International Journal Of Health, Engineering And Technology (IJHET) *E-ISSN 2829 - 8683*
Volume 4, Number 6, March 2026, *Page. 2289 - 2297*
Email : editorijhess@gmail.com

The Impact Of Delaying Elective Surgeries On Patient Safety During Covid-19: Literature Review

Ulya Serly Amrillah[1)]
[1)] Department of Health Policy and Administration, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

*Corresponding Author
Email : ulya.serly.amrillah-2022@fkm.unair.ac.id

Abstract

The COVID-19 pandemic has had a major impact on the global healthcare system, including the postponement of elective operations due to limited resources and efforts to prevent the transmission of the virus. Globally, more than 28 million operations were postponed, including in Indonesia. Delays have an effect on patient safety because they risk having a serious impact on patients. This study aims to understand the impact of delaying elective surgeries on patient safety during the COVID-19 pandemic. The design of this research is a literature review. Searching for articles through the Pubmed, Science Direct, and Google Scholar databases (2020-2025) using the keywords "patient safety" AND "elective surgery" OR "delay elective surgery" AND "covid elective surgery" OR "delay covid elective surgery". Data are extracted based on objectives, research design, research samples, research locations, and findings. The total number of article findings was 844, but only 8 articles met the inclusion criteria. The impact of delay on patient safety is classified into three main categories: (1) Physical health includes decreased physical health score, increased pain, increased risk of falling, and increased weight gain (average 4 kg); (2) Mental health includes anxiety, depression, frustration, and adverse psychological effects; (3) Delay in the recovery process. The delay in elective surgeries during COVID-19 has an impact on patient safety, namely physical health, mental health, and delays in the patient's recovery process.

Keywords: COVID-19, Patient Safety, Elective Surgery, Delayed Surgery.

INTRODUCTION

Elective services are an integral part of the healthcare system that demonstrate the clinical quality and ability of the system to meet the non-urgent needs of patients. Elective surgery is a previously scheduled medical procedure that is not emergency, but is necessary to reduce symptoms, prevent disease progression, and improve the patient's quality of life (Ademuyiwa et al., 2024). Although not emergency, these surgeries can pose substantial health risks if not treated in a timely manner, as conditions that could have been treated electively can actually worsen into more complex conditions or even emergencies.

The COVID-19 pandemic that occurred for approximately 3 years has had a significant impact on the health service system in the world. Many hospitals are allocating limited resources to manage the growing number of COVID-19 patients. For example, by moving ventilators from the operating room to the intensive care unit (ICU), placing surgical teams to COVID-19 patients, and converting other units into COVID-19 inpatient units (EL-Andari et al., 2023; Chimed-Ochir et al., 2023). This has made all hospitals in the world cancel or postpone all scheduling elective surgeries. Apart from limited resources, it is also to reduce the risk of infection and transmission of the COVID-19 virus.

The results of a study conducted by the National Institute for Health Research Global Health Research Unit on Global Surgery, University of Birmingham, found that the cancellation rate reached 72.3% in the world with an estimated 28,404,603 surgeries canceled or postponed during a peak of 12 weeks (2,367,050 per week). If a country increases its operating volume by 20% after the pandemic, it will take about 45 weeks to resolve the backlog of operations delayed due to COVID-19 (COVIDSurg Collaborative, 2020). A study in a Polish hospital reported that of the 1,935 elective surgeries scheduled, about 10.5% of them were canceled during the pandemic period (Topolewski et al., 2024). In Indonesia, research at referral hospitals shows that the average elective cancellation rate reaches 7.4% with a peak in August 2021 reaching 14.7% (Giwangkancana et al., 2022). A study at

the Dr. Hasan Sadikin Hospital in Bandung reported an increase in the cancellation of elective surgery in obstetrics and gynecology from 3.6% in 2020 to 6.5% in 2021 with most of it due to COVID-19 (Erfiandi et al., 2023).

