

## Utilization of Peri-operative Chemotherapy for Bladder Cancer in Ontario: A Population-Based Study

**Introduction and Background:** Evidence from clinical trials and international guidelines support the use of perioperative chemotherapy for patients with muscle-invasive bladder cancer undergoing cystectomy, particularly in the neoadjuvant (NACT) setting. Here we describe delivery of perioperative NACT as well as adjuvant chemotherapy (ACT) in the general population of Ontario, Canada.

**Methods and Materials:** Electronic records of treatment were linked to the population-based Ontario Cancer Registry to identify all patients who underwent cystectomy for bladder cancer in Ontario 1992-2006. Census data concerning median household income were linked to the registry to provide an ecologic measure of socioeconomic status (SES). Utilization was compared across 3 study periods: 1992-96, 1997-01, 2002-06. Logistic regression was used to analyze temporal trends in the use of perioperative chemotherapy, while controlling for changes in case mix.

**Results:** In 1992-2006, 4886 patients underwent cystectomy (1359 had curative-intent radiotherapy) and the absolute number of surgical procedures done yearly nearly doubled over the study period. The majority of histo-pathology revealed urothelial carcinoma (92%) and 87% of these surgical cases were found to be pathologic stage 2 or greater. The overall survival of patients treated with radical surgery did not vary over the three study periods with a 3- and 5- year survival of 47.9% (45.6-50.1) and 39.5% (37.1-41.9) respectively during the most recent era. Of those undergoing cystectomy in Ontario, 736 (16%) received perioperative chemotherapy; NACT and ACT were used in 142 (3%) and 623 (14%) of cases respectively. While the use of NACT did not change over the 3 study periods (4%, 2%, 3%;  $p=0.080$ ), utilization of ACT increased a small degree with time (10%, 15%, 16%;  $p<0.001$ ). Use of perioperative chemotherapy varied widely across catchment areas of provincial cancer centers (11% to 22%,  $p<0.001$ ). As expected, patients with lower stage disease and those with higher levels of comorbidity were less likely to receive CT ( $p<0.001$ ), but after controlling for stage and comorbidity, older patients and residents of poorer communities were also significantly less likely to receive CT ( $p<0.001$ ).

**Conclusions:** Despite accumulating evidence and guideline development over the study period, chemotherapy remains substantially underutilized in the general population. The observed variations in use of chemotherapy across geographic regions and SES, may represent opportunities for further outcomes research as a natural experiment and possibly to target future interventions to optimize utilization.