

TITLE: Reducing Maternal Morbidity on the Frontline: Acute Care Physical Therapy After Cesarean Section During and Beyond the COVID-19 Pandemic

RUNNING HEAD: Acute Care Physical Therapy After Cesarean Section

TOC CATEGORY: Women's Health

ARTICLE TYPE: Point of View

KEYWORDS: Acute Care, Postnatal Care, Postoperative Care, Pregnancy Complications, Postoperative Complications, Women's Health, Mobility, Morbidity, Length of Stay, Pain

ACCEPTED: February 28, 2021

Revised: January 13, 2021

Submitted: December 14, 2020

© The Author(s) 2021. Published by Oxford University Press on behalf of the American Physical Therapy Association. All rights reserved. For permissions, please email: journals.permissions@oup.com

R.L. Segraves PT, DPT, WCS, Texas Children's Pavilion for Women, 6651 Main Street,
Houston, TX, 77030 (USA). Address all correspondence to Dr Segraves at
rebecasegraves@gmail.com.

J.M. Segraves, PT, DPT, NCS, Texas Children's Pavilion for Women. Address all
correspondence to Dr Segraves at jenna.segraves@gmail.com.

Cesarean section is the most common surgery in the United States.^{1,2} Approximately 1.2 million women per year undergo a cesarean section in the United States, accounting for 31.9% of all deliveries.³ Leonard and colleagues noted that cesarean section in California between 2007-2014 was associated with 2.7 times the risk of severe maternal morbidity when compared to vaginal delivery. In their findings, cesarean section contributed to 37% of severe maternal morbidity cases, larger than any other risk factor.⁴ Severe maternal morbidity is defined as life-threatening, unexpected outcomes of labor and delivery that result in significant short or long-term consequences to the mother's health and adversely affect the health and well-being of her newborn.^{4,5}

The Centers for Disease Control and Prevention (CDC) recognized a 200% increase in severe maternal morbidity from 1993-2014.⁶ Severe maternal morbidity cases were primarily associated with postpartum hemorrhage requiring blood transfusion, followed by hysterectomy and respiratory distress requiring ventilation support or temporary tracheostomy. According to the CDC, the rate of unexpected hysterectomy following delivery has increased by 55% from 1993-2014 and the rate of ventilation support, or temporary tracheostomy, has increased by 93% over the same time period.⁶ In addition to cesarean section, risk factors contributing to severe maternal morbidity include pre-pregnancy obesity, diabetes (pre-existing or gestational), hypertension (chronic or gestational), pulmonary hypertension, and pulmonary diagnoses such as chronic bronchitis, fibrosis, and asthma.⁴⁻⁷

[H1] Factors Impacting Cesarean Section Recovery during COVID-19

On November 2, 2020, the CDC included pregnancy under medical conditions that place individuals at increased risk for contracting severe illness from the virus that causes COVID-19.⁸ Severe illness from COVID-19 is defined as hospitalization, admission to the ICU, mechanical

ventilation, or death. Additional comorbidities considered to be high risk factors for COVID-19 related illness include obesity (BMI > 30 kg/m²) and diabetes.⁸ Moreover, the American College of Obstetrics and Gynecologists (ACOG) states that obesity during pregnancy increases the likelihood of having a cesarean section.⁹ When a cesarean section is indicated, the risks of infection, bleeding, and other complications are greater for overweight or obese women than for women with a BMI < 25 kg/m². Increased BMI has a direct relationship to surgical site infection and surgical site occurrences requiring procedural intervention following open-abdominal surgery.^{10,11} For women with diabetes, their risk is higher for post-cesarean complications involving wound separation, fascial dehiscence, pelvic/abdominal abscess, and infection requiring postpartum antibiotics.¹¹ Patients who are both obese and diabetic have a significantly higher risk of surgical site occurrences requiring procedural intervention.¹⁰⁻¹²

Physical therapists routinely intervene in the immediate postoperative period following open abdominal surgery to preserve pulmonary function, optimize expiratory muscle strength, and improve overall mobility.¹³ Early physical therapy intervention as part of the Enhanced Recovery After Surgery (ERAS) protocol reduces postoperative pulmonary complications and hospital length of stay following abdominal surgery.^{14,15} Since the impact of COVID-19 in the United States, acute care physical therapists have provided frontline interventions to reduce short and long-term impairments resulting from cardiac and pulmonary dysfunction due to the virus.¹⁶ However, at a time when women are at an increased risk for cardiopulmonary complications and COVID-19, physical therapy is not a standard component of inpatient obstetric and gynecologic care following a cesarean section or hysterectomy in the United States.

