

Clinical implementation of plan transformation: A process description

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PURPOSE

- To propose a methodology for clinical implementation of “**plan transformation**”.

INTRODUCTION

- Our center is the busiest radiation-oncology department in Canada treating about 50/linac/day, 7days/week.
- In case of a linac breakdown, patients can not be transferred from ML to HD MLC unit since there is no straightforward method to move patients from **Millennium120** to **HD** MLC Varian units.
- This increases workload on other Millennium units while HD units have empty spots. Patients have to be cancelled and/or rescheduled increasing strain on an already heavy workload in our department (Fig 1.).

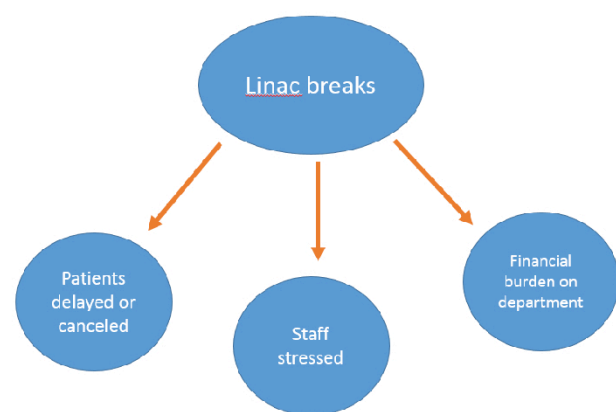


Figure 1 In the case of a machine break down, patients can not be transferred to other units with different type of MLC.

PROPOSED METHODOLOGY

- Our center is equipped with 4 Millennium120 and 2 High Definition MLC Varian units.
- Transformation is initiated when there is need to move patients from Millennium to High Definition MLC units (Ref 1).
- An in-house developed **API script** automatically identifies plans that are eligible for transformation in ARIA. Eligibility criteria for a plan being non-VMAT with Y-jaw collimation of 21.6cm or less.
- Transformation allows a patient to be transferred for a given number of fractions or the entire treatment course.
- Plan transformation is initiated by therapy, performed by dosimetry and checked by physicist before going for treatment.
- During transformation nothing in beam geometry or MUs change. Only MLCs are changed (Fig 2).

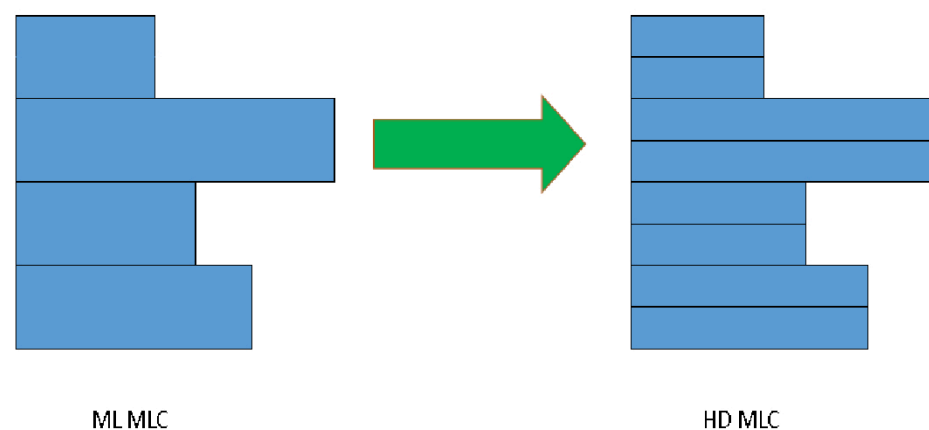


Figure 2 BEV for a breast tangent initially planned on a Millennium 120 MLC (left) transformed to a HD MLC plan (right) without the need to replan.

- Transformation produces plans that are very similar to the original plans. If the difference does not exceed 2% at any point, no physician review is required. Instead the physicist will approve the plans for treatment making the process quicker than a replan.

RESULTS

- On a given day, about 25% of appointments on all Millennium units were eligible for transformation. The majority of those were forward-planned step and shoot breast tangent and boost (Fig 3). The difference between the original and the transformed plan is usually not clinically significant.

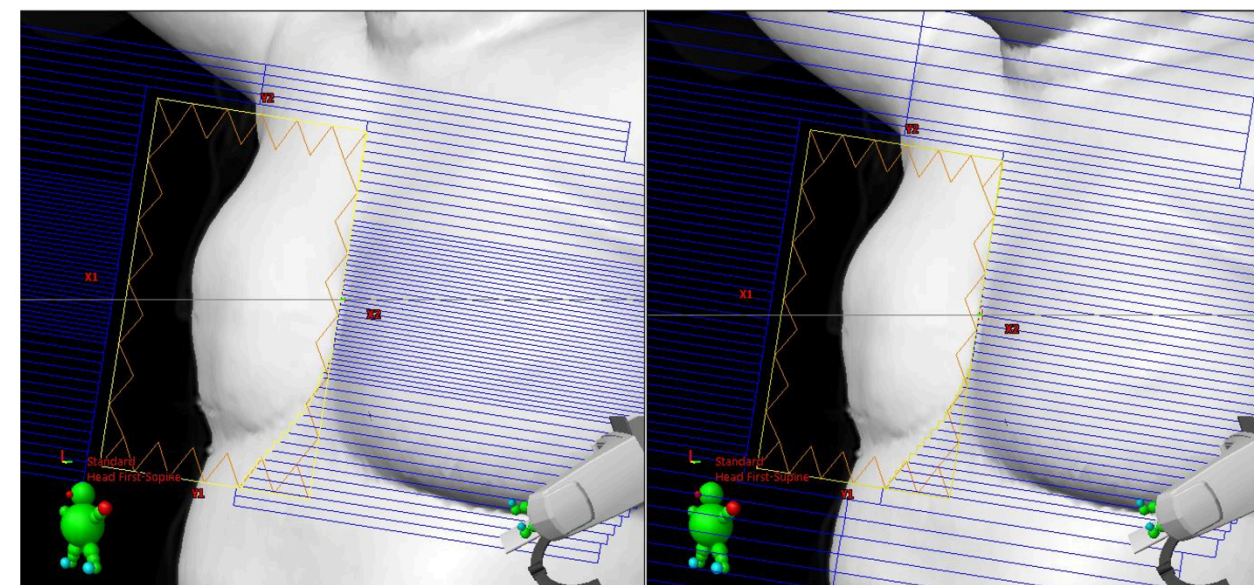


Figure 3 BEV for a breast tangent initially planned on a Millennium 120 MLC (left) transformed to a HD MLC plan (right) without the need to replan.

CONCLUSIONS

- Plan transformation is feasible and a better alternative to replanning in order to divert the high load of our Millennium MLC units to HD MLC units, if needed.
- Transformation allows for operational flexibility for bookings that can offset unplanned downtime.
- Plan transformation process saves time to planners by taking less than a quarter the time required for a replan which represents a huge time gain for our centre.

REFERENCES

- A feasibility study of plan transformation between Millennium & HD MLCs: A novel workaround enabling patient transfer between different Varian machines, Afsharpour et al. AAPM 2019