indicative of probable PTSD (unadjusted odds ratio (OR) 4.45, 95% confidence interval (CI) 0.99–20.06; Table 3), the calculated p value (p = 0.035) did show a significant difference. Median PCL-5 scores were higher for PPH patients (5.0) than controls (4.0, p = 0.005).

Figure 2: Flowchart of the inclusions in our study



*Everyone was sent the PCL-5, but not everyone filled it out ** Exclusion criteria consisted of PTSD in history and ≤500 mL of blood loss (controls) PCL-5: PTSD Checklist for DSM-5; CAPS-5: Clinician-Administered PTSD Scale for DSM-5; PTSD: posttraumatic stress disorder.

Three of these participants (two PPH patients and one control) who did not want to participate any longer after filling out the PCL-5, but who did give informed consent, disclosed they were diagnosed with PTSD after delivery and that they were being treated. Eventually, this resulted in the administration of 34 out of 44 (77.3%) CAPS-5 interviews in the PPH patient group, and in 4 out of 9 (44.4%) CAPS-5 interviews in the control group (Figure 2(a,b)).

Because we only administered the CAPS-5 when the self-report severity score (Criterion G) was three or more, 20.0% of PPH patients (11 out of 55) and 40.0% of the controls (6 out of 15) were not invited for an additional CAPS-5 interview (Figure 2(a,b)). Seven PPH patients with a PCL-5 score ≥11 and three PPH patients with a PCL-5 score ≥32 were lost to follow up. In the control group, four controls with a PCL-5 score ≥11 and one control with a PCL-5 score ≥32 were lost to follow up. Reasons for loss to follow up were unwillingness to participate any longer or by being unreachable.

The prevalence of PTSD according to the CAPS-5 in the PPH patient group was 5.6% (n = 10), which was significantly different compared to the control group at 0.0% (n = 0, p = 0.007; Table 3). When also taking into account the participants who disclosed they were diagnosed with PTSD postpartum (but who did not want to participate in the CAPS-5 interview), 6.7% (n = 12) of the PPH patient group and 0.9% (n = 1) of the control group met criteria for PTSD (OR 8.34, 95% CI 1.07–64.99; Table 3).

Table 2 – Baseline characteristics

	PPH patients (blood loss ≥ 2000 mL) (n=187)	Controls (blood loss ≤ 500 mL) (n=121)	p
Age, years	32.7 ± 4.2	32.6 ± 4.2	0.720
Completed college or	135 (73.8)	88 (72.7)	0.840
BMI *	23.5 ± 4.4	23.3 ± 3.8	0.640
Reported history of	11 (5.9)	9 (7.4)	0.588
Primipara [a]	102 (54.5)	80 (66.1)	0.044
Gestational age,	40+1 (38+6 - 41+0)	39+4 (38+1 - 40+6)	0.083
Birth weight, grams [a,*]	3563 ± 578	3332 ± 583	0.001
Spontaneous start of	97 (51.9)	56 (46.3)	0.338
Pain relief during delivery	81 (43.3)	69 (57.0)	0.019
Vaginal delivery	144 (77.0)	87 (71.9)	0.312
Ventouse delivery	18 (9.6)	14 (11.6)	0.585
Planned caesarean	14 (7.5)	5 (4.1)	0.232
Emergency caesarean	11 (5.9)	14 (11.6)	0.074
Assisted delivery	43 (23.0)	33 (27.3)	0.395
History of PPH [a,+]	29 (15.5)	4 (3.3)	0.001
Blood loss, mL [a]	2500 (2000-3000)	300 (200 - 400)	<0.001
Delivered during shift [+++]	106 (57.3)	67 (56.3)	0.864
Third stage of labor,	45 (8 - 80)	9 (5 - 15)	<0.001
Received packed cells [a]	114 (61.0)	0 (0.0)	<0.001
Hospitalization of	3 (2 - 4)	2 (1 - 3)	<0.001
Feeling bleeding to death	92 (49.2)	6 (5.0)	<0.001
Time between delivery	51 (41 - 65)	48 (39 - 68)	0.407
Time between delivery	82 (65 - 111)	120 (97 - 127)	0.098

All variables are shown in n (%), mean ± SD or median (25-75%). All differences were analyzed using χ^2, T-test or Mann-Whitney U, except if stated otherwise below.

[a] Significant difference between patient group and control group.

[+] History of PPH: defined according to the Dutch Society of Obstetrics and Gynecology (NVOG): ≥1000 mL of blood loss after a vaginal or instrumental delivery.

[++] Feeling bleeding to death: as answered by patients in the digital questionnaires. Affirmative answers were: a little bit, moderately, a lot, extremely. [+++] Delivered during shift: all deliveries between 17:00 and 08:00. * Due to incomplete data, measurements were based on: completed college or university PPH patients n=183, controls n=121; BMI PPH patients n=175, controls n=113; birth weight PPH patients n=180, controls n=120; delivered during shift PPH patients n=185, controls n=119; third stage of labor PPH patients n=179, controls n=116; days of admission PPH patients n=185, controls n=121; days between delivery and CAPS-5 PPH patients n=35, controls n=5.

BMI: body mass index; PPH: postpartum hemorrhage; PCL-5: PTSD Checklist for DSM-5; CAPS-5: Clinical Administered PTSD Scale for DSM-5

Table 3 – Outcomes PCL-5 and CAPS-5

	PPH patients (blood loss ≥ 2000 mL) (n=187)	Controls (blood loss ≤ 500 mL) (n=121)	Unadjusted OR (95% CI)	P
PCL-5, median score [a]	5.0 (2.0-12.0)	4.0 (1.0-7.0)	N/A	0.005
PCL-5, score ≥11 [a]	55 (29.4)	15 (12.4)	2.94 (1.58-5.50)	0.001
PCL-5, score ≥32, probable PTSD [a]	13 (7.0)	2 (1.7)	4.45 (0.99-20.06)	0.035
CAPS-5, PTSD [a,*, +,1]	10 (5.6)	0 (0.0)	N/A	0.007
Clinically diagnosed PTSD no CAPS-5 [+]	2 (1.1)	1 (0.9)	N/A	N/A
PTSD total, CAPS-5 + clinically diagnosed [a,+]	12 (6.7)	1 (0.9)	8.34 (1.07-64.99)	0.016
CAPS-5, subthreshold PTSD [*,+]	8 (4.5)	1 (0.9)	5.44 (0.67-44.11)	0.093
CAPS-5, re-experiencing [++]	1.8 ± 1.6	0.8 ± 1.5	1.69 (0.72-4.00)	0.211
CAPS-5, avoidance [++, a]	0.6 ± 0.7	0.0 ± 0.0	N/A	<0.001
CAPS-5, negative mood [++]	1.7 ± 1.9	0.5 ± 1.0	1.83 (0.63-5.36)	0.227
CAPS-5, hyperarousal [++]	1.5 ± 1.5	0.8 ± 1.5	1.47 (0.62-3.51)	0.381
CAPS-5, functional significance [++]	1.4 ± 1.2	0.8 ± 1.5	1.63 (0.62-4.30)	0.318
CAPS-5, dissociative symptoms [++]	3 (8.6)	0 (0.0)	N/A	N/A

All variables are shown in n (%), mean ± SD or median (25-75%). All differences were analyzed using χ^2, T-test or Mann-Whitney U, except if stated otherwise below.

[a] Significant difference between PPH patient group and control group

* Fisher's exact test

[+] Due to incomplete data, measurements were based on: subthreshold PTSD PPH patients n=177, controls n=116; PTSD according to CAPS-5 PPH patients n=177, controls n=116; clinically diagnosed PTSD PPH patients n=179, controls n=117; PTSD total including clinically diagnosed PPH patients n=179, controls n=117; subthreshold PTSD PPH patients n=179, controls n=117 [++] Administered CAPS-5 PPH patients n=34, controls n=4

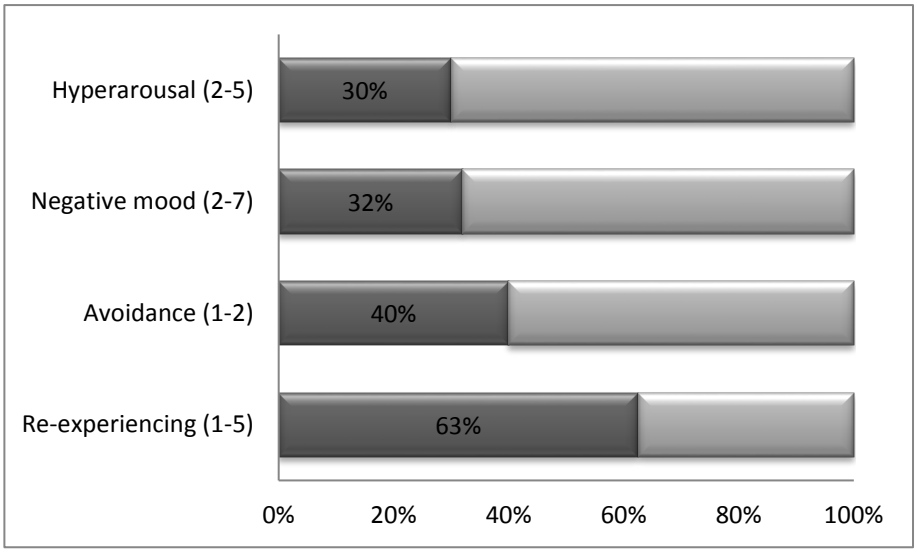
[1] No OR since the control group has 0.0% PTSD

OR: odds ratio; CI: confidence interval; N/A: not applicable; PCL-5: PTSD Checklist for DSM-5; CAPS-5: Clinical Administered PTSD Scale for DSM-5; PTSD: posttraumatic stress disorder; PPH: postpartum hemorrhage.

Subthreshold PTSD alone was not significantly associated with PPH with 4.5% (n = 8) in the PPH patient group and 0.9% in the control group (n = 1, OR 5.44, 95% CI 0.67–44.11; Table 3). The two controls with subthreshold PTSD or PTSD (according to a psychologist) reported a feeling of bleeding to death postpartum, even though they both had 400 ml of blood loss. Figure 3 shows that PPH patients and controls with PTSD scored relatively highly on Criterion B (re-experiencing). The mean score of Criterion B was 3.5 (with a minimum score of 1 and a maximum score of 5).

The relationship between the amount of blood loss and the development of PTSD within the PPH patient group (≥2000 ml blood loss) was analyzed by comparing the median amount of blood loss in the PPH patient group with PTSD (n = 12) and the PPH patient group without PTSD (n = 167). We found no significant difference between the median amount of blood loss in the PPH patient group with PTSD (2500 ml (2000–3750 ml)) and the PPH patient group without PTSD (2500 ml (2000–3000 ml), Mann-Whitney U test (p = 0.754)); Figure 4).

Figure 3 Relative scores of PTSD Criteria B, C, D, E



Relative scores of PTSD criteria B-E on a range of 0 – 100%. Minimum and maximum values stated after the Criteria. Criterion B: re-experiencing, Criterion C: avoidance, Criterion D: negative mood, Criterion E: hyperarousal.

3.3 Other risk factors for developing PTSD

Univariable logistic regression analyses showed a significant association between premature delivery (OR 4.21, 95% CI 1.22–14.60) and PTSD. The other known risk factors were not significantly associated with PTSD (Table 4).

