Overview of TG262 on Electronic Record Keeping & Clinical Experience with ARIA

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Chair, TG-262
Overview

• TG262 overview
• ARIA as an information repository
• ARIA as a workflow and communication manager
• ARIA connectivity and IT considerations
  – TPS integration
  – Hospital EMR integration
Sources

- TG262 internal survey
  - 2015 educational course
- MSKCC physician survey on workflow
- MSKCC experience
- ARIA documentation
- TG201 rapid communication
- Mechalakos J. Dieterich S., “Quality and the EMR in radiation oncology” from “Quality and Safety in Radiation Oncology”, Dicker, Williams, Ford, eds., Demos Medical Publishing- to be published


TG262 charges

• To provide guidance in the administration, design, and implementation of electronic charting for simulation, planning and treatment using external beam radiotherapy and brachytherapy

• To provide guidance in maintaining safe clinical processes and communication when designing an electronic charting system—both during the transition to the new system and once the system is implemented.

• To provide guidance in implementation and management of electronic charting in the context of other systems in the clinic and other programs in the hospital (billing, IT, medical records)

• To provide a list of desired features for a robust electronic charting system and potential pitfalls based on accumulated clinical experience.
TG262 current work

• Internal survey - white paper in progress
• Groups
  – Implementation, training, and QA
  – Information repository- documents, forms, checklists
  – Workflow management and communication
  – IT considerations-connectivity
  – Brachytherapy and non-standard txt devices

ARIA as an information repository
**Information in the electronic chart**

“The biggest challenge was where to document all the items that were documented in patient's treatment section of the paper chart.” - TG262 internal survey

<table>
<thead>
<tr>
<th></th>
<th>Pre Treatment-Simulation</th>
<th>Planning</th>
<th>On Treatment</th>
<th>Post-Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MD/Nursing</strong></td>
<td>-Consents</td>
<td>-Prescription/written directive</td>
<td>-chart rounds checklists</td>
<td>-MD Treatment Summary</td>
</tr>
<tr>
<td></td>
<td>-Initial Consultation (Radiation Oncology)</td>
<td>-Special orders (not on Rx)- imaging, treatment goals, etc.</td>
<td>-MD status check</td>
<td>-Followup visits</td>
</tr>
<tr>
<td></td>
<td>-Simulation order</td>
<td></td>
<td>-Nursing status check</td>
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<td></td>
<td>-Simulation note</td>
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<td></td>
<td>-Pathology reports</td>
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<td>-Radiology reports</td>
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<td></td>
<td>-Patient questionnaires</td>
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<tr>
<td>**Physics/</td>
<td>-Simulation checklists and QA forms</td>
<td>-Treatment Plan</td>
<td>-Brachytherapy treatment delivery checklists/logs- pt specific and room</td>
<td>-Post implant evaluation</td>
</tr>
<tr>
<td>Radiation Therapy</td>
<td>-Simulation documentation (CT-PET-MRI)</td>
<td>-Manual IMU calculation forms for non-planned cases</td>
<td>specific</td>
<td>-End of treatment check</td>
</tr>
<tr>
<td></td>
<td>-Seed inventory and calibration</td>
<td>-Treatment planning timeout</td>
<td>-Daily treatment documentation form</td>
<td>-RTT end of treatment check</td>
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<tr>
<td></td>
<td></td>
<td>-Initial chart check form</td>
<td>-SRS and SBRT QA (includes IGRT forms: on-board imaging, OSI, etc)</td>
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<tr>
<td></td>
<td></td>
<td>-Protocol specific dosimetry forms</td>
<td>-Procedure specific QA (craniospinal irradiation, respiratory gating, etc)</td>
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<tr>
<td></td>
<td></td>
<td>-Patient specific dosimetry report</td>
<td>-EKG report</td>
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<td></td>
<td>-Record of previous treatment/multiple concurrent tx</td>
<td>-Procedure specific dosimetry (TBI, TSEB)</td>
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<td>-In vivo dosimetry (OSL, TLD)</td>
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<td></td>
<td>-Setup instructions (site/procedure specific)</td>
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<td></td>
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<td>-Custom worksheets and QA forms (breast boost, clinical setup, etc)</td>
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<tr>
<td></td>
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<td></td>
<td>-Room surveys</td>
<td></td>
</tr>
</tbody>
</table>

Mechalakos J. Dieterich S., “Quality and the EMR in radiation oncology” from “Quality and Safety in Radiation Oncology”, Dicker, Williams, Ford, eds., Demos Medical Publishing- to be published
ARIA as an information repository

• Birds eye view
• The prescription
• The treatment plan
• The treatment history
• The journal
• QA functions
Birds Eye View

Appointments and Tasks

Txt courses and diagnosis

Plans

Reference Points

Alerts for the therapist
Prescription

Document

Customizable

Integrative
Prescription workflow

- The tyranny of electronic approval
  - Move non-essential information
  - Use templates
- What if the prescription is changed?
  - Communication is vital between attending, machine, and physics but compliance isn’t 100%

Require concordance between timestamp reported in alert and Rx document timestamp
• How are modifications to the prescription managed?
  – A modification to the prescription automatically triggers a treatment hold until it is reapproved-4 (all MOSAIQ)
  – A modification to the prescription triggers a warning message but not a treatment hold-0
  – A modification to the prescription does not trigger a treatment hold. -7 (6 ARIA, 1 MOSAIQ)
"If a prescription which has been linked to a plan is edited, the treatment plan automatically reverts to a planing approved status so that the plan linked to the original prescription is not able to be treated without a revision."

