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12 **Title: A transactional "second victim"-model – experiences of affected healthcare**

13 **professionals in acute-somatic inpatient settings: a qualitative metasynthesis**

14 **Short title: A transactional "second victim"-model**

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41 **Contributors**

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50 **Transparency declaration**

51 The lead author (manuscript's guarantor) affirms that this manuscript is an honest, accurate,
52 and transparent account of the study being reported; that no important aspects of the study
53 have been omitted; and that any discrepancies from the study as planned (and, if relevant,
54 registered) have been explained.

55 **ABSTRACT**

56 **Background:** "Second victims" are healthcare professionals traumatized by involvement in
57 significant adverse events. Associated burdens, e.g., guilt, can impair professional
58 performance, thereby endangering patient safety. To date, however, a model of second
59 victims' experiences towards a deeper understanding of qualitative studies is missing.
60 Therefore, we aimed to identify, describe and interpret these experiences in acute-somatic
61 inpatient settings.

62 **Methods:** This qualitative metasynthesis reflects a systematic literature search of PubMed,
63 CINAHL and PsycINFO, extended by hand searches and expert consultations. Two
64 researchers independently evaluated qualitative studies in German and English, assessing
65 study quality via internationally approved criteria. Results were aggregated quantitatively and
66 analysed inductively.

67 **Results:** Based on 19 qualitative studies (explorative-descriptive: n=13; grounded theory:
68 n=3; phenomenology: n=3), a model of second victim experience was drafted. This depicts a
69 multi-stage developmental process: in appraising their situation, second victims focus on
70 their involvement in an adverse event and become traumatized. To restore their integrity,
71 they attempt to understand the event and to act accordingly; however, their reactions are
72 commonly emotional and issue-focused. Outcomes include leaving the profession, surviving
73 or thriving. This development process is alternately modulated by safety culture and
74 healthcare professionals.

75 **Conclusions:** For the first time, this model works systematically from the second-victim
76 perspective based on qualitative studies. Based on our findings, we recommend integrating
77 second victims' experiences into safety culture and root-cause analyses. Our transactional
78 model of second victim experience provides a foundation for strategies to maintain and
79 improve patient safety.

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81 **Key words:** adverse events; human error; patient safety; safety culture; qualitative research

82 INTRODUCTION

83 The term "second victim", introduced by Wu (2000), describing healthcare professionals
84 traumatized via involvement in serious adverse events.^{1,2} Having unintentionally caused
85 harm to patients ("first victims"), many consider these events as personal failures, losing their
86 confidence as clinicians and professionals.^{1,2} However, in today's complex healthcare
87 environments, eventual involvement in a serious adverse event is normal.³ When adverse
88 events—defined by their potential for harm⁴—affect patients, guilt, frustration, and fear can
89 impair involved healthcare professionals' performance, further endangering patient safety.³
90 Hilfiker (1984) and Leape (1994) highlighted human fallibility in medical settings;^{5,6} and in
91 2000, the US Institute of Medicine published "*To err is human*".⁷ That report estimated that
92 up to 98 000 persons died annually in the US from medical errors, leading to associated
93 expenses as high as 29 billion USD.⁷ Current estimates place the annual death relating to
94 adverse events up to 440 000.⁸ However, even these figures are questionable: many cases
95 go unreported, as therapy- and disease-related harm are often indistinguishable.⁹
96 Internationally, while patient safety is a global priority, the incidence rate of adverse events is
97 14.2 per 100 hospitalisations per year in high-income countries.^{10,11}
98 From 2009–2017, review articles focused on qualitative and quantitative second-victim
99 studies of varying explanatory power in the US, Asia and Europe.^{3,12–16} These indicated that
100 second victims experience intense emotional burdens (e.g., burnout and depression),
101 impacting their personal relationships, their professional collaborations, their physical health,
102 and even their institutions ("third victims").^{3,12–14,16}
103 However, while supportive environmental conditions (e.g., support from colleagues) are
104 beneficial, many institutional reactions simply compound the damage.^{3,13} Ideally, care teams
105 and superiors support their affected colleagues, while their organizations ensure that
106 supportive structures are embedded in their safety culture.^{3,12–16} Research has yet to identify
107 how to relieve second victims' burdens while considering short- and long-term affects to
108 safety culture.^{3,12,15}
109 Within healthcare organizational culture, safety culture reflects management and staff values,
110 attitudes, perceptions, competencies and behaviours regarding individual fallibility.¹⁷
111 Therefore security-promoting behaviour depends not only on individual character, but on
112 collectively shared values.¹⁸
113 Although increasing numbers of differentiated, empirical studies illuminate second victims'
114 experiences, no review article have systematically aggregated nor interpreted regarding
115 theory formation and development. Moreover, shortages of theoretical associations often
116 preclude in-depth understanding of interactions. Even though, e.g., Lazarus' stress model or
117 Antonovsky's concept of salutogenesis help elucidate second victim experience e.g. by

118 means of cognitive appraisals relating to stress or a jeopardized Sense of Coherence,^{19,20} yet
119 no available model explains the overall second-victim construct.

120 Until now, strategies to maintain or improve patient safety have focused on affected patients.
121 By shifting "from a personal to a systemic perspective" incident analyses and safety culture
122 promotion become strategic pillars of patient safety²¹. Regarding healthcare priorities and
123 lack of support for many second victims,^{10,12–14,16} a model of their experience will, by
124 increasing the visibility of the often neglected experiences of second victims, contribute to a
125 higher level of awareness regarding this vulnerable group.

126 This qualitative metasynthesis is rooted in holistic thinking akin to pragmatism and aims to
127 describe and interpret second victims' experiences in acute-somatic settings from this
128 group's perspective. We approach experience as a learning process evolving and generating
129 meanings between the individual and the context.^{22–24}

130 **METHODS**

131 This qualitative metasynthesis follows Sandelowski and Barroso's (2007) steps: goalsetting,
132 literature search, evaluation of studies, classification of results, metasynthesis and
133 metasummary.²⁵ The ENTREQ statement was used to ensure methodical rigour.²⁶

134 **Goalsetting and literature search**

135 The SPIDER structure was used for goalsetting and keywords (table 1), referring to the
136 SPIDER structure and associated with Boolean operators, were used to search in PubMed,
137 CINAHL und PsycINFO without temporal limitations (27.09.2016, update: 23.12.2016).²⁷

138 [Table 1: Search string in PubMed, CINAHL and PsycINFO]

139 Additionally, we searched reference lists of included studies, other systematic reviews, study
140 protocols, professional publications, dissertations, and monographs, and contacted authors
141 (n=22).

142 We included original German- and English-language articles offering insight into second-
143 victim experience based on qualitative designs, and conducted interviews, predominantly of
144 healthcare professionals in acute-care inpatient settings. We excluded studies in other
145 languages, non-original articles, mixed-methods studies, non-research-based articles and
146 first-level interpretations (e.g. interview transcripts).

147 **Evaluation of studies**

148 For the initial screening, the first and fifth author independently checked all titles and
149 abstracts according to predefined inclusion criteria. Next, they read potentially relevant full
150 texts. For both steps, inter-rater reliability was determined.^{28,29} We discussed discrepancies
151 until we reached consensus.

152 For individual evaluation, following Sandelowski and Barroso's guidance, the authors read all
153 included studies repeatedly with increasing attention to detail, and wrote synopses of all.²⁵

154 For overarching conclusions, they tabulated and compared study evaluations.²⁵

155 **Classification of results**

156 The first author dichotomized the result sections of all included studies as first- or second-
157 level interpretations, and evaluated each one's methodology regarding design, sample, data
158 collection and analysis.³⁰ The fifth author verified 47% of these evaluations.

