Moving Towards More Efficient And Safer Radiation Treatment Plan Processing

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Loyce Chua
Patemah Salleh
Hu Jing
National Cancer Centre Singapore

Background

Division of Radiation Oncology operates in two locations (SGH & NCCS) concurrently, thus the radiation oncologists (ROs) have to commute from one site to another in order to approve the radiotherapy treatment plans.

The approval process includes (Figure 1):
1. Viewing the plan on the Eclipse Treatment Planning System (TPS)
2. Signing off on the printed paper plan (Figure 2)
3. Digital approval on the Record & Verify System (Mosaix)

However, the manual entry of TPS’ planning prescription on to the paper plan poses a problem when it is not prescribed as per planned prescription or with incomplete entries as well as illegible handwriting. These will cause a delay in plan checks which will also affect the timely delivery of the plans to Quality Improvement (QI) checks that is benchmarked at 24 hours before treatment starts. Hence, this may compromise patient’s safety as QI checks are conducted in a rush manner and thus, inducing stress on the dosimetrists (Dos), physicists, QI and radiation therapists.

Mission Statement

To reduce the rate of missing items encountered with radiotherapy treatment plan processing from 35% to 5% by planning team in 6 months.

This project is of great importance to:
- Maintain high level of radiation and patient safety.
- In alignment with the NCCs care service quality values: Safety comes first.
- Reduce redundancy in duplicating the treatment plan parameters on paper.
- Reduce redundancy check on paper, TPS and Mosaix.
- Increase the efficiency and productivity of Planning section.
- Smoothen workflow and streamline processes.
- Increase staff job satisfaction.
- Saving cost on paper and ink cartridges.
- Reduce storage space and archiving for the paper print out.

Data Collection

Baseline data was collected weekly over a period of 8 weeks (Nov-Dec 2017) on problems encountered during treatment plan processing. The printed paper plan encountered an overage of 35% of missing items weekly from the plan processing.

Analysis

Radiation Oncologist

- Missing prescription, approval of prescription
- Missing dataset on paper plan
- Missing indications on paper plan
- Missing indication on paper plan

Dosimetrist: RT Planner

- Missing prescription, approval of prescription
- Missing dataset on paper plan
- Missing indication on paper plan
- Missing indication on paper plan

Physicist

- Missing prescription, approval of prescription
- Missing dataset on paper plan
- Missing indication on paper plan
- Missing indication on paper plan

Mission Items From Treatment Plan Processing

- ROs’ instructions on paper plan
- Missing prescription, approval of prescription
- Missing dataset on paper plan
- Missing indication on paper plan

Intervention

- ROs electronically sign Treatment Plan (in phases)
- ROs electronically approving of Treatment Plan to Mosaix (Reducing printing of Paper Plan in phases)
- All checks and electronically approval of Treatment Plan in Mosaix

PDSA 1:
- Dosis and physicists were briefed and familiarised with the new workflow. Dosis trained and guided the ROs on the approval process. Guide reference guide on the approval process was put up to facilitate learning and success of the project.
- Prostate Volumetric Modulated Arc Therapy (VMAT) plans were selected to pilot the implementation of electronic approval, as this site was less complex and the ROs were more compliant to support the change. Physicist and IT updated the ROs’ login and password in TPS and Mosaix to facilitate the electronic approvals.

PDSA 2:
- Implementation of electronic approval for Head and Neck VMAT plans.

PDSA 3:
- Implementation of electronic approval for all VMAT plans.

PDSA 4:
- Implementation of electronic approval for all conventional Three Dimensional plans.

Results

After PDSA 1 to 4, the percentage of missing items have reduced from 35% to 3% which had exceeded the plan goals.

Conclusions

With electronic approval, staff was less stressed as plans were delivered timely to QI for safety checks and treatment preparation. This is due to the application of technology (electronic approval) to streamline work process by cutting down the redundancy of the paper plan and improve ROs plan approval efficiency at any of the two locations.

In addition, the paperless interventions had improved job satisfaction and also resulted in a cost saving of around $22,200 per year on ink cartridges and paper.

Figure 1: Plan approval & processing flowchart

Figure 2: Treatment prescription on paper plot

Figure 3: Ishikawa diagrams showing causes of missing items during the plan processing

Figure 4: Problematic prescription on paper plan

Figure 5: Ishikawa diagrams showing causes of missing items during the plan processing

Table 1: Type of missing items and incidences on treatment plan processing (Nov-Dec-2017)

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<th>Incidence</th>
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Table 2: Type of missing items and incidences on treatment plan processing (Nov-Dec-2017)

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