The high rate of delays in elective surgeries not only has serious consequences for access to services, but also for patient safety (Byrnes et al., 2021). An epidemiological study in the Netherlands showed that more than 305,000 pending elective procedures in 2020-2021 contributed to more than 319,000 quality-adjusted life years (QALYs) that were not realized (Oosterhoff et al., 2023). This indicates the loss of the patient's chances of becoming healthy due to delays in necessary medical procedures. Postponement of elective surgeries during the COVID-19 pandemic risks worsening clinical conditions, increased morbidity, psychological impacts due to uncertainty, and prolonged anxiety in patients (Atary & Abu-Rmeileh, 2023). This situation is a big challenge for the health service system in maintaining patient safety in the midst of the noisy COVID-19 pandemic. Therefore, researchers are interested in understanding more deeply the impact of delaying elective surgeries on patient safety during the COVID-19 pandemic. By knowing the impact of the delay of elective surgery on the patient's safety, it is hoped that a strategy can be formed to minimize the risks arising from the delay.

RESEARCH METHODS

The method used in this article is literature review. The databases used in this literature search are PubMed, ScienceDirect, and Google Scholar. The keywords used in the article search are "patient safety" AND "elective surgery" OR "delay elective surgery" AND "covid elective surgery" OR "delay covid elective surgery". The search for articles was limited from 2021 to 2026 with selection based on the purpose of the writing, which was to find out the impact caused by the postponement of elective operations during the COVID-19 pandemic.

The overall search results yielded 844 articles with details of 423 articles on PubMed, 367 articles on ScienceDirect, and 54 articles on Google Scholar. The search continued with a screening of titles relevant to the topic of discussion and obtained 48 article title articles. Then filtering through abstracts was carried out to find out the subject matter of each article and 14 articles were obtained that were considered relevant to the topic of discussion. The search continued by reading the entire content of the article to assess the feasibility study and obtained 8 articles that were considered feasible and met the inclusion criteria, namely in the form of original articles, full text, open access, and published in 2021-2026. Meanwhile, 6 of them did not meet the inclusion criteria because they had less specific discussions so they were excluded. Data extraction and identification are outlined in the PRISMA diagram as follows.

