

POST-SEPSIS SYNDROME: A CASE STUDY

by

Summer L. West

A Senior Honors Project Presented to the

Honors College

East Carolina University

In Partial Fulfillment of the

Requirements for

Graduation with Honors

by

Summer West

Greenville, NC

December 5, 2022

Approved by:

Dr. Amy Campbell

East Carolina University College of Nursing

Abstract

Post-Sepsis Syndrome (PSS) is comprised of the physical and psychological manifestations affecting sepsis survivors. Sepsis is difficult to diagnose and there are no universal treatment guidelines. A qualitative exploratory single case study was conducted to explore PSS and its effects on quality of life. The case was a community-dwelling 52-year-old adult male, “Tom,” who experienced a near-fatal accident in 2004 and as a result, experienced sepsis three times. Data were collected through a semi-structured interview, lasting one hour. The transcript was read independently by three readers and first and second-level code words and phrases were categorized. Content and thematic analysis were used to identify common themes. The overarching theme, a System out of Whack, was represented by three sub-themes: Hard work, Being lost, and Sort of normal. This study found PSS is a chronic condition requiring long-term management and rehabilitation. In addition, caregivers are critical to the safety and well-being of PSS survivors. Further qualitative research is needed to understand PSS survivors’ and their caregivers’ needs. This research could be used to educate the healthcare team on how to guide long-term care for patients, their families, and caregivers.

Post-Sepsis Syndrome: A Case Study

In the United States (US), sepsis is the leading cause of death in hospitals (Hu et al., 2022). Each year, 1.7 million people in the US develop sepsis, with 270,000 subsequently dying (Ackerman et al., 2021). In 2020, North Carolina's sepsis death rate was 12.2 per 100,000, ranking it the thirteenth-highest state in the nation (National Center for Health Statistics, 2022). Sepsis is defined as organ dysfunction related to an individual's dysregulated response to infection. This condition, named by the World Health Organization (WHO) as a global health priority, is life-threatening and can lead to death in some individuals (Ackerman et al., 2021; Merdji et al., 2021).

Sepsis survivors are at an increased risk of being re-hospitalized due to infections, mental health disorders, renal failure, cognitive impairment, and cardiovascular events compared to non-sepsis patients (Van der Slikke et al., 2020). The cost of a sepsis diagnosis totals more than each of the costs associated with chronic heart failure, chronic obstructive pulmonary disease, and pneumonia (Schmidt et al., 2022). Due to the lasting emotional and physical complications, only 50% of sepsis survivors return to work within the first year of post-hospitalization and 25% require a caregiver to assist them in their activities of daily living (Umberger et al., 2021). Investigators have found that after recovering from sepsis, survivors have a 30-day hospital readmission rate between 20% and 32%, a 90-day readmission rate of 40%, and a one-year readmission rate of 63%, indicating that overcoming sepsis does not mean a restoration of pre-sepsis quality of life or outcome (Mostel et al., 2019). With each readmission, individuals have a heightened risk of Post-Sepsis Syndrome (PSS), and one in five persons go on to develop PSS. PSS includes the long-term physical and psychological effects experienced by survivors after

they have received treatment for sepsis. In addition, PSS can last up to eight years, significantly impacting an individual's quality of life (Leviner, 2021; Van der Slikke et al., 2020).

Review of Literature

To understand this phenomenon, we searched PubMed and OneSearch, using the terms, “post-sepsis,” “Post-Sepsis Syndrome,” “post-sepsis sequelae,” and “sepsis survivors.” A total of 17 studies were found on PSS; there were six systematic reviews (between the years 2018-2021). Two studies were qualitative or had a qualitative component—one was a convergent, mixed-methods study that included face-to-face interviews with caregivers’ and the other was a phenomenological study to explore the physical and mental impacts of sepsis on health and quality of life. Both studies utilized content analysis. A nurse scientist contributed to seven studies, and only one study used a theoretical framework. We organized the literature into three categories: Physical and Psychological Manifestations of PSS, Symptom Management, and Primary and Secondary Prevention.

