SURGEONS' STRESS ASSESSMENT AFTER SURGICAL MORTALITY: FIRST INTERNATIONAL VALIDATED SURVEY (STRESSURG study)

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List of Abbreviations:

PTSD: Post-Traumatic Stress Disorder

IES-R: Impact of Event Scale-Revised

MDM: Morbidity and Mortality Multidisciplinary Meeting

OS: Overall Survival

1. PROTOCOL ABSTRACT

Background: Over the last decade, the significance of mental health in the medical field has gained increased recognition, especially due to the COVID-19 pandemic. Numerous studies have highlighted the psychological toll on healthcare providers, including surgeons who experience patient perioperative mortality. A validated psychological score, the Impact of Event Scale-Revised (IES-R), is a useful self-report scale designed to assess the subjective distress caused by traumatic events. Through 22 items, IES-R assesses the severity of post-traumatic stress symptoms.

Aim: This study aims to evaluate the psychological impact on surgeons 'lives and surgical practices following an unexpected death of a patient during surgery or within 48 hours post-surgery.

Methods: A self -survey evaluation by using the IES-R, will measure the prevalence and severity of post-traumatic stress symptoms among surgeons. The study will focus on gender differences and the effect of professional experience on these psychological outcomes. Additionally, we will assess the frequency of discussions about such events in morbidity and mortality multidisciplinary meetings and the level of psychological support surgeons receive in their institutions.

Limitations: Memory degradation over time and alleviation of PTSD symptoms as part of the healing process could modified responses. How trauma is perceived after receiving therapy or social support may mitigate this concern; thus, we have introduced additional questions into the survey.

Strengths: Despite these considerations, the IES-R was specifically designed for retrospective use following traumatic events. The IES-R serves as a valuable instrument for assessing the psychological toll that an incident has taken on the lives of surgeons because it examines the overall effect rather than specific details.

PLANNING: The survey will be share as soon as possible. Data-analysis is expected to be ready to present its findings at the E-AHPBA conference in June in Dublin in 2025. Manuscript completion is expected around June 2024.

2. INTRODUCTION

Over the last decade, mental health has gained increasing relevance in the medical field. The interest in mental health and caregiving has led to an increase in scholarly articles about mental health during and after the COVID-19 Pandemic. In the first three years after the pandemic's onset, over 4000 scholarly articles highlighted the need to understand the impact of traumatic events, such as patient deaths on healthcare providers (1). Before 2019, there were very few studies or systematic reviews on this topic. A study by Joliat GR et al., conducted immediately preceding the COVID-19 pandemic, examined the effects of patient deaths on surgeons (2). Despite the review of the literature, merely seven studies were analysed indicating a lack of literature delineating the lasting psychological impact of patient mortality on surgeons**.**

Surgeons are regularly placed in high-stress environments where they must make important decisions. Patient perioperative mortality is an event that most surgeons will face at some point during their careers. The rates of perioperative mortality can vary widely based on factors such as the patient's overall morbidity, the stage of cancer, the complexity of the surgery (even within the same type of procedure), the skill and experience of the surgical team and the volume of the centre. There are several estimations: for colorectal cancer surgery, perioperative mortality rates range from 2 to 7%, depending on the income level of the country (3)(4), for gastric surgery, rates range from 3.8 to 10%, also depending on the country's income level (4), and for pancreatic cancer surgery, rates ranges from 1.6 to 16%, influenced by the volume of the hospitals and the complexity of the cases (5)(6).

Furthermore, in acute emergency surgeries, perioperative mortality often ranges from 10% to 40%, depending on the severity and complexity of the trauma. Liver surgery can have mortality rates from 4% to as high as 15-25% if extreme hepatic and biliary surgeries are needed, particularly in patients with underlying cirrhosis or liver disease with subsequent frailty (7). Liver transplant mortality typically range from 3% to 10% (8), but can reach up to 36% in re-transplantations situations in low-volume centres (9). Pancreatic transplant mortality ranges from 2% to 5%. Despite the high mortality rates, these surgeries remain life-saving procedures and should performed due to the increased overall survival (OS) that they can provide (ref).

These numbers are not exempt from evoking sadness, guilt, and embarrassment when involved in major adverse events. Studies have shown that surgeons often experience a range of emotional responses, including sadness, stress, anxiety, and guilt, which can lead to more serious mental health issues such as depression, post-traumatic stress disorders (PTSD) and burnout (10)(11). Moreover, the recent heightened focus on the well-being of physicians and surgeons has led to more attention towards traumatic affectations and suffering, commonly denoted as the "second victim syndrome" or phenomenon (12). That term was coined by Albert Wu in 2000 (13). Psychological assessment of surgeons after traumatic events, such as the death of a patient, has become an important issue that requires support and assistance.