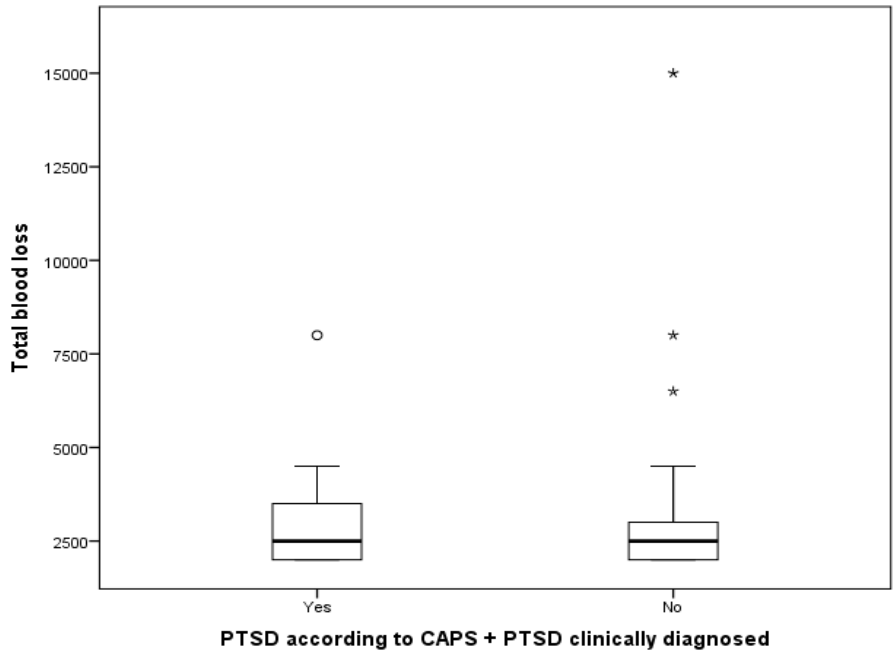
Even though pain relief, duration of third stage of labor, primiparity, birthweight and duration of hospitalization were significantly different between PPH patients and controls according to baseline characteristics, no significant association between pain relief, duration of third stage of labor, primiparity and PTSD was observed. Birthweight and duration of hospitalization showed a significant difference between participants with and without PTSD (Table 4).

Table 4 – Univariable regression analyses

	PTSD total[1] (n=13)	No PTSD (n=283)	Unadjusted OR (95% CI)	*P*-value
History of PPH [+,] **	2 (15.4)	29 (10.2)	1.59 (0.34-7.54)	0.634
Depression during pregnancy **	0 (0.0)	1 (0.4)	N/A	1.000
Premature delivery [a,]**	4 (30.8)	27 (9.5)	4.21 (1.22-14.60)	0.036
Premature rupture of membranes **	1 (7.7)	7 (2.5)	3.29 (0.374-28.88)	0.305
Preeclampsia **	1 (7.7)	9 (3.2)	2.54 (0.30-21.68)	0.366
Assisted delivery (vaginal or surgical) **	3 (23.1)	68 (24.0)	0.95 (0.25-3.55)	1.000
Pain relief	6 (46.2)	135 (47.7)	0.94 (0.31-2.87)	0.913
Third stage of labor, minutes *	8 (4-104)	14 (7 - 59)	N/A	0.944
Primipara	5 (38.5)	172 (60.8)	0.40 (0.13-1.26)	0.109
Birth weight, grams [a,]*	3111 ± 633	3494 ± 588	0.37 (0.16-0.89)	0.023
Days of hospitalization[a]	3.0 (2.5-5.0)	3.0 (2.0-3.0)	N/A	0.040

Univariable regression analyses with known risk factors and baseline characteristics that are significantly different.
All variables are shown in n (%), mean ± SD or median (25-75%). All differences were analyzed using χ^2, T-test or Mann-Whitney U, except if stated otherwise below.
[a] Significant difference between PTSD and no PTSD
[+] : History of PPH is defined as having a previous delivery complicated by PPH (≥1000 mL).
* Due to incomplete data, measurements were based on: third stage of labor PTSD total n=12, no PTSD n= 272; birth weight PTSD total, n=13, no PTSD n=275; days of hospitalization PTSD total = 13, no PTSD = 281.
** Fisher's exact test
[1] PTSD according to CAPS-5 + clinically diagnosed
OR: odds ratio; CI: confidence interval; PPH: postpartum hemorrhage; PTSD: posttraumatic stress disorder; CAPS-5: Clinical Administered PTSD Scale for DSM-5

Figure 4 – Median blood loss in PPH patients (≥2000 mL blood loss) with PTSD and without PTSD



Median amount of blood loss in PPH patients without PTSD: 2500 (2000 – 3000 ml). *P* =.754. PTSD: posttraumatic stress disorder; PPH: postpartum hemorrhage.

4. Discussion

In this study we examined whether severe PPH is a risk factor for developing PTSD or subthreshold PTSD. The PCL-5, which we used as a screening test, showed a significantly higher median score in PPH patients. There were significantly more PPH patients scoring above the cutoff for probable PTSD.

The CAPS-5, conducted in 34 of the 187 PPH patients and four of the 121 controls, showed that significantly more PPH patients than controls met the

criteria for PTSD diagnosis based on the CAPS-5. Subthreshold PTSD was not significantly associated with severe PPH.

Previous studies evaluating PTSD after PPH showed inconsistent results. Our findings are in line with a retrospective study by Stramrood et al. who found a significant association between PPH (≥1000 ml) and PTSD in their univariable analysis and with the pilot study of Ricbourg et al., who found a significant association between PPH and PTSD one month postpartum. [16,20] Three studies on this subject did not find an association between PPH and PTSD, but they all defined PPH differently and not one study defined severe PPH as more than 2000 ml of blood loss.[2,18,19] This may explain the difference in outcomes between these three studies and our results. One can imagine that the physical and consequential impact of ≥2000 ml of blood loss postpartum is different than a 500 – 2000 ml blood loss, since ≥2000 ml will likely cause physical complaints.

Another possible explanation for the inconsistent results of the previous studies is that PTSD was assessed differently in all five studies, using various measurements (Impact of Event Scale - Revised (IES-R), Traumatic Event Scale (TES) and the PTSD Checklist (PCL)).[17] Furthermore, these measurements can only be used as screening tools, whereas, to our knowledge, this is the first study that used the CAPS-5, which is the gold standard for diagnosing PTSD. In addition, most studies had a retrospective design in contrast to this prospective cohort study. [17]

We found less participants with subthreshold PTSD than PTSD, contrarily to what is to be expected. This could be due to a too small sample size. Since subthreshold PTSD can cause similar complaints as PTSD, more research is needed. [21,36]

Because multivariable analyses were not possible due to the small sample with PTSD, we performed univariable analyses with the known risk factors of

PTSD surrounding delivery. [2,8,16] Only premature delivery was associated with PTSD, which is in line with the findings of the prospective study of Stramrood et al. [16] However, it should be noted that these univariable analyses are highly biased because of the small number of participants with PTSD.

Our patient and control group did differ slightly in baseline characteristics, where the higher percentage of pain relief, lower birthweight and the shorter third stage of labor in the control group are the most striking. Previous research has shown that experiencing less pain during a traumatic event will less likely cause PTSD compared to experiencing more pain.[37] However, our univariable analyses did not show a significant association between having had pain relief and PTSD. Higher birthweight is known to be a risk factor for developing PPH, despite that, the average birthweight was lower in the PTSD group compared to the group without PTSD.[38] This is probably due to the fact that premature delivery was more prevalent in the PTSD group. Participants with longer hospitalization after delivery had significantly more PTSD, which may be explained by the fact that women who went home faster may be more resilient in coping with adverse events. This increased hospital stay may generate a time window for proactive treatment. Previous research has shown that cesarean section gives an increased risk of developing PTSD, however, we could not confirm this statement in our study. [14]

One of the main strengths of this study is its prospective design. We included participants in the first few days after their delivery and sent the questionnaire several weeks later. Another strength is the follow-up with the CAPS-5 after an elevated score on the PCL-5, and therefore being the first study using the CAPS-5. The PCL-5 was used as a self-report screening measurement for symptoms of PTSD while the CAPS-5 is the gold standard for diagnosing PTSD. The CAPS-5 was administered (by trained clinicians) only when a participant scored ≥11 on the PCL-5. This cutoff value to administer the CAPS-5 was purposefully low and thus sensitive in order to not miss any

participants with subthreshold PTSD. Also, we used a telephone interview, in order to lower the threshold for participation. We estimate that using this method has given a higher response rate and thus a more realistic prevalence rate, but it cannot completely be ruled out that this is still an underestimation.

The calculated sample size was not reached in the control group, which is our main limitation. This is due to the fact that more controls than expected had to be excluded based on predefined exclusion criteria after the participants already filled out the PCL-5. However, increasing the amount of participants in the control group would probably have made the difference between PPH patients and controls even more prominent. Furthermore, the study was overpowered for the PPH patient group, causing the smaller than anticipated difference to be significant. Another limitation is the insufficient power to perform a multivariable regression analysis. Furthermore, a little over 30% of the participants (83 PPH patients (30.7%) and 45 controls (25.6%)) did not complete the PCL-5 even though we tried to contact them several times. After filling out the PCL-5, ten PPH patients (22.7%) and five controls (55.6%) were lost to follow-up and the CAPS-5 could not be administered. Because avoidance is one of the criteria of PTSD, we assume our prevalence rate is an underestimation of the real prevalence rate. Administering the CAPS-5 by telephone may have been a limitation, since it might be easier for participants to hide part of their emotions.

In conclusion, there is a significant and clinically relevant increased risk for developing PTSD after severe PPH. Based on the findings in our study, we advise clinicians to be aware of PTSD after severe PPH and to screen patients at their postpartum follow-up, for example routinely after ≥ 2000 ml of blood loss or with combined risk factors. This could be done with the PCL-5. This is particularly important because symptoms can be confused with and/or overlap with PPD. It is known that early screening and intervention (e.g.

online, CBT, EMDR) may prevent the development of PTSD as well as long-term health effects and economic and social problems. [11,23,26,39] When severe PPH occurs this offers a unique moment in time to identify persons at risk for posttraumatic stress reactions and to address this in the follow-up visit.

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8.

POSTTRAUMATIC STRESS DISORDER IN PARTNERS FOLLOWING SEVERE POSTPARTUM HAEMORRHAGE: A PROSPECTIVE COHORT STUDY

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ABSTRACT

Background: Partners of women are increasingly present during childbirth and may be exposed to a traumatic experience. Since parents' mental health issues (i.e. posttraumatic stress disorder) have been shown to increase the risk of problems in the child's development, it is important to identify these risk factors. Partners often describe severe postpartum hemorrhage as traumatic.

Aim: Whether witnessing severe postpartum hemorrhage is a risk factor for developing posttraumatic stress disorder in partners.

Methods: In this prospective cohort study, we compared partners of women with severe postpartum hemorrhage (≥2000 mL) and partners of women with ≤500 mL of blood loss (controls). Four weeks after birth partners were screened for posttraumatic stress disorder symptoms with a self-report questionnaire. Scores ≥11 were followed by a gold standard clinical interview to diagnose posttraumatic stress disorder.

Findings: We included 123 severe postpartum hemorrhage partners and 62 control partners. Partners of women with severe postpartum hemorrhage reported higher scores than control partners (median 3.0 (0.0 - 7.0) vs 2.0 (0.0 - 4.0), p=.04) on symptoms of posttraumatic stress, but no significant difference in probable posttraumatic stress disorder diagnosis according to the self-report questionnaire was found. According to the clinical interview no partners were diagnosed with posttraumatic stress disorder. Severe postpartum hemorrhage was experienced as traumatic by the partners who felt excluded.

Conclusion: None of the partners developed posttraumatic stress disorder, revealing the resilience of young fathers. Because some partners reported severe postpartum hemorrhage as traumatic, we recommend sufficient information and support is provided during childbirth.

1. Introduction

Partners of women are increasingly present during labour and childbirth and are exposed to the same possible traumatic experience as the women giving birth. [1] Up to 4.9% of women giving birth develop a posttraumatic stress disorder (PTSD) and their partners might be at risk as well. [2] PTSD is a trauma and stressor-related disorder that may develop in response to experiencing or witnessing a traumatic event. [3–5] Symptoms of PTSD include re-experiencing, avoidance, negative alterations in cognitions and mood, and hyperarousal. [6] Parents' mental health issues have been shown to increase the risk of problems with the child's social-emotional, cognitive, language and brain development, as well as the formation of secure attachment and the child's future mental health.[7]

There is very little research on the risk factors for developing PTSD after childbirth in partners. Some studies show that partners are at increased risk of developing subthreshold PTSD after premature birth but until now, other risk factors have rarely been studied.[8–10] Subthreshold PTSD can be defined as posttraumatic stress symptoms that do not meet full PTSD criteria, but it is common and clinically relevant. [11,12]

Postpartum hemorrhage (PPH) is a common complication of childbirth, however, severe PPH (≥2000 mL) is less common (0.5-1.4%). [13,14] PPH is often described as a traumatic experience by women and their partners. Therefore, witnessing a potentially life threatening complication such as PPH may cause PTSD. In a recently published study, Etheridge et al. report on the experiences of partners who perceived childbirth as traumatic.[15] In this study, symptoms of PTSD were screened using the Impact of Event Scale (IES), which does not provide information on the diagnosis of PTSD.[15] Besides this study, there is no literature reporting on the development of PTSD after witnessing PPH in partners. Using self-report questionnaires, PTSD cannot be diagnosed, but with the correct cut-off values, a

diagnosis of probable PTSD is possible.[16] A diagnosis of PTSD can be made using the Clinical Administered PTSD Scale for DSM-5 (CAPS-5).