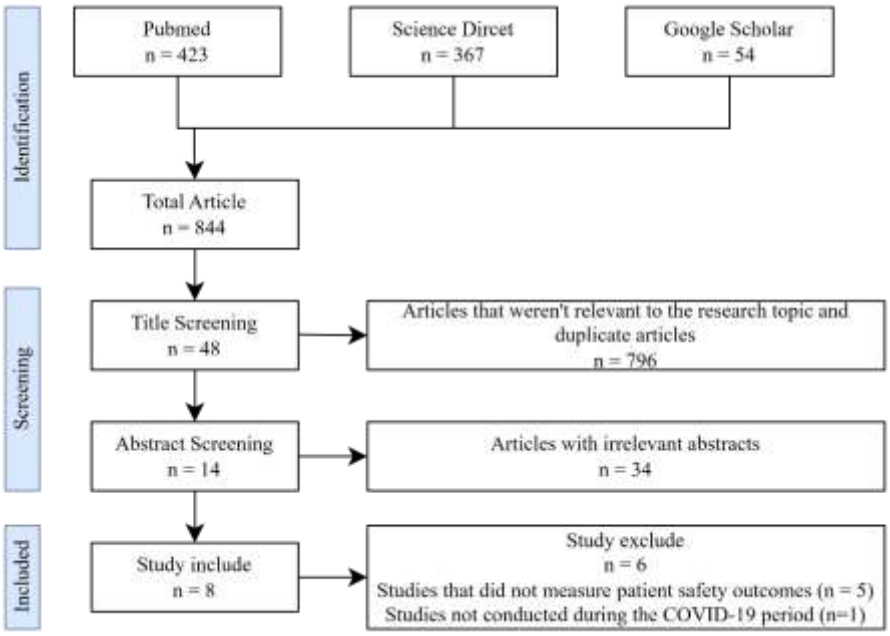

Figure 1. PRISMA Diagram

RESULTS AND DISCUSSION

Based on the results of the literature on 8 articles, there are 3 countries used for the research, namely: Palestine (n = 1), the United States (n = 6), and the United Kingdom (n = 1). A total of two articles were published in 2023, three articles were published in 2022, and three articles were published in 2021. The largest number of samples was found in the study by Hu et al. (2022) conducted in 14 children's hospitals in the United States that are members of the Pediatric Surgery Research Collaborative (PedSRC), with a total of 1,404 samples. Meanwhile, the smallest number of samples was found in a study by Byrnes et al. (2021) conducted at a hospital undergoing cardiovascular surgery at the University of Michigan Medicine, Ann Arbor, United States, with a total of 47 samples. Summary of the study and key results are presented in table 1.

Table 1. Summary of the Study of Delay of Elective Surgery on Patient Safety

Author's Name (Year)	Purpose	Research Design	Research Sample / Population	Research Location	Results
Byrnes et al. (2021)	Understand the life experiences of individuals whose surgery schedules have been delayed due to COVID-19, particularly in the context of cardiovascular procedures.	Qualitative hermeneutic phenomeno-logy.	Individuals who have experienced postponement of cardiovascular surgery due to COVID-19 purposively selected with a total of 47 patients.	Hospitals undergoing cardiovascular surgery at the University of Michigan Medicine, Ann Arbor, United States.	**Physical health impacts:** Patients interpret elective surgery as an opportunity to relieve symptoms that interfere with daily living activities and allow them to return to normal functioning. When surgery is delayed, the physical symptoms will persist and worsen the patient's ability to manage his or her health condition. **Mental health impacts:** The experience of delay creates deep emotional distress and psychological distress as surgery is perceived as a

Author's Name (Year)	Purpose	Research Design	Research Sample / Population	Research Location	Results
					hope of "returning to normal." **Impact on recovery process delays:** Delays in action lead to a delay in the process of improving health conditions and prolong periods of dependence on symptoms that limit function.
Johnson et al. (2021)	Understand the emotional and physical impact of patients who have experienced delays in total joint replacement surgery due to the COVID-19 pandemic.	Quantitative, descriptive surveys conducted in a cross sectional manner.	367 patients whose surgeries were canceled or postponed due to the COVID-19 pandemic.	Atrium Health dan OrthoCarolina Research Institute di Charlotte, North Carolina, Amerika Serikat.	**Physical health impacts:** A total of 77 joint arthroplasty patients experienced delays for at least 5 weeks, 41% of patients reported a Visual Analog Scale (VAS) pain level of more than 7.5, 16% had falls, and 1% had hip fractures **Mental health impacts:** Of the 77 patients who experienced delays, 40% of them experienced increased anxiety during delays. **Impact on recovery process delays**: -
Ahmed et al. (2021)	Understand the impact of postponement of bariatric surgery during the COVID-19 pandemic on patients, including its physical and psychological impacts.	Mix methods, cross sectional survey using google forms.	71 patients who were scheduled to undergo bariatric surgery at the unit prior to the suspension of elective services due to COVID-19.	Salford Royal NHS Foundation Trust, Salford, England.	**Physical health impacts:** A total of 67.6% of 71 patients experienced weight gain with a median of 4 kg Procrastination worsened physical symptoms **Mental health impacts:** 74.6% of patients experience adverse psychological effects. Increased anxiety **Impact on recovery process delays**: Delay in follow-up therapy that has the potential to change quality of life (secondary life-altering treatments).
Christino et al. (2022)	Understand the impact of postponement of elective surgeries during the COVID-19 pandemic on patients and evaluate how these delays affect patients'	Quantitative, cross-sectional surveys using SF-12 and PROMIS-PSE instruments.	194 patients who experienced delays in elective surgical procedures during the COVID-19 pandemic, including young athletes of various age levels.	Boston Children's Hospital, Boston, Massachusetts, Amerika Serikat.	**Physical health impacts:** The Short Form-12 Physical Component Score (SF12-PCS) is significantly lower than the population norm, indicating a decrease in physical health status. The average duration of the delay of surgery for 76 days causes physical

