

# Robotic Vs Open Cytoreductive Surgery (CRS) and Heated Intraperitoneal Chemotherapy (HIPEC): Comparison of Progression-Free Survival (PFS) and Overall Survival (OS)



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**Background:** Peritoneal carcinomatosis (PC) occurs when cancer spreads from the intrabdominal organs and leads to tumor growth on the peritoneum. PC was a terminal diagnosis before the rise of modern therapies like CRS and HIPEC, which give patients a better chance of survival and even complete remission. While the open laparotomic method is standard for this procedure, it is highly invasive and requires extended recovery time. The less-invasive robotic approach may be equally effective and have fewer

drawbacks for patients. The purpose of this study was to compare outcomes of open vs. robotic CRS/HIPEC.

**Methods:** A retrospective cohort analysis was conducted using a database containing all patients who underwent CRS/HIPEC at Marshfield Clinic Health System from 2008 to 2025. A descriptive summary of demographics and operative variables was generated. Propensity score weighting was applied to balance potentially confounding variables between open and robotic groups. Hazard ratios for disease recurrence were calculated, and weighted Kaplan-Meier curves were used to compare progression-free and overall survival by surgery type. Restricted mean survival times (RMST) for the first year were estimated using both weighted Kaplan-Meier and Cox regression models.

**Results:** A total of 96 patients met inclusion criteria for this study (n=76: open surgery; n=20: robotic surgery). Robotic surgery patients had a shorter median ICU stay (0.5 days) compared to open surgery patients (2 days;  $p=0.016$ ). Open surgery patients had a higher median estimated blood loss of 500 mL, compared to 100mL for robotic surgery patients ( $p=0.001$ ). The weighted log-rank test for progression-free survival (PFS) determined that the area between the curves (ABC) was not significant, meaning that there was no difference in PFS between open and robotic treatment groups ( $p=0.238$ ). The weighted log rank test for overall survival showed that the area between the curves was significant ( $p=0.034$ ), with robotic surgery patients having a higher probability of OS. RMST for OS in the first year was 12 months for robotic surgery patients and 11.24 months for open surgery patients (95% CI: 10.7-11.8) and the difference in RMST was significant ( $p=0.019$ ).

**Conclusions:** Study findings indicated some potential survival benefits for robotic surgery. Although propensity score weights were applied to adjust for differences between robotic and open surgery patients, including underlying disease severity, residual differences may remain, and the sample size was small. Robotic surgery is a safe and effective approach for CRS/HIPEC for patients who meet the appropriate clinical criteria, but future analyses with greater statistical power are needed to confirm survival differences.