159 **Metasynthesis**

160 We performed an inductive qualitative data analysis using MAXQDA V.12.³¹ "First cycle
161 coding" involved line-by-line micro-analysis of second-level interpretations of the included
162 studies' results sections.³¹ Via splitting, we grouped qualitative data into open, inductive
163 single-word- or phrase-based codes.³¹ "Second cycle coding" differentiated categories by
164 means of subcodes and codes.³¹ This resulted in a conceptual model.³¹

165 **Metasummary**

166 To avoid under- or overrating individual findings we quantitatively aggregated qualitative
167 data.²⁵ After extracting, paraphrasing, categorizing and abstracting as parts of the
168 metasynthesis described above, we calculated via the following formulas by means of code
169 frequencies, which results were the most frequent across the studies (frequency) and how
170 much each study contributed to the analysis (intensity):

$$frequency = \frac{\text{number of publications of a certain category (n = 16)}}{\text{total number of publications (n = 19)}}$$

$$intensity = \frac{\text{number of categories per publication (n = 4)}}{\text{total number of categories (n = 5)}}$$

171 **Trustworthiness**

172 To ensure our results' trustworthiness, we applied Sandelowski and Barroso's descriptive,
173 interpretative, theoretical, and pragmatic validity criteria.²⁵ The first author's in-depth
174 familiarity with the second victim issue contributed to his nuanced understanding of this
175 subject. In addition, regular meetings within the research team contributed to this study's
176 interpretative and theoretical validity. Furthermore, the comprehensive and systematic
177 literature search, the metasummary and the inclusion of studies with heterogeneous
178 epistemological bases strengthened the interpretative and theoretical validity. The research
179 steps described above further strengthened our results' descriptive and pragmatic validity.²⁵

180 **RESULTS**

181 **Included studies**

182 Evaluations of the chosen studies' titles and abstracts (figure 1) resulted in high inter-rater
183 reliability ($k=0.78$); full-text evaluations yielded near-perfect inter-rater reliability ($k=0.96$),
184 leading to inclusion of 19 studies.^{2,32-49} For reasons of methodological quality, no studies
185 were excluded (figure 2).²⁵

186 [Figure 1: Flow diagram of included studies]

187 [Figure 2: Methodological quality of included studies]

188 The 19 between 1992 and 2016 published studies (explorative-descriptive
 189 studies^{2,32,33,35,36,39,43-49}, grounded theories^{34,37,42}, phenomenologies^{38,40,41}) involved 478
 190 predominantly medical or nursing healthcare professionals of both genders ($n_{\text{physicians}}=325$ and
 191 $n_{\text{nurses}}=131$) in American ($n_{\text{studies}}=9$), European ($n_{\text{studies}}=8$) and Asian ($n_{\text{studies}}=2$) hospitals.
 192 Despite diverse descriptions and definitions of adverse events, all focused on the healthcare
 193 professionals' response to actual or potential patient harm. (table 2)

194 [Table 2: Study characteristics]

195 **Metasynthesis: Transactional "second victim" experience**

196 Our metasynthesis outlined a transactional "second victim" experience model (figure 3).
 197 Vertically, this represents a system open to external influences, with mutual modulation
 198 between *safety culture* and *healthcare professionals*. Due to reciprocity, indicated by arrows,
 199 *safety culture* is both a central influencing factor regarding affected *healthcare professionals*
 200 and an endpoint.

201 Horizontally, iterative development begins with *appraising the situation*, extending first to
 202 *restoring integrity*, then *continuing professional life*. Between *appraising the situation* and
 203 *restoring integrity*, *healthcare professionals weigh their internal and external resources*. For
 204 example, they activate personal resources and receive assistance from colleagues via *safety*
 205 *culture*.⁴⁹ However, while second victims often need support urgently^{2,32,38,43-49} and search for
 206 "emotional relief valves",^{35,49} they tend to deny themselves such support via undemanding or
 207 unreceptive behaviour.^{32,34,39,41,46,48,49}

208 "*Several claimed that they did not have any expectations about getting support because they*
 209 *had made a mistake, and therefore had to bear the consequences themselves.*"^{46, p.321}

210 [Figure 3: Transactional "second victim" experience]

211 *Safety culture and healthcare professionals*

212 *Safety culture* influences whether and to what extent *healthcare professionals* become
 213 second victims.^{2,36,41,43,47-49} Acknowledgment of second victims' need for help is a first step
 214 toward overcoming the negative consequences of the „blame-shame culture“ that dominates
 215 many institutions.^{2,32,34,36,38,40,41,43,44,46,47,49}

216 Communicative processes are formative in a *safety culture*. For example, speaking to first
 217 victims can be therapeutic for second victims; however, emotional issues for both first and
 218 second victims can make discussions challenging.^{32,33,35,37-42,46} Considering second victims'
 219 damaged professional confidence, they often share their feelings with friends rather than
 220 medical professionals.^{2,32,33,35-37,40-42,44,46-49} While this informal support channel usually
 221 involves persons with no professional healthcare background,^{33,35,46-49} the advantage of
 222 disclosing one's inner feelings and preserving a perspective "from the outside" can outweigh
 223 the disadvantages.^{2,33,35} While professional assistance offers both trustability and a neutral
 224 perspective, it can also be associated with stigmatization.^{49,38} And while empathic and

225 sympathetic team behaviour can benefit second victims, staying silent or minimizing an event
 226 can be regressive.^{34,39,40,48} Likewise, within a robust safety culture, superiors can use adverse
 227 events to imprint that culture via role modeling,^{38,46,47} e.g., cultivating a trustful, systemic
 228 perspective on errors and addressing informational needs e.g. concerning support
 229 programs.^{2,37,39,44,45,47-49}

230 *"The respondents within this study suggested that none of these support systems are*
 231 *possible if there is not an organizational patient safety culture."*^{#49, p. 9}

232 Depending on the event's seriousness, second victims are often eager both to learn and to
 233 contribute to safety culture via root-cause analyses (RCA).^{35,37,39,41,42,47,48} As *understanding*
 234 and *acting* require readiness to learn, training and further education are vital not only to
 235 preventing adverse events, but to responding to their occurrence.^{33,39,44,47-49}

236 *Healthcare professionals* respond similarly to different events, based on their
 237 seriousness.^{2,33,35,36,40,41,48,49} In the conflict between expectation and reality, personally
 238 experienced responsibility is of major importance for many second victims.^{32,34-37,41,43,45,48}

239 Reactions can also depend upon personal traits, e.g., self-efficacy, resilience, perfectionism
 240 or professional experience, spirituality, and gender aspects.^{2,33,37,38,40-42,47-49} E.g., as a result
 241 of a perfectionism, healthcare professionals may be more affected by feelings of guilt when
 242 they interpret errors as individual failures and seek zero tolerance for errors.

243 *Appraising the situation: Experiencing stress and trauma*

244 After initial incomprehension, second victims *realise* their responsibility for avoidable
 245 events.^{2,34,40,44,46,48} In our model, only events associated with significant *stress* have further
 246 relevance. Non-stressful events can inspire either a sense of *well-being* (good luck) or
 247 *learning*.^{35,36,41,47}

248 After initial nonspecific stress experience (e.g., shock), second victims *respond* rather
 249 *physiologically* or rather *psychosocially*.^{32-34,40,46-49} *Physically*, common symptoms range from
 250 *sleep disturbance* to muscular tension.^{2,33,34,38,41,43,44,46-49} *Psychosocial* responses are
 251 characterized by a sense of damaged personal integrity.^{32,33,35,37,38,40,43,45-47,49}

252 *"Nurses expressed feelings of guilt because they felt that they had oppressed or betrayed*
 253 *someone who had needed them and had trusted them with his or her life."*^{#40, p. 5}

254 Having participated in a serious adverse event, second victims suffer severely conflicting
 255 emotions: having caused suffering, some feel they should suffer;^{32-41,43,45-49} having suffered
 256 trauma, many experience *anxiety and panic, with potential health consequences*.^{2,33-35,37,40,43-}