Furthermore, these events have often been hidden due to our inability to accept or cope with the lack of success and the difficulty in seeing these occurrences as part of the inherent risks rather than solely personal failures or social stigmas associated with failure (ref). A recent scoping review indicated that female and junior surgeons tend to personalise the situation. They appear to be more affected and are more open in admitting to this impact (10)(14).

Despite the increased interest in mental health for healthcare workers after the COVID-19 pandemic, there remains a significant lack of adequate mental health support to address the increased stress and trauma experienced by physicians (1). Recent literature reviews indicate that the institutional support provided is still inadequate (11)(15). Albert Wu et.al, observed the absence of assistance for physicians when errors occur (13). This observation was also supported by Akyol et.al, through a national survey conducted in 2022, where they described the need for increased effort from institutions and organizations to provide effective support in coping with the emotional burden (16).

The aim of this study is to evaluate the psychological impact on surgeon's lives and surgical practices after an unexpected death on the operating table or within 24-48 hours.

3. METHODS

An international online survey using Google Forms consisting of 52 questions will be conducted.

3.1 Patients and design

The online international survey is voluntary and can be anonymous. However, surgeons who wish to share their name and affiliations will be acknowledged as collaborators. A validated psychological score, the Impact of Event Scale-Revised (IES-R) (17) will be used, covering three sections: demographics, the IES-R, and opinions. Participants will have a period of 6 months to complete the survey before data analysis begins.

3.2 Inclusion criteria

- **Inclusion criteria:** Surgeons of all genders and levels of experience who have experienced the unexpected death of a patient during surgery or within 24-48 hours post-operation.
- **Exclusion criteria**: Non-surgeons or surgeons who have not experienced an unexpected patient death as described.

3.3 Definitions

The IES-R is a self-report scale designed to assess the subjective distress caused by traumatic events during seven days after the traumatic event. Allowing to assess the severity of post-traumatic stress symptoms. It focused on two key components: intrusive thoughts and avoidance behaviour. These components were identified as central features of stress response to trauma (17). It is a revision of the original Impact of Event Scale (IES), which was developed by Mardi Horowitz and colleagues in 1979 (18). The IES-R was created to include a broader range of symptoms associated with post-traumatic stress disorder (PTSD) and to improve the sensitivity and specificity of the original scale. The scale was expanded to 22 items, covering three symptom clusters: Intrusion (8 items related to intrusive thoughts,

nightmares, etc…), Avoidance (8 items related to avoiding reminders of the trauma), and Hyperarousal (6 items related to heightened physiological arousal). Each item was rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely).

3.4 Objectives

- **Primary endpoint**: to describe the prevalence and severity of PTSD symptoms in surgeons after an unexpected surgical death, using the IES-R score.

- **Secondary endpoints**: to evaluate how gender and experience affect surgeons after a patient´s death, how often those cases will be discussed in MDMs, and the level of psychological support surgeons received in their institutions.

3.5 Data collection

Data will be collected using Google Forms and Excel, and analysis will be carried out using Stata, a statistical software for data science. The survey will be anonymous, with single-response completion to maximize data accuracy. However, surgeons willing to share their names and affiliations will be acknowledged as contributors. This survey will be shared with international societies. Participants will have 6 months to complete the survey, with data analysis scheduled for presentation at the E-AHPBA conference in June 2025.

3.6 Ethics

Ethical approval will be sought from Ethics Committee of Hospital del Mar. Responses can be anonymous or non-anonymous and will be recorded in the Google Forms application.

3.6 Statistical Analysis

Statistical analysis Data will be conducted using Stata/BE 18 (StataCorp LLC, College Station, TX, USA). Descriptive statistics will summarize the baseline characteristics of the study population. Regression models will assess the relationship between independent and

dependent variables, adjusting for potential confounders. Student's t, Mann Whitney U, Chi-square, or Fisher's exact tests will be used as appropriate. Categorical data will be expressed as frequency and percentage. Continuous data will be expressed either as mean and standard deviation or as median and interquartile range depending on the distribution of the data. Subgroups will compare characteristics and treatment outcomes, using Chi-square test, Mann-Whitney U test and Kruskal Walls test as appropriate. Alpha < 0.05 will indicate statistical significance.

