Results: In total 50 patients were treated. A minority were rural (9%) or low-income (11%) from a socioeconomic perspective. Patients were found to have the following T staging by MRI: T0 n = 1 (2%), T1c n = 8 (16%), T2a n = 9 (18%), T2b n = 4 (8%), T2c n = 2 (4%), T3a n = 18 (36%), T3b n = 6 (12%), T4 n = 2 (4%). Nodal staging by MRI found N0: n = 45 (90%) and N1: n = 5 (10%) whereas PET imaging identified N0: n = 40 (80%) and N1: n = 10 (20%). Overall, n = 36 (72%) had lymph nodes electively covered to 25 Gy with a median D99 of 24.1 Gy (range = 23.79 − 25.3). A total of n = 10 (20%) of patients had PET-identified lymph node disease boosted to 35Gy with a median D99 of 34.8 Gy (range = 33.97-35.7). The median D99% DIL coverage was 42.5 Gy (range = 40.0 − 50.5). SBRT-related acute toxicity was collected. The highest acute GI toxicity per patient was no toxicity n = 20 (40%), grade 1 n = 20 (40%), grade 2 n = 9 (18%), and grade 3 n = 1 (2%). The highest acute GU toxicity per patient was no toxicity n = 13 (26%), grade 1 n = 21 (42%), grade 2 n = 15 (30%), and grade 3 n = 1(2%). The highest acute sexual toxicity per patient was no toxicity n = 40 (80%), grade 1 n = 4 (8%), grade 2 n = 2 (4%), grade 3 n = 4 (8%). The grade three toxicities were categorized as follows: GI - diarrhea n = 1, GU - pain from fiducials and catheterization n = 1, Sexual - Erectile dysfunction n = 4. The highest other acute toxicities per patient were no toxicity n = 35 (70%), Grade 1 n = 14 (28%), and Grade 2 n = 1 (2%). Other toxicities included pain, fatigue, insomnia, and anxiety. There were no acute grade 4 or 5 toxicities identified.

Conclusion: PSMA PET and MRI-guided SBRT boosting of DILs was found to be both feasible and safe with a limited acute toxicity profile. Ongoing follow-up is underway to identify late toxicities, quality of life, and disease-free survival associated with focused SBRT treatments.

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Microboost and Dosimetric Variability in Localized Prostate Cancer: Analysis of a Prospective Statewide Quality Collaborative

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Purpose/Objective(s): Radiation dose escalation for localized prostate cancer via a simultaneous-integrated microboost to intraprostatic gross disease improves biochemical endpoints with isotoxicity. Which men receive microboost in routine practice and whether implementation results in isotoxic radiation doses to organs-at-risk (OARs) is unclear. We hypothesized both microboost use and dosimetry would vary across practices within a statewide radiation oncology quality consortium.

Materials/Methods: Men with prostate cancer who received curative-intent EBRT from 10/26/20 − 06/26/23 were included. Patient characteristics, treatment-related data, and DICOMs were collected prospectively. A mixed model with a random intercept for facility was employed to test for facility-level variability in microboost use. Equivalent dose in 2 Gy fractions (EQD2; a/b 2.5 for bladder/rectum, 1.5 for targets) were used to plot blended dose-volume histogram curves; doses to OARs/targets were compared to current NRG protocol constraints.

Results: 524 men with intermediate (n = 369) and high-risk disease (n = 155) were included; 10% received a microboost (n = 53) and 7/26 centers used microboost. The microboost cohort did not differ from the no microboost cohort by fractionation or intended ADT use/duration (p>0.05) but had more MRI-based planning (91% vs 62%; p<0.0001) and rectal spacer +fiducial use (76% vs 45%; p<0.0001). The random intercept model found significant facility-level variation (p<0.0001) in microboost use beyond that explained by clinical factors. In this model, only grade group 4/5 was associated with microboost (OR = 3.4, 95% CI = 1.2−10.1, p = 0.03). The microboost cohort had significantly smaller median PTV (91 vs 127 cc) and smaller CTV to PTV expansion margins (p<0.05); bladder (187 vs 220 cc) and rectum (70 vs 73 cc) volumes did not differ (p>0.05). The median boost D98% was 94.4 Gy (EQD2). The percent exceeding NRG bladder/rectum constraints was low and did not differ by cohort (Table). Microboost rectal volumes received less high dose (e.g., V65Gy: 2.5% vs 5.2%, p <0.01) but increased intermediate doses (e.g., V30Gy: 32.6% vs 23.7%, V20Gy: 53.8% vs 36.5%, p<0.05).

Conclusion: In a large prospective cohort of men with localized prostate cancer, fewer than 30% of centers used microboost, and only 10% of patients received this treatment. Most plans met NRG constraints for bladder/rectum, and the microboost cohort did not have a significantly higher proportion of plans exceeding planning limits. Further research on microboost implementation, its influence on intermediate OAR dose, and the clinical relevance of intermediate dose, is needed.

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Limit	% >Limit, No Microboost	% >Limit, Microboost	P value
Bladder V80Gy≤10%	23.2	24.3	0.88
Bladder V75Gy≤20%	9.2	2.7	0.18
Bladder V70Gy≤30%	2.1	0	0.37
Rectum V80Gy≤5%	8.0	5.4	0.57
Rectum V75Gy≤10%	1.9	0	0.40
Rectum V70Gy≤20%	0	0	−

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