257 ^{46,48,50} A broad variety of *anxieties* of second victims are related both to the harm of first
 258 victims and to their own situation as second victims, e.g. anxiety to loss of trust and legal
 259 consequences.^{2,33,34,40,41,43-46,48,49} Additionally, feelings of inadequacy, uncertainty, and
 260 reduced *self-confidence* often arise.^{2,32-35,37,38,40,44-49} Other consequences can include
 261 flashbacks, burnout syndrome, *depression* and suicidal thoughts.^{2,33,37,40,41,44-46,48,49} On a

262 personal level, *psychosocial responses* swing between anger-frustration and regret-
 263 repentance; on a *professional* level, reduced *performance* can manifest as efficiency deficits
 264 or defensive decision-making.^{2,32-38,40,41,44,46,48,49}

265 Unlike normal stressful events, second victim experiences include incisive *trauma*, with
 266 effects extending beyond initial stress responses and leaving a profound impression at both
 267 private and professional levels.^{2,32-35,37,40,41,43-49}

268 *Restoring integrity: Understanding and acting*

269 Second victims need an internally and externally motivated (e.g., by superiors) *restoration of*
 270 *integrity*.^{2,32,33,37,42,46,49} The *emotion- and event-oriented process of acting* on traumatic
 271 experience can be rather *constructive* or rather *destructive*. Focusing on *understanding and*
 272 *acting*, its aim is to achieve a return to work as soon as possible, with regained self-
 273 esteem.^{2,34-37,39,41,42,46,48,49} A discursive process combining reconciliation/forgiveness with
 274 coping with imperfection has proved key to *returning to professional life*.^{33,34,36,37,42,46}

275 Repressive mechanisms, e.g., *rationalisation, self-punishment, minimalisation*, are
 276 *destructive emotion-oriented responses to adverse events*; more *constructive emotion-*
 277 *oriented strategies, e.g., disclosing* the event to the first victim often receive high priority, but
 278 can have complex outcomes.^{32-37,39-43,45-49}

279 "Although they were comforted when the family forgave them or grieved alongside them,
 280 surgeons also recognised difficulty with these interactions."^{87, p. 1184}

281 Many second victims wish to apologize to their corresponding first victims but received
 282 lawyers' recommendations to maintain silence.^{34,39,42,43} For some, *disclosing* the event results
 283 from a process of consideration.^{33,34,36-38,40,42,45,46,48} Depending on the level of harm and "real"
 284 error, second victims may disclose varying degrees of detail.^{33,34,36,37,40,42,45,46,48} In this
 285 respect, along with events that cause harm with potential legal consequences, for well-known
 286 events are favourable for *disclosure*; unknown error events, as well as anxiety and minor
 287 length of service on the part of the second victim, are unfavourable.^{34,36}

288 While *minimalisation* is a rather *destructive task-oriented way of dealing with an event*,
 289 *constructive task-oriented strategies, e.g., learning*, rank among the most helpful.<sup>2,32-38,40-
 290 44,46,48,49</sup> In the short term, second victims strive to reduce *harm* in first victims and to restore
 291 medical stability,^{33,35,40,43} in the medium term, they wish to participate in root-cause analyses
 292 to prevent recurrences of their experiences and *to optimize the system*, e.g., via error
 293 prevention programs,^{2,33-35,37-39,41,42,44,47-49} and in the long term, it is necessary to *extension*
 294 *perspectives* towards fallibility.^{34,40,42} Expressions of this include improvement-oriented
 295 behaviour patterns, *increased mindfulness* with regard to imperfectness, and self-care, as
 296 well as increased patient-centricity.^{2,33,37,41-44,46,49}

297 *Continuing professional work: Finding meaning*

298 Traumatic second victim experience also has a long-term existential effect on *professional*
 299 *life*.⁴⁶ *Re-evaluation* and *perceived meaning* can both support private and professional
 300 improvement of the situation.⁴²

301 While second victims with serious professional doubts may *change their positions* or *leave*
 302 *their profession*, some second victims continue their profession lives with unimpaired
 303 performance despite a *trajectory of burden* and *reduced work satisfaction*
 304 (*surviving*).^{2,32,36,37,44,46,48,49}

305 Most desirably, *thriving* can follow a positive turn of a traumatic experience, characterized by
 306 *enhanced expertise* and an *evolved personality*.^{2,33,37,42,44,45} Both can manifest in improved
 307 handling of complexity and uncertainty, as well as in a revised view of oneself and the world.
 308 *Second victims* who have regained their self-confidence see themselves as imperfect, but
 309 good *healthcare professionals*.^{33,37,42,44,45}

310 "[in]<the humble expert>... physicians described learning to temper their expertise with
 311 humility and learning to have confidence without being cocky." ^{42, p. 240}

312 **Metasummary**

313 As table 3 shows, all included studies contributed to one or more of three categories: *safety*
 314 *culture*, *appraising the situation*, and *restoring integrity*; 58% contributed to all categories.^{2,32-}
 315 ^{34,36,37,41,42,45,48,49} The median contribution of each study was 5%; the most recent and the
 316 oldest were most influential.^{33,49}

317 [Table 3: Metasummary]

318 **DISCUSSION**

319 This qualitative metasynthesis highlighted, described and interpreted second victim
 320 experiences in acute-somatic settings. Based on nineteen qualitative studies, the main
 321 outcome is a model of transactional second victim experience. Including the central stages of
 322 appraising the situation, restoring integrity and continuing professional life, this experience is
 323 moderated by safety culture and healthcare professionals. The model finds its theoretical
 324 foundation in Lazarus' model of stress, as well as in Antonovsky's "sense of coherence".^{19,20}
 325 Against the background of a primarily physiological experience,³ we assumed that supporting
 326 a person to restore their integrity could prevent long-term pathological consequences. There
 327 is some evidence, that support from peers and superiors can have a protective influence on
 328 burnout.⁵¹ A prospective longitudinal study showed that, in the context of serious adverse
 329 events, assistant physicians have significantly increased burnout scores and a threefold
 330 elevated risk of depression.⁵²

331 Scott (2015) reaffirmed that safety culture can be both a key factor of support, and a
 332 measurable endpoint.⁵³ Additionally to the wish of second victims for cultural change and
 333 learning needs, the authors emphasized the importance of communication with first victims,
 334 support by peers and superiors, and external emotional support as factors of a positive

335 safety culture. These factors are congruent with safety culture features described
336 elsewhere.⁵⁴

337 An organization's treatment of second victims reflects its safety culture and represents an
338 important aspect of socialization. Ideally, adverse events offer team learning opportunities.
339 Regarding organizational support and underscoring the importance of results from Burlison
340 et al. (2016), alongside absenteeism, their results associate intention to abandon one's
341 workplace significantly with the support of peers and superiors.⁵⁵ In fact, peer support is the
342 strongest predictor of second victims' recovery;⁵⁵ and Edrees et al. (2016) observed that
343 recovery can be improved and promoted via institutionalised telephone support from
344 colleagues.⁵⁶ However, the current results support the literature's indications that collegial
345 readiness to support second victims can be limited:⁵⁷ barriers to support programs' use
346 include missing knowledge about their availability and doubts regarding their reliability.^{56,58,59}

347 After the initial stress response, the second victim's appraisal of the situation is influenced by
348 feelings of guilt and reduced professional performance. In systematic reviews, guilt was the
349 those most frequently reported emotional response.^{12,14,16} The current results concerning
350 second victims' efficiency deficits and tendencies towards defensive decision-making confirm
351 the thesis regarding reciprocity of error involvement, post-traumatic stress response, and
352 endangered patient safety due to reduced professional performance.³

