Purpose/Objective(s): The Genitourinary Radiation Oncologists of Canada (GUROC) published a three-group risk stratification (RS) system to assist prostate cancer decision-making in 2001. The Prostate Cancer Risk ProCaRS database has been established by merging data from seven unique databases. The objective of this project is to use the ProCaRS database to statistically model the predictive accuracy of expanded RS schemes and to assess the clinical utility of a proposed new GUROC RS schema.

Materials/Methods: The RS analyses utilized the ProCaRS database that consists of 7974 patients from four Canadian institutions. This database contains patients treated with external-beam radiotherapy and LDR/HDR brachytherapy technique with approximately one-third of patients receiving some form of hormonal therapy. Conditional inference trees (otherwise known as Unbiased Recursive Partitioning Analysis) were utilized as the optimal methodology to explore the substratification of groups defined by the existing GUROC scheme. ASTRO II biochemical failure-free survival receiver operator curves and the associated area under the curve at 5 years were used to compare the predictive accuracy of proposed RS systems. 10-fold cross-validated C-Indices were also obtained and used for comparison between various existing and proposed schema. All analyses were carried out using the R statistical language.

Results: Existing GUROC risk stratification classification was low-risk in 52%, intermediate-risk in 35%, and high-risk in 13%. The recursive partitioning ProCaRS analysis has suggested that the existing GUROC classification system could be altered to accommodate as many as six separate and statistical unique groups based on differences in ASTRO II biochemical failure-free survival (10-fold C-index 0.67 and AUC 0.70). These new GUROC groups would define subgroups of the existing low--risk, intermediate-, and high-risk classifications. GUROC low-risk patients would be divided into new favourable-low and low-risk groups based on PSA ≤ 6 and PSA > 6. GUROC intermediate-risk patients can be subclassified into low-intermediate and high-intermediate groups. GUROC high-intermediate-risk is defined as existing GUROC intermediate-risk with PSA ≥10 AND either T2b/c disease or T1T2a disease with Gleason 7. GUROC high-risk patients would be subclassified into an additional extreme-risk group (GUROC high-risk AND PSA= 90% OR (PSA> 30)). Based on future consensus discussion, various groups can be collapsed into new or existing unified groups (e.g. high-intermediate with high-risk or not splitting low-risk due to limited clinical benefit).

Conclusions: GUROC subcategories have been identified by a recursive partitioning analysis of the ProCaRS database.