Stony Brook School of Health Professions

Mount Sinai Department of Radiation Oncology

Utilizing RapidPlan in the radiation oncology clinic through medical dosimetry student education

Materials and Methods

Students at the Mount Sinai Center for Radiation Sciences Education at Stony Brook University investigated the use of RapidPlan (RP) in clinic and its potential to standardize quality, improve efficiency, and determine applications of RP. Students planned 80 patients with RP and compared them to the respective clinical plan (CP). The DVH generated by RP was then compared to departmental dose constraints. The sites planned were prostate and nodes, prostate bed, and prostate SBRT.

- Dosimetric parameters recorded for the prostate and nodes were PTV maximum, D95, V95, rectal wall and bladder wall V20Gy, V30Gy, V40Gy and maximum dose, large and small bowel maximum dose
- For the prostate bed, the rectal and bladder wall parameters noted were V75Gy, V70Gy, and V65Gy
- For prostate SBRT, guidelines followed RTOG 0938

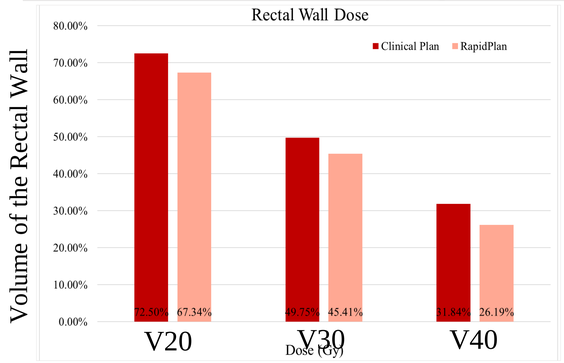
The percentage overlap of the rectal and bladder wall, large and small bowel with the PTV were noted, as well as the time required to do the RP. Dosimetric parameters were compared for significance using Wilcoxon signed-rank test.

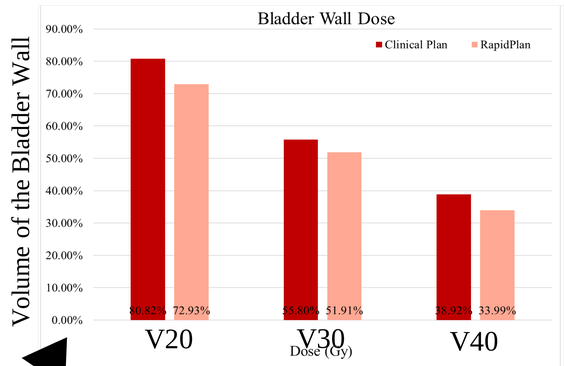
Results

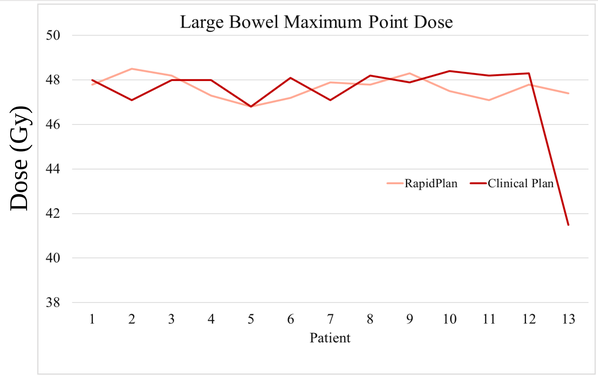
All RPs met institutional dose constraints in one iteration. It took an average of 20.3 min per plan when using RP.

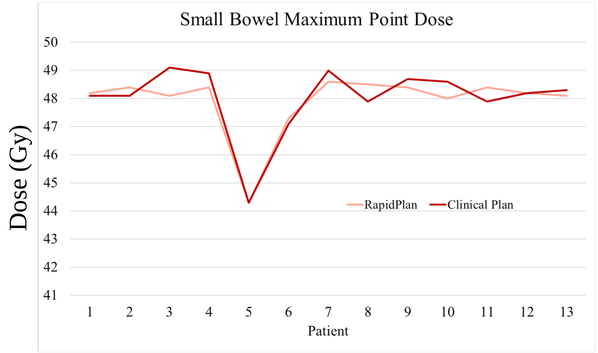
- For prostate and node cases, rectal wall overlaps ranged from 4.6% - 27.7% and bladder wall from 2% - 44%. RP was able to successfully meet the bladder and rectal wall constraints for overlaps within these ranges while improving sparing of the rectal and bladder wall V20Gy, V30Gy and V40Gy by as much as 10% ($p<0.001$). Coverage was not compromised
- For prostate bed plans, the overlap ranged from 47.5% - 71.7% for the rectal wall and from 42.3% - 67.6% for the bladder wall. No significant difference was noted between plans CP vs RP
- For prostate SBRT, the range of overlap for the rectum and bladder varied from 0.2% - 3.4% and 3.5% - 8.8% respectively; no significant dosimetric difference was seen between CP vs RP

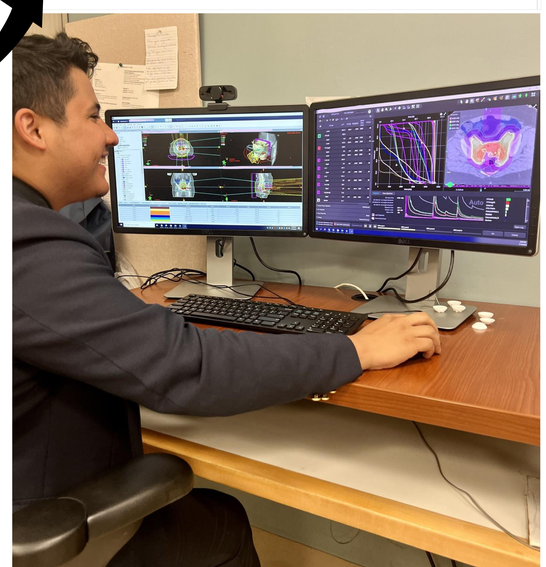
Analysis of RapidPlan (Single Iteration) vs. Clinical Plan for Prostate and Nodes











Future Developments

Students have successfully learned how to apply RP for prostate pelvic lymph nodes, prostate bed, and prostate SBRT sites. In this exercise, RP has deemed effective in achieving dose constraints, and took an average of 20.3 min per plan. Since completing the 80 plans, under supervision, students have effectively utilized RP for clinical cases. Given that RP presents as a planning tool in the clinical environment, educational programs should embed RP learning into their curriculum to ensure graduates are fully prepared for the workforce. Exploring graduate preparedness to utilize RP through alumni surveys provides an opportunity for future research.

Author Information

Victoria Olsen, BS, CMD Victoria.olsen@stonybrook.edu
Vishruta Dumane, PhD, DABR Vishruta.dumane@stonybrook.edu
Anthony Machuca, BS Anthony.machuca@stonybrook.edu
Talha Mojawalla, BS Talha.mojawalla@stonybrook.edu
Miftah Rahman, BS Muhammad.rahman@stonybrook.edu
Eden Zhang, BS Xuantong.zhang@stonybrook.edu
M.Dimopoulos, PhD, MBA, RT(T) Maria.dimopoulos@stonybrook.edu

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