May 7, 2012

Marilyn Tavenner
Acting Administrator
Centers for Medicare & Medicaid Services
Department of Health and Human Services
Room 445-G, Hubert H. Humphrey Building
200 Independence Ave. SW
Washington, DC 20201

{Submitted Electronically}

Re: CMS-0044-P; RIN 0938-AQ84; Medicare and Medicaid Programs;
Electronic Health Record Incentive Program- Stage 2

Dear Ms. Tavenner:

The American Society for Radiation Oncology (ASTRO), representing more than 10,000 radiation oncology physicians and medical professionals treating more than 1 million cancer patients each year, is pleased to provide comments on the Health Information Technology for Economic and Clinical Health (HITECH) Act provisions of the American Recovery and Reinvestment Act (ARRA) of 2009. ASTRO supports a number of aspects of the Stage 2 proposal, including the efforts of making Stage 2 standards more applicable to specialties, including radiation oncology, and extending the deadline to achieve these goals. While we do support the overall proposed rule, we have some specific concerns that we address in this letter.

Background on Radiation Oncology

Treating a patient who has cancer with radiation requires the coming together of multiple complex systems, people and processes. In a typical radiation oncology clinic, information flows from imaging equipment through treatment planning software, to treatment management software and finally to the treatment delivery machine, which delivers a precise dose of radiation to the patient. For this reason, it is imperative that the information generated within each system is accurately transferred through each step in the process. The main challenge that clinicians experience is the robust transfer of information through these systems because each system in a clinic may be developed by a different vendor. A treatment plan could be made on vendor A’s equipment and then that information would be transferred to vendor B for treatment management and finally to vendor C for delivery. Achieving seamless connectivity through these different vendor systems poses a constant obstacle for radiation oncologists. Attaining compatibility with hospital information systems is also a necessary component of the treatment process for hospital-based providers.

Due to the many handoffs necessary before a patient can actually be treated for cancer with radiation, the risk of error and the concern for patient safety are extremely high. ASTRO has been supporting the IHE-RO (Integrating the Healthcare Enterprise Radiation Oncology) program since 2004. This program brings together radiation oncologists, physicists, dosimetrists...
and radiation oncology software manufacturers to help tackle some of the interoperability challenges faced in radiation oncology. The initiative and some of the integration profiles developed thus far are outlined in a recent article published in *Practical Radiation Oncology* (PRO), titled “Addressing connectivity issues: The Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) initiative.”

**General Comments**
We understand the challenges in implementing such a program nationwide and appreciate CMS’ efforts to make this program worthwhile for providers and patients. ASTRO applauds the efforts of CMS to include specialties, such as radiation oncology, in the Stage 2 proposed standards. If implemented, the proposed rule will propel important functionality in many EHRs. For example, we appreciate the inclusion of the proposed objective to view imaging results through a Certified EHR technology. We believe this is a functionality that our physicians can attest to and furthermore is an important step in achieving seamless connection within systems.

While we appreciate CMS’ efforts, we believe there are opportunities to improve the proposed regulations governing Stage 2. We agree with the comments submitted by the American Medical Association (AMA). In particular, we want to emphasize the following points:

- **Evaluate Stage 1 to inform Stage 2**: CMS should survey physicians who elected to participate and those who elected not to participate during Stage 1 of the incentive program and identify barriers to and solutions for physician participation prior to finalizing Stage 2 requirements. In addition, prior to moving a measure from the Stage 1 menu set to the core set for Stage 2, or prior to adding new core measures for Stage 2, the expected impact, the expected value, risks (both clinical and administrative), evidence of efficacy, administrative burden, costs to physicians, and technological standards of the move should be thoroughly assessed.

- **Avoid high thresholds**: High thresholds should be avoided for new measures and for measures that cannot be met due to the lack of available, affordable, well-tested tools or abundant bidirectional health information exchanges.

- **Only use measures within a physician’s control**: Measures that require adherence from a party other than the physician should be eliminated (e.g., measures based on patient’s use of technology).

- **Testing of electronic specifications**: CMS should ensure that electronic specifications for all CQMs are tested prior to vendors imbedding them into their systems for use, with CMS funding to ensure an appropriate testing process.

Beyond the points outlined in the AMA letter, ASTRO would like to highlight some specific concerns from the perspective of radiation oncology.