Author's Name (Year)	Purpose	Research Design	Research Sample / Population	Research Location	Results
	quality of life and mental well-being.				complaints as well as functional limitations. **Mental health impacts:** The PROMIS Psychological Stress Experience (PROMIS-PSE) score was significantly higher than the population norm, which indicates an increase in psychological stress levels. A lower SF12 Mental Component Score (SF12-MCS) indicates that patients experience higher concerns about delaying surgery. The main concern of patients relates to the potential loss of the opportunity to return to participate in the sports season. **Impact on recovery process delays**: -
Hu et al. (2022)	Assess whether the cancellation of elective surgery during the COVID-19 pandemic caused a delay in inguinal hernia iperation in children and whether such delays increased the risk of complications as well as visits to the emergency room.	Quantitative, multicenter retrospective cohort.	1,404 patients aged ≤ 18 years who underwent primary inguinal hernia surgery during the period of September 13, 2019 – September 13, 2020.	14 pediatric hospitals in the United States that are members of the Pediatric Surgery Research Collaborative (PedSRC).	**Physical health impacts:** There is no increased risk of hernia incarceration in the period after the cancellation of surgery. There was no increased incidence of interval incarceration after diagnosis and before surgery. There was no increase in emergency room visits after the delay period. **Mental health impacts:** - **Impact on recovery process delays:** -
Wong et al. (2022)	Evaluate whether delays in elective surgeries during COVID-19 led to an increase in emergency or hospitalization events related to the condition for which surgery was supposedly performed.	Quantitative, cross sectional	Patients with a scheduled non-cardiovascular elective surgery between March 17, 2020 – June 8, 2020 that was canceled or rescheduled.	The University of Arkansas for Medical Sciences (UAMS) is the only tertiary academic medical center in the southern states of the US.	**Physical health impacts:** Only 2% of the 197 procedures that were delayed resulted in GD/IP admissions. **Mental health impacts:** - **Impact on recovery process delays:** -

Author's Name (Year)	Purpose	Research Design	Research Sample / Population	Research Location	Results
Atary & Abu-Rmeileh(2023)	Evaluate the impact of the delay of elective surgeries during the COVID-19 pandemic on Palestinian patients.	Quantitative, cross sectional	398 patients whose elective surgical procedures were postponed due to the COVID-19 pandemic.	3 Government Hospitals in the West Bank of the Palestinian Territories.	**Physical health impacts:** As many as 55.5% or most of the patients experienced a decrease in the ability to move and work physically. **Mental health impacts:** 45% of patients feel anxious and another 29.6% experience depression due to postponement of surgery **Impact on recovery process delays**: -
Gitkind et al. (2023)	To evaluate the impact of delaying elective intervention pain procedures during the COVID-19 pandemic on the improvement of patients' spontaneous pain.	Quantitative, observational	640 patients scheduled for elective interventional pain procedures before March 23, 2020.	Montefiore Medical Center, New York.	**Physical health impacts:** Only 3% of patients experienced spontaneous pain improvement after a delay of 3 months. About 86% of patients reschedule procedures after a delay due to physical complaints (spinal/radicular pain). **Mental health impacts:** - **Impact on recovery process delays:** -

The results of the review show that the delay of elective surgeries during the COVID-19 pandemic has had an impact on patient safety. Based on table 1, it can be seen that most elective surgery delays have an impact on the physical and mental health of patients. In addition, there is also a delay in elective surgery which has an impact on delaying the patient's recovery process.