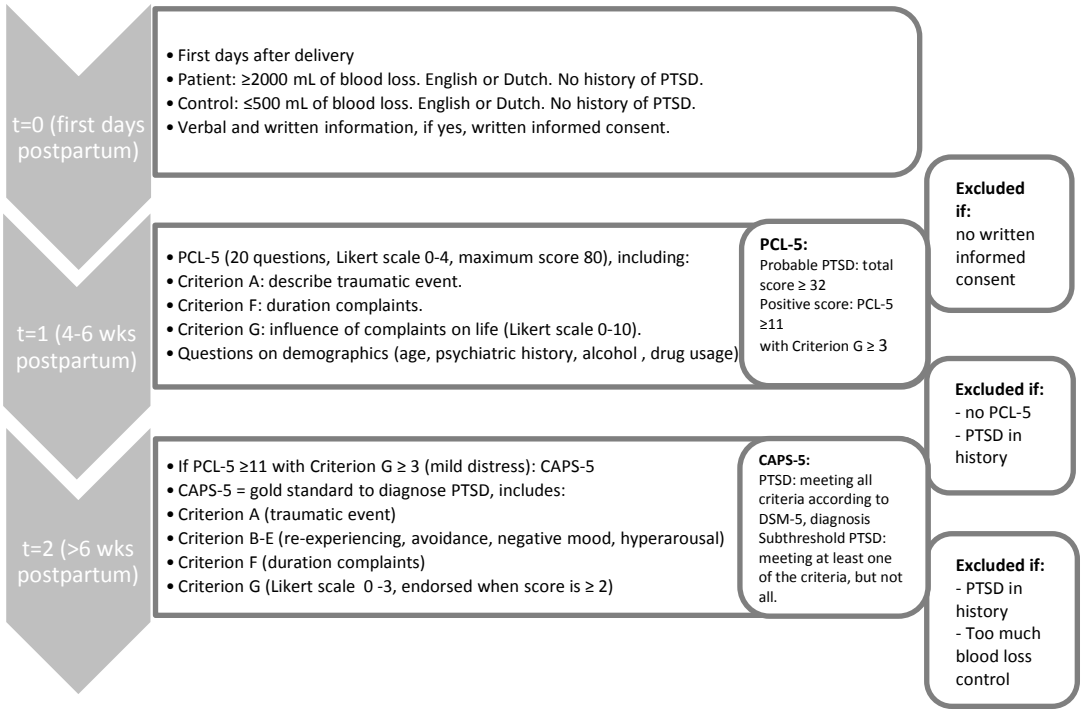
The purpose of this study was to answer the following research questions: (1) Is severe PPH in women associated with self-report based PTSD symptom severity and probable PTSD in partners (using the PTSD Checklist for DSM-5 (PCL-5))? (2) Is severe PPH in women associated with PTSD diagnosis in partners as assessed by a clinical interview (CAPS-5)? (3) What makes an experience traumatic in partners of women with severe PPH? (4) Is there an linear association between PCL-5 scores in women and their partners?

2. Participants, Ethics and Methods

In this multicentre prospective cohort study (IPAD-study; Identification of PArents in Distress), we compared four groups of participants; (1) partners of severe PPH patients (≥2000 mL of blood loss, PPH partners) and (2) control partners (≤500 mL of blood loss), as well as (3) women who gave birth and experienced severe PPH (PPH patients) compared to (4) control women with blood loss ≤ 500 mL.[17] The manuscript concerning the outcome of the last two– Is experiencing severe PPH a risk factor for PTSD in women giving birth? - is published separately.[18] Participants (both women and their partners) were recruited from eight hospitals in the region of Amsterdam, The Netherlands. One tertiary (university) hospital and six secondary hospitals were involved in data collection (respectively Amsterdam UMC, location University of Amsterdam and location Vrije Universiteit Amsterdam and OLVG East and West, Amsterdam; Spaarne Gasthuis, Haarlem and Hoofddorp; Westfriesgasthuis, Hoorn; Flevoziekenhuis, Almere). Data were collected from February 2015 until June 2017. Blood loss was measured according to the protocols in different hospitals. We defined severe PPH using a cut-off value of 2000 mL blood loss or more because of the physical impact of such an amount of blood loss.[19] The cut-off of 500 mL blood loss or less was chosen as this is being considered as a physiological birth in the Netherlands.

In the Netherlands, the prevalence of PTSD in the general postpartum population is 1.2%.[10] The sample size calculation was based on the women who gave birth and these data indicated that the prevalence among controls is 0.012. If the prevalence for PPH patients is 0.087 (we estimated an difference of 7.5%), we needed to study 130 PPH patients and 130 controls (totalling 260 women) to be able to reject the null hypothesis that the prevalences for PPH patients and controls are equal with probability (power) 0.8. Since we aimed to include partners of all participating women who gave birth, we decided on the same sample size for PPH partners and control partners.[17]

Figure 1 – Flow diagram of timeline



Flow diagram of the timeline of the study containing exclusion criteria to clarify the order of events.
* First days after giving birth: As soon as the woman who gave birth and her partner were ready for receiving this kind of information. In case of the controls and their partners, this could be several hours after birth. In case of PPH patients and their partners, this could be several days.
CAPS-5: Clinical Administered PTSD Scale for DSM-5; mL: millilitre; PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage; PTSD: posttraumatic stress disorder

2.1 Procedures

A flow diagram is added to give an overview of the timeline of the study (Figure 1). If childbirth was complicated by severe PPH, this PPH patient and two controls were asked to participate in the IPAD-study. PPH partners and control partners were asked to participate as well. Controls were defined as the birth before and after the severe PPH patient. Exclusion criteria were applied to all participants and were: (1) a known history of PTSD, (2) age younger than 18 and (3) not speaking English or Dutch. All participants received verbal and written information about the study by doctors or midwives, after which they were given the time needed to decide whether they wanted to participate, and provided written informed consent for participation. Two controls for each patient were selected because controls are often discharged soon after the birth, causing a lower inclusion rate.

Between four to six weeks postpartum, the digital version of the PCL-5 was sent to all participants, including questions about demographics and medical history (Appendix 1). PCL-5 scores were obtained from both women and their partners. Positive screening according to the PCL-5 was followed by the CAPS-5 to diagnose PTSD.

Data were collected from the added questions in the digital questionnaire (the PCL-5) and CAPS-5, and obstetric data from the hospital files of the women who gave birth.

2.2 Assessment of probable PTSD

The PCL-5 is a 20-item self-report tool that assesses the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) symptoms of PTSD, namely B Criteria (re-experiencing), C Criteria (avoidance), D Criteria (negative alterations in cognitions and mood) and E Criteria (hyperarousal).[16,20,21] Respondents indicated how much they have been bothered by each PTSD symptom in the past month on a five-point Likert scale, ranging from 0-4 (0 = Not at all, 1 = A little bit, 2 = Moderately, 3 = Quite

a bit, 4 = Extremely). The maximum score of the PCL-5 is 80. [6,20,21] A probable PTSD diagnosis can be made using the PCL-5; if a participant scored a question as at least 'moderately' (at least '2' on the five-point Likert scale) this question is endorsed (Figure 1). When scoring at least 1 B item (questions 1-5), 1 C item (questions 6-7), 2 D items (questions 8-14) and 2 E items (questions 15-20), this resulted in a probable PTSD diagnosis16. When having a total score of ≥32 on the PCL-5, it is also likely someone had probable PTSD.[6,20,21]

Questions were added to explore duration of complaints (Criterion F, 0 = Zero weeks, 9 = Longer than eight weeks), functional significance (Criterion G, eleven-point Likert Scale, 0-10, 0 = Not at all, 10 = Extremely), co-morbidities, partners' search for treatment and partners' symptoms of depression, and use of antidepressant medication during their partners' pregnancy (Appendix 1).

It was not feasible to conduct the CAPS-5 with all participants, and thus, prior to the study, we excluded participants with low symptom levels on the PCL-5 who were unlikely to meet criteria for a (subthreshold) PTSD diagnosis according to the CAPS-5. To be included, a sensitive-based cut-off was set, using a PCL-5 score of ≥11, with a self-reported severity score of ≥3 (ranging 0-10), as to not miss any participants with probable (subthreshold) PTSD.

2.3 Assessment of (subthreshold) PTSD

Participants with a positive screening in the PCL-5 (≥11, combined with a severity score of ≥3), were asked to participate in a telephone interview in which the CAPS-5 questionnaire was completed.[22,23] We conducted telephone interviews to maximise the participation and response rate. It is known that people with PTSD avoid situations or places that may trigger flashbacks, such as a hospital. Also, young parents have less time and energy to participate in an extensive clinical interview.

The CAPS-5 is considered the gold standard for diagnosing PTSD. In addition to assessing the DSM-5 PTSD symptom criteria, extra questions targeted the onset and duration of symptoms (Criterion F), subjective distress and impact of symptoms on social and occupational functioning (functional significance, Criterion G), overall response validity, overall PTSD severity, and specifications for the dissociative subtype.[22,23] Clinical researchers were trained to conduct the CAPS-5. Blind assessment was not possible, due to the fact that Criterion A had to be known to conduct the CAPS-5. The assessor combined information about the intensity and frequency of each item and scored accordingly. To meet the criteria for PTSD, we used the criteria according to the DSM-5. [6]

PTSD was diagnosed when a participant met the criteria according to the CAPS-5; one should score at least one B Criterion symptom, one C Criterion symptom, two D Criterion symptoms and two E Criterion symptoms and, additionally, Criterion A, Criterion F and Criterion G should be met. [6] When a participant met at least one of the abovementioned criteria for PTSD according to the CAPS-5, but not all, in combination with a Criterion G score of ≥2 (maximum 3), this was defined as subthreshold PTSD (Figure 1). [24,25]

To answer the third research question the answers of the CAPS-5 were transcribed and the most common answers were extracted.

To determine if there was an association between PTSD symptom levels in women and their partners, we determined a linear trend line and the R2 between PCL-5 scores of women and their partners. [17] For this analysis, we only used data from women who formed a dyad with their partners.

When the CAPS-5 interview revealed a history of PTSD, participants were excluded from participation. Participants were also excluded when exclusion criteria were met, even if the PCL-5 was completed. When PTSD was diagnosed, participants were referred to their general practitioner, who arranged further referral to a specialized psychologist.

2.4 Statistical analysis

The primary outcome of this study was to determine whether there is a significant association between severe PPH and PTSD in partners. Demographic and birth-related data were collected from the women's patient files in the hospitals. Dichotomous data were compared using the Chi-square analysis ($\chi 2$) or Fisher's exact test where applicable. Continuous data were compared either with t-tests or Mann-Whitney U. All tests were two-tailed and $p<.05$ denoted significance. We calculated the correlation coefficient between PCL-5 scores in women and their partners with Microsoft Excel 2010. Other data were analysed using Statistical Package for the Social Sciences (SPSS, Version 22).

The study was approved by the MEC-U (Medical Research Ethics Committees United) and the Medical Ethics Committees of each participating hospital. Clinical Trial Registration: NL50273.100.14

3. Results

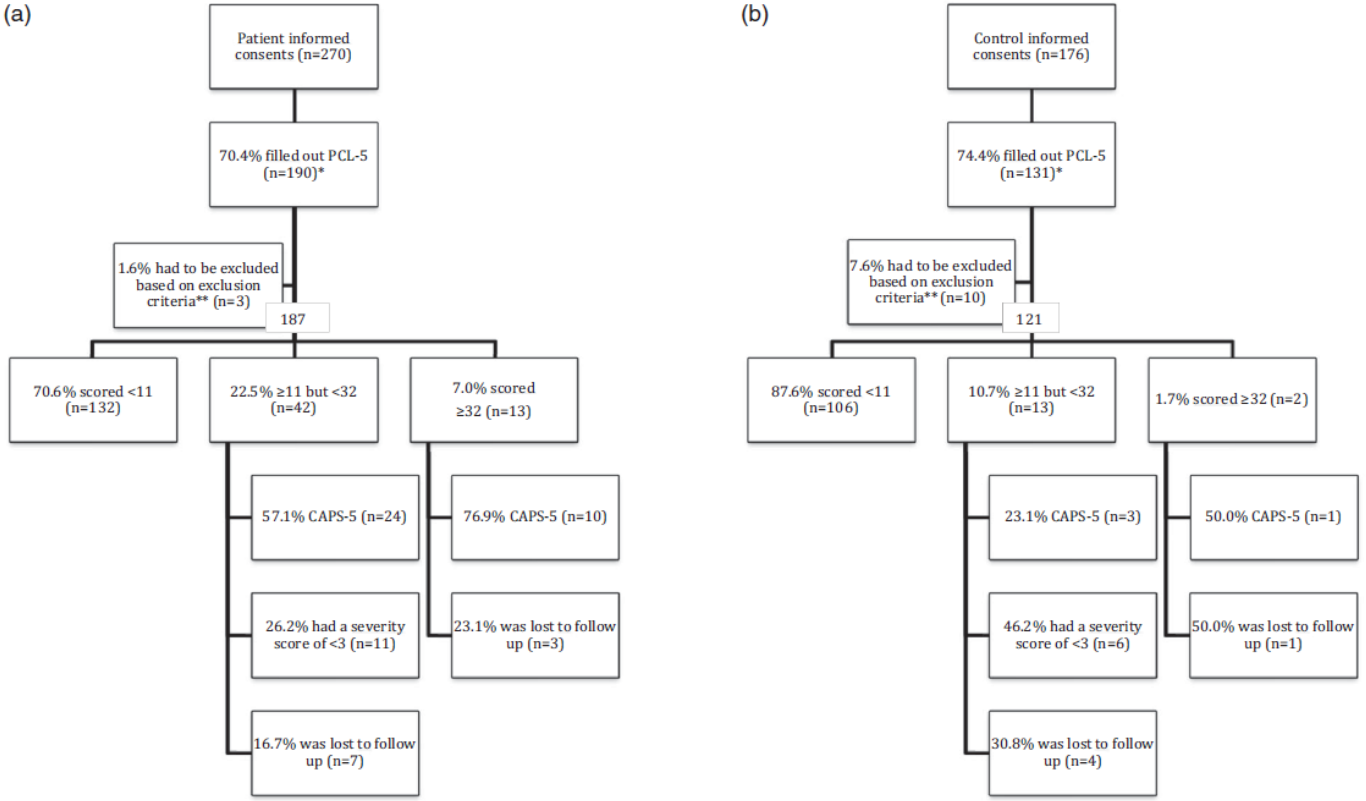
We obtained 223 informed consents from PPH partners and 144 informed consents from control partners. The PCL-5 questionnaire was completed by 55.2% (n=123) of the PPH partners compared to 43.1% (n=62) of the control partners (Figure 2a and 2b). After reaching the defined sample size of 260 of the participating women for the primary outcome of the IPAD-study, inclusion of partners was stopped regardless of the lower response rate.

Table 1 presents an overview of the baseline characteristics. Pain relief during childbirth (43.3% vs 59.7%), third stage of labour (55 vs 9 minutes) and length of hospital stay postpartum (3 vs 2 days) were significantly different between groups. The amount of alcohol usage was similar in both PPH partners (n=89, 72.4%) and control partners (n=41, 66.1%, p=.38; Table 1). The percentage of daily users of alcohol was 13.5% (n=12) in PPH partners and 12.1% (n=5) in control partners. Only

PPH partners used drugs (n=3, 2.4%), which was not significantly different between groups (p=.55).

The median score of the PCL-5 was 3.0 (0.0 - 7.0) in PPH partners and 2.0 (0.0 – 4.0, p=.04) in control partners (Table 2). A probable PTSD diagnosis could be made according to the PCL-5 in seven (5.7%) PPH partners and in zero (0.0%) of the control partners (p=.10; Table 2). Eighteen PPH partners scored ≥11 in the PCL-5, of whom nine had a severity score of <3 and were thus not eligible for the CAPS-5 (Figure 2a and 2b). Three control partners scored ≥11, of whom one had a severity score of <3. Consequently, nine PPH partners and two control partners were eligible for the CAPS-5. Of these, four (of nine) PPH partners and no (of two) control partners were lost to follow up.

Figure 2: Flowchart of the inclusions in our study



*Everyone was sent the PCL-5, but not everyone filled it out ** Exclusion criteria consisted of PTSD in history and ≤500 mL of blood loss (controls) PCL-5: PTSD Checklist for DSM-5; CAPS-5: Clinician-Administered PTSD Scale for DSM-5; PTSD: posttraumatic stress disorder.

Table 1 – Baseline characteristics

	PPH partners (n=123)	Control partners (n=62)	P-value
Male *	122 (100.0)	62 (100.0)	1.00
Age *	35.4 ± 5.0	35.9 ± 7.5	0.64
Completed college or university *	60 (49.6)	29 (46.8)	0.72
Psychiatric history	2 (1.6)	4 (6.5)	0.10
History postpartum hemorrhage *	15 (12.5)	3 (5.1)	0.12
Duration pregnancy (wk+day) *	40+1 (38+4-41+0)	39+3 (38+1-40+6)	0.28
Primigravida *	68 (55.7)	35 (56.5)	0.93
Pain relief during birth [a]	52 (43.3)	37 (59.7)	0.04
Assisted delivery *, [+]	31 (25.8)	17 (28.8)	0.67
Delivered during shift *, [++]	63 (53.4)	29 (50.9)	0.76
Third stage of labor [a]	55 (10-83)	9 (6-13)	<0.001
Total blood loss [a]	2500 (2000-3000)	300 (200-350)	<0.001
Length of hospital stay postpartum [a]	3 (2-4)	2 (1-3)	<0.001
Alcohol use after delivery	89 (72.4)	41 (66.1)	0.38
Days between PCL-5 and delivery	54.5 (39.3-73.0)	56.0 (41.0-72.5)	0.95

All variables are shown in n (%), mean ± SD or median (25-75%). All differences were analysed using χ2, T-test or Mann-Whitney U, except if stated otherwise below.
History postpartum haemorrhage, duration pregnancy, primigravida, pain relief during delivery, assisted delivery, delivered during shift, third stage of labour, total blood loss and length of hospital stay postpartum relate to the women who delivered.
a Significant difference between PPH partners and control partners
+ Assisted delivery: ventouse, forceps or caesarean section
++ Delivered during shift: deliveries between 16:00 and 08:00
* Due to incomplete data, measurements were based on: male PPH partners n=122, control partner n=62; age PPH partners n=120, control partners n=62; completed college or university PPH partners n=121, control partners n=62; history PPH PPH partners n=120, control partners n=59; duration pregnancy PPH partners n=120, control partners n=59; primigravida PPH partners n=122, control partners n=62; assisted delivery PPH partners n=120, control partners n=59; delivered during shift PPH partners n=118, control partners n=57
PPH: postpartum haemorrhage, wk: week

In total, seven CAPS interviews (5 PPH partners and 2 control partners) were conducted. During the CAPS-5, no PTSD was diagnosed in either group (Table 2). In PPH partners, three (2.5%) participants did meet criteria for subthreshold PTSD while in control partners this was 0.0% (p=.55; Table 2). One PPH partner who

scored highest on the PCL-5 (total score 36, severity score 4) was lost to follow-up with the CAPS-5. The second highest PPH partner score (total score 33, severity score 7), did appear to have subthreshold PTSD, but had previously been diagnosed with an anxiety disorder, something which might explain why he met Criteria D and E.

Table 2 – Outcomes of the PCL-5 and CAPS

	PPH partners (n=123)	Control partners (n=62)	P-value
PCL-5 median overall score [a]	3.0 (0.0-7.0)	2.0 (0.0-4.0)	0.04
Probable PTSD* according to PCL-5 [+]	7 (5.7)	0 (0.0)	0.10
PCL-5 mean score Criterion B [a]	1.2 ± 2.2	0.2 ± 0.7	<0.001
PCL-5 mean score Criterion C [a]	0.5 ± 1.1	0.05 ± 0.2	<0.001
PCL-5 mean score Criterion D [a]	1.6 ± 2.6	0.8 ± 1.4	<0.001
PCL-5 mean score Criterion E	2.0 ± 2.8	1.7 ± 2.0	0.40
PCL-5 Criterion B score ≥ 1 [a]	22 (17.9)	1 (1.6)	<0.001
PCL-5 Criterion C score ≥ 1	8 (6.5)	0 (2.7)	0.05
PCL-5 Criterion D score ≥ 2 [a]	11 (8.9)	0 (0.0)	0.02
PCL-5 Criterion E score ≥ 2 [a]	12 (9.8)	4 (6.5)	0.45
PTSD according to CAPS-5 [++]	0 (0.0)	0 (0.0)	
Subthreshold PTSD according to CAPS-5	3 (2.5)	0 (0.0)	0.55

All variables are shown in n (%), mean ± SD or median (25-75%). All differences were analysed using χ2, T-test or Mann-Whitney U, except if stated otherwise below.
a Significant difference between PPH partners and control partners
+ Fisher's exact test
++ Administered CAPS-5 PPH partners n=5 control partners n=2
* Probable PTSD according to PCL-5: when a participant scored a question as at least 'moderate' (at least two points on the four point Likert scale) this symptom was endorsed, where after the DSM-5 diagnostic rule according to the DSM-5 was followed
** Subthreshold PTSD according to CAPS-5: when a participant met at least one, but not all, of the criteria as described above.
CAPS-5: Clinical Administered PTSD Scale for DSM-5; Criterion B: re-experiencing; Criterion C: avoidance; Criterion D: negative thoughts and feelings; Criterion E: hyperarousal; PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage; PTSD: posttraumatic stress disorder.

Table 3 shows an overview of the situations PPH partners (n=5) described as traumatic during the CAPS-5. Three of the PPH partners elaborated that they got really scared after they saw panic in the caregivers' eyes. Also, staying behind in the

delivery room during their partners surgery, was described as frightening. Furthermore, not daring to ask what was going on during the acute moments had a big impact. According to the PCL-5, Criterion B (re-experiencing) was the most common Criterion partners experienced (n=22, 17.9%; Table 2).

Table 3 – CAPS-5 most common answers

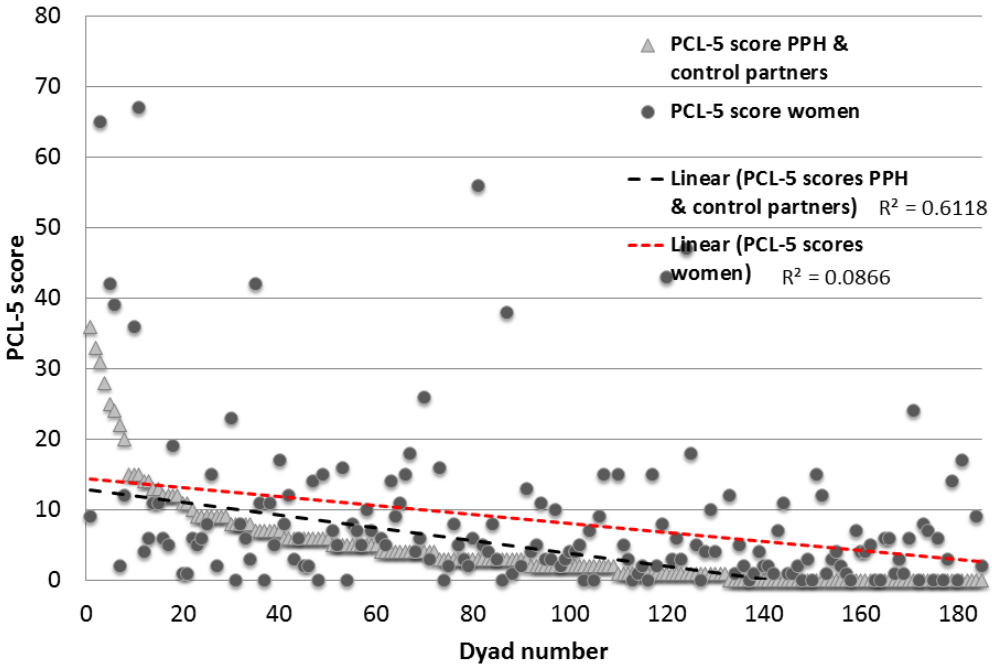
Situation	Frequency	Quote
Panic in caregivers eyes	3 of 5 PPH partners	'The doctors were panicking. I was very scared I would lose her.'
Unwanted memories	3 of 5 PPH partners	'I keep thinking about the birth. Actually, every time I see small children; it makes me sad.'
Staying behind in delivery room	2 of 5 PPH partners	'The moment the doctors ran out with my wife, I stayed behind with our little daughter. I was alone for 20 minutes. The nurse eventually came in to tell me everything was going to be fine, but I will never forget the panic in her eyes.'
Didn't dare to ask what was going on	1 of 5 PPH partners	'There were six people standing around her bed. I didn't want to ask any questions because I didn't want to worry my wife.'

Quotes from CAPS-5 interviews, total number of PPH partners = 5.

In the main study concerning women, we included 187 PPH patients and 121 controls, where we found higher median PCL-5 scores in PPH patients (5.0) than in controls (4.0, p=.005). Women who formed the dyad with their partners were then selected, i.e. 123 PPH patients and 62 control patients, for analysis to compare the scores between women and their partners. Figure 3 and 4 show the relationship between the PCL-5 scores of PPH partners and controls and the related women. Figure 3 shows the descending scores of the PCL-5 scores in PPH partners and controls, coupled to the scores of the related women. When plotting a linear trend line, the R2 of the women is 0.09, which means 9% of the variability is explained by the scores of the PPH partners and controls. In conclusion, if PPH partners and controls have a higher PCL-5 score, this does not consequently lead to a higher PCL-5 score in the related women. In Figure 4, this assumption was tested the other way

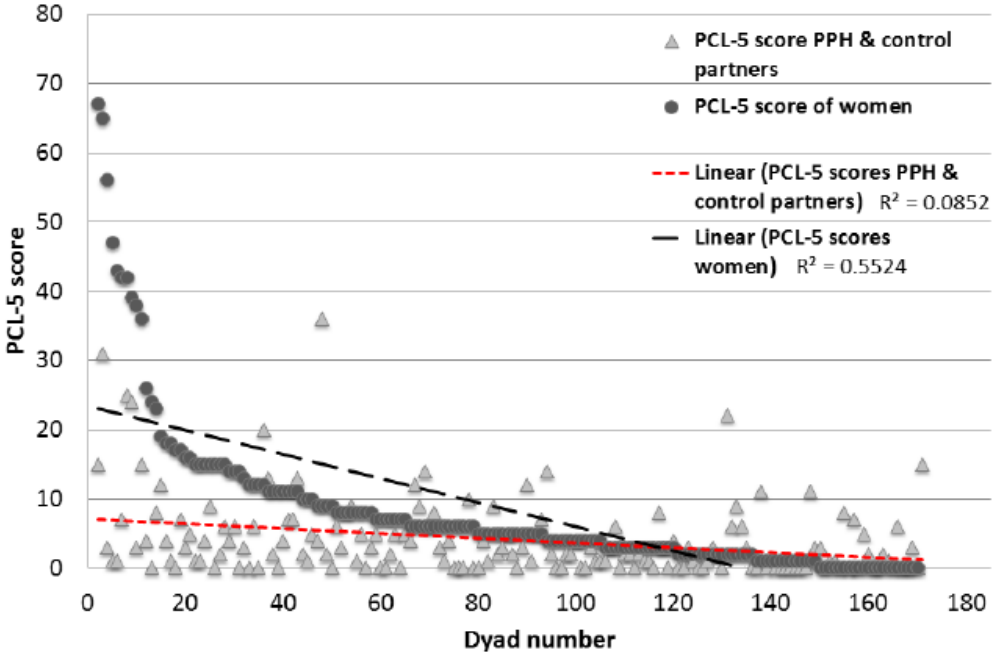
around. It shows the descending scores of the women with the coupled scores of the PPH partners and controls. The R2 of the PPH partners and controls is 0.09. However, it is evident the women score higher than the PPH partners and controls (Figure 4).

Figure 3 - PCL-5 total scores of PPH & control partners compared with their partners (women)



Shows the descending scores of the PCL-5 scores in PPH partners and controls, coupled to the scores of their partners (women).
PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage.

Figure 4 - PCL-5 total scores of partners (women) compared with PPH partners and controls



Shows the descending scores of the PCL-5 scores in women, coupled to the scores of PPH partners and controls.
PCL-5: PTSD Checklist for DSM-5; PPH: postpartum haemorrhage.

4. Discussion

In this study we examined whether witnessing severe PPH was associated with increased PTSD symptoms, probable self-reported PTSD, clinical interview based PTSD diagnosis, and subthreshold PTSD. PPH partners scored significantly higher on the symptom Criteria than the control partners. Criterion B (re-experiencing) was the most prevalent Criterion according to the PCL-5. However, both groups reported low PTSD symptom levels and using a probable diagnosis of PTSD according to the PCL-5, there was no significant difference between the PPH and control partners. Of the partners included in the CAPS-5 interviews none fulfilled

the criteria for a PTSD diagnosis including functional impairment. Due to the small and uneven sample size, these results should be interpreted with care. To answer the question what kind of an experience is traumatic during childbirth complicated by severe PPH we report on several quotes of the partners. Partners most often indicated feeling excluded, not knowing what was going on and panic in the caregivers eyes as traumatic experiences. Lastly, in this study, within dyads, no relationship was demonstrated between PCL-5 scores between the women who gave birth and their partners.

Our results are consistent with several previous studies, where no difference in PTSD was found in partners of women who gave birth compared to controls. [10,26] However, Etheridge et al. reported that some partners experience PPH as traumatic in a qualitative study where a self-report instrument (IES) was used. [15] It could be hypothesized, that partners do experience severe PPH as traumatic, but they tend to not express their negative emotional feelings when asked for in an interview during this 'happy' period. [26] Complaints fitting subthreshold PTSD may be underreported during the interviews, since a high score on the PCL-5 does indicate experiencing PTSD-like symptoms. Another explanation may be that partners of women who experienced severe PPH have the feeling they are less permitted to express distress and emotions, since they have not actually experienced it themselves. Also, partners may have the feeling they have to take care of their family and are therefore more likely to suppress their own feelings. [26] The most parsimonious explanation may be that women are being transferred to the operation theatre quickly and thereby their partners miss the majority of the blood loss, all the more, because witnessing a traumatic event leads to less PTSD than actually experiencing the traumatic event. [3,27]

When partners receive an inadequate amount of information during childbirth, this leads to a negative birth experience. [28,29] Previous research has shown that if partners experience childbirth negatively, this has a subsequent effect on their emotional well-being. [30] Furthermore, when the partner is distressed, this may have

a negative subsequent effect on the mother, so clinicians need to be aware of this. [31,32] Providing sufficient information, showing empathy and other forms of support during childbirth is being perceived as supportive. [28]

No relationship was demonstrated between PCL-5 scores between the women who gave birth and their partners. However, in earlier research with different measurements (IES and PSS-SR) and a larger group of participants (n=372), this relationship has been found. [10,32]

In literature, men do report more alcohol use after a traumatic event, but no significant difference between PPH partners and control partners was found. [33] Unfortunately, we do not have any data on alcohol usage before childbirth.

In several studies intrusion and avoidance were found to score highest of all the Criteria, though in our study partners scored highest on re-experiencing. [34] This may be explained by the different measurements used, but may also originate in the fact only PPH partners were screened and not specifically the whole spectrum of complicated childbirth.

The main strengths of this study are its prospective design and the usage of validated questionnaires (PCL-5 and CAPS-5). The PCL-5 is superior to other self-report measurements since it is a self-report questionnaire based on the DSM-5 and it includes all different symptom criteria at the basis of a PTSD diagnosis. [35] Furthermore, the CAPS-5 is the gold standard to diagnose PTSD and was only administered by trained clinicians. Also, we used a telephone interview to administer the CAPS, in order to lower the threshold to participate. The cut-off value to administer the CAPS-5 was highly sensitive, in order to not miss any participants with subthreshold PTSD.

This study is limited because of its small sample size. Unfortunately, the defined sample size of 130 PPH partners and 130 control partners was not reached. It is known that women are two times more likely to develop PTSD and generally have

more symptoms than men (100% was male in our study), therefore, our sample sizes for the partners may have been too small. [33,36–38] Because of the low rates of help seeking in case of mental health problems in the postpartum population due to shame, guilt and difficulties with problem identification during a period that is supposed to be a happy event, less PTSD symptoms may be expressed and thus real prevalence of (subthreshold) PTSD may be higher. [26,39,40] Due to a high amount of dropout in the PPH partners who potentially have higher PTSD symptoms a sample bias may have been introduced. We may have missed partners with PTSD who were avoiding this topic. Because of the big difference in sample size between the PPH partners and control partners, this may have influenced the detection of significant effects and makes it hard to draw firm conclusions. Furthermore, we cannot be completely sure that scores on the PCL-5 are solely due to childbirth since we did not explore Criterion A. However, the partners who completed the CAPS-5 who did have some symptoms, all indicated this was because of witnessing a traumatic childbirth. Another limitation may have been the administration of the CAPS-5 by phone, since the clinician could not observe the participants and may miss emotions. Also, the CAPS-5 could not be blinded and therefore the interviewer knew if the partner witnessed the severe PPH or not.

5. Conclusion

In this prospective cohort study, both partners of women with severe PPH and control partners of women with little blood loss reported low levels of PTSD symptoms, but severe PPH partners reported higher scores than control partners. No significant association was found between witnessing severe PPH and probable PTSD or PTSD diagnosis in partners, revealing the resilience of young fathers in dealing with the adverse side of this event. Due to the small and uneven sample size, these results should be interpreted with care. Nonetheless, some partners did indicate they experienced severe PPH as traumatic. Partners expressed feelings of being left out, not knowing what was going on and panic in the caregivers eyes as

the most traumatizing parts of childbirth complicated by severe PPH. In conclusion, although not diagnosed with a clinical disorder as PTSD, PPH partners showed significantly more symptoms compared to controls, and thus we need to be aware partners may experience severe PPH as traumatic. Therefore, providing sufficient information, support and staying composed during complicated childbirth is important. Future studies on the current topic with larger sample sizes should shed light on the mental health consequences of this frequent complication during childbirth not only in mothers but also in partners.

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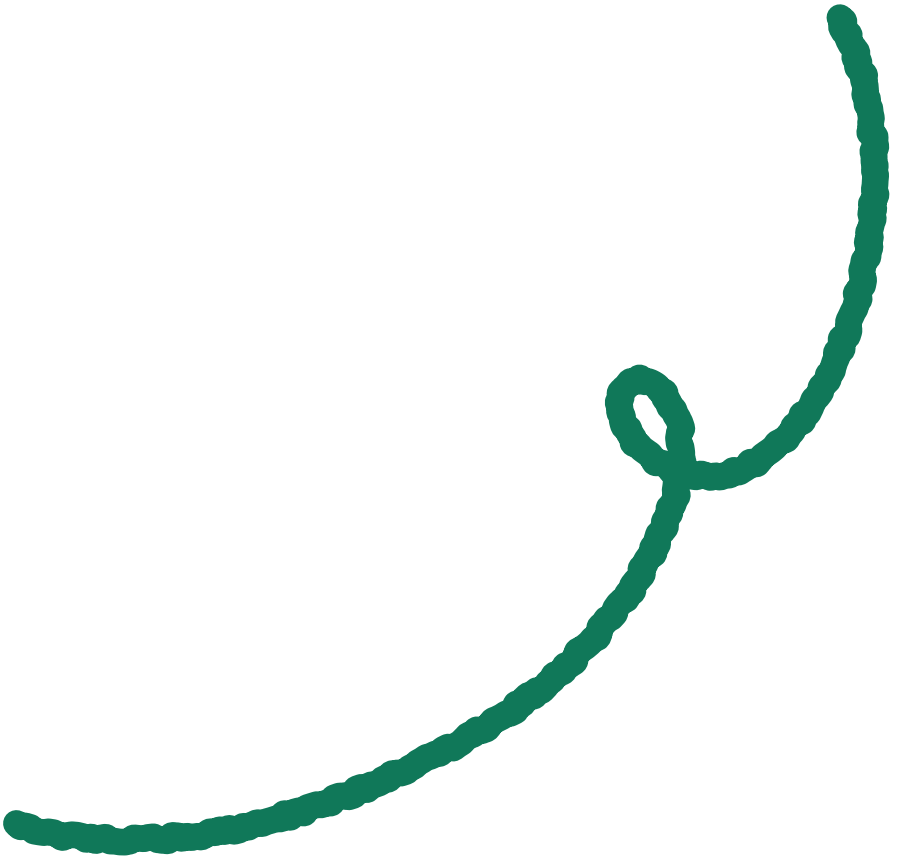

SUMMARY AND GENERAL DISCUSSION

Aims

Part 1 describes the Work related Adverse and Traumatic Events Research (WATER) studies, in which we studied depression, anxiety, posttraumatic stress disorder (PTSD) and coping and support after potential traumatic events (PTE) among several medical specialties. The goal of the studies of part 1 was to answer the following questions:

- What are the prevalence rates of depression, anxiety and PTSD among Dutch psychiatrists, pediatricians, gynecologists and orthopedic surgeons?
- How prevalent are PTEs in the workplace and what is the opinion of physicians concerning coping and support after such events?
- What are clinical and occupational consequences of PTEs and traumatic stress?

Part 2 of this thesis describes our Identification of Parents in Distress (IPAD) study, which investigated the prevalence of posttraumatic stress and PTSD after severe postpartum hemorrhage. In the studies of the second part, the goal was to answer the following questions:

- Is severe PPH of more than 2000 mL blood loss a risk factor for developing PTS symptoms or PTSD?
- What is the prevalence of PTSD among partners that witness severe PPH?
- What are predictive factors for developing PTS symptoms or PTSD within the PPH group?

Summary

Part 1 key findings

In part 1 of this thesis, the results WATER studies are described. Chapter 2 describes our survey results in Dutch psychiatrists. A survey was piloted among several psychiatrists and then sent to the members of the Dutch Society of Psychiatry (NVvP; n=3288) of which 250 questionnaires were completed and suitable for analysis. At least one work-related potential traumatic event (PTE) was reported by 196 (78.4%) of the respondents, of which 177 described the PTE. Witnessing or experiencing verbal aggression (29.2%), physical violence (29.2%) or completed suicide (26.8%) were the most common PTEs. The participants that scored above the cut-off for probable PTSD was 3.2%, which is lower compared to rates recently reported in literature. For example Olashore et al. reported that 18.4% of mental health staff met criteria of PTSD and Hilton et al recently reported a rate of 16.0%, also both measured with the PCL-5. [1,2] However, these surveys also included nursing staff. Our survey nevertheless implies that it is the rule rather than the exception that psychiatrists experience work-related PTEs, often with a significant emotional impact. The majority of respondents considered current support as insufficient.

A comparable survey with specialty specific questions was sent to Dutch pediatricians, as described in chapter 3. To goal was to study mental health, coping, and support after work-related adverse events among pediatricians. The questionnaire was sent to all members of the Pediatric Association of The Netherlands in October 2016. The questionnaire focused on adverse events, coping, and support. The Hospital Anxiety and Depression Scale (HADS) and the Trauma Screening Questionnaire (TSQ) were included for evaluation of anxiety, depression, and posttraumatic stress. Four hundred ten (18.9%) were eligible for analysis. Seventy nine percent (n = 325) of the

respondents experienced adverse events, with 'missing a diagnosis' having the most emotional impact and 'aggressive behavior' from parents as the most common adverse event. Nine (2.2%) pediatricians scored above the cut-off value indicative of PTSD. In total, 7.3% (n = 30) and 14.1% (n = 58) scored above the cut-off values in the Hospital Anxiety and Depression Scale, indicative of depression and anxiety. Only 26.3% reported to have a peer support protocol available for emotional support following adverse events. Verbal and physical aggression of parents towards pediatricians seems to be a common problem, which is a specialty specific adverse event.

Chapter 4 describes the results of the survey among obstetricians-gynecologists (ObGyn). The questionnaire was piloted and emailed to all members of the Dutch Society of Obstetrics and Gynecology, which included residents, attending, retired and non-practicing ObGyn. The response rate was 42.8% with 683 questionnaires eligible for analysis. 12.6% of the respondents have experienced a work-related traumatic event, of which 11.8% met the criteria for current posttraumatic stress disorder. This revealed an estimated prevalence of 1.5% obstetricians-gynecologists with current posttraumatic stress disorder. Twelve percent reported to have a support protocol or strategy in their hospital after adverse events. The most common strategies to cope with emotional events were: to seek support from colleagues, to seek support from family or friends, to discuss the case in a complication meeting or audit and to find distraction. 82% would prefer peer-support with direct colleagues after an adverse event.

To be able to compare between specialties with a high response rate, the data of the ObGyn, pediatricians and orthopedic surgeons was combined as described in chapter 5. The data of the psychiatrists was not added, due to the low response rate. This supplementary analysis on a large number of physicians gave more power to explore consequences of PTEs and PTSD on work choices. Our questionnaire was sent to all Dutch gynecologists,

orthopedic surgeons and pediatricians, including resident physicians (4959 physicians). 1374 questionnaires were eligible for analysis, corresponding with a response rate of 27.7%. Of the respondents, 20.8% experienced a work-related potential traumatic event at least four weeks ago. Prevalence rates indicative of depression, anxiety or posttraumatic stress disorder (PTSD) were 6.4%, 13.6% and 1.5% respectively. Depression (9.2% vs. 5.2%, p=0.019), anxiety (18.2% vs. 8.2%, p<0.001) and psychological distress (22.8% vs. 12.5%, p<0.001), were significantly more prevalent in female compared to male attendings. The absence of a support protocol was significantly associated with more probable PTSD (p=0.022). Those who witnessed a PTE, reported more defensive work changes (28.0% vs 20.5%, p=0.007) and those with probable PTSD considered to quit medical work more often (60.0% vs. 35.8%, p=0.032). This corresponds with a recent study from the UK where burnout was associated with both increased defensive medical practice and worse doctor well-being. [3] Implementation of some form of support is recommended, however further research is needed into whether- and which support programs help prevent developing PTSD. Also, further investigation into the negative impact of PTEs and PTSD on quality of care is needed.

Part 2 key findings

Part 2 describes the study-protocol and results of the IPAD study. The main goal of part 2 was to determine whether severe postpartum haemorrhage, defined as blood loss of more than 2000 mL, is a risk factor for PTSD in both women and their partners. Chapter 6 is the study protocol of the Identification of Parents in Distress (IPAD) study, describing the background, aim, methods and power calculations. New about this protocol compared to existing literature, is the cut off of 2000 mL and the CAPS-5 telephone interview. 2000 mL is the amount of blood loss that is expected to give hypovolemic symptoms and may be experienced by patients as threatening and potentially psychotraumatic. Another reason for choosing a higher cut-

off was that the only literature showing an increased risk for PTSD were the studies with massive haemorrhage where hysterectomies were performed to stop the hemorrhage. [4,5] Furthermore this is the first study to use the golden standard for diagnosing PTSD after PPH by using the CAPS-5. Also new is the fact that these interviews were done by telephone, to increase the response rate, as young parents are not likely to participate in face-to-face interviews and avoidance is one of the main symptoms of PTSD. A non-response bias is common in this kind of research and a strength of this protocol is that this bias was minimized.

Chapter 7 reports the results of the IPAD study. This chapter describes the comparison of two groups of participants; women with ≥2000 mL of blood loss (severe PPH, patients) and women with ≤500 mL of blood loss (controls). Participants were screened for PTSD using the PCL-5 four to six weeks after delivery. Positive screening was followed by a clinical interview (CAPS-5) to diagnose PTSD. One hundred eighty seven PPH patients and 121 controls were included. Median PCL-5 scores were higher for PPH patients (5.0) than controls (4.0, p = 0.005). Thirteen PPH patients (7.0%) and two controls (1.7%) scored ≥32 on the PCL-5, indicative of probable PTSD (OR 4.45, 95% CI 0.99-20.06, p = 0.035). Significant more PPH patients than controls met criteria for a clinical diagnosis of PTSD on the CAPS-5 (n = 10, 5.6% vs n = 0, 0.0%; p = 0.007). These results show a significant and clinically relevant increased risk for developing PTSD after severe PPH, in contrast to a recent review. [6] This is the first well performed study to use the golden standard to diagnose PTSD after PPH. Gynecologists and midwives are advised to screen for PTSD at postpartum follow-up visits to prevent long-term negative mental health effects, in both patients, partners and their children.

Chapter 8 is also part of the IPAD study, but reports on the results of the partners witnessing a severe PPH. This prospective cohort tests whether severe PPH is a risk factor for partners to develop a PTSD. One hundred

twenty three PPH partners and 62 control partners were included. Partners of women with severe PPH reported higher scores than control partners (median 3.0 (0.0 - 7.0) vs 2.0 (0.0 - 4.0), p=.04) on symptoms of posttraumatic stress on the PCL-5 screener, but no significant difference in the prevalence of probable posttraumatic stress disorder diagnosis was found. According to the golden standard clinical interview, no partners were diagnosed with posttraumatic stress disorder. Severe postpartum hemorrhage was experienced as traumatic= by the partners who felt excluded or ignored during delivery. In this study none of the 123 partners developed posttraumatic stress disorder, revealing the resilience of young fathers. Because some partners reported severe postpartum hemorrhage as traumatic, we recommend sufficient information and support is provided during childbirth.

General discussion

Hospital based potential traumatic events (PTEs) are common, within the different contexts of the posttraumatic triad. Anyone exposed to stressful details of medical practice is at risk, including the patient, partner and physician. This thesis aimed to explore these hospital based PTEs and its consequences on mental health and clinical work and to give direction to future research.

Part 1: physician well-being

A profession with a high emotional burden

Physician well-being has been a popular topic in top medical journals for more than 50 years. It is an interesting paradox: medical doctors are care givers, but also notorious care avoiders. High rates of depression, anxiety, burnout, substance abuse disorders and suicide among physicians, residents and medical students were already described in the 70s and 80s. [7–10] The

relative high suicide rate among medical doctors was first described in the 60s. [11] House officer stress syndrome, sleep loss and even nutritional deprivation and their effect on medical performance have frequently been described in well-known medical journals such as the BMJ and JAMA. [7,8,12]

However, when looking at more recent literature and our prevalence rates for depression and anxiety, not a great deal seems to have changed over the past 50 years. Our WATER studies show high numbers of depression, anxiety and psychological distress among several Dutch medical specialties, both in residents and attending physicians. This is in line with alarmingly high rates reported worldwide, as depression and burnout in physicians are taking epidemic forms according to some literature. [13,14] Burnout and suicide rates may even increase in the US, despite increased awareness. [15–17] When comparing demographic differences in our groups, we found that female physicians report significantly more depression, anxiety and psychological distress. This finding is relevant, because of the feminisation of medical specialties, with an increase in female physicians of 1.0%–2.0% each year between 2006 and 2016 in the Netherlands. [18]

When adding the psychiatrists (total n=1622; table 1, not published), the total prevalence rates indicative of depression, anxiety, psychological distress and PTSD were 6.9%, 14.4%, 17.6% and 1.7% respectively. When comparing specialties, all mental health outcomes were most prevalent in the psychiatrists and lowest in the orthopedic surgeons. Compared to prevalence rates of depression, anxiety disorders and PTSD in the Dutch high income population, the prevalence rates in physicians are high. [19] Interestingly, the number of complaints was lowest in the pediatricians, even though pediatricians report high numbers of parental aggression. Complaints were highest in orthopedic surgeons, possibly due to the elective nature of surgeries performed, as was in line with another that reported more complaints in surgical admissions. [20] Psychiatrists also reported high numbers

of complaints, corresponding to high rates reported in literature. [21]

Table 1: Mental health outcomes and complaints across all specialties						
	Total (n=1622)	ObGyn (n=672)	Orthopedic Surgeons (n=292)	Pediatricians (n=410)	Psychiatrists (n=248)	Dutch high income population
Depression	6.9	6.5	4.8	7.3	9.7	3.0
Anxiety	14.4	15.8	8.2	14.1	18.1	6.0
Psychological distress	17.6	18.2	12.0	19.3	20.2	
PTSD						
Criterion A	22.7	12.8	19.5	34.9	33.5	
TSQ above cut-off	1.7	1.5	0.3	2.2	3.2	1.3
Complaints disciplinary board	21.2	21.0	29.8	11.2	28.2	
All values shown as:%						

Posttraumatic stress among physicians

Potential traumatic events (PTEs) are unavoidable in the medical profession; our data shows that such events are the rule rather than the exception for some specialties. In that sense, there is an occupational hazard comparable to other high risk professions. However, the support system is largely underdeveloped compared to those professions. [22–24] Our WATER study is one of the few studies on posttraumatic stress among physicians. Our prevalence rate of 1.7% probable PTSD is low compared to other studies. We hypothesize however, that this rate is a better approximate of the real prevalence, as criterion A and F were incorporated. Due to the high number of participants, we were able to show that traumatic stress may have large clinical consequences, such as on work dissatisfaction and defensive practice. This is in line with more recent literature describing that both burnout and

posttraumatic stress are related to an increased defensive practice among ObGyn. [3,25] Another recent study among ObGyn reported lower job satisfaction (´seriously considering leaving the profession´) and organisational impacts of trauma, such as sick leave and changes in allocations, after PTEs.

When looking at our data of all four specialties together, a large portion of respondents either report no support protocol in situ (38.5%) or report not being aware of a protocol (36.2%). Only a quarter was aware of a support protocol after a PTE. This indicates that many hospitals have not formalized support, but also that the awareness or sense of urgency to formalize this, may be low. For further research, it would be interesting to survey the hospitals to objectively measure the number and types of support organised. This is especially important, since our data suggests a strong correlation between the absence of a support protocol and an increase of PTSD (symptoms). This finding also calls for a randomized controlled study on effectiveness of a support protocol.

Clinical implications part 1

One of the main conclusions of our studies could be that not much has changed over the years concerning physician well-being. Our high depression and anxiety prevalence rates show that the problem remains apparent, but it is extremely persistent, multifactorial and deeply rooted in the medical system. The solution should therefore be multifactorial as well, and should be rooted in every hospital, every ward and every medical professional, starting in both nursing, medical and paramedical training. Actively creating awareness, by informing in journals and campaigning on wellbeing is part of the solution, but not enough.

As physician well-being is now embedded in the 2018 CANMEDS competency framework as part of the competency professionalism, it could be made an Entrustable Professional Activity (EPA) as part of medical training. Just like

other competencies of future specialists are tested with EPAs in the Netherlands. During medical training, a student or resident should be able to demonstrate a commitment to physician health and well-being to foster optimal patient care. For example, participating in a Balint group, a disclosure training, an e-learning or chairing a debriefing after an incident, could all be ways to shape such EPAs. [26,27] This is already the case for psychiatry trainees in the Netherlands, as they are obliged to participate in Balint groups and undergo learning therapy. Interestingly, when asked where respondents learned coping with adverse events, only 11.5% of the psychiatrists report having ´never learnt coping strategies´ against 54.5% of the ObGyn. And just like other competencies, all medical doctors should be able to actively supervise their trainees or residents on these topics. Teaching these competencies early in the careers of young doctors, could be a way to root physician well-being, increase professional identity and build resilient physicians for sustainable practice. One of our future projects is an intervention trial, in which we will explore whether ´job crafting´ may reduce or prevent burnout complaints early in medical training. Job crafting in this study involves three pragmatic training sessions with psychologists, in which cognitive pitfalls and skills are explored in order to increase autonomy and resilience in their medical practice.

Concerning support after PTEs, our data suggests a support protocol is associated with less posttraumatic stress. Therefore, we strongly advice implementing support programs and creating awareness on the importance and existence of such programs. In a recent qualitative study among ObGyn, 91% reported the need of a trauma support protocol. [28] Physicians often have feelings of guilt and shame, have time-limitations or are afraid for the consequences (e.g. losing their job) of using programs offered by their employer. To lower the threshold of using resources offered by the hospital, support given by peers of another department is recommended. [29] Web-based peer support education could be an interesting alternative. [26,30]

Part 2: posttraumatic stress after postpartum hemorrhage

Severe postpartum hemorrhage is a risk for posttraumatic stress

Any peri- or postpartum incident experienced by the patient or bystander as psychotraumatic can cause posttraumatic stress, and eventually lead to post-partum PTSD (PP-PTSD). [31] Severe PPH is not an exception, as it is associated with PTS symptoms in several studies. [32–34] However, as described in a systematic review performed by our group, data from these studies are conflicting and a clear conclusion could not be drawn. [6] One of the explanations for the inconsistent results is that the definition for PPH differed significantly, with cutoffs differing from 500 mL to 1500 mL. Some studies also used a definition based on hemoglobin level drop. [35,36] When designing this study we hypothesized that, to gain further insights in these risks, a PPH definition should mainly include severe cases of patients that experience symptoms of hypovolemic shock and find oneself in an emergency situation. Hemorrhage of more than 2000 mL leads to the feeling of ´slowly bleeding to death´ and may result in an emergency setting that is often described as extremely upsetting and potentially traumatic. The IPAD study is the first study that used the definition of blood loss of 2000 mL or more and showed a clear increased risk for developing PTSD (5.6% vs 0%). [37] Compared to other severe obstetric complications such as severe pre-eclampsia/HELLP (11%) and PPROM (17%), this rate is lower, however only short PTSD screeners were used in most of these studies. [38–40] One in twenty severe PPH patients develop full blown PTSD, but taking into account avoidance symptoms this prevalence is probably underestimated. This binary outcome of PP-PTSD does not portray the patients suffering from subthreshold PTSD and other symptoms, as some studies show clinically significant PP-PTS symptoms in up to 16.8%. [41] The more subtle and long term effects on maternal well-being and psychosocial implications, such as the effects on attachment styles, partner and family bonding, fear of childbirth (and e.g. refraining of further

family expansion), sexual dysfunctioning, were not measured. Further longitudinal research to gain insights on long term effects of traumatic birth are needed.

Clinical implications

In precision psychiatry, defining risk profiles vulnerable for psychiatric complaints is crucial. PPH of more than 500 mL is common and the number needed to screen would be high. For efficient deployment of screening resources, it is important to identify the patient groups with the highest vulnerability. [41] Identified risk factors for posttraumatic stress can be divided in ante-, peri- and postpartum and thus a risk stratification should be based on combining such factors. [42,43] To do so, specialized pediatric-obstetric-psychiatric (POP) out-patient clinics or expert groups should play a critical role in identifying patients ´at risk´ and advising clinicians in every hospital. The IPAD study indicates that a cut-off of 2000 mL blood loss could be used for routinely screening patients for PTSD, with a digital screener such as the PCL-5. Routinely screening for early symptoms in high risk groups could lead to earlier interventions and may prevent long term mental health problems for patients and partners, and maybe even problematic attachment in the child. [44,45] However, further research is needed on long term effects of untreated PP-PTSD, on the number needed to screen and cost-effectiveness. Also further qualitative studies are needed on the resilience of partners and fathers, to try to explain the low prevalence of posttraumatic stress compared to mothers.

Conclusion

This thesis explored hospital based PTEs and its consequences on mental health and work, among the triad of patients, partners and physicians. Our data shows that the mental health burden remains high among the Dutch physicians studied. PTEs are common in the hospital and in all medical

specialties, with significant health- and clinical consequences such as increased posttraumatic stress, defensive practice and work dissatisfaction. Support protocols for caregivers and postpartum screening in patients, could play a significant role in preventing posttraumatic stress. The work in this thesis endorses the importance of traumatic stress research and professional performance in the medical setting. Future studies should focus on interventions and education on physician well-being and on profiling of patients at risk for PTSD.

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APPENDICES

Nederlandse samenvatting

Acknowledgements/dankwoord

PhD portfolio and list of publications

Nederlandse samenvatting

Een posttraumatische stress stoornis (PTSS) is een stoornis die ontstaat na blootstelling aan een potentieel traumatische gebeurtenis. PTSS gaat gepaard met symptomen en klachten van herbelevingen en nare herinneringen aan de gebeurtenis, negatieve cognities en stemming, prikkelbaarheid met overdreven schrikreacties en vermijding. Een potentieel traumatische gebeurtenis wordt gedefinieerd als elke vorm van blootstelling aan een feitelijke of dreigende dood, ernstige verwonding of seksueel geweld. Risicoberoepen zoals de politie, brandweer en ambulancepersoneel worden met regelmaat geconfronteerd met impactvolle incidenten. Dergelijke gebeurtenissen komen echter ook frequent voor in- en rondom het ziekenhuis. Iedereen die in deze medische setting aan emotioneel belastende gebeurtenissen wordt blootgesteld - zoals artsen, verpleegkundigen, patiënten en familie - kunnen PTSS klachten ontwikkelen. Dit proefschrift beschrijft de impact van potentieel traumatische gebeurtenissen in de medische setting op patiënten, partners en artsen, de zogenoemde posttraumatische triade.

Frequente en repetitieve blootstelling aan emotioneel belastende gebeurtenissen, zoals ziekte, ernstig lijden en de dood, zijn inherent aan het medische vak. Echter krijgen artsen met regelmaat te maken met incidenten waarop ze mogelijk onvoldoende worden voorbereid in de opleiding, zoals medische fouten, ernstige complicaties, tuchtklachten en patiënten agressie. Er zijn enkele studies verricht naar het vóórkomen van PTSS onder artsen in Westerse landen en de punt prevalentie wordt geschat tussen de 3.8 en 15.0%. Naar depressie onder artsen is meer onderzoek gedaan en dit komt veelvuldig voor, met een prevalentie van 10.3% tot 43.2%. De mentale ziektelast onder artsen is hoog. Zo laat een recente review zien dat het aantal suïcides onder artsen in Amerika verhoogd is, met jaarlijks 40 per 100.000,

ongeveer het dubbele vergeleken met de algemene populatie. In **deel 1** van deze thesis worden de resultaten beschreven van de Work-related Adverse and Traumatic Events Research (WATER) studies. Het doel van de WATER studies is het meten van het vóórkomen van depressie, angst en PTSS klachten onder artsen in Nederland en de vormen van coping en opvang na ernstige incidenten.

Patiënten kunnen na een ongeval, ziekte of ziekenhuis opname posttraumatische stress klachten ontwikkelen, bijvoorbeeld na het doormaken van een ernstig hartinfarct of een intensive care opname. Ook na een traumatische en gecompliceerde bevalling, bijvoorbeeld na een pre-eclampsie of een prematuur geboren kind, kunnen ouders herbelevingen of andere PTSS klachten ontwikkelen. Een andere ernstige complicatie tijdens- en na de bevalling is ernstig bloedverlies, ook wel fluxus postpartum genoemd. Over fluxus postpartum als risicofactor voor het ontwikkelen van PTSS worden in de literatuur tegenstrijdige resultaten beschreven. De reden is dat studies verschillende definities van fluxus gebruiken met wisselende afkapwaardes van de hoeveelheid bloedverlies. Bij een ernstige fluxus verliest een patiënt dusdanig veel bloed, dat er sprake kan zijn van orgaanfalen, hypovolemische shock en uiteindelijk zelfs de dood. Ook partners kunnen getraumatiseerd worden na het meemaken van een traumatische bevalling, echter over het vóórkomen van PTSS na een fluxus postpartum is weinig bekend. In **deel 2** worden de resultaten beschreven van de Identification of Parents in Distress (IPAD) studie. Het doel van de IPAD studie is het meten van het vóórkomen PTSS als gevolg van ernstige fluxus postpartum met meer dan 2 liter bloedverlies, bij zowel patiënten als hun partners.

Belangrijkste bevindingen deel 1

Deel 1 bespreekt de bevindingen van de WATER studies. In hoofdstuk 2 worden de resultaten van onze survey gericht op depressie, angst en posttraumatische stress onder Nederlandse psychiaters (in opleiding) beschreven. Deze vragenlijst werd via een digitale nieuwsbrief verspreid door de Nederlandse Vereniging voor Psychiatrie. Twee honderd vijftig (respons 7.6%) vragenlijsten werden volledig ingevuld en waren geschikt voor analyse. Honderd zes en negentig (78.4%) respondenten rapporteerden een werk-gerelateerd potentieel traumatische gebeurtenis te hebben meegemaakt, van wie 177 deze gebeurtenis in eigen woorden beschreven. Het meemaken van verbale agressie (29.2%), fysieke agressie (29.2) of geslaagde suïcide (26.8%) werden het vaakst beschreven als potentieel traumatische gebeurtenis. Het aantal participanten dat scoorde boven de afkapwaarde voor PTSS was 3.2%. De meerderheid van de psychiaters vond de huidige opvang na incidenten onvoldoende.

Een vergelijkbare vragenlijst werd verstuurd naar kinderartsen (in opleiding), via de Nederlandse Vereniging van Kindergeneeskunde. Hoofdstuk 3 beschrijft de resultaten van deze vragenlijst. Vierhonderd tien (respons 18.9%) vragenlijsten werden volledig ingevuld en waren geschikt voor analyse. Drie-honderd-vijf-en-twintig (79.0%) respondenten rapporteren een potentieel traumatische gebeurtenis mee te hebben gemaakt, langer dan vier weken geleden. 'Het missen van een diagnose' en 'agressie van ouders' werden gerapporteerd als het meest emotioneel belastend. Negen (2.2%) kinderartsen scoorden boven de afkapwaarde indicatief voor PTSS, 30 (7.3%) indicatief voor depressie en 58 (14.1%) voor angst. Ouderlijke agressie werd gerapporteerd als een veelvoorkomend probleem op de werkvloer.

Hoofdstuk 4 beschrijft de resultaten van de Nederlandse gynaecologen (in opleiding). De respons was 42.8%, waarvan 683 vragenlijsten geschikt zijn

voor analyse. Meer dan 12% rapporteert een potentieel traumatische gebeurtenis te hebben meegemaakt, langer dan vier weken geleden. Van deze potentieel getraumatiseerde groep, voldeed 11.8% aan de criteria indicatief voor een PTSS. Over de totale groep is dit 1.5%. Slechts 12% rapporteert een gestandaardiseerd opvang protocol te hebben in hun ziekenhuis na een ernstig incident. De meest voorkomende coping strategieën waren: ondersteuning zoeken bij collega's, ondersteuning zoeken bij familie of vrienden, het bespreken van het incident in een complicatie of incidenten nabespreking en afleiding zoeken. Twee en tachtig 82% geeft aan het liefste ondersteuning van directe collega's te krijgen na een potentieel traumatische gebeurtenis.

Om verschillen aan te tonen tussen de verschillende specialismen, werden in hoofdstuk 5 de data van de gynaecologen, kinderartsen en orthopedisch chirurgen gecombineerd. De data van de psychiaters werd in dit artikel niet toegevoegd, vanwege de lage respons vergeleken met de andere specialismen. Deze aanvullende analyse omvat de resultaten van 1374 ingevulde vragenlijsten, met een totale respons van 27.7%. Van de respondenten gaf 20.8% aan een werkgerelateerd potentieel traumatische gebeurtenis te hebben meegemaakt. Prevalenties indicatief voor depressie, angst en PTSS waren 6.4%, 13.6% en 1.5%, respectievelijk. Depressie en angst kwamen significant vaker voor bij vrouwelijke specialisten. Bij de logistische regressie analyses, was er een significante toename van depressie naarmate respondenten langer werkzaam waren als arts. Aan de andere kant was er een significante afname van angst naarmate respondenten langer werkzaam waren als arts. Het niet aanwezig zijn van een standaard opvang protocol werd significant geassocieerd met het vaker voorkomen van PTSS. Respondenten die een potentieel traumatische gebeurtenis meemaakten, rapporteerden vaker defensief te werken en respondenten met vermoedelijk PTSS overwogen vaker te stoppen met hun werk als arts.

Belangrijkste bevindingen deel 2

Deel 2 bespreekt de opzet en bevindingen van de IPAD studie. Hoofdstuk 6 is het studie protocol van de IPAD studie, waarin de achtergrond, aanleiding, doel, methoden en power berekeningen worden beschreven. Vernieuwend aan dit protocol vergeleken met bestaande literatuur, is de afkapwaarde van 2 liter bloedverlies en het telefonische ´Clinician-Administered PTSD Scale for the DSM-5´ (CAPS-5) interview. Vanaf twee liter bloedverlies wordt verwacht dat er ernstige lichamelijke symptomen zullen optreden passend bij hypovolemie, waarvan verwacht wordt dat patiënten dit ervaren als lichamelijk bedreigend en potentieel psychotraumatisch. Daarnaast is dit de eerste studie die de gouden standaard gebruikt (CAPS-5) voor het vaststellen van postpartum PTSS. Om het responspercentage te verhogen werd er gekozen voor een laagdrempelig telefonisch interview, aangezien non-respons bias vaak voorkomt in dergelijk onderzoek. Deze bias ontstaat doordat vermijding van herinneringen aan de bevalling een symptoom is van PTSS en doordat tijdsgebrek een limiterende factor is voor participatie van jonge ouders.

Hoofdstuk 7 beschrijft de resultaten van de vrouwelijke deelnemers aan de IPAD studie. In dit hoofdstuk worden vrouwen met meer dan twee liter bloed verlies tijdens de bevalling (ernstige fluxus postpartum) vergeleken met een controle groep van vrouwen met bloedverlies van minder dan 0.5 liter. Participanten werden gescreend voor PTSS door middel van de ´PTSD Check List for the DSM-5´ (PCL-5) vragenlijst. Indien boven een bepaalde afkapwaarde werd gescoord, werd er een telefonisch interview (CAPS-5) afgenomen om de diagnose PTSS te stellen. Honderd zeven en tachtig fluxus patiënten en 121 controle patiënten werden geïncludeerd. Mediane PCL-5 scores waren hoger voor de fluxus patiënten (5.0) vergeleken met de controle groep (4.0, $p = 0.005$). Dertien fluxus patiënten (7.0%) en twee controle patiënten (1.7%) scoorden hoger dan 32, hetgeen indicatief is voor

de diagnose PTSS (OR 4.45, 95% CI 0.99-20.06, p = 0.035). Significant meer fluxus patiënten voldeden aan de criteria voor PTSS na de CAPS-5 (n = 10, 5.6% vs n = 0, 0.0%; p = 0.007). Deze resultaten laten een significant en klinisch relevant toegenomen risico zien voor het ontwikkelen van PTSS na een ernstige fluxus postpartum. Naar aanleiding van deze data adviseren wij gynaecologen en verloskundigen na een ernstige fluxus alert te zijn en te screenen voor PTSS klachten.

Hoofdstuk 8 is onderdeel van de IPAD studie, waarin de resultaten besproken worden van de partners die blootgesteld werden aan een ernstige fluxus postpartum. Honderd drie en twintig fluxus partners en 62 controle partners werden geïncludeerd. Partners die een ernstige fluxus bij hun vrouw meemaakten rapporteerden hogere scores op de PCL-5 vragenlijst, vergeleken met de controle groep (mediaan 3.0 (0.0 – 7.0) vs 2.0 (0.0 – 4.0), p = 0.04). Echter werd er geen verschil gezien in het aantal partners dat boven de afkapwaarde van 32 scoorde op de PCL-5, indicatief voor een diagnose van PTSS. In beiden groepen werd geen enkele partner gediagnosticeerd met PTSS middels het CAPS-5 interview. Partners die zich tijdens de bevalling buitengesloten of genegeerd voelden door de zorgverleners, vonden de bevalling vaker traumatisch. In deze studie met 185 partners ontwikkelde geen enkele partner een PTSS, hetgeen een uitzonderlijke veerkracht laat zien onder jonge partners. Aangezien sommige partners een ernstige fluxus als potentieel psychotraumatisch beschreven, is het van belang dat zorgverleners voldoende psychoeducatie geven en partners betrekken gedurende- en na de bevalling.

Conclusie

Dit proefschrift beschrijft de impact van potentieel traumatische gebeurtenissen in de medische setting op patiënten, partners en artsen, de zogenoemde posttraumatische triade. Onze data laat zien dat de mentale

ziektelast hoog is, onder artsen van de onderzochte medisch specialismen. Potentieel traumatische gebeurtenissen komen frequent voor in het ziekenhuis, met significante consequenties voor werkbeleving en welzijn. Geprotocolleerde opvang voor zorgverleners en postpartum screening voor PTSS in fluxus patiënten, kunnen een significante rol spelen in het voorkómen van traumatische stress. Het werk in dit proefschrift onderschrijft het belang van onderzoek naar traumatische stress in de medische setting. Toekomstige studies moeten zich richten op interventies en de rol van de medische opleiding op artsen welzijn en het bepalen van een risicoprofiel van patiënten die PTSS ontwikkelen na de bevalling.

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PhD portfolio

General courses

-	Introductory course PhD students AMC	2016
-	eBROK	2020

Specific courses

-	CE 4: Systematic Reviews	2017

Seminars, workshops and master classes

-	Minisymposium Commissie Collegiale Ondersteuning	2018

Presentations

-	Second victims, coping en opvang na belastende gebeurtenissen onder gynaecologen in NL (AMC)	2015
-	Impact van een Calamiteit voor de orthopedische AIOS: the evidence! (OLVG-W, ROGO)	2016
-	'Wat werk met ons doet?' Uitkomst van vragenlijsten onder (aios) gynaecologie, psychiatrie, orthopeden en kinderartsen (CCO)	2018
-	Poster presentation 'Mental health among Dutch physicians following adverse events on the work-floor: a cross-sectional study' (OLVG Wetenschapsdag).	2018
-	Werkgerelateerd psychotrauma en burn-out onder psychiaters en AIOS (OLVG-O, CAPTURE symp)	2019
-	Cognitive profiles of physicians and burn-out (ISPOG)	2019
-	Podcast The BMJ - Tackling burnout in The Netherlands	2019

(Inter)national conferences

-	SOBP, New York, USA	2018
-	Voorjaarscongres NVvP	2019
-	ISPOG, the Hague, Netherlands	2019
-	'Depressie bij kinderen en jongeren' Medilex conference, Zeist, NL	2019
-	eVJC	2020

Supervising

-	E. van Lent (master thesis, daily SV)	2015
-	H. Pauw (master thesis, daily SV)	2016
-	G. Doelemans (bachelor thesis, daily SV)	2019
-	N. Schukking (master thesis, daily SV)	2019

Awards and Prizes

Winnaar Best Abstract: Symposium Incidenten in de Patiëntenzorg (AMC) 2015

List of publications

Peer reviewed

Wiweger MI, De Andrea CE, **Scheepstra KWF**, Zhao Z, Hogendoorn PCW. Possible effects of EXT2 on mesenchymal differentiation - Lessons from the zebrafish. Orphanet J Rare Dis. 2014;9(1).

Scheepstra KWF, van Steijn ME, Dijksman LM, van Pampus MG. Post-traumatic stress disorder in women and their partners, following severe post-partum hemorrhage: A study protocol for a prospective cohort study. Cogent Med. 2017 Jan; 4:1

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Scheepstra KWF, van Lent E, Lok A, Olff M, van Pampus MG. Exploring the impact of work-related potential traumatic events among Dutch psychiatrists. Psychiatry research. 2020;

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Other

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Impact van en ondersteuning bij tuchtzaken. Nederlands Tijdschrift Obstetrie Gynaecologie. Vol 131 dec 2018.