[H1] Frontline Rehabilitation to Optimize Cesarean Section Outcomes

In response to the COVID-19 pandemic, ACOG compiled recommendations intended to supplement guidance from the CDC to inform physicians on the frontline providing maternal care.¹⁷ Most hospitals where women delivered in the United States implemented visitor restriction policies which limited traditional support from doula and family members. To reduce the risk of inadvertent exposure to the virus in women postpartum, ACOG recommended that physicians consider expedited discharge after 2 days following a cesarean section, a reduction from an average of 3 days.^{17,18} The initial post-cesarean wound check typically performed in-person between 1 - 3 weeks, was recommended to be conducted via telehealth. Federspiel and colleagues noted that in the cases of uncomplicated cesarean sections for low-risk patients, hospital discharge on day 2 was not associated with 30-day readmissions. However, the authors emphasized that their analysis was deliberately limited to a small, low-risk subset of all cesarean sections and did not reflect patients with high-risk factors such as pregnancy-related hypertensive disorders or diabetes.¹⁸ Acute care therapists play a critical role in ensuring a safe discharge disposition of patients following open abdominal procedures, regardless of their morbidity risk. In the immediate postoperative period after abdominal surgery, therapists can enhance recovery of pulmonary and bowel function, provide individualized wound management education, and instruct patients on techniques that improve their pain, ambulation, stair negotiation, and safety with transfers to prepare them for discharge to home. Data, including patient-reported outcomes, is needed to standardize acute care therapy services for women after cesarean section, similar to care that is routine following other abdominal surgeries or total knee replacement.^{14,19}

The goal of acute care physical therapy for women after cesarean section is to optimize their functional recovery and reduce wound healing complications prior to hospital discharge. This is especially impactful in cases where first-time mothers were planning a vaginal delivery

yet underwent a primary cesarean section. Following the implementation of COVID-19 restrictions, women delivering by cesarean section now have to navigate open abdominal surgery recovery with limited support from family and without specific strategies for protecting their incision during infant care and mobility. Acute care physical therapists are essential for expediting safe discharge during the COVID-19 pandemic to mitigate risks of maternal morbidity and to offer individualized instruction that accounts for unique environmental and social factors impacting postpartum recovery.

Physical therapy interventions provided to women immediately post-cesarean section are aligned with the Abdominal Core Surgery Rehabilitation ProtocolSM that was developed for patients following hernia repair.²⁰ The goals of introducing abdominal surgery rehabilitation in the immediate postoperative period after cesarean section are similar to the goals of the post-hernia repair protocol: to reduce post-surgical wound complications, optimize respiratory function and endurance, instruct patients on breathing and body mechanics to decrease pain and surgical wound tension during bed mobility and transfers, and to improve tolerance to activities involving walking and stair climbing. Post-surgical interventions for these procedures involve the use of an abdominal binder with instructions on appropriate placement over the hips, specific focus on breathing during exertion to reduce abdominal pressure associated with the Valsalva maneuver, and use of the log-roll technique during bed transfers to reduce pain and surgical wound tension.

[H1] Unique Maternal Populations Who Benefit From Physical Therapy

In addition to pre-pregnancy risk factors of obesity and diabetes, women with high-risk pregnancy conditions that require activity restriction have greater exposure to maternal morbidity following a cesarean section compared with a vaginal delivery. These high-risk pregnancy

conditions include placenta previa, placenta accreta spectrum, severe preeclampsia, multiple gestation, and certain fetal abnormalities.^{21,22} Women with these conditions are often prescribed some level of activity restriction that may place them at higher risk for maternal bone loss, muscle weakness, lower infant birth weight, and prolonged postpartum recovery.²¹ Women who undergo a cesarean section following high-risk pregnancy activity restriction have a significantly higher rate of morbidity than women who delivered vaginally with the same level of activity restriction.²¹ Acute care physical therapists in hospitals with antepartum units have a unique opportunity to develop therapeutic exercise programs for women with activity restrictions to reduce deconditioning, optimize postpartum recovery, and offer pre-surgical education to those expecting to undergo a cesarean section necessitated by their high-risk pregnancy diagnosis.

In May 2020, the CDC released provisional data from 2019 showing that 25.6% of first-time, low-risk mothers delivered by cesarean section.²³ NTSV is the designation used for the rate of low-risk, nulliparous, term, singleton, vertex cesarean sections. First-time, low-risk mothers who are induced are twice as likely to undergo a cesarean section compared to women who have a spontaneous onset of labor.²⁴ Acute care physical therapy in the immediate postoperative period may significantly reduce the extended postpartum recovery these women typically encounter to care for their newborn with less pain and limitations.