353 Disclosing the event relates significantly to reducing guilt feelings and can contribute to
354 restoring ones sense of integrity; however, disclosure only occurred in a third of cases.⁶⁰ The
355 present metasynthesis described disclosure as a process of consideration, which is also
356 expressed in a just recently published "qualitative systematic review" (n_{Studies}=9) using the
357 Joanna Briggs Institute meta-aggregation approach about second victim experiences of
358 predominantly female nurses, which describes disclosing as a dilemma.⁶¹ Reasons for
359 forgoing disclosure include fear of legal consequences, deficient communication skills, and
360 inadequate support.⁶⁰ Interprofessional skill training could overcome missing communication
361 skills; this would benefit the second victim by increasing the chances of the first victim
362 directly forgiving them.^{60,62,63} According to the outlined potential of disclosing adverse events
363 on the recovery of second victims, it is necessary to establish guidelines and structures that
364 promote, instead of often selective, full disclosure; this not only as a strategy to reduce
365 liability damages, but also to meet ethical obligations to first and second victims.⁶⁴⁻⁶⁷

366 This metasummary on the one hand offers comprehensive state of knowledge regarding
367 safety culture, situational appraisal and restoring integrity. On the other hand, it illuminates
368 knowledge gaps concerning destructive forms of dealing with the event. This knowledge gap
369 may result from an underlying selection bias of included studies. It is possible that only
370 second victims with predominantly constructive strategies for dealing with adverse events are
371 recruited for studies, as others are unavailable due to changing their profession. However,

372 especially during a deepening skills shortage, further knowledge should be obtained by
373 identifying the perspectives of colleagues who support second victims.⁶⁸ Not disclosing an
374 event proved to be the most frequent defensive coping strategy in the review by Seys et al.
375 (2013).¹⁴

376 **Limitations**

377 To the authors' knowledge, the current model offers the first conceptual framework to
378 understand second victim experience across professions and cultures. Despite efforts to
379 ensure reliability, the results should be seen in the context of two major limitations. For the
380 most part, only one person evaluated the methodological quality of included studies and
381 coded the data of only German- and English-language articles in German. Additionally, being
382 three-times removed from direct experience may have diminished the results' credibility
383 during interpretation.

384 **CONCLUSIONS**

385 The newly developed model works for the first time systematically from the second victim
386 perspective based on qualitative studies including majoritarian physicians and nurses. This
387 perspective should increasingly be applied to daily practice to promote institutional safety
388 culture. As a platform upon which to refine policies fostering professional development and
389 preservation, the new model contributes ultimately to patient safety.

390 **Implications for practice**

391 Many organizations are unprepared for serious adverse events.⁶⁹ The need for hospitals to
392 conceive second victim experience as a clinical emergency and to prepare accordingly is
393 emphasized.⁷⁰

394 Our results indicate that hospital safety culture affects not only patients, but healthcare
395 professionals. Therefore, safety culture can provide a path to support second victims in
396 restoring their integrity. These results indicate a scope for integrating second victims in RCA,
397 in the elaboration and implementation of recommendations for event disclosure to first
398 victims, in ensuring a trustful approach to superiors, in learning from a systemic viewpoint
399 and in communicating existing support programs. While the effectiveness of RCA in learning
400 from errors and preventing recurrences can be questioned, RCA has the potential to relief
401 burdens of affected healthcare professionals at the sharp end due to insights in the
402 systematic emergence of adverse events.^{71,72}

403 **Implications for education**

404 Stakeholders in education should meet second victims' request for a culture prepared for
405 adverse events. One central prerequisite would be curricular integration of the second victim
406 experience on all levels of healthcare professional education. In this regard definitions and
407 descriptions of factors triggering second victim phenomena, consequences, theoretical
408 frameworks, support systems, and barriers to support are all relevant.⁷³ The second victim

409 transactional model can support curriculum development, transmit a valid knowledge base
410 and contribute to socialization in dealing with human fallibility.

411 **Implications for research**

412 According to the current knowledge concerning safety culture, appraisal of adverse event
413 situations and restoration of integrity, further research should focus on developing and
414 implementing effective supportive interventions. Therefore, the model of transactional second
415 victim experience provides a valid knowledge base and promotes the integration of the
416 affected persons' perspectives. Investigating the effectiveness of supportive interventions
417 and examining the problem vis-à-vis payers will require development and evaluation of
418 culture-specific instruments to assess second victim experience including support. For
419 practical use, an instrument such as the Burlison's et al. (2017) could facilitate discussions
420 and supportive approaches.⁷⁴ To ensure targeted support in the early, it should differentiate
421 between second victim experience and burnout or depression. The newly developed
422 transactional model of second victim experience will contribute to this.

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599 November 16, 2017.

600 **FIGURES & TABLES**

601 **Figures**

602 Figure 1: Flow diagram of included studies following Moher et al. (2009)⁷⁵

603 Figure 2: Methodological quality of included studies

604 (author's own chart, elaborated by means of review manager 5.3, Nordic

605 Cochrane Centre, 2014)

606 Figure 3: Transactional "second victim" experience

607 (author's own chart)

608 Figure 3 Legend: Legend relating to figure 3, legend based on the International

609 Organization for Standardization (1985)⁷⁶

610

611 **Tables**

612 Table 1: Search string in PubMed, CINAHL and PsycINFO

613 (author's own chart)

614 Table 2: Study characteristics

615 (author's own chart)

616 Table 3: Metasummary

617 (author's own chart)

618

619

Table 1: Search string in PubMed, CINAHL and PsycINFO

Concepts	Key words combined with Boolean operators
Setting	"acute care" OR "acute care setting" OR "acute care settings" OR "acute setting" OR "acute settings" OR "clinic" OR "clinics" OR "hospital" OR "hospitals" AND
Population	"healthcare professional" OR "healthcare professionals" OR "healthcare provider" OR "healthcare providers" OR "resident" OR "residents" OR "second victim" OR "second victims" AND
Causes	"adverse event" OR "adverse events" OR "adverse patient event" OR "adverse patient events" OR "error" OR "errors" OR "mistake" OR "mistakes" OR "patient harm" OR "patient harms" OR "patient safety event" OR "patient safety events" OR "patient safety incident" OR "patient safety incidents" OR "unanticipated outcome" OR "unanticipated outcomes" AND
Evaluation	"affected" OR "anger" OR "anxiety" OR "burnout" OR "coping" OR "depression" OR "distress" OR "emotional" OR "experience" OR "fatigue" OR "fear" OR "feelings" OR "frustration" OR "guilt" OR "impact" OR "meaning" OR "psychological" OR "safety culture" OR "sleep" OR "stress" OR "support" OR "traumatic" AND
Design	"content analysis" OR "ethnographic study" OR "ethnography" OR "grounded theory" OR "interview" OR "interviews" OR "interviewed" OR "phenomenological study" OR "phenomenology" OR "qualitative study" OR "thematic analysis"

(author's own chart)