Physical and Psychological Manifestations of PSS

Risk factors for acquiring PSS include aging, the severity and duration of the sepsis episode, preexisting medical conditions including depression, vision and hearing impairments, delirium during hospitalization, residence in a nursing home, immobility, and single marital status (Calsavara et al., 2018; Leviner, 2021). Long-term complications of PSS affect sepsis survivors, their families, and caregivers. Physical symptoms include hallucinations, insomnia, muscle and joint pain leading to weakness, sexual dysfunction, and prolonged immunosuppression. Psychological symptoms include difficulty concentrating, low self-esteem, and mental disorders, such as depression, anxiety, and post-traumatic stress disorder (PTSD) (Calsavara et al., 2018; Leviner, 2021).

Clinical manifestations include physical symptoms which can affect an individual's activities of daily living. Investigators conducted a study to assess the functional status of sepsis survivors and discovered that those with no physical limitations prior to the sepsis event developed an average of 1.57 limitations in completing activities of daily living post-sepsis, while those hospitalized for reasons other than sepsis developed fewer new limitations (Mostel et al., 2019). In addition, Oh and Song (2021) discovered that of the 119,660 sepsis survivors in their study, 8.9% (10,648) were recently registered to have a physical disability after being diagnosed with sepsis, which is associated with an overall increased three-year all-cause mortality risk.

Sepsis causes inflammation to the vasculature system, which may result in atherosclerosis and cardiovascular events, such as stroke and myocardial infarction (Harding et al., 2020). As many as 45% of sepsis survivors do not have a diagnosis of cardiovascular disease prior to being hospitalized for sepsis; yet 25.9% of survivors experience at least one cardiovascular event after being hospitalized for sepsis (Mostel et al., 2019).

PSS also has long-term impacts on sleep and energy level, leading to what some sepsis survivors describe as “complete exhaustion” (Apitzsch et al., 2021). Apitzsch and colleagues (2021) identified four themes in their qualitative study—*The experience of health care and being a sepsis patient*, *New circumstances' impact on life*, *Family and social interactions*, and *The psychological impact on life*. Six out of eight sepsis survivors in this study reported fatigue, while two out of eight reported sleeping problems as long-term effects of sepsis (Apitzsch et al., 2021). Song et al. (2021) found that 6.4% of sepsis survivors were diagnosed with a sleep disorder within one year after receiving a diagnosis of sepsis. In addition, almost one-half of survivors suffer from PTSD six months post-discharge, leading to an increased risk of substance

abuse and insomnia. The origin of these sleep disturbances has been linked to delirium experienced during hospitalization, the use of sedatives, and increased sensitivity to stimuli post-hospitalization (Apitzsch et al., 2021; Song et al., 2021). Sleep disorders cause stress and affect energy levels and have been associated with a 1.79-fold increase in five-year all-cause mortality risk when diagnosed post-sepsis (Song et al., 2021).

Estimates show that 25% to 50% of sepsis survivors suffer from cognitive impairment, such as memory, concentration, and learning problems, or difficulty making decisions (Mostel et al., 2019). One out of three survivors suffer from depression and anxiety three months post-discharge (Van der Slikke et al., 2020). These emotional disorders are caused by the loss of memory experienced during sepsis and a fear of the future in the post-sepsis period, affecting an individual's quality of life (Mostel et al., 2019).

Symptom Management

There are no universal treatment guidelines for survivors experiencing PSS (Mostel et al., 2019). Treatment for PSS primarily focuses on symptom management. Post-sepsis discharge instructions include physiotherapy rehabilitation referral and psychosocial support for the sepsis survivor and their family (Raman et al., 2021; Van der Slikke et al., 2020). Mostel and colleagues found half of sepsis survivors reach either a complete or almost complete recovery two years post-discharge, while one-third of survivors die within two years post-discharge, and one-sixth have one or more of the long-term clinical manifestations of PSS (Mostel et al., 2019). One study found that 27.9% of 1731 participants received no education related to post-sepsis and long-term complications (Huang et al., 2019).

Primary and Secondary Prevention

Prevention has been found to be the most successful approach to reducing the incidence of sepsis and therefore PSS. Pre-sepsis primary prevention includes promoting handwashing and vaccinations and managing chronic diseases, such as obesity, diabetes, heart failure, hepatic disease, and nephrotic syndrome (Leviner, 2021). Secondary prevention includes early mobilization, using the lowest dose and shortest duration for medications, and avoiding sudden changes in blood glucose levels. Other methods include preventing delirium, administering pain medications and antibiotics, and controlling the source of infection (Leviner, 2021; Mostel et al., 2019; Van der Slikke et al., 2020). In combination, these interventions help reduce an individual's risk of acquiring PSS.