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Electronic Messaging

The proposed rule includes requirements regarding the use of secure electronic messaging to communicate with patients on relevant health information (77 Fed.Reg. 13728). While ideal, we have concerns about feasibility of this requirement for several reasons.

We urge CMS to consider the demographics of the population that are covered under Medicare and to remove the requirement that patient action is required to meet certain objectives. We believe it is unfair on the patients and the providers, especially in the rural areas who do not have access or limited access to technology, to meet this requirement. Additionally, we note that one of the provisions under the ARRA act is the “Broadband Initiatives Program” (BIP) to help those in rural areas attain access to the Internet. However, until all rural areas have gained access to the Internet through BIP, it’s unreasonable to expect uniform compliance with this objective by 2014. The April 2012 Government Accountability Office (GAO) report evaluating the EHR incentive program cited “obtaining sufficient broadband access, which can affect providers’ abilities to exchange health information…. as one of the challenges to acquiring EHR systems.

Furthermore, in the first “nationally representative” survey on EHR adoption since the HITECH act, a study done by Health Affairs concluded that “hospitals in rural areas saw growth in system adoptions over time but had the lowest rate of any group analyzed.” We are concerned that this group is already lagging in EHR adoption and meeting meaningful use requirements from Stage 1, and will not be able to meet this core objective for Stage 2. We request that CMS move this to a menu objective instead of a core objective. We appreciate CMS’s intentions to involve patient interaction with their health, yet don’t believe this is a meaningful way to achieve the goal, considering some of the obstacles outside of the provider’s control.

Transitions to Another Setting of Care

The proposed rule states: “The EP that transitions or refers their patient to another setting of care or provider of care electronically transmits using Certified EHR Technology to a recipient with no organizational affiliation and using a different Certified EHR Technology vendor than the sender a summary of care record for more than 10 percent of transitions of care and referrals” (77 Fed.Reg. 13819).

We appreciate the effort of CMS to encourage interoperability between EHRs. As cited above, achieving interoperability within and outside of practice is highly valued in radiation oncology due to the complexity of the field. ASTRO agrees with the meaningful use requirement that requires transfer of information from one Certified EHR technology to a different Certified EHR system for transitions of care and referrals. Although this is a step in the right direction, radiation oncologists typically refer patients to other radiation oncologists/medical oncologists who may be using the same EHR system. We do understand that there is an exclusion to this rule for “any EP who neither transfers a patient to another setting nor refers a patient to another provider during the EHR reporting period is excluded from both measures” (77 Fed. Reg. 13819).

2 United States Government Accountability Office (GOA), Electronic Health Records: First Year of CMS’s Incentive Programs Shows Opportunities to Improve Processes to Verify Providers Met Requirements,” GAO-12-481, April 30

However, radiation oncologists would not be able to meet this exclusion because they do refer patients to other care settings. Achieving this objective or exclusion would be difficult for radiation oncologists due to the small number of vendors providing radiation oncology-compatible EHRs. Additionally, we believe that achieving interoperability within a radiation oncology practice is vital to patient safety. Thus, we hope that CMS can implement the meaningful use standards in a way that recognizes the unique challenges in this field, such as with the integration profiles developed by IHE-RO.

Reporting to Cancer Registries
In the proposed rule, CMS requires EHRs to have the capability to identify and report cancer cases to a state cancer registry, except where prohibited, and in accordance with applicable law and practice (77 Fed.Reg. 3820).

ASTRO appreciates the efforts of CMS to include the requirement of reporting electronically to state cancer registries. Radiation oncologists can participate in attesting to this requirement, when feasible. Additionally, we suggest that the reporting of cancer cases should not be limited to a state cancer registry. Physicians should have the flexibility of reporting to other registries to satisfy this objective, particularly if their state cannot receive electronic cancer case information. ASTRO is supporting the development of the National Radiation Oncology Registry (NROR), which we believe is relevant to radiation oncologists and likely to produce information to improve cancer patient outcomes, consistent with CMS’ overall approach to quality. We recommend CMS allow reporting to such cancer registries, beyond state registries, to satisfy this objective.