“ARIA 13.6 Prescribe Treatment Video”, available via myVarian website- document AI 13.6-VID-04-A
How effective is the OIS for QA?

### QA Functions

<table>
<thead>
<tr>
<th>QA Functions</th>
<th>Importance</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forcing functions and constraints (e.g. interlocks)</td>
<td>2.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Automation and computerization (templates, indexing, statistical process control features)</td>
<td>2.5</td>
<td>4.2</td>
</tr>
<tr>
<td>Protocols, standards and information (e.g. checklists, communication)</td>
<td>2.5</td>
<td>3.9</td>
</tr>
<tr>
<td>Independent double check systems (e.g. ease of performing physics QA)</td>
<td>2.5</td>
<td>4.1</td>
</tr>
<tr>
<td>Rules and policies (e.g. scheduling assistants)</td>
<td>2.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Education (i.e. build in policies, help features)</td>
<td>2.3</td>
<td>3.4</td>
</tr>
</tbody>
</table>


[https://www.ismp.org/newsletters/acutecare/articles/19990602.asp](https://www.ismp.org/newsletters/acutecare/articles/19990602.asp)
Electronic systems introduce electronic approval which should fit the institutional workflow.
Treatment History

“There are some infrequent instances where the communication is dropped between the delivery system and the RO e-chart system. If this is not discovered on time, there is the potential to treat the patient for another fraction. We have processes in place to avoid this issue.” – TG262 survey

“Clinics should have policies and procedures in place to handle treatments that are interrupted by network or software problems” – TG201 rapid communication

The journal

- It is an easy way to document planning, QA or treatment related items or notes
- Anything that would have been written as a note in the paper chart - for example setup checks, early txt completion, etc
- For everything that we have not found a good place for
- Admin. or nursing use as a communication note section
QA documents

- Dynamic document
- Questionnaire
- ARIA checklist*

Facilitate staff compliance to your department protocols by linking customizable checklists to any activity.

Questionnaires

• ARIA users- do you use questionnaires?
  – Yes(Please explain how) 5
    • document initial chart check
    • for time out before tx, sbrt rounds, pacemakers, hdr audits, theraspheres, eyeplaque for second checks, sim check list, srs pre treatment qa and weekly physics checks.
    • tried to, only one that stuck was resident chart round tasks
    • EOT
  • It is useful to standardize the input of information and also since it is structured data, this information can be queried and used for future data gathering and analysis for outcomes.
Weekly checks

Can use a checklist (ARIA checklist, ARIA questionnaire or document).
### Treatment History

#### White
- Identifies treatments received by the selected patient.

#### Gray
- Describes plans for treatments to be received by the selected patient.

#### Red
- Shown on plans, giving a cell-by-cell identification of variances between a plan and actual treatments received by the selected patient.

#### Yellow
- Identifies overrides performed at a treatment machine.

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Varian Medical Systems, “Chart QA Reference Guide”, available via myvarian.com
ARIA as a workflow and communication manager
ARIA as a workflow and communication manager

- Bird’s eye view
- TG-262 workflow comments
- Physician workflow comments
- TG262 communication comments
- Physician communication comments
Care path, activities specific to patient

Simulation

Treatment Planning

Ad hoc task and appt
Pending - It’s not time yet, all the tasks before have not been completed or cancelled
Available - I’m ready when you are
In progress - being worked on
Completed - done
Cancelled - self explanatory
Design linked care paths with workflow and compliance in mind

Electronic task based workflow is difficult to use and often ignored by physicians—simplification and ongoing education needed—TG262 survey
Generic Users

Used to keep track of tasks associated with rotating responsibilities such as EOT- rather than assigning to a specific person, it is assigned to a generic ID and users on that rotation monitor for that generic ID.
Ad Hoc tasks

**MD approval tasks**
Sends the message
Hyperlinks for navigation

For documentation issues
For on-call cases
For emergent planned cases

Alerts planning teams

For replans due to chart rounds
Alerts therapist/physics to acquire/review pt specific QA
For cases exceeding standard dose constraints
For late volumes, issues causing loss of planning time
Physician carepath comments

- Filters not set properly - miss tasks
- Task completion is manual
  - Seen by many as redundant - completing the activity should complete the task
  - Sometimes causes confusion, for example plan approval task appears after plan has been approved (“carepath should be updated instantly”)
  - Volumes, plan approval, prescription task not autocompeted, either an issue completing or forgot
  - More tasks like physics weekly which can autogenerate a task via data administration
- More annotation requested in task note
  - Multiple sites/multiple tasks - use the note more
- Due dates must be managed if they are to be respected (tasks without due dates are like “looking at the sky and waiting for a comet”)
- System does not work well for covering attendings - “when someone is covering for me, I get the task and the covering gets the email”
TG262 and MD comments on communication

- Are there common failure/near-missed events relating to communication using the electronic chart? If so please specify.
  - A task based workflow has holes, email vs task an ongoing issue
    - Email vs task
      - People split 50/50
      - Email group visits ARIA less frequently
      - Task group gets too many emails
    - multiple forms of communication lead to message not reaching RTTs - consistency in communication
      - 80% email creates expectation of 100% email
      - Covering attendings sometimes get mixed messages
  - Not enough communication/human interaction since we went electronic.
    - One TG262 site has a planner/physician plan review checklist that must be reviewed together
ARIA Integration and Connectivity
Hospital EMR Integration

• Hospital EMR
  • RO Init Consult
  • RO Status check
  • Review of systems
  • Pathology, etc
• ARIA
  • Sim order
  • Prescription
ARIA integration with planning systems

- Eclipse/ARIA integration
  - Pros- no data transfers
  - Cons-
    - minor non-dosimetric changes affect the signed plan
- Concurrent users
- There may still be manual entry of some items such as bolus thickness- it is advised to make these manual entry items part of a checklist

ARIA integration with planning systems

- External planning system integration- some recommendations from TG201:
  - Workflow should include checkpoints at all data exchange interfaces.
  - Perform pt specific verification of treatment parameters in the txt database prior to approval. This ideally includes all control points.
  - CIAO doesn’t chk all control points
  - Manually entered items should be in a checklist
  - Data transfer should be checked after software upgrades using benchmark cases
  - An independent review is required when the prescription is changed after the plan is entered into the system

ARIA upgrades - preparation

• Provide directed training on the changes in workflow
• Confirm availability of representatives for all vendors involved, especially those connecting to the RO-EMR.
• Confirm connectivity of 3rd party systems with the new version.
• Confirm availability of clinical staff for the upgrade which typically happens on off hours or weekends.
• Plan out carefully the events of the upgrade weekend since a large amount of validation/verification is done in a short time and with minimal clinical disruption.
• If there is a database migration, this can take time therefore it may be necessary to manually transfer patient data to the new system for any changes that occur after the database snapshot is obtained.
• Plan for emergency treatments that may be necessary during the upgrade period.
• Create test patients for spot checks of basic clinical functionality such as IMRT delivery, imaging, etc.
• QA and acceptance of the upgraded planning system and management system.

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ARIA upgrades- upgrade weekend

• Verify basic clinical functionality on the machines using previously created test patients
• Mode up existing patients and investigate any errors or warnings.
• If there is a database migration,
  – Accept the new database- this can be done by choosing a subset of existing patients across the clinical range and checking that information has been transferred correctly to the new database. This includes all documents, treatment parameters, and images.
  – Once the new database is accepted, verify transfer of patient information to the new database for all patients on treatment. Some clinics have software which can query and compare the old and new databases on a patient specific basis. This greatly accelerates the validation process*
  – Enter information on changes that occurred after the database snapshot was obtained and check independently. It is important to check these manual entries carefully.
  – It may be helpful to take advantage of workflow tools in the system, such as using tasks to alert the therapists that physics has finished checking the data transfer for patient A so the therapist can proceed with the test mode-up.
• Check synchronization of software from 3rd party vendors touching the system using test patients.

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Changes that can be made to a txt approved plan - v13

<table>
<thead>
<tr>
<th>Non-Dosimetric Data change for Treatment Approved plan with Advanced Feature Set OFF</th>
<th>Non-Dosimetric Data change for Treatment Approved plan with Advanced Feature Set ON</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment Preparation Workspace</strong></td>
<td><strong>Treatment Preparation Workspace</strong></td>
</tr>
<tr>
<td>Couch Vrt, Lat, and Lng can be edited</td>
<td>Couch Vrt, Lat, Lng can be edited</td>
</tr>
<tr>
<td>Setup Notes can be edited or deleted; and added</td>
<td>Setup Notes &amp; photos can be added, edited, deleted</td>
</tr>
<tr>
<td>Dosimetrically Equivalent Machine can be added</td>
<td>Dosimetrically Equivalent Machine can be added</td>
</tr>
<tr>
<td>Reschedule Treatment Session or Imaging</td>
<td>Reschedule Treatment Session or Imaging</td>
</tr>
<tr>
<td>Parameters Workspace</td>
<td>Parameters Workspace</td>
</tr>
<tr>
<td>No edits possible</td>
<td>Couch Vrt, Lat, Lng can be edited</td>
</tr>
<tr>
<td>No edits possible</td>
<td>Setup Notes &amp; photos can be added, edited, deleted</td>
</tr>
</tbody>
</table>

From “ARIA 13.0 Treatment Preparation Workbook”, p110-112, available at my.varian.com
Planning approved, no dose

From “ARIA 13.0 Treatment Preparation Workbook”, p110-112, available at my.varian.com
Thank you!