Theoretical Framework

The Individual and Family Self-Management Theory (IFSMT) is a descriptive mid-range nursing theory addressing the self-management (SM) of chronic illnesses and how SM impacts individuals and their family systems (Ryan & Sawin, 2009). The theory consists of three dimensions: context, process, and outcomes. Context refers to an individual's risk and protective factors. This dimension will be explored by examining the complexity of PSS, treatment plans, access to care, and health literacy related to post-sepsis. Process refers to a) knowledge and beliefs, b) self-regulation of skills and abilities, and c) social facilitation. This dimension will be evaluated by assessing ability to manage PSS and degree of social support. The outcome dimension incorporates the cost of healthcare services and quality of life. The outcomes dimension will be examined by describing health status and quality of life as related to PSS.

The IFSMT is supported by current evidence to improve health outcomes when SM behaviors are practiced by both individuals and their caregivers. This theory has been used in past nursing research to examine chronic SM conditions, such as, Type 1 Diabetes Mellitus in

adolescents (Verchota & Sawin, 2016), Human Immunodeficiency Virus (HIV) treated with antiretroviral therapy (Areri et al., 2020), and heart failure (Irani et al., 2019). In addition, the IFSMT has been used in nursing research to explore and guide other (non-chronic) SM behaviors, such as interventions to reduce pain associated with breastfeeding (Lucas et al., 2019), factors that affect physical activity among women (Sosa et al., 2021), and the effects of the COVID-19 pandemic on individuals' support after hospital discharge (Schmutz et al., 2022). The IFSMT is relevant in today's healthcare system with shortened hospitalization times leading to more care provided in the community by caregivers. Furthermore, the theory is applicable to sepsis survivors and their families as 25% of sepsis survivors need a caregiver to assist in the management of PSS (Umberger et al., 2021).

In summary, PSS occurs in up to 20% of sepsis survivors (Calsavara et al., 2018). This long-term condition has variable clinical manifestations that affect sepsis survivors and can lead to a decreased quality of life. Few investigators have captured the perspective of a PSS survivor with regard to daily life and symptom management. Thus, the purpose of this study was to explore PSS and the quality of life that this condition has on sepsis survivors.

Methodology

Research Design

A qualitative exploratory-holistic single case study (Yin, 2018) was conducted in the Fall of 2022. This study design was chosen to explore a clinical phenomenon, Post-Sepsis Syndrome, from a personal perspective that is not well understood. The research team was composed of a hospital-based nurse scientist (PI), a nursing honors student, and a nurse scientist with expertise in qualitative methods. Study approval was granted by the university's institutional review board, UMCIRB 22-001285.

The Case

The case for this study was a community-dwelling 52-year-old adult living in a rural county in Eastern North Carolina (NC). For this paper, the participant was given the pseudonym, Tom. One research team member learned of Tom through a family member and referred him to the principal investigator (PI) of this study. The PI shared a flyer via email with Tom's family member and Tom, to participate in the study. Tom agreed to participate and confirmed the time and location for the interview.

For many years, Tom had worked as an operations manager in a major medical center with responsibility of over 100 employees. He was a young adult when he experienced a near-fatal accident in 2004 where he free-fell from a height of eight feet, straddling a 1.5-inch piece of lumber. As a result, Tom suffered severe damage to all pelvic organs. In November 2016, he experienced his first episode of sepsis, and would later experience sepsis two more times, with each episode presenting progressively worse symptoms. Tom was chosen for this case study due to his symptoms related to PSS and his agreement to be interviewed.

Setting

The county has an estimated population of 172,000 people and is home to a major academic medical center. In both 2020 and 2021, in this county, sepsis was included in the top five diagnoses requiring hospitalization after an Emergency Department (ED) visit, making it a key condition faced by individuals living in this area. In 2020, it was the top diagnosis for patients hospitalized after presenting to the ED and occurred in 643 patients, ranking it above kidney disease, heart failure, COVID, and Chronic Obstructive Pulmonary Disease. In addition, septicemia was found to be the eighth leading cause of death in this county, at a rate of 16.04 per 100,000 in 2019 (United States Census Bureau, 2022).