Clinical Quality Measures
ASTRO appreciates the efforts of CMS to align the reporting on clinical quality measures with the existing PQRS program. We support Option 2 that allows EPs “an alternative to reporting the 12 clinical quality measures as described under Options 1a and 1b, and in order to streamline quality reporting options for participating providers, Medicare EPs who submit and satisfactorily report Physician Quality Reporting System clinical quality measures under the Physician Quality Reporting System’s EHR reporting option using Certified EHR Technology would satisfy their clinical quality measures reporting requirement under the Medicare EHR Incentive Program” (77 Fed. Reg. 13748).

However, we are concerned that the lack of a sufficient number of approved radiation oncology-specific individual measures or an oncology measure group will unnecessarily exclude radiation oncologists from satisfying this requirement. In conjunction with the American Society for Clinical Oncology, ASTRO submitted an oncology measure group to CMS in October of 2011 to be included in the 2013 PQRS program. Unfortunately, in the 2012 Physician Fee Schedule final rule, CMS indicated it would not add new measures given the impending implementation of ICD-10. Since this decision, however, CMS has delayed ICD-10 implementation. ASTRO met with CMS officials in February 2012 and again requested that the agency consider adding a new oncology measure group for 2013 comprised of measures currently in the PQRS program. We have not yet been notified of a final decision, but we are concerned that the implementation timelines of the respective programs will unfairly prevent an oncology measure group from being available for radiation oncologists to use to satisfy this reporting option.
ASTRO also is concerned about the feasibility of reporting on clinical quality measures through the PQRS option in the proposed rule, as we believe that the majority of measures in the PQRS program don’t have EHR specifications. The following measures in the 2012 PQRS program are typically reported by radiation oncologists. However, these measures currently have only claims or registry reporting specifications.

<table>
<thead>
<tr>
<th>PQRS Number</th>
<th>NQF Number</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>104</td>
<td>NQF# 0390</td>
<td>Prostate Cancer: Adjuvant Hormonal Therapy for High-Risk Prostate Cancer Patients</td>
</tr>
<tr>
<td>105</td>
<td>NQF# 0388</td>
<td>Prostate Cancer: Three-Dimensional (3D) Radiotherapy</td>
</tr>
<tr>
<td>143</td>
<td>NQF#0384</td>
<td>Oncology: Medical and Radiation – Pain Intensity Quantified</td>
</tr>
<tr>
<td>144</td>
<td>NQF# 0383</td>
<td>Oncology: Medical and Radiation – Plan of Care for Pain</td>
</tr>
<tr>
<td>156</td>
<td>NQF#0382</td>
<td>Oncology: Radiation Dose Limits to Normal Tissues</td>
</tr>
<tr>
<td>194</td>
<td>NQF#0386</td>
<td>Oncology: Cancer Stage Documented</td>
</tr>
</tbody>
</table>

In fact, in 2012, the only oncology measures that have EHR specifications are:
- NQF#0385 Colon Cancer: Chemotherapy for Stage III Colon Cancer Patients
- NQF#0387 Breast Cancer: Hormonal Therapy for Stage IC-IIIC Estrogen Receptor/Progesterone Receptor (ER/PR) Positive Breast Cancer
- NQF#0389 Prostate Cancer: Avoidance of Overuse of Bone Scan for Staging Low Risk Prostate Cancer Patients

CMS should work with the AMA-PCPI to ensure all measures developed by the PCPI in the PQRS program have EHR specifications or provide sufficient alternate pathways for reporting, such as via a PQRS approved registry. We believe this will facilitate electronic reporting and better align this program with the PQRS program.

**Unique Interoperability Issues in Radiation Oncology**

The series of articles that were released by the *New York Times* in 2010 highlighted the worst case scenarios in which oversight of a few factors could potentially lead to an overdose of radiation and inadvertently harm the patient. Radiation oncologists take extreme care when treating a patient with radiation. However, the *New York Times* articles stress the need for CMS to recognize radiation oncology as a unique field. ASTRO has committed itself to patient safety through the Target Safely initiative, a plan committed to the safe and effective use of radiation. One of the proponents of the Target Safely plan is a push for radiation oncologists to adopt IHE-RO compliant technology in their practice.