Discussion

Based on the results of the literature, it is shown that the delay of elective surgeries during the COVID-19 pandemic has had a real impact on patient safety, both clinically and psychosocially. Non-emergency procedures such as elective surgery often have an impact on a decrease in quality of life and response to specific diseases (Sauro et al., 2024). Clinically, patients who experience delays in elective surgery report decreased physical function, increased pain, and risk of long-term complications. This can be seen in a study of arthroplasty patients that were delayed for more than 5 weeks where 41% of patients reported high pain with a Visual Analog Scale (VAS) value of more than 7.5 and 16% of them experienced falls (Johnson et al., 2021). The longer the delay in surgery, the greater the likelihood of unfavorable clinical outcomes, including the development of chronic diseases and other long-term health problems, due to the diminishing benefits of the intervention over time (Uimonen et al., 2021).

From the perspective of patient safety, the findings support the theoretical argument, namely the Swiss Cheese Model by Reason (2000) where the health care system is illustrated as a layer of defense that protects patients from the risk of health loss; When one of these layers weakens or disappears, risk gaps can meet and open up opportunities for adverse events to occur. In this case, delays serve as one of the systemic loopholes that reduce the overall effectiveness of the healthcare

system, thereby increasing the risk of patients experiencing long-term clinical loss or decreased quality of life, especially for patients with chronic conditions and high functional needs.

In addition to the physical impact, the literature shows that delaying elective surgery also negatively impacts patients' mental well-being, namely related to emotional and psychological well-being (Byrnes et al., 2021). Good mental health in individuals is characterized by the absence of psychiatric disorders and the ability of individuals to function optimally in daily life, especially in adjusting and overcoming various problems that arise throughout their lives. A study of 398 patients who experienced delays showed that 45% of patients felt anxious and 29.6% experienced depression due to the delay (Atary & Abu-Rmeileh, 2023). Quantitatively, this is supported by a study by Christino et al. (2022) that showed the level of psychological stress and anxiety in young patients who experienced delayed elective surgery with an average PROMIS PSE score of 57.7 (95% CI, 56.1-59.3). This score has a higher population reference value and thus indicates increased psychological distress in patients who experience surgical delays. Another study of cancer patients awaiting surgery noted that about 50% experienced significant anxiety during the waiting period, and 72% showed moderate to high levels of distress as a result of the cancellation or delay of surgery (Soloff et al., 2023). In this case, health is not only related to physical conditions, but involves the emotional and social conditions of patients in dealing with diseases and health service disruptions.

Another impact resulting from the delay in elective operations is the delay in the recovery process. Those who experience delays feel they lose the opportunity to return to a normal quality of life (Byrnes et al., 2021). This reflects the patient's expectation that function and quality of life will be significantly improved with surgery. However, the delay that occurred hindered the realization of these expectations. Delays also lead to delays in secondary care that should improve quality of life (Ahmed et al., 2021). Another study states that delaying elective surgeries contributes to prolonged functional developmental barriers, especially when delayed surgeries are part of a strategy to improve the quality of care for people with chronic or degenerative diseases (Kang et al., 2025). So that the delay in the recovery process will have an impact on the dynamics of return to work and social participation, because patients whose recovery is delayed takes longer to return to work or return to their social roles.

CONCLUSION

The results of the literature review show that the delay in elective surgeries during the COVID-19 pandemic has an impact on patient safety, as it directly impacts physical health, mental health, and delays in the patient's recovery process. Physical health includes increased pain and discomfort, worsening of physical symptoms related to underlying conditions, increased risk of complications such as falls and fractures, disruption of daily activities, and worsening of comorbidities that can affect the patient's prognosis, Mental health includes increased anxiety and stress, symptoms of depression, frustration, and worry of worsening health conditions. Delays in the recovery process include delays in achieving normal quality of life, delays in secondary treatment that depend on the success of primary care. Therefore, there is a need to develop a comprehensive strategy to minimize risks in a global health crisis, taking into account not only medical urgency but also its impact on the overall well-being of patients.

