Purpose: To determine the need for arc splitting for VMAT prostate patient quality assurance.

Methods: Prior to Eclipse version 10.0, a verification plan for VMAT treatment could only be created which mirrored the clinical plan; if the plan called for a full arc, then the verification plan also contained a full arc. In this case, for a center that uses the Sun Nuclear MapCheck device with its Isocentric Mounting Fixture, the full fluence of an arc is delivered en face to the device. The question arose as to whether partial arcs, if they could be created, would fail a center's criteria, while the full arc passed them, in effect, whether there are cancellations occurring and not being observed. With Eclipse version 10.0, it is now possible to split a clinical arc into many subdivisions for verification; the software recommends no more than 40 partial arcs, for computing speed limitations. Twelve VMAT plans for prostate patients were investigated, in order to search for the aforementioned cancellations. Two full arcs were used clinically in all cases. Verification plans were created consisting of (1) the two full arcs; (2) 8 partial arcs of 90 degrees each; and (3) 16 partial arcs of 45 degrees each. These were all analyzed against our criteria of 3%/3mm with a threshold of 10%, and 95% of points passing.

Results: Of 288 partial arcs and 49,670 points analyzed, there were a total of 100 points (0.2%) that failed the 3%/3mm criteria. No arcs, however, failed the 95% passing criteria. Moreover, there was no evidence of cancellation; if a point failed low, there was no corresponding high failure in another partial arc.

Conclusions: In this study, splitting a full arc into partial arcs revealed no unseen failures.