Table 2: Characteristics of included studies

Author /year	Design/Setting/ Country	Sample	Event	Aim/Research question	Data collection	Data analysis	Results
Balogun <i>et al.</i> , 2015 ³²	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> University hospitals (n=6) <i>Country:</i> Canada	<i>Targeted sample:</i> 23 physicians, 27–37 years with various ethnic and religious background (assistant physicians n=14; physicians in specialist training: n=9; neurosurgery: n=12; general surgery: n=8; women: n=7; men: n=16)	<i>Catastrophic error events;</i> defined as error events having entailed serious harm or having resulted in deaths	The aim was to understand the response and coping strategies of surgical assistants and to recommend possibilities of support.	Semi-structured individual interviews (n=23)	Open and axial coding (Strauss <i>et al.</i> , 1990)	Indications that catastrophic error events represent system deficits rather than individual errors. In spite of experiencing a wide array of emotions, surgical assistance physicians learn from error events. Irrespective of highly valued mentoring relationships with senior staff, they do not feel safe enough to actively approach superiors. Consulting services should be at their disposal, probably offering a benefit. Surgical culture proved to be a barrier to help-seeking behaviour as emotional vulnerability is often equated with personal weakness.
Christensen <i>et al.</i> , 1992 ³³	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> Public hospital <i>Country:</i> USA	<i>Targeted sample:</i> 11 physicians with practical experience between 4 and 18 years (min. 4 years) (medical sub-specialities: n=7; general medicine: n=3; women: n=3; men: n=8)	<i>Error events;</i> individually defined by physicians	The aim was to describe how physicians think and feel about error events and to investigate which beliefs influence their emotional response.	Semi-structured individual interviews (n=11)	Analysis according to guideline criteria	Indications that physicians experience error events in a unique way and are affected by a wide sphere of long-lasting emotions. After an initial shock, they experience e.g. fear, guilt, anger, embarrassment, humiliation and depressive symptoms. Emotion-focused and problem-centred coping (e.g. dealing emotionally with the event or learning from the event) are significantly influenced by insufficient control, characteristic for medicine. Disclosing an event towards patients rarely occurs.
Crigger <i>et al.</i> , 2007 ³⁴	<i>Design:</i> Grounded Theory <i>Setting:</i> Public hospital <i>Country:</i> USA	<i>Theoretical sample:</i> 10 nurses between 25 and 57 years with practical experience between one year and 35 years and various ethnic, religious and educational background (Bachelor of Nursing: n=8; Associate Degree: n=2; women: n=9; men: n=1)	<i>Error events;</i> defined as measures having actually or potentially entailed harm	The aim was to investigate the psychosocial process starting with the realization of an error event and to examine how participants manage to reconcile their self-esteem and professional image (self-reconciliation).	Semi-structured individual interviews (n=10)	Open, selective and axial coding of transcripts	Indications that following error events, nurses pass a process of four consecutive and/or discursive steps leading to self-reconciliation with regard to self-esteem, personality and professional image. The four steps comprise <i>realisation of having committed an error</i> (reality hitting), <i>evaluating the need to disclose the event</i> (weighing in), deciding the best way of responding (acting) and evaluating the event and subsequently "moving on" (repair).
Engel <i>et al.</i> , 2006 ³⁵	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> University hospital <i>Country:</i> USA	<i>Stratified random sample:</i> 26 assistant physicians between 25 and 39 years with various educational backgrounds (medicine: n=17; surgery n=5; gynaecology and obstetrics: n=4; women: n=12; men: n=14)	<i>Error;</i> defined as the failure of a planned action to be completed as intended or the use of a wrong plan to achieve this aim". " <i>Near miss</i> " is defined as "an event or situation that could have resulted in an accident, injury, or illness, but did not, either by chance or through timely intervention"	The aim was to investigate the emotional challenges associated with medical error events and the ways of coping with this difficult events	Semi-structured individual interviews (n=26)	Iterative analysis	Indication that following adverse events, assistant physicians have to deal with distress and intensive emotional responses, e.g. guilt, self-doubt, frustration, anger, confusion, fear, isolation, depending on the degree of negative effects associated with the event. While coping requires relief and learning possibilities, conversations about error events with other healthcare professionals and superiors proved to be of central significance.

Author /year	Design/Setting/ Country	Sample	Event	Aim/Research question	Data collection	Data analysis	Results
Kroll <i>et al.</i> , 2008 ³⁶	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> Hospitals (n=10) <i>Country:</i> England	<i>Stratified random sample:</i> 38 assistant physicians with experience in their role between 6 and 12 months	<i>Error events;</i> not defined (e.g. diagnosis or treatment error)	The aim was to investigate the experiences, perceptions and meaning of error events and to examine reasons for and against disclosure	Semi-structured individual interviews (n=38)	Open, axial and selective coding according to a modified Grounded Theory approach (no reference indicated)	Indications that assistant physicians to some extent informally discuss error events in supportive teams with peers. Disclosing an error event towards patients is, however, rare. In dealing with error events, many assistant physicians received support and attributed a central, favourite role to colleagues with regard to prevention and minimisation of harm. While formal conversations and constructive-supportive feedbacks can probably enhance learning, accusations and reassurance proved obstructive if they were preferred to learning.
Luu <i>et al.</i> , 2012 ³⁷	<i>Design:</i> Grounded Theory <i>Setting:</i> University hospitals (n=3) <i>Country:</i> Canada	<i>Theoretical sample:</i> Stage I: 20 experienced (n=12) and inexperienced (n=8) surgeons (general surgery: n=13; neurosurgery: n=3; cardiosurgery/urology, gynaecology/obstetrics /vascular surgery: 1 n=1; women: n=5; men: n=15) Stage II: Six general surgeons, allowing to be interviewed within 24 hours after an adverse event	<i>Adverse events;</i> defined as events entailing harm caused by medical treatment and not by the course of the disease.	The aim was to investigate responses and psychological consequences of adverse events and to assess them with regard to judgement and decision-making.	Semi-structured individual interviews (stage I: n=20) (stage II: n=6)	Inductive qualitative data analysis with subsequent deductive-qualitative analysis of the reference model (Scott <i>et al.</i> , 2009)	Indications that surgeons have the impression to be "the only one" experiencing fear, stress and self-doubts, with possible gender differences. The authors elaborated a four-stage response conforming to the model of Scott <i>et al.</i> (2009), ranging from feelings of failure accompanied by physiological stress response, loss of control and concurrent need for recovery and restoration, involving long-term effects (meaningfulness vs. change of occupation, consequences concerning judgement and decision-making).
Mankaka <i>et al.</i> , 2014 ³⁸	<i>Design:</i> Phenomenology <i>Setting:</i> University hospital with patients after adverse events in regional hospitals (n=6) and university hospitals (n=2) <i>Country:</i> Switzerland	<i>Targeted sample:</i> 8 assistant physicians (general internal medicine) between 28 and 33 years between second and sixth year of assistance, being responsible for typical adverse events.	<i>Error events;</i> not defined (e.g., missed diagnosis, inadequate monitoring)	The aim was to answer the question: How do assistant physicians experience medical error events and which kinds of coping strategies do they utilize?	Semi-structured individual interviews (n=8)	Inductive-thematic analysis with deductive approaches	Indications that following error events caused by e.g. tiredness or overwork, assistant physicians can be affected by strong emotional distress in the context of insufficient safety cultures. However they can also receive various forms of support from superiors. The most important coping strategy proved to be talking about error events. Defensive and constructive changes are possible as a result of error events. Male physicians seem to be less sensitive and more self-confident than female physicians.

