Purpose: To verify the ability of a proposed comprehensive calculation-based IMRT QA method to detect uncertainties introduced by the initial calculation, the data transfer through the V&R system to the console, and/or physical delivery. Materials/Methods: We have developed a calculative-based system that recomputes the treatment plan in the patient geometry using data from the V&R system, these data can be combined with data from the delivery unit to estimate the “as delivered” plan. These data can be sent into the original TPS to verify transfer and delivery or into a second TPS to also verify the original calculation algorithm. Each data set, dose as computed from the ideal V&R record, dose computed from the actual delivery records, and dose computed with a secondary TPS, were compared to the original planned dose distribution using 3D gamma analysis with three sets of distance and dose criteria: 3% - 3mm, 2% - 2mm, and 1% - 1mm. Results: For 43 treatment plans the average percentage of voxels passing the 3% - 3mm, 2% - 2mm, and 1% - 1mm gamma analysis for the V&R transfer tests were 100.0 (σ=0.0), 100.0 (σ=0.0), and 100.0 (σ=0.1); for the treatment delivery tests were 100.0 (σ=0.1), 99.9 (σ=0.6), and 95.7 (σ=4.7); and for the independent calculation tests, using the 2nd TPS, were 99.3 (σ=0.6), 97.1 (σ=1.5), and 78.8 (σ=8.9). Conclusions: Together with mechanical and dosimetric QA of the treatment unit, our novel methods for calculative-based, V&R derived IMRT QA presented in this work suggest that we can minimize the need for patient-specific QA measurements. Research sponsored by Philips Healthcare