REFERENCES

Ademuyiwa, A. O., Bhangu, A., Chakrabortee, S., Glasbey, J., Kamarajah, S. K., Ledda, V., Li, E., Morton, D., Nepogodiev, D., Picciochi, M., Simoes, J. F. F., Lapitan, M. C., Cheetham, M., Forkman, E., El-Boghdadly, E., Ghosh, D., Harrison, E. M., Hutchinson, P., Lawani, I., … Tabiri, S. (2024). Strategies to strengthen elective surgery systems during the SARS-CoV-2 pandemic: Systematic review and framework development. *British Journal of Surgery*, *111*(2), znad405. https://doi.org/10.1093/bjs/znad405

Ahmed, B., Altarawni, M., Ellison, J., & Alkhaffaf, B. H. (2021). Serious Impacts of Postponing Bariatric Surgery as a Result of the COVID-19 Pandemic: The Patient Perspective. *Journal of Patient Experience*, *8*, 23743735211008282. https://doi.org/10.1177/23743735211008282

Atary, M., & Abu-Rmeileh, N. M. E. (2023). Deferral of elective surgeries during the COVID-19 pandemic and its impact on Palestinian patients: A cross-sectional study. *Conflict and Health*, *17*(1), 13. https://doi.org/10.1186/s13031-023-00509-w

Byrnes, M. E., Brown, C. S., De Roo, A. C., Corriere, M. A., Romano, M. A., Fukuhara, S., Kim, K. M., & Osborne, N. H. (2021). Elective Surgical Delays Due to COVID-19: The Patient Lived Experience. *Medical Care*, *59*(4), 288–294. https://doi.org/10.1097/MLR.0000000000001503

Chimed-Ochir, O., Amarsanaa, J., Ghotbi, N., Yumiya, Y., Kayano, R., Van Trimpont, F., Murray, V., & Kubo, T. (2023). Impact of COVID-19 on Health Emergency and Disaster Risk Management System: A Scoping Review of Healthcare Workforce Management in COVID-19. *Sustainability*, *15*(15), 11668. https://doi.org/10.3390/su151511668

Christino, M. A., Sanborn, R. M., Miller, P. E., Milewski, M. D., Heyworth, B. E., Kramer, D. E., Yen, Y.-M., Kocher, M. S., Micheli, L. J., & O'Brien, K. H. M. (2022). COVID-Delayed Elective Surgery Has a Negative Effect on Young Sports Medicine Patients. *Arthroscopy, Sports Medicine, and Rehabilitation*, *4*(4), e1377–e1384. https://doi.org/10.1016/j.asmr.2022.05.001

COVIDSurg Collaborative. (2020). Elective surgery cancellations due to the COVID-19 pandemic: Global predictive modelling to inform surgical recovery plans: Elective surgery during the SARS-CoV-2 pandemic. *British Journal of Surgery*. https://doi.org/10.1002/bjs.11746

EL-Andari, R., Fialka, N. M., & Nagendran, J. (2023). The impact of resource allocation during the COVID-19 pandemic on cardiac surgical practice and patient outcomes: A systematic review. *European Journal of Cardio-Thoracic Surgery*, *63*(6), ezad230. https://doi.org/10.1093/ejcts/ezad230

Erfiandi, F., Harsono, A. B., Salima, S., & Kireina, J. (2023). Pengaruh Masa Pandemi Covid-19 terhadap Operasi Elektif Obstetri dan Ginekologi di RSUP Dr. Hasan Sadikin Tahun 2020-2021. *Indonesian Journal of Obstetrics & Gynecology Science*, *6*(1), 68–75. https://doi.org/10.24198/obgynia.v6n1.445

Gitkind, A. I., Ms-II, J. S., Mowrey, W., Qin, J., Sim, G. Y., Shaparin, N., & Yassari, R. (2023). Better late than never? Impact of delayed elective interventional pain procedures due to the COVID-19 pandemic. *Interventional Pain Medicine*, *2*(3), 100266. https://doi.org/10.1016/j.inpm.2023.100266