ASTRO has been the chief financial supporter and lead organization for the IHE-RO effort. As mentioned above, this initiative brings together cancer care professionals and the medical device
industry to create an environment of interconnectivity and interoperability where vital clinical information is passed seamlessly from system to system, within and across practices, and made readily available at the point of care. In 2007, IHE-RO successfully demonstrated connectivity for basic information exchange across eight different medical systems in the radiation oncology treatment planning process. In 2008, IHE-RO completed an effort to seamlessly transmit and align multi-modality tumor images, a key component of the treatment planning process, across different systems using standards-based interchanges. Additional projects for enhancing the treatment delivery process and other advanced information exchange efforts are underway with the goal of full device interoperability by 2015. These integration profiles have already been implemented by many radiation oncology software companies. With the help of CMS, we hope that these integration profiles can be implemented by all radiation oncology software manufacturers. **We would look forward to working with CMS to implement IHE-RO profiles as part of the EHR meaningful use standards.**

In conclusion, we appreciate the chance to provide comments on the Stage 2 implementation of the EHR meaningful use program. We understand the challenges in implementing such a program nationwide and appreciate working with CMS to make this program as worthwhile for providers and patients. Thank you again for the opportunity to provide input. We look forward to continuing to work with you to on the EHR meaningful use program. If you have any questions, please contact Sidrah Abdul, Programs Manager at [sidraha@astro.org](mailto:sidraha@astro.org) or (703) 839-7370.

Sincerely,

Laura I. Thevenot
Chief Executive Officer
Addressing connectivity issues: The Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) initiative

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Abstract In today’s world, treating a patient successfully with radiation requires the integration of complex data from a variety of systems. In a typical radiation oncology clinic, data move from the treatment management system to treatment planning system to treatment delivery system. When there is a lack of interconnectivity between the systems, the potential for medical error is increased.

Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) is dedicated to the identification of connectivity problems encountered in the modern day radiation oncology clinic and the development of solutions to these problems. These solutions are then integrated and made available to the radiation oncology community. This article introduces the IHE-RO initiative, outlines the relevance of IHE-RO for the radiation oncology community, and provides a resource so that therapists, physicists, dosimetrists, administrators, and physicians alike can best understand which vendor equipment can effectively communicate between platforms because it has been deemed IHE-RO compliant through a series of connectivity tests.

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Introduction

Radiation oncology is a technology driven field, from the imaging that we use to identify the tumor and surrounding vital organs, to the computers that we use to generate a treatment plan, to the hardware that we use to deliver the dose and confirm the accuracy of its delivery. This requires integration of software and hardware from a variety of vendors using a multitude of systems. For this integration to be done successfully we need a series of data transfers to occur with 100% fidelity and reliability (see Fig 1). When these connections falter, errors occur, and patient safety is compromised. Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) is dedicated to identifying and correcting connectivity and compatibility issues affecting members of the radiation oncology community in their everyday clinic and to developing solutions to these problems. It is a unique organization where administrators, clinicians, industry representatives, physicists, and information technologists work together. Support for the IHE-RO initiative is an important component of a larger commitment by all to improve patient safety.1

The American Society for Radiation Oncology (ASTRO) 6-point “Target Safely” plan for patient protection and IHE-RO.2

In February of 2010, the ASTRO committed to a 6-point patient protection program with the goal of improving the safety and quality of radiation treatment and reducing the chance of medical treatment errors. This plan, known as the Target Safely initiative, was approved by the Board of Directors of ASTRO, motivated in part by a series of New York Times articles entitled the “Radiation Boom” by Walt Bogdanich that examined issues arising from the increasing use of medical radiation and the new technologies that deliver it.3-7 In this series of articles, a number of disturbing radiation treatment delivery errors and the consequence to patients were highlighted. The Target Safely initiative consisted of 6 separate domains through which ASTRO would focus future efforts in order to improve the quality of patient care.

1. Working with the Conference of Radiation Control Program Directors and other stakeholders to create a database for the reporting of linear accelerator- and computed tomography-based medical errors.
2. Launching a significantly enhanced practice accreditation program, and beginning the development of additional accreditation modules specifically addressing new, advanced technologies such as intensity modulated radiation therapy.

Figure 1 Schematic representation of critical data handoffs within a typical radiation oncology clinic. Solid lines represent connectivity issues for which Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) has developed an agreed upon standard (also known as integration profiles). Hatched lines represent a connectivity issue for which IHE-RO is currently working to develop a standard.
radiation therapy (IMRT), stereotactic body radiation therapy, and brachytherapy.