Within the Academic Medical Center in this county, a Sepsis Steering Committee was established in 2014. This committee's mission is to coordinate evidence-based sepsis care for all nine hospitals affiliated with the Academic Medical Center. It is an interdisciplinary team that meets quarterly to discuss data, barriers to care, and current cases of sepsis. The interdisciplinary team includes the PI of this study (nurse researcher), ED physicians, ED nurses, Quality Nurse Specialists, Nurse Educators, Pharmacy, Emergency Response Team Nurses, Information Technology Specialists, and ED Leadership. The team has achieved a 25-50% quality improvement depending on the affiliate hospital related to the streamlining of order sets, developing the ED Sepsis nursing protocol, and job aids within the department.

Data Collection

Data was collected through a single semi-structured interview conducted by the PI. The interview was held in person in a room in an office building, private and convenient for Tom. The interview lasted 62 minutes. A semi-structured interview guide was developed from the literature and nursing practice and focused on day-to-day activities and how symptoms were managed. By asking open-ended questions, the research team was able to gain more insight into the long-term effects of PSS. On the day of the interview, Tom entered the room using a walker, and wearing slip-on tennis shoes, dress pants, and a polo-collared shirt. His hair was combed and appeared wet from a recent shower.

Data Management and Analysis

The interview was recorded using a digital audio recorder and transcribed verbatim the next day by the nursing honors student. The PI listened to the interview separately and reviewed the transcript to ensure accuracy. Three research team members read the transcript independently multiple times and met weekly to discuss coding and codebook development. We initially

conducted in vivo and descriptive coding (Miles et al., 2020). Content and thematic analysis were used to merge codes, create categories, and finalize the themes.

Study rigor was maintained by using a case study protocol and implementing a chain of evidence throughout the data analysis process. External validity was maintained by using the Individual and Family Self-Management Theory (Ryan & Sawin, 2009) to guide the research. Reflexivity was implemented by the research team's weekly discussions of code words, categories, and patterns identified in the transcript. Credibility was achieved by the PI summarizing major points at the end of the interview and receiving Tom's approval to ensure that his perspective was accurately captured.

Findings

The overarching theme, A system out of whack, was represented by three sub-themes, Hard work, Being lost, and Sort of normal. A system out of whack refers to how Tom described his entire body since experiencing Post-Sepsis Syndrome. Out of whack was first noted when Tom described how his first episode of sepsis affected his bodily functions. He stated,

But every system and when I say I mean, when I say everything, I'm talking about every system, head-to-toe, hand-to-hands, feet-to-feet I mean everywhere, everything that you can imagine, it goes wrong, it gets out of whack and may stay that way for weeks and it may come back and like that just umm that just may slow down to where and this is terrible but it can be 10 days between bowel movements.

Tom had particular trouble with his speech, which had progressively gotten worse with each sepsis episode. He stated, "I can't get it wrapped up in my mind to make it happen," referring to the difficulty he experienced in verbalizing his thoughts. Moreover, he explained that before PSS he had an IQ of 165, and now his IQ is 70. He further shared how he loves to read,

“there are days when a second-grade reader book would take me an hour or more to read, and then there are days where I can sit down and read the King James version of the Bible,” indicating the variability in his memory from day to day.

When asked to describe a typical day, he responded, “Everything is atypical.” Yet, he was able to piece together his typical day. He spends most days alone, with his dog in his apartment, behind his walker, trying to get a little exercise. Tom indicated trying to find a balance between sleep and wake times, stating that he would be “awake for six straight days with not even five minutes of sleep. No, no amount of sedative could put me to sleep.”

Sub-theme I: Hard Work

The first sub-theme, Hard work, refers to both how hard he worked as an operations manager before the near-fatal accident and how hard he worked in rehabilitation to regain his pre-fall health status. Following the hospitalization from the fall, Tom spent time in a rehabilitation center. Initially, Tom thought rehabilitation was going to return him to his baseline functioning before his sepsis episodes,

If I hadn't been where I was [the medical center] and exposed to all the things I was exposed to, I wouldn't have realized there was something wrong after my hard work and I'm going to go back to work but [what] happened would have been my hard work would have went to more hard work to more hard work and well basically I would have still ended up right where I am because nothing works because there's not enough known and that's the thing I would say is just don't let anybody ever tell you that it isn't, I mean it is as real as it gets.