Giwangkancana, G., Anzhari, R. A., & Indriasari. (2022). Prevalence of surgery cancelation and challenges in restarting elective surgery in the pandemic: A cross-sectional study. *Perioperative Care and Operating Room Management*, *28*, 100271. https://doi.org/10.1016/j.pcorm.2022.100271

Hu, A., Reiter, A. J., Gerardo, R., Skertich, N. J., Lewit, R., Ghani, M., Witte, A., Kang, H.-S., Richards, H., Perry, B., Tian, Y., Mehl, S. C., Gonzalez, A., Novotny, N. M., Haynes, J., Aranda, A., Zamora, I. J., Rhee, D., Fialkowski, E., … Raval, M. V. (2022). Association between COVID-19 related elective surgery cancellations and pediatric inguinal hernia

complications: A nationwide multicenter cohort study. *Surgery*, *172*(3), 989–996. https://doi.org/10.1016/j.surg.2022.05.011

Johnson, N. R., Odum, S., Lastra, J. D., Fehring, K. A., Springer, B. D., & Otero, J. E. (2021). Pain and Anxiety due to the COVID-19 Pandemic: A Survey of Patients With Delayed Elective Hip and Knee Arthroplasty. *Arthroplasty Today*, *10*, 27–34. https://doi.org/10.1016/j.artd.2021.05.013

Kang, S. W., Yoon, S., Park, Y., Jang, D., Moon, M. H., & Choi, M. H. (2025). Patient characteristics associated with elective shoulder surgery cancellation: Focus on socioeconomic factors. *Frontiers in Public Health*, *13*, 1620173. https://doi.org/10.3389/fpubh.2025.1620173

Oosterhoff, M., Kouwenberg, L. H. J. A., Rotteveel, A. H., Van Vliet, E. D., Stadhouders, N., De Wit, G. A., & Van Giessen, A. (2023). Estimating the health impact of delayed elective care during the COVID -19 pandemic in the Netherlands. *Social Science & Medicine*, *320*, 115658. https://doi.org/10.1016/j.socscimed.2023.115658

Reason, J. (2000). *Human error: Models and management*.

Sauro, K., Vatanpour, S., Thomas, A., D'Souza, A. G., Southern, D. A., Eastwood, C., Ibadin, S., Ademola, A., & Brindle, M. (2024). Consequences of delaying non-urgent surgeries during COVID-19: A population-based retrospective cohort study in Alberta, Canada. *BMJ Open*, *14*(8), e085247. https://doi.org/10.1136/bmjopen-2024-085247

Soloff, M. A., Keel, T., Nizam, A., Goldberg, G. L., Sakaris, A., Diefenbach, M. A., DePeralta, D. K., & Frimer, M. (2023). Stress, anxiety, and illness perception in patients experiencing delay in operative care due to the COVID-19 pandemic. *Gynecologic Oncology Reports*, *48*, 101245. https://doi.org/10.1016/j.gore.2023.101245

Topolewski, P., Szplit, D., Kobiela, J., Łaski, D., Stepaniak, P., & Stefaniak, T. J. (2024). Reasons for Day-of-Surgery Cancellation of Elective Surgical Procedures During the COVID-19 Pandemic Compared to Pre- and Post-COVID-19 Periods. *Cureus*. https://doi.org/10.7759/cureus.74205

Uimonen, M., Kuitunen, I., Paloneva, J., Launonen, A. P., Ponkilainen, V., & Mattila, V. M. (2021). The impact of the COVID-19 pandemic on waiting times for elective surgery patients: A multicenter study. *PLOS ONE*, *16*(7), e0253875. https://doi.org/10.1371/journal.pone.0253875

Wong, L., Hollaway, M., Sanford, J., Sexton, K., Yu, F., & Jensen, H. (2022). Elective operations delay and emergency department visits and inpatient admissions during COVID-19. *Surgery in Practice and Science*, *10*, 100111. https://doi.org/10.1016/j.sipas.2022.100111