3. Expanding our educational training programs to include specific courses on quality assurance and safety, and adding additional content to other educational programs.

4. Working with patient support organizations to develop tools for cancer patients and caregivers for use in their discussions with their radiation oncologist to help them understand the quality and safety programs at the centers where they are being treated. These tools will include questions to ask their treatment team, such as, “Do you have daily safety checks?” and “What kinds of safeguards do you have to make sure I’m given the right treatment?”

5. Further developing our Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) connectivity compliance program to ensure that medical technologies from different manufacturers can safely transfer information to reduce the chance of a medical error.

6. Providing our members’ expertise to policymakers and advocating for new and expanded federal initiatives to help protect patients, including the following: support for immediate passage of the Consistency, Accuracy, Responsibility and Excellence in Medical Imaging and Radiation Therapy Act to require national standards for radiation therapy treatment team members; additional resources for the National Institute of Health’s Radiological Physics Center to evaluate the safety of treatments; and funding for a national reporting database.

Although the treatment errors identified in the New York Times articles had many causes, it was clear that connectivity errors arising from the failure to properly integrate the various hardware and software commonly utilized in a radiation oncology clinic can compromise patient safety. Interoperability errors can result in safety hazards as well as inhibit efficiency. IHE-RO works on developing both workflow and interoperability solutions to allow the clinical environment to operate safely and efficiently. One important goal of IHE-RO workflow development is to enable incorporation of automated safeguards that are designed to identify and correct errors before they can do harm to the patient. Therefore, support for the IHE-RO initiative became one of the tenets of the ASTRO Target Safely initiative.

**What is IHE-RO?**

IHE (Integrating the Healthcare Enterprise) is an international collaborative effort that aims to improve compatibility across all segments of health care technologies. The goal of IHE is to enable sharing of information that is relevant to a patient’s care among all health care systems, thereby eliminating interoperability challenges. The hope is that this will ultimately improve patient care and reduce medical errors.

ASTRO sponsors the Radiation Oncology domain of IHE (IHE-RO). In 2004, ASTRO formed a multi-society, multi-national, and multi-specialty IHE-RO task force to address issues of information sharing between various health care systems in radiation oncology and is working to resolve them in a systematic way using established industry standards. First, IHE-RO seeks connectivity problem submissions from users in the clinic. Once a problem is identified, it is then articulated into a standardized form developed into a solution that serves as an implementation roadmap for vendors (see Table 1). Once the vendors have implemented the connectivity solution, they come together annually for the IHE-RO Connectathon to demonstrate that the connectivity problem has been resolved.

**Testing connectivity solutions at a Connectathon**

After the Connectathon, solutions are finalized and vendors integrate these solutions into their products and test their systems. Successful completion of the testing requires the vendor’s system to receive information from at least 3 other vendors who support the previous step in the information flow, and to transmit information to 3 vendors whose applications represent the next step. The vendors who passed the Connectathon for 1 or more of the tests are provided the opportunity to demonstrate successful integration of the connectivity solution into their product for consumers by ASTRO. This usually takes place in the exhibit hall during the ASTRO Annual Meeting. A product that has passed a Connectathon can then be deemed as “IHE-RO Compliant” once the product has been market released within 1 year after passing.

The first connectivity problem solved by IHE-RO was in the realm of basic radiotherapy planning in 2007. IHE-RO recognized the fundamental importance of the treatment planning system (TPS) and the connectivity issues surrounding its ability to communicate seamlessly with the radiology picture archiving and communication systems, treatment management systems (TMS), and other TPSs. This connectivity solution provides the structural mechanisms required for image-based treatment planning.

**What can IHE-RO do for me as a radiation oncologist or a medical physicist: IHE-RO can improve patient safety and treatment effectiveness in radiation oncology**

Radiation overdoses and mistreatments have been labeled as one of the most important technology hazards
IHE-RO proposed a safety connectivity issue to address this: an automated quality assurance system, where the desired treatment plan is verified by the TMS to be correct and then transferred to the TDS. The TDS in turn will have an internal check and verification of this plan and will stop delivery of the treatment if these parameters do not match. While this is only in the developmental phase, the ultimate goal is automated quality assurance (AQuA) of all these different connections. The role of IHE-RO is to verify accuracy of connections between diverse TPS and TDS systems that are available on the market. We are currently working to test this in the 2012 Connectathon.