Author /year	Design/Setting/ Country	Sample	Event	Aim/Research question	Data collection	Data analysis	Results
May <i>et al.</i> , 2012 ³⁹	<p><i>Design:</i> Explorative-descriptive qualitative design</p> <p><i>Setting:</i> Academic institutions and medical practices</p> <p><i>Country:</i> USA</p>	<p><i>Casual sample:</i> 61 physicians (women: n=28; men: n=33), average: 46 years, from various subspecialties, being ready to talk about an adverse event (most frequently misdiagnosis) disclosed to patients and families in 61% of cases. Included are data of 46 physicians reaching "wisdom" after being involved in an error event.</p>	<p><i>Serious error events;</i> defined as events having resulted in disability, extended length of stay or deaths</p>	<p>The aim was to investigate the significance of talking to patients, colleagues and families following serious error events.</p>	<p>Semi-structured in-depth individual interviews (n=61)</p>	<p>Coding according to the interview-guideline with subsequent modified taxonomic analysis (Spadley, 1979)</p>	<p>Indications that not talking about serious error events has an isolating effect on physicians, prevents from reflecting the event, thereby impeding the possibility of learning. While serious conversations are of central importance with regard to recovery and attribution of meaning, dishonest, inhuman, accusatory, insensitive or egotistical ways of talking about the event proved obstructive. This is also the case for "well-intended" minimalisation of the error on the part of colleagues and family members. Fearing legal consequences of conversations represents a major barrier to talking openly about the error event.</p>
Mohsenpour <i>et al.</i> , 2016 ⁴⁰	<p><i>Design:</i> Phenomenology</p> <p><i>Setting:</i> Public and private hospitals (n=4)</p> <p><i>Country:</i> Iran</p>	<p><i>Targeted sample:</i> 8 nurses (Bachelor degree: n=6; Master degree: n=2; women: n=6, men: n=2) between 30 and 50 years old with professional experience between one year and 24 years</p>	<p><i>Error events;</i> not defined</p>	<p>The aim was to answer the question: What does it mean to be perceived as a culprit due to involvement in an error event?</p>	<p>Semi-structured individual interviews (n=8)</p>	<p>Thematic analysis (van Manen, 2001)</p>	<p>Indications that following error events, nurses are confronted with unpleasant physical symptoms (e.g., heat sensitivity), negative emotions (e.g., fear), and remorse. Additionally, they are affected by detailed traumatic memories. Changes resulting from error events can affect the assumption of responsibility, learning from error events, strengthening supportive relationships and spirituality.</p>
Pinto <i>et al.</i> , 2013 ⁴¹	<p><i>Design:</i> Phenomenology</p> <p><i>Setting:</i> University hospitals (n=2)</p> <p><i>Country:</i> England</p>	<p><i>Targeted sample:</i> 27 specialist physician (general/vascular surgery; women n=5; men: n=22) with professional experience in the current position of minimal three years</p>	<p><i>Surgical complications;</i> defined as deviation of post-surgical standard</p>	<p>The aim was to investigate personal and professional consequences of surgical complications and to examine factors influencing the response as well as coping with consequences and use of support.</p>	<p>Semi-structured individual interviews (n=27)</p>	<p>Interpretative phenomenological <i>analysis</i> (Smith <i>et al.</i>, 2003)</p>	<p>Indications that owing to complications, surgeons in the long term are affected by personal and professional consequences (emotional, behavioural, cognitive, social and otherwise), according to the possibility of avoiding these complications. Influencing factors consist of the particularities of the individual case, the surgeon's own personality, as well as characteristics of patients and families (e.g. outcomes and reactions), teams and organisations (e.g. blame-culture). Discussions about complications, reconstruction of the event and rationalization, aiming at problem- and emotion-focused coping proved to be the most important and most frequently available resource, in addition to collegial support. In contrast, organisational support was described as insufficient.</p>

Author /year	Design/Setting/ Country	Sample	Event	Aim/Research question	Data collection	Data analysis	Results
Plews-Ogan et al., 2013 ⁴²	<i>Design:</i> Grounded Theory <i>Setting:</i> Academic institutions and medical practices <i>Country:</i> USA	<i>Casual sample:</i> 61 physicians (women: n=28; men: n=33) with a median age of 46, various specialisations, willing to talk about a serious error event (mostly diagnostic error). Disclosure to patients occurred in 61% of cases. Data are considered of 46 physicians who reached "wisdom" after error involvement.	<i>Serious error events;</i> defined as events having actually or potentially entailed harm (including disability, death or additional medical care)	The aim was to investigate the experience of positive coping associated with serious error events	Semi-structured individual interviews (n=61)	Data analysis according to Grounded Theory (coding and constant comparative analysis)	Indications that as a result of serious adverse events, physicians can attain growth and "wisdom" via a circular process. After accepting the reality, learning from the event becomes possible as the basis for integrating experiences and reaching advanced ways of perceiving, thinking and acting. In this context, "wisdom" can be interpreted as a result of reflected experience. A central aspect of this experience is the development of a balance between humility regarding imperfection and self-confidence as a result of positive changes
Rassin et al., 2005 ⁴³	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> Major national hospital <i>Country:</i> Israel	<i>Casual sample:</i> 21 nurses (Bachelor degree: 60%; women: n=14; men: n=7), between 21 and 52 years of professional experience, having been involved in a medication error. The event occurred between three and 24 months before the interview	<i>Medication error;</i> defined as, e.g., dosage errors or administration error	The aim was to investigate the consequences of medication errors on the psychological and social condition. The focus was on subjective perception of the error event and coping with consequences.	Semi-structured in-depth individual interviews (n=21)	Content analysis (Berg, 1998)	Indications that stress, pressure and negligence represent central error-promoting factors in the process of medication. Nurses respond to some extent in a long-term physical and emotional way (e.g., with fear and guilt). Initially they try to cope with consequences and with their responsibility in a rather problem-focused way. Afterwards they pass over to a rather emotion-focused manner of coping, e.g., by talking with their family about error events and by learning from this event.
Rinaldi et al. 2016 ⁴⁴	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> Local health care service and university hospital <i>Country:</i> Italy	<i>Targeted sample:</i> 33 healthcare professionals (nurses: n=20; physicians: n=6; midwives: n=4; others: n=3; women: n=20; men: n=13) with professional experience between 3 and 20 years, being able to describe minimally one (most serious) event, having occurred between five and 132 months before the interview	<i>Adverse events;</i> not defined	The aim was to investigate psychosocial consequences of adverse events, focusing on recovery and current support.	Semi-structured individual interviews (n=33)	Analysis by means of Qualitative Data Analysis Guides of Leuven (Dierckx de Casterleé et al., 2012)	Indications that following adverse events, healthcare professionals can be affected by headache and stomach pain, additionally to the physical and psychosocial symptoms often described in the literature, e.g., extreme tiredness, increased respiratory rate, intrusions, fear of returning to the work place). In this study, participants passed through the six stages towards restoring integrity described by Scott et al. (2009) in an American comparative population. Participants expressed their wish for external psychological support and experienced support they received as insufficient. Therefore, less than half of the participants made use of psychological support. The need to talk about the event and to receive understanding was particularly pronounced.
Santos et al., 2007 ⁴⁵	<i>Design:</i> Explorative-descriptive qualitative design <i>Setting:</i> Hospital <i>Country:</i> Brasil	<i>Targeted sample:</i> 15 nurses (predominantly female nursing assistants) between 22 and 49 years, having been involved in an medication error	<i>Medication error;</i> not defined	The aim was to identify feelings and coping strategies	Semi-structured individual interviews (n=15)	Thematic analysis (Polit et al., 2004)	Indications that after medication errors, nurses can be affected by panic, despair, concern, guilt, shame and uncertainty. To reach a feeling of calmness, they search for help in conversations and learn from error events, thereby developing strategies to avoid error events in the future.