Women who undergo an unexpected, emergent hysterectomy at the time of delivery are also unprepared for the relatively longer recovery period and the post-surgical complications that may arise.²⁵ The likelihood of having a peripartum hysterectomy increases with the number of previous cesarean sections. The most common factors contributing to peripartum hysterectomy include placental abnormalities, uterine atony, and uterine rupture which may all lead to life-threatening postpartum hemorrhage. Complications arising from peripartum hysterectomy may

involve hematologic, integumentary, genitourinary, renal, pulmonary, cardiovascular, and neurologic impairments.²⁵ Acute care physical therapy is essential for this medically dynamic population to integrate complex clinical factors with optimal safety outcomes to improve the success of women to independently manage their own care and that of their newborn.

[H1] A Call to Action

This commentary discusses the essential role of physical therapists to provide abdominal surgery rehabilitation as part of the maternal care team during and beyond the COVID-19 pandemic. We conclude with a call to action for acute care physical therapists to provide early intervention for women in the immediate postoperative period following a cesarean section. A cesarean section is a major, open abdominal surgery that increases a woman's risk for severe maternal morbidity, decreases her functional mobility, and prolongs her postpartum recovery. The goals for early intervention are to optimize incision protection, facilitate pain reduction, improve pulmonary function, promote safe mobility during transfers, provide appropriate positioning techniques for infant care, and to reduce the incidence of respiratory, circulatory, and wound complications affecting maternal health outcomes in the United States.

The goal for women postpartum should be to have an acute care physical therapy consult within 24 hours of a cesarean section. Further research is needed to establish the effectiveness and value of early intervention for the postpartum population. Part of that process will be systematically integrating acute care therapy into existing maternal care models while measuring outcomes. The goal should be to enhance the quality of maternal care and positively influence short- and long-term maternal health outcomes by establishing obstetric rehabilitation (within 0-6 weeks) as the standard of care.

Author Contributions

Concept / idea / research design: R.L. Segraves, J.M. Segraves,

Writing: R.L. Segraves, J.M. Segrave

Data collection: R.L. Segraves, J.M. Segrave

Consultation (including review of manuscript before submitting): R.L. Segraves,

J.M. Segraves

Acknowledgements

The authors would like to thank the following individuals for their expertise and valuable insights on the subject matter and editing of this manuscript: Dr. Susan Clinton, co-founder of the Global Women's Health Initiative and co-owner of Embody Physiotherapy and Wellness, in Sewickley, PA, Dr. Kelli Barbour, Maternal Fetal Medicine specialist and Assistant Professor of the Global Women's Health Fellowship with Baylor College of Medicine and Texas Children's Hospital in Houston, TX, and Dr. Laura Keyser, co-founder of MAMA, LLC focused on global maternal and child health initiatives.

Funding

The authors have received no funding for this manuscript.

Disclosure

During the COVID-19 pandemic, the authors provided acute care physical therapy services as part of a multidisciplinary team of providers with expertise in obstetrics, maternal fetal medicine,

and gynecology in a level IV maternal-infant care facility, treating the most complex maternal conditions and critically ill women from antepartum to postpartum.

The authors certify that they have no affiliations with or financial involvement in any organization or entity with a direct financial interest in the subject matter discussed in this manuscript.

The authors completed the ICMJE Form for Disclosure of Potential Conflicts of Interest and reported no conflicts of interest.

References

1. Sung S, Mahdy H. Cesarean Section. Updated August 23, 2020. In: StatPearls. Accessed March 9, 2021.
<https://www.ncbi.nlm.nih.gov/books/NBK546707/?report=reader>
2. Iriye BK, Gregory KD, Saade GR, Grobman WA, Brown HL. Quality measures in high-risk pregnancies: Executive Summary of a Cooperative Workshop of the Society for Maternal-Fetal Medicine, National Institute of Child Health and Human Development, and the American College of Obstetricians and Gynecologists [published correction appears in *Am J Obstet Gynecol*. 2018 Feb 1;]. *Am J Obstet Gynecol*. 2017;217:B2-B25.
3. Martin JA, Hamilton BE, Osterman MJK, Driscoll AK. Births: Final Data for 2018. National Vital Statistics Reports; vol 68, no 13. Hyattsville, MD: National Center for Health Statistics. 2019.
4. Leonard SA, Main EK, Carmichael SL. The contribution of maternal characteristics and cesarean delivery to an increasing trend of severe maternal morbidity. *BMC Pregnancy Childbirth*. 2019;19:16.