In this statement, when Tom said, “exposed to all the things I was exposed to,” he was referring to his professional experience working as an operations manager. Tom was saying that because

of PSS, he has never been able to return to his baseline functioning. He is disabled and currently unemployed. After experiencing sepsis, he planned to return to work after completing rehabilitation; however, due to the long-term effects of PSS, he has not been able to return to work. He noted that he felt “crazy” when his baseline functioning, such as tying his own shoes, did not return. In addition, he mentioned his condition being “real,” almost like he must convince someone of his symptoms. He compared it to being as “real as the cancer that took my dad’s life, or like Lou Gehrig’s that took my high school typing teacher’s life.” He further remarked on the lack of knowledge of PSS among physicians, including specialists. This lack of knowledge poses even more of a challenge related to returning to baseline functioning. Tom expressed his expectations and then plummeting disappointments in all the hard work he put into rehabilitation,

You’re going to work through it. You’re going to come out the other side. No matter, no matter how hard I worked, I never could come out the other side because the other side always moved. It’s like being in a sphere and the goal is to get out of it, but the sphere is always moving.

In this instance, Tom was referring to the difficulty in accomplishing his goals in rehabilitation.

Sub-theme II: Being Lost

The second sub-theme, Being lost, refers to the isolation experienced by Tom because of PSS, which includes variability in cognitive functioning and memory loss. Tom stated how at times he experiences trouble remembering how to perform simple tasks, like tying his shoes,

Memory loss is a big thing...but the memories, they don’t stay gone. You can’t always trust what you remember because a lot of times it’s two or three things that you’re remembering as one thing. You know, they can be stuck together, but it’s the emotions,

the headaches, vision, and these are probably things I ought to have said earlier but umm, hearing.

Tom compared his memory loss to that experienced in dementia, saying “there are parts of it that are like it,” but he decided it’s not quite the same. Tom also mentioned “emotions,” when referring to his extreme emotions toward situations, he stated, “I cry...if somebody shuts the door too loud.” In addition, he mentioned headaches, vision, and hearing problems, which also lead to a sense of isolation related to activities of daily living. Tom also discussed how difficulty verbalizing his thoughts leads to isolation,

You know I define a group of people, you know, five, six, seven people you know, I just feel like the only thing or the, the best thing for me to do is to just find somewhere comfortable and fade away like a chameleon...

This statement is related to how Tom feels around a group of people due to the trouble he experiences in verbalizing his thoughts, a phenomenon known as expressive aphasia. When Tom mentioned how he tends to “disappear” when he gets around a group of five or more people, Tom stated,

I feel like I operate slower than everybody else’s operating system and I’m not compatible anymore. You know? It’s like my server won’t connect because I didn’t update enough and I think that’s what causes some of the things that I see now.

Tom shared concern that he feels he is “using somebody else’s hour” when trying to communicate due to the amount of time it takes for him to form his thoughts into words.

Therefore, instead of having the desire to communicate with others, he would rather “fade away like a chameleon,” a term used to signify disappearing in a room. Tom said if someone other

than his daughter is in a room, there “seems to be something off” and as a result, he often spends a lot of time by himself or talking to his dog.

Subtheme III: Sort of Normal

The third sub-theme, Sort of normal, represents Tom working toward achieving his pre-sepsis life and ultimately, identifying the things in his post-sepsis life that he still has control over. Tom explained,

One of the things that I’ve done for a good part of my life don’t laugh okay, please just don’t laugh. I know it’s an old fuddy-duddy thing to do but I started when I was young, and I kept doing it. First, it was coins and stamps that I collected and then I quit collecting coins for a while and collected stamps. And then I really got tired of stamps, but I really enjoyed collecting coins and it’s something that I did way before post- before sepsis and it’s something that you know I’ve continued to do now.

Tom was describing a hobby that he can still enjoy. He went on to state, “it’s harder...but it is the something that I can focus on, and the coin doesn’t have to talk back.” Collecting coins is a task that he can still do on his own, where he does not have to communicate with others, a source of worry for him.

Tom also expressed gratitude for being able to share his perspective, “Having someone listen to me jabber on relentlessly is, is nice I reckon’ ‘cause there are days when I realize you know I’ve not spoken all day.” As a result of Tom’s trouble with speech, he admitted “that’s how my life is, talking to a dog a lot.” Tom has found a sort of normalcy and comfort by talking to his dog instead of interacting with people.

Limitations

Several limitations were identified in this study, including a single case, limited to one county in North Carolina, and limited time in the field. Still, the participant was a knowledgeable informant, who had an important story to tell.