Author /year	Design/Setting/ Country	Sample	Event	Aim/Research question	Data collection	Data analysis	Results
Scheibred <i>et al.</i> , 2007 ⁴⁶	<p><i>Design:</i> Explorative-descriptive qualitative design</p> <p><i>Setting:</i> Hospitals, community services, nursing homes (n=7 bzw. n=2 bzw. n=1)</p> <p><i>Country:</i> Norway</p>	<p><i>Targeted sample:</i> 10 nurses with professional experience between 6 months and almost 30 years, involved in medication errors having actually or potentially resulted in significant patient harm</p>	<p><i>Medication error;</i> defined as events having actually or potentially entailed significant injuries (e.g., dosage error or application error)</p>	<p>The aim was to describe the experiences of nurses involved in serious medication errors in order to investigate which kind of support they received after disclosing the error event.</p>	<p>Semi-structured in-depth individual interviews (n=10)</p>	<p>Phenomenological interpretation and analysis (Giorgi, 1985 and 1997)</p>	<p>Indications that following medication errors, nurses are personally and professionally deeply affected, depending, in part, on others' responses. Immediately after a medication error, they respond with panic. However, despite paralysis, exhaustion and loss of control, they try everything to alleviate the harm experienced by the affected patient. Particularly after events entailing irreversible harm, nurses report about personal and professional traumatization, accompanied by guilt, shame, betrayal, suicidal thoughts or the intention to leave the profession. Most nurses articulate the need for support and attest a better healing effect to conversations with colleagues than with friends or family members. However, they mostly do not receive sufficient support. Overall, nurses are willing to share their experience. This, however, implies the possibility to feel trust.</p>
Schwappach <i>et al.</i> , 2010 ⁴⁷	<p><i>Design:</i> Explorative-descriptive qualitative design</p> <p><i>Setting:</i> Hospitals</p> <p><i>Country:</i> Switzerland</p>	<p><i>Targeted sample:</i> 11 nurses, 7 physicians</p>	<p><i>Error event;</i> not defined</p>	<p>The aim was to investigate the needs for supportive interventions and to identify factors allowing and fostering positive coping and overcoming error-related stress.</p>	<p>Focus group interviews (n=3)</p>	<p>Qualitative analysis</p>	<p>Indications that nurses and physicians in Swiss hospitals are affected by emotional responses similar to those described in international literature (e.g., vegetative reactions, guilt, shame). To receive support, they search for a person of trust and articulate the need for a committee offering support on the emotional level, supplementary to the CIRS committee. They also express the necessity of education and further education as well as for support programs with the aim of learning to cope with error events. According to the results, nurses show different ways of dealing with error events.</p>
Scott <i>et al.</i> , 2009 ²	<p><i>Design:</i> Explorative-descriptive qualitative design</p> <p><i>Setting:</i> University hospital</p> <p><i>Country:</i> USA</p>	<p><i>Targeted sample:</i> 31 health care professionals with professional experience between six months and 36 years (physicians: n=10; nurses: n=11; others: n=10; women: n=18; men: n=13); the event took place between three months and 44 months before the interview</p>	<p><i>Adverse event;</i> not defined</p>	<p>The aim was to describe and characterize the experiences and the course of restoration</p>	<p>Semi-structured individual interviews (n=31)</p>	<p>Iterative reading, classification of stages and characterisation</p>	<p>Indication that confrontation with an adverse patient event can be a life-altering experience for healthcare professionals, independent of gender, profession and professional experience, releasing psychosocial (frustration) and physical symptoms (extreme tiredness) as well as trigger-related flashbacks. Emotions can be classified by means of a six-step course leading towards restoration, comprising chaos, response, intrusions, restoration of personal integrity, enduring the investigation, receiving emotional first aid and "moving on" in three ways: leaving the profession, surviving or thriving in professional life.</p>
Ullström <i>et al.</i> , 2014 ⁴⁸	<p><i>Design:</i> Explorative-descriptive qualitative design</p> <p><i>Setting:</i> University hospital</p> <p><i>Country:</i> Sweden</p>	<p><i>Targeted sample:</i> 21 health care professionals with professional experience between five and 30 years (physicians: n=10; nurses: n=9; others: n=2; women: n=16; men: n=5)</p>	<p><i>Serious adverse events;</i> defined as events having actually caused harm or having a high risk to cause harm (e.g., medication error or diagnostic error)</p>	<p>The aim was to investigate how healthcare professionals are affected by avoidable serious adverse events; the focus was on desired and received organisational support.</p>	<p>Semi-structured individual interviews (n=21)</p>	<p>Qualitative content analysis (Shanon <i>et al.</i>, 2005; Graneheim <i>et al.</i>, 2004)</p>	<p>Indications that adverse events can have a personal effect (emotional distress) as well as a professional long-term effect on health care professionals, depending on the response of the organisation. Many professionals react emotionally, e.g., with shock, sadness or fear and feel uncertain about their professional role. Although they express the need to talk about the event and to receive emotional support from the organisation and from peers, organisational support is insufficient, unstructured and unsystematic. Lack of support and feedback complicates emotional processing.</p>

Author /year	Design/Setting/ Country	Sample	Event	Aim/Research question	Data collection	Data analysis	Results
van Gerven et al., 2016 ⁴⁹	<p><i>Design:</i> Explorative-descriptive qualitative design</p> <p><i>Setting:</i> Hospitals</p> <p><i>Country:</i> Belgium</p>	<p><i>Casual sample:</i> 31 health care professionals (nurses: n=17; physicians; n=11; midwives: n=3), having been directly involved in patient safety events resulting in deaths (n=14), serious harm (n=9), short-term harm (n=7) or no harm (n=1). Excluded were health care professionals having been involved in legal cases or having been involved only indirectly in patient safety events</p>	<p><i>Patient safety events;</i> defined as events or circumstances causing or having caused harm</p>	<p>The aim was to identify the consequences of patient safety events with regard to coping strategies, support needs and received support and to identify factors influencing the extent of "second victim" experience.</p>	<p>Semi-structured in-depth individual interviews (n=31)</p>	<p>Using sensitive concepts (Bower, 2006)</p>	<p>Indications that following serious patient safety events, healthcare professionals are personally and professionally affected by symptoms presenting on an emotional, psychological and physical level. They use several problem- and emotion-focused coping strategies. One of the aims consists of learning from the event. Therefore, "second victims" should be, for example, integrated into root-cause analyses. However, repression and flight are also common ways of coping. To openly discuss patient safety events, safety culture is required as a supportive basis, formed by colleagues, families and professionals. The extent of the consequences on „second victims“ depends on various personal, situational and organisational aspects</p>

(author's own chart)

Table 3: Metasummary

		Transactional „second victim“ experience						
Category	Author/year	Safety culture*	Health care professional	Appraising the situation	Restoring integrity*	Continuing professional life	Intensity (%)	
							dichotomous	continually / n=2015
	Balogun et al., 2015 ³²	33	10	10	21	1	100	4
	Christensen et al., 1992 ³³	34	24	48	32	7	100	7
	Crigger et al., 2007 ³⁴	11	10	33	67	1	100	6
	Engel et al., 2006 ³⁵	39	4	29	17		80	4
	Kroll et al., 2008 ³⁶	32	14	11	15	1	100	4
	Luu et al., 2012 ³⁷	22	9	24	19	5	100	4
	Mankaka et al., 2014 ³⁸	17	12	15	13		80	3
	May et al., 2012 ³⁹	87		8	10		60	5
	Mohsenpour et al., 2016 ⁴⁰	23	10	90	18		80	7
	Pinto et al., 2013 ⁴¹	45	25	29	26	1	100	6
	Plews-Ogan et al., 2013 ⁴²	11	5	3	57	16	100	5
	Rassin et al., 2005 ⁴³	8	5	16	16		80	2
	Rinaldi et al., 2016 ⁴⁴	30		64	15	9	80	6
	Santos et al., 2007 ⁴⁵	4	1	18	8	1	100	2
	Schelbred et al., 2007 ⁴⁶	47		44	39	7	80	7
	Schwappach et al., 2010 ⁴⁷	76	3	11	9		80	5
	Scott et al., 2009 ²	25	4	50	20	14	100	6
	Ullström et al., 2014 ⁴⁸	34	7	39	21	2	100	5
	van Gerven et al., 2016 ⁴⁹	114	17	73	57	3	100	13
Frequency (%)								
	dichotomous	100	84	100	100	68		
	continually	34	8	31	4	3		

*intersecting categories
(author's own chart)