5. American College of Obstetricians and Gynecologists and the Society for Maternal–Fetal Medicine, Kilpatrick SK, Ecker JL. Severe maternal morbidity: screening and review. *Am J Obstet Gynecol.* 2016;215:B17-B22.
6. Centers for Disease Control and Prevention. Severe maternal morbidity in the United States. 2017. Accessed March 9, 2021.
https://www.cdc.gov/reproductivehealth/maternalinfanthealth/severematernalmorbidity.html#anchor_SMM
7. Campbell KH, Savitz D, Werner EF, et al. Maternal morbidity and risk of death at delivery hospitalization. *Obstet Gynecol.* 2013;122:627-33. doi:10.1097/AOG.0b013e3182a06f4e.
8. Centers for Disease Control and Prevention (CDC). COVID-19 (Coronavirus Disease). People with Certain Medical Conditions, 2020. Updated November 2, 2020. Accessed March 9, 2021.
<https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html>
9. American College of Obstetricians and Gynecologists (ACOG). Obesity and Pregnancy. FAQs for patients. Washington, DC: ACOG 2020. Accessed March 9, 2021.
<https://www.acog.org/womens-health/faqs/obesity-and-pregnancy>
10. Tastaldi L, Krpata DM, Prabhu AS, et al. The effect of increasing body mass index on wound complications in open ventral hernia repair with mesh. *Am J Surg.* 2019;218:560-566.
11. Too G, Mourad M, Booker W, et al. Postoperative wound complications in gestational diabetics. *Am J Obstet Gynecol.* 2017;216:1:S362.
12. Alkhatib H, Tastaldi L, Krpata DM, et al. Impact of modifiable comorbidities on

- 30-day wound morbidity after open incisional hernia repair. *Surgery*. 2019;166:94-101.
13. Forgiarini L, Torres de Carvalho A, de Souza Ferreira T, et al. Physical therapy in the immediate postoperative period after abdominal surgery. *J Bras Pneumol*. 2009;35:455-459.
 14. Melnyk M, Casey R, Black P, Koupparis A. Enhanced recovery after surgery (ERAS) protocols: Time to change practice? *Can Urol Assoc J*. 2011;5:342-348.
 15. Possa S, Amador C, Costa A, et al. Implementation of a guideline for physical therapy in the postoperative period of upper abdominal surgery reduces the incidence of atelectasis and length of hospital stay. *Rev Port Pneumol*. 2014;20:69-77.
 16. Ng JA, Miccile LA, Iracheta C, et al. Prone positioning of patients with acute respiratory distress syndrome related to COVID-19: A rehabilitation-based prone team. *Phys Ther*. 2020;100:1737-1745.
 17. American College of Obstetricians and Gynecologists. COVID-19 FAQs for obstetricians-gynecologists, obstetrics. Washington, DC: ACOG; 2020. Accessed March 9, 2021. <https://www.acog.org/clinical-information/physician-faqs/covid-19-faqs-for-ob-gyns-obstetrics>
 18. Federspiel JJ, Suresh SC, Darwin KC, Szymanski LM. Hospitalization duration following uncomplicated cesarean delivery: predictors, facility variation, and outcomes. *AJP Rep*. 2020;10:e187-e197.
 19. Morisawa T, Takahashi T, Nishi S. The effect of a physiotherapy intervention on intestinal motility. *J Phys Ther Sci*. 2015;27:165-168.

20. Abdominal Core Health Quality Collaborative. Abdominal Core Surgery Rehabilitation Protocol Physical Therapist Guide. Cleveland, OH: The Cleveland Clinic. June 17, 2020. Accessed March 9, 2021.
https://www.achqc.org/uploads/general_images/ACHQC_Abdominal_Core_Surgery_Rehabilitation_Protocol_Physical_Therapist_Guide_6.17.20.pdf
21. Maloni JA. Lack of evidence for prescription of antepartum bed rest. *Expert Rev Obstet Gynecol*. 2011;6:385-393.
22. Wataganara T, Grunebaum A, Chervenak F, Wielgos M. Delivery modes in case of fetal malformations. *J Perinat Med*. 2017;45:273-279.
23. Hamilton BE, Martin JA, Osterman MJK. Births: Provisional data for 2019. Vital Statistics Rapid Release; no 8. Hyattsville, MD: National Center for Health Statistics. May 2020. Available from: <https://www.cdc.gov/nchs/data/vsrr-8-508.pdf>
24. Nippita TA, Lee YY, Patterson JA, et al. Variation in hospital caesarean section rates and obstetric outcomes among nulliparae at term: a population-based cohort study. *BJOG*. 2015;122:702-711.
25. van den Akker T, Brobbel C, Dekkers OM, Bloemenkamp KW. Prevalence, indications, risk indicators, and outcomes of emergency peripartum hysterectomy worldwide: A systematic review and meta-analysis. *Obstet Gynecol*. 2016;128:1281-1294.