4. AUTHORSHIP AND PUBLICATION POLICY

Authorships will be based on the International Committee of Medical Journal Editors (ICMJE) guideline https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html. Participants willing to share their names and affiliations will be listed as a collaborator in alphabetic order. Centres with more than 10 participants will be acknowledged as affiliation in the published article. The first authorship position is reserved for the study coordinator (OM). Principal investigators will be listed as senior authors.

5. REFERENCES

1. Huang J, Huang ZT, Sun XC, Chen TT, Wu XT. Mental health status and related factors influencing healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Vol. 19, PLoS ONE. 2024. 21–31 p.
2. Joliat GR, Demartines N, Uldry E. Systematic review of the impact of patient death on surgeons. Br J Surg. 2019;106(11):1429–32.
3. Zhao J hua, Sun J xu, Gao P, Chen X wan, Song Y xi, Huang X zhang, et al. Fast-track surgery versus traditional perioperative care in laparoscopic colorectal cancer surgery: a meta-analysis. BMC Cancer [Internet]. 2014;14(1):607. Available from: https://doi.org/10.1186/1471-2407-14-607
4. Knight SR, Shaw CA, Pius R, Drake TM, Norman L, Ademuyiwa AO, et al. Global variation in postoperative mortality and complications after cancer surgery: a multicentre, prospective cohort study in 82 countries. Lancet. 2021;397(10272):387–97.
5. Sánchez-Velázquez P, Muller X, Malleo G, Park JS, Hwang HK, Napoli N, et al. Benchmarks in Pancreatic Surgery: A Novel Tool for Unbiased Outcome Comparisons. Ann Surg. 2019;270(2):211–8.
6. Tjarda Van Heek N, Kuhlmann KFD, Scholten RJ, De Castro SMM, Busch ORC, Van Gulik TM, et al. Hospital volume and mortality after pancreatic resection: A systematic review and an evaluation of intervention in The Netherlands. Ann Surg. 2005;242(6):781–90.
7. Filmann N, Walter D, Schadde E, Bruns C, Keck T, Lang H, et al. Mortality after liver surgery in Germany. Br J Surg. 2019;106(11):1523–9.
8. Valvi D, Villagomez D, Shah MB, Mei X, Gupta M, Ancheta A, et al. Perioperative Challenges in Patients Transplanted with Livers from Extreme Obese Donors. Liver Transplant. 2021;27(12):1824–9.
9. Oh SY, Jang EJ, Kim GH, Lee H, Yi NJ, Yoo S, et al. Association between hospital liver transplantation volume and mortality after liver re-transplantation. PLoS One [Internet]. 2021;16(8 August):1–15. Available from: http://dx.doi.org/10.1371/journal.pone.0255655
10. Siddaiah-Subramanya M, To H, Haigh C. The psychosocial impact of surgical complications on the operating surgeon: A scoping review. Ann Med Surg. 2021;67(July):102530.
11. Biggs S, Waggett HB, Shabbir J. Impact of surgical complications on the operating surgeon. Color Dis. 2020;22(9):1169–74.
12. Busch IM, Moretti F, Purgato M, Barbui C, Wu AW, Rimondini M. Psychological and Psychosomatic Symptoms of Second Victims of Adverse Events: A Systematic Review and Meta-Analysis. J Patient Saf. 2020;16(2):E61–74.
13. Berwick DM. Medical error: the second victim. The doctor who makes the misake needs help too. 2000;320(March):726–7.

14. Luu S, Patel P, St-Martin L, Leung AS, Regehr G, Murnaghan ML, et al. Waking up the next morning: Surgeons' emotional reactions to adverse events. Med Educ. 2012;46(12):1179–88.

15. El Hechi MW, Bohnen JD, Westfal M, Han K, Cauley C, Wright C, et al. Design and Impact of a Novel Surgery-Specific Second Victim Peer Support Program. In: Journal of the American College of Surgeons [Internet]. American College of Surgeons; 2020. p. 926–33. Available from: https://doi.org/10.1016/j.jamcollsurg.2019.10.015

16. Akyol C, Celik SU, Koc MA, Bayindir DS, Gocer MA, Karakurt B, et al. The Impact of Patient Deaths on General Surgeons' Psychosocial Well-Being and Surgical Practices. Front Surg. 2022;9(April):1–7.

17. Konopaske GT, Dorph-Petersen KA, Sweet RA, Pierri JN, Zhang W, Sampson AR L DA. The impact of Event Scale-Revised: Phsychometric properties in a sample of motor vehicle accident survivors. Bone. 2008;23(1):1–7.

18. Horowitz M, Wilner N, Alvarez W. Impact of event scale: A measure of subjective stress. Psychosom Med. 1979;41(3):209–18.