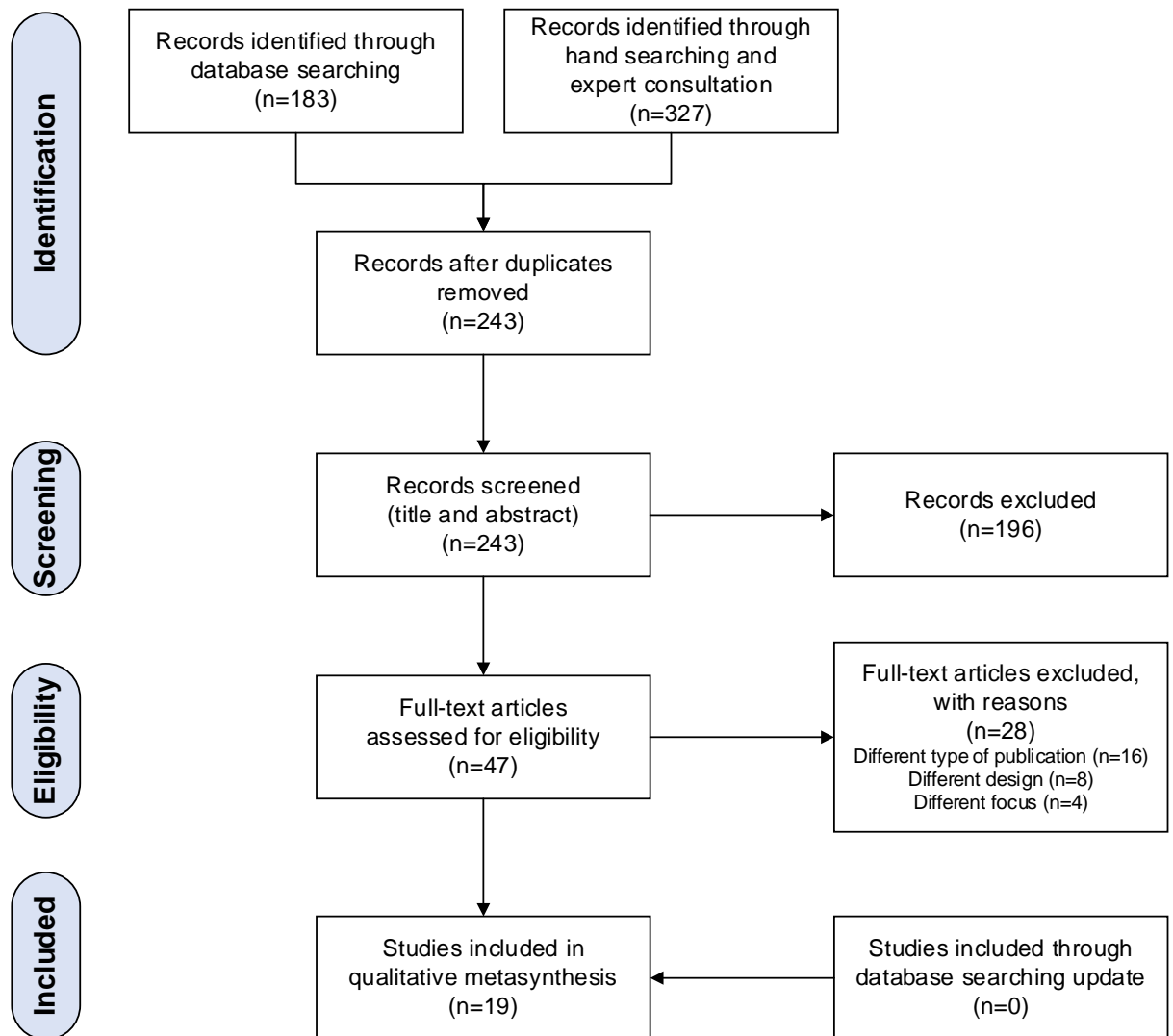


Figure 1: Flow diagram of included studies, following Moher *et al.* (2009)⁷⁵

	Aim/research question(s)	Design	Literature research	Selection of participants	Descriptions of participants	Description of researchers	Data collection	Data analysis	Saturation	Description of results	Validation of results
Balogun et al., 2015	+	+	+	+	+	?	+	?	+	+	?
Christensen et al., 1992	+	+	+	+	+	?	+	?	?	+	+
Crigger et al., 2007	+	+	+	+	+	?	+	+	+	+	+
Engel et al., 2006	+	+	+	+	+	?	+	?	?	+	+
Kroll et al., 2008	+	+	+	+	?	?	+	+	?	+	+
Luu et al., 2012	+	+	+	+	+	?	+	+	+	+	+
Mankaka et al., 2014	+	+	+	+	+	+	+	+	+	+	+
May et al., 2012	+	+	+	+	+	?	+	+	+	+	?
Mohsenpour et al., 2016	+	+	+	+	+	?	+	+	+	+	+
Pinto et al., 2013	+	+	+	+	+	?	+	+	+	+	+
Plews-Ogan et al., 2013	+	+	+	+	+	?	+	+	+	+	+
Rassin et al., 2005	+	?	+	+	+	?	+	?	?	-	?
Rinaldi et al., 2016	+	+	+	+	+	?	?	+	?	+	+
Santos et al., 2007	+	+	+	+	+	?	+	?	+	+	?
Schelbred et al., 2007	+	+	+	+	+	?	+	+	?	+	?
Schwappach et al., 2010	+	+	+	+	?	?	+	?	?	+	?
Scott et al., 2009	+	+	+	+	+	?	+	?	?	+	+
Ullström et al., 2014	+	+	+	+	+	?	+	+	?	+	+
van Gerven et al., 2016b	+	+	+	+	?	?	+	?	+	+	+

Legend: green=adequate, yellow=unclear, red=problematic

Supplement 2: Methodological quality of included studies

(author's own chart, elaborated by means of review manager 5.3, Nordic Cochrane Centre, 2014).

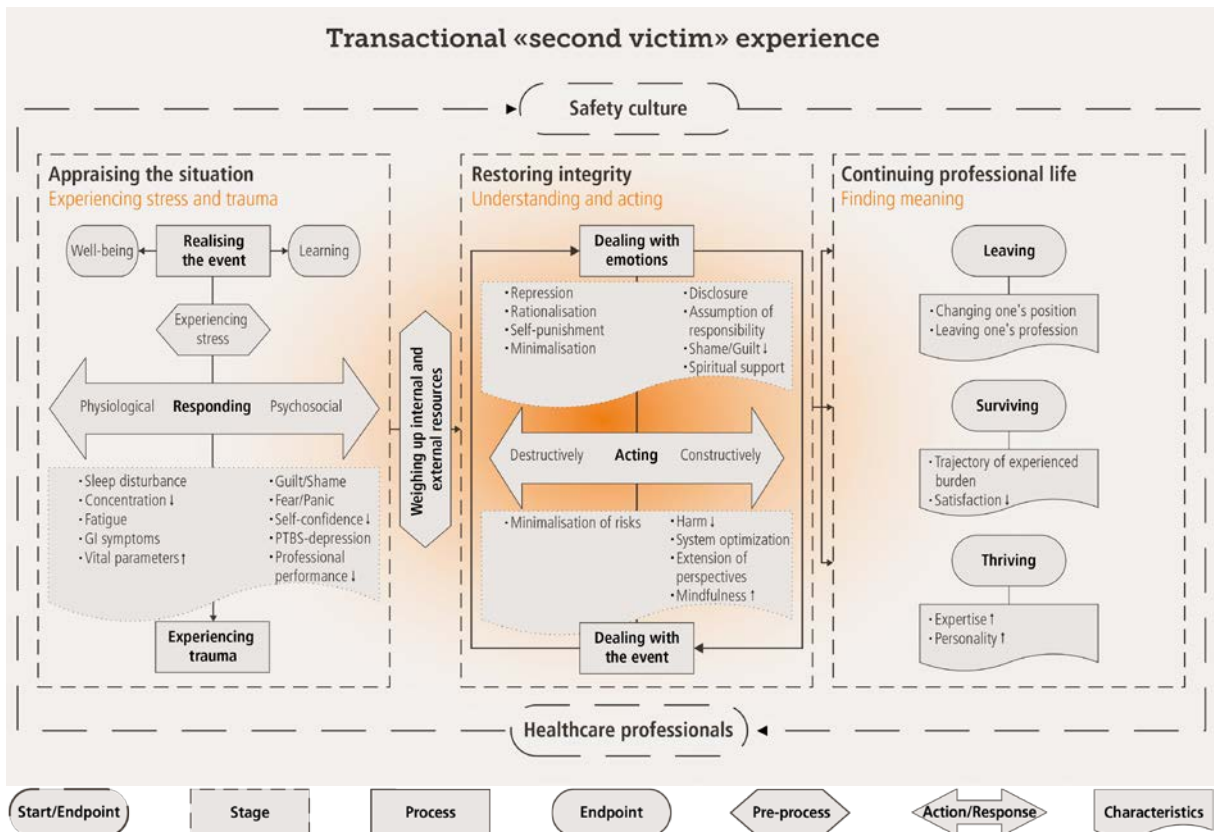


Figure 2: Transactional "second victim" experience (author's own chart)