Discussion

In this exploratory single-case study, the research team was able to capture one individual's perspective of living with the long-term effects of PSS. Over the last two decades, PSS has been linked to poor quality of life, hospital readmission, and increased risk of death (Mostel et al., 2020). Most of Tom's experiences with cognitive and physical impairments correlate with findings in the literature (Leviner, 2021; Van der Slikke et al., 2020). Every day, Tom faces symptoms of insomnia, physical disability, memory loss, and low self-esteem. Currently, Tom is unemployed and dependent on a caregiver to complete tasks of daily living. Tom has experienced symptoms of PSS for six years and has variations in cognitive and physical impairment. Tom described having good and bad days, with no rationale for why some days were better than others. This is a discrepancy between this case and the literature, which states that symptoms can be experienced for up to eight years (Leviner, 2021). Tom has been readmitted with sepsis two additional times. Iwashyna et al. (2010) found with each new admission of sepsis, the chances of cognitive impairment were 3.3 times higher.

There has been little consideration related to how surviving sepsis burdens the patient and their family. Unlike other chronic illnesses, little is known about the emotional and physical effects of PSS (Mostel et al., 2020). Rehabilitation should be early and focused on these long-term, debilitating effects. In other critical illnesses, the caregivers and patients are educated on the dangers of the diagnosis and the possibility of relapse. Tom mentioned multiple times, providers were unsure of the cause of his symptoms and did not correlate them with his three

hospitalizations related to sepsis. Tom shared he had a wide variation of symptom occurrences including trouble verbalizing thoughts and extreme emotional responses to situations. His provider did not understand or see a correlation with PSS. There is a dire need to provide further education on the possible long-term effects of sepsis to the patient, family, and healthcare team.

Implementation of IFSMT

The IFSMT was utilized throughout this study to examine the holistic impacts of PSS (a chronic condition) on Tom. The context dimension is applicable to Tom due to the complexity and variability of his symptoms, as well as his advanced health literacy due to his experience working in a major medical facility. The process dimension applies to Tom through his efforts to manage his post-sepsis symptoms, such as adapting his daily tasks to meet his sleep needs and continuing to do hobbies that he loves, such as collecting coins. In addition, Tom has a strong relationship with his caregiver and daughter. The outcome dimension is demonstrated by Tom's perceived quality of life because of his symptoms.

Implications for Nursing Research and Practice

Only two studies that focus on the perspectives of sepsis survivors were found (Apitzsch et al., 2021; Huang et al., 2019). Apitzsch and colleagues (2021) conducted a qualitative study illuminating eight sepsis survivors' quality of life, while Huang and colleagues (2019) implemented a prospective, observational online survey study. The findings from this study suggest the need for more qualitative inquiry on the topic of PSS to include the perspectives of caregivers and clinicians. Current knowledge mainly focuses on sepsis, with little research on post-sepsis and how to best manage PSS symptoms. Moreover, this study found that Tom might benefit from having someone who experiences the same symptoms as a result of PSS to communicate with, therefore; one recommendation for practice would be to develop networks or

support groups for sepsis survivors within the community. Pandey (2018) found members of social support groups for their chronic diseases, like PSS, experienced an increased level of optimism, health esteem, and were better equipped to cope with their illness.

Further, more professional development should be considered for health care providers who may care for sepsis survivors, including physicians, nurses, physical therapists, occupational therapists, and so on. With this further education, providers can be more familiar with this condition to provide anticipatory guidance to sepsis survivors, their families, and caregivers related to the chance of experiencing long-term effects because of sepsis. This guidance has the potential to improve patient outcomes.

Conclusion

This study aimed to explore the long-term effects of Post-Sepsis Syndrome from the perspective of a single case study. By conducting an exploratory case study, the research team was able to capture the perspective of one individual who has PSS and identify areas for improvement in Eastern North Carolina's healthcare system pertaining to this condition. As a result, recommendations have been made to increase research on this condition, knowledge among healthcare providers, and support groups available to sepsis survivors. Further research should include a larger sample size composed of individuals from different counties/regions who experience symptoms related to PSS to get a broader view of the long-term effects of this condition, as well as other possible recommendations and implications for nursing practice related to PSS. Sepsis causes a lack of tissue perfusion to the vital organs and often causes irreversible damage. Sepsis can happen to any individual exposed to a bloodstream infection. Understanding PSS can change the trajectory of the disease process and improve the health of individuals around the world.

References

- Ackerman, M. H., Ahrens, T., Kelly, J., & Pontillo, A. (2021). Sepsis. *Critical Care Nursing Clinics of North America*, 33(4), 407-418. <https://doi.org/10.1016/j.cnc.2021.08.003>
- Apitzsch, S., Larsson, L., Larsson, A., & Linder, A. (2021). The physical and mental impact of surviving sepsis – a qualitative study of experiences and perceptions among a Swedish sample. *Archives of Public Health*, 79(1). <https://doi.org/10.1186/s13690-021-00585-5>
- Areri, H., Marshall, A., & Harvey, G. (2020). Factors influencing self-management of adults living with HIV on antiretroviral therapy in northwest Ethiopia: A cross-sectional study. *BMC Infectious Diseases*, 20(1). <https://doi.org/10.1186/s12879-020-05618-y>
- Boede, M., Gensichen, J. S., Jackson, J. C., Eißler, F., Lehmann, T., Schulz, S., Petersen, J. J., Wolf, F. P., Dreischulte, T., & Schmidt, K. F. (2021). Trajectories of depression in sepsis survivors: An observational cohort study. *Critical Care*, 25(1). <https://doi.org/10.1186/s13054-021-03577-7>
- Calsavara, A. J., Nobre, V., Barichello, T., & Teixeira, A. L. (2018). Post-sepsis cognitive impairment and associated risk factors: A systematic review. *Australian Critical Care*, 31(4), 242-253. <https://doi.org/10.1016/j.aucc.2017.06.001>
- Harding, M., Kwong, J., Hagler, D., Roberts, D., & Reinisch, C. (2020). *Lewis's medical-surgical nursing: Assessment and management of clinical problems* (11th ed.). Elsevier Health Sciences.
- Hu, J., Yo, C., Lee, H., Su, C., Su, M., Huang, A. H., Liu, Y., Hsu, W., Lee, M., Chen, Y., & Lee, C. (2022). Risk-standardized sepsis mortality map of the United States. *DIGITAL HEALTH*, 8, 205520762110724. <https://doi.org/10.1177/20552076211072400>

- Huang, C. Y., Daniels, R., Lembo, A., Hartog, C., O'Brien, J., Heymann, T., Reinhart, K., & Nguyen, H. B. (2019). Life after sepsis: An international survey of survivors to understand the post-sepsis syndrome. *International Journal for Quality in Health Care*, *31*(3), 191-198. <https://doi.org/10.1093/intqhc/mzy137>
- Irani, E., Moore, S. E., Hickman, R. L., Dolansky, M. A., Josephson, R. A., & Hughes, J. W. (2019). The contribution of living arrangements, social support, and self-efficacy to self-management behaviors among individuals with heart failure. *Journal of Cardiovascular Nursing*, *34*(4), 319-326. <https://doi.org/10.1097/jcn.0000000000000581>
- Iwashyna, T. J., Ely, E. W., Smith, D. M., & Langa, K. M. (2010). Long-term cognitive impairment and functional disability among survivors of severe sepsis. *Journal of the American Medical Association*, *304*(16), 1787-1794. <https://doi.org/10.1001/jama.2010.1553>
- Leviner, S. (2021). Post-sepsis syndrome. *Critical Care Nursing Quarterly*, *44*(2), 182-186. <https://doi.org/10.1097/cnq.0000000000000352>
- Lucas, R., Zhang, Y., Walsh, S. J., Evans, H., Young, E., & Starkweather, A. (2019). Efficacy of a breastfeeding pain self-management intervention: A pilot randomized controlled trial. *Nursing Research*, *68*(2), E1-E10. <https://doi.org/10.1097/nnr.0000000000000336>
- Merdji, H., Schini-Kerth, V., Meziani, F., & Toti, F. (2021). Long-term cardiovascular complications following sepsis: Is senescence the missing link? *Annals of Intensive Care*, *11*(1). <https://doi.org/10.1186/s13613-021-00937-y>
- Meyer, N., Harhay, M. O., Small, D. S., Prescott, H. C., Bowles, K. H., Gaieski, D. F., &

- Mikkelsen, M. E. (2018). Temporal trends in incidence, sepsis-related mortality, and hospital-based acute care after sepsis. *Critical Care Medicine*, 46(3), 354-360.
<https://doi.org/10.1097/ccm.0000000000002872>
- Miles, M. B., Huberman, A. M., and Saldana, J. (2020). *Qualitative data analysis*, 4th ed. SAGE, Inc.
- Mostel, Z., Perl, A., Marck, M., Mehdi, S. F., Lowell, B., Bathija, S., Santosh, R., Pavlov, V. A., Chavan, S. S., & Roth, J. (2019). Post-sepsis syndrome – an evolving entity that afflicts survivors of sepsis. *Molecular Medicine*, 26(1), 6. <https://doi.org/10.1186/s10020-019-0132-z>
- National Center for Health Statistics. (2022, March 2). *Septicemia mortality by state*. Centers for Disease Control and Prevention.
https://www.cdc.gov/nchs/pressroom/sosmap/septicemia_mortality/septicemia.htm
- Oh, T. K., & Song, I. (2021). Quality of life after sepsis and its association with mortality among sepsis survivors in South Korea: A population level cohort study. *Journal of Critical Care*, 64, 193-198. <https://doi.org/10.1016/j.jcrc.2021.04.018>
- Pandey, M. K. (2018). Does social support group membership help in coping with chronic diseases? *Indian Journal of Health and Wellbeing*, 9(3), 428-435. <https://www.proquest.com/scholarly-journals/does-social-support-group-membership-help-coping/docview/2030128852/se-2>
- Raman, S., English, A., O'Keefe, M., Harley, A., Steele, M., Minogue, J., Weller, K., Long, D., Irwin, A., & Lister, P. (2021). Designing support structures post sepsis in children: Perspectives of the Queensland paediatric sepsis program. *Frontiers in Pediatrics*, 9. <https://doi.org/10.3389/fped.2021.759234>

- Ryan, P., & Sawin, K. J. (2009). The individual and family self-management theory: Background and perspectives on context, process, and outcomes. *Nursing Outlook*, *57*(4), 217-225.e6. <https://doi.org/10.1016/j.outlook.2008.10.004>
- Schmidt, K., Huelle, K., Reinhold, T., Prescott, H., Gehringer, R., Hartmann, M., Lehmann, T., Mueller, F., Reinhart, K., Schneider, N., Schroevers, M., Kosilek, R., Vollmar, H., Heintze, C., & Gensichen, J. (2022). Healthcare utilization and costs in sepsis survivors in Germany—secondary analysis of a prospective cohort study. *Journal of Clinical Medicine*, *11*(4), 1142. <https://doi.org/10.3390/jcm11041142>
- Schmutz, K. E., Wallace, A. S., Bristol, A. A., Johnson, E. P., & Raaum, S. E. (2022). Hospital discharge during COVID-19: The role of social resources. *Clinical Nursing Research*, *31*(4), 724-732. <https://doi.org/10.1177/10547738221075760>
- Song, I., Park, H. Y., & Oh, T. K. (2021). Sleep disorder and long-term mortality among sepsis survivors: A nationwide cohort study in South Korea. *Nature and Science of Sleep*, *13*, 979-988. <https://doi.org/10.2147/nss.s319769>
- Sosa, M., Sethares, K. A., & Chin, E. (2021). The impact of demographic and self-management factors on physical activity in women. *Applied Nursing Research*, *57*, 151353. <https://doi.org/10.1016/j.apnr.2020.151353>
- Taito, S., Taito, M., Banno, M., Tsujimoto, H., Kataoka, Y., & Tsujimoto, Y. (2018). Rehabilitation for patients with sepsis: A systematic review and meta-analysis. *PLoS ONE*, *13*(7), e0201292. <https://doi.org/10.1371/journal.pone.0201292>
- Umberger, R. A., Todt, K., Talbott, E., Sparks, L., & Thomas, S. P. (2021). Advocating for a loved one in the setting of uncertainty. *Dimensions of Critical Care Nursing*, *40*(1), 36-50. <https://doi.org/10.1097/dcc.0000000000000449>

- United States Census Bureau. (2022). Explore Census Data. <https://data.census.gov/>
- Van der Slikke, E. C., An, A. Y., Hancock, R. E., & Bouma, H. R. (2020). Exploring the pathophysiology of post-sepsis syndrome to identify therapeutic opportunities. *EBioMedicine*, *61*, 103044. <https://doi.org/10.1016/j.ebiom.2020.103044>
- Verchota, G., & Sawin, K. J. (2016). Testing components of a self-management theory in adolescents with type 1 diabetes mellitus. *Nursing Research*, *65*(6), 487-495. <https://doi.org/10.1097/nnr.0000000000000180>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.