An extension of AQuA would be for the TMS to perform automated checks of the different QA parameters required prior to treatment initiation. The Medical Imaging and Technology Alliance has published recommendations that attempt to create a high safety environment in radiation oncology departments. One of the recommendations has included the performance of an accurate and complete QA test prior to the delivery of radiation therapy. QA should cover all steps in the treatment delivery process; any step vital for accurate radiation dose delivery should be included. Systems of checklists and verifications are available but this is subject to human discipline and does not require that the checklist is completed prior to

for 2011 by the ECRI institute (a designated federal patient safety organization). Technology is a double-edged sword. It can function as a valuable adjunct to the human brain serving to remind and ensure completeness. However, it can also magnify the scale of errors when it is relied on excessively or taken for granted.

IHE-RO is working intensively on a connectivity problem that can occur because of poor interconnectivity between different TPSs, TMSs, and treatment delivery system (TDSs) (see Table 1). A recent incident that highlighted this miscommunication between the TPS and TDS resulted in severe consequences for the patient. While this kind of interconnectivity mismatch is rare and can be corrected by human oversight, often it is undetectable until it is too late. Another problem is human error resulting from an individual’s incorrect use of technological systems. An example of such a safety-related connectivity problem could be the incorrect setup by a few centimeters in 1 axis of an IMRT patient on the table by a new therapist working alone after the initial isocenter was verified and filmed but not marked on the patient mask. Unfortunately there is no automated discovery of this error until the next port film day after as many as 6 fractions, as all other parameters of treatment delivery such as monitor units, beam angles, etc, are correct.

<table>
<thead>
<tr>
<th>Clinical challenge</th>
<th>IHE-RO standardization protocol that addresses this problem (integration profile)</th>
<th>Description of IHE-RO solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferring CT images and treatment planning data between 2 different treatment planning systems</td>
<td>Basic radiation therapy objects integration profile</td>
<td>Specifies protocols for each component in the PACS system. This allows users to move data between systems. It establishes baseline interoperability for simple RT objects from image acquisition through dose display.</td>
</tr>
<tr>
<td>Transfer of registered data (with spatial coordinate sets) from one system to another without loss of integrity. For example (head-first, feet-first, supine, prone, etc)</td>
<td>Multi-modality image registration integration profile</td>
<td>Specifies how images, RT structure sets, RT doses, and associated spatial registration information can be exchanged, stored, processed and displayed.</td>
</tr>
<tr>
<td>Use of distinct vendor solutions for treatment planning, dose review, plan review, virtual simulation, etc</td>
<td>Advanced radiation therapy objects integration profile</td>
<td>Specifies protocols for data (ie, treatment schedule information, plan, and treatment records) transfer between the treatment planning system, treatment management system, and delivery system.</td>
</tr>
<tr>
<td>Use of different treatment machines with a single treatment management system in the clinic</td>
<td>Treatment delivery workflow integration profile</td>
<td>Specifies data and handoffs required for sophisticated treatment planning for computer-controlled accelerators in external-beam treatment delivery. This allows for treatment planning data to be transferred from one TPS to another without loss of integrity.</td>
</tr>
<tr>
<td>Sum multiple (planned or delivered) dose distributions derived from different phases of treatment (initial vs cone-down, etc)</td>
<td>Dose compositing integration profile</td>
<td>Specifies protocols for dose deposition data to be tagged with coordinate and phase of treatment. This would facilitate dose summation.</td>
</tr>
</tbody>
</table>

CT, computed tomographic; IHE-RO, Integrating the Healthcare Enterprise-Radiation Oncology; PACS, picture archiving and communication system; RT, radiotherapy; TPS, treatment planning system.
delivery of the fraction. The downside of all this is that this can slow the treatment process and may reduce efficiency in the treatment. However, if this is automated, as proposed by the IHE-RO safety connectivity solution or AQuA, this will certainly speed up things.

IHE-RO interconnectivity increases efficiency of the clinic and reduces costs

The demands of the competitive marketplace often compel departments to invest in diverse planning and delivery platforms so that they can attract patients to the “latest and greatest” treatments. It would not be unusual to find a Cyberknife (Accuray, Inc, Sunnyvale, CA), a standard linear accelerator, and a Gamma Knife (Elekta AB) all under one roof. Communication among all the hardware and software components of these machines can result in interconnectivity problems with consequent inefficiency in clinical workflow. Additional time is often spent by dosimetrists, physicists, and physicians to circumvent these connectivity hurdles in order to deliver quality care. This time impedes workflow and ultimately affects the bottom line of the clinic.

In order to assess the financial impact of connectivity problems faced in the clinic, let us take a common scenario, the re-irradiation of a patient. The exact percentage of patients requiring re-irradiation is unclear, but estimates from literature review range from 3%-10% for central nervous system tumors.18 Re-treatment of the same or adjacent body sites requires intensive effort by the RO team for re-planning, recalculation, and re-verification of treatments. The process of doing this is simpler if the patient is being treated in the same institution using the same TPS. It becomes more problematic if the patient was initially treated elsewhere using a different TPS. Based on an informal survey in a large academic department, the following were found: on an average, the dosimetrist spends an extra day for re-planning a complex IMRT re-treatment, the physicist spends an extra hour, and the physician spends an extra 2 hours (K. Albuquerque; personal communication, 2011). This is required for checking and looking at different data sets for images that cannot be fused due to being generated on different platforms. The time and effort and the work value involved in re-treatments is significant.

To estimate the cost of this extra effort on an annual basis, consider a large radiation department in an academic center treating approximately 1000 to 1200 patients a year. If we estimate that 5% of the cases are for re-irradiation, this would translate into 20-25 re-treatment patients per year. Using US national median salaries as a measure of work value, the additional dollar cost for planning these would be $22,250 per year.19 In a clinic that sees a higher percentage of head and neck, central nervous system, and lung tumors, we may estimate that 10% of the cases are re-irradiation, and then the additional dollar value to the clinic for planning these patients climbs to $45,000. This does not include the stress and anxiety created because of uncertainty of the actual dose and location of dose delivered due to inability of different planning systems to have dose composting, one of the goals of IHE-RO.

Thus, complete interconnectivity among all of the treatment delivery, planning, and management platforms would create a state of “nirvana” (Sanskrit word which refers to the state of being free from suffering) in the radiation oncology clinic and increase efficiency while reducing cost.

How can I ask for IHE-RO compliant technologies?

To benefit from the results of the IHE-RO initiative, be sure to request IHE-RO-compliant products from your vendors. The technical aspects of the clinical solution specific to your clinic must be incorporated into your purchasing process. The most effective and efficient way to communicate your needs to the vendor is by providing purchase specifications that define IHE-RO compliance. The purchasing process can be very different depending on the size and administrative culture of the institution. In general, 2 purchasing models are followed; community hospital-freestanding clinic model and academic-corporate model. The primary difference in the models is the role of the radiation oncology team (radiation oncologist, physicist, and administrator). In the community hospital, the radiation oncology team initiates and drives the purchasing process and the purchasing department acts as the agent in final negotiations. The team must clearly define its clinical and technical specifications to the vendors solicited for quotations. The quotations are evaluated based on compliance to each vendor’s ability to meet the specifications and pricing. In academia, the radiation oncology team initiates the request-justification, and the purchasing department is the primary driver of the process. The purchasing agent uses industry standard specifications to generate a purchase proposal that several approved vendors are asked to respond to with sales quotations. The quotations are evaluated based on compliance to each vendor’s ability to meet the specifications and pricing. In academia, the radiation oncology team defines and collaborates with the radiation oncology team to define clinical and operational specifications for the hardware or software purchase. IHE-RO-compliant purchase specifications should be an integral component of the purchase request regardless of the model followed by your institution. IHE-RO compliance can be required for any product upgrade or new purchase request. To simplify the procurement of compliant products IHE-RO has developed a purchase specification template. This
IHE-RO Helper: Your guide to interconnectivity

One of IHE-RO’s current initiatives is to develop a web-based tool that will help the end user determine whether or not he or she will face interoperability issues in the clinic when matching one system with another. For example, if you are planning to purchase a treatment planning system capable of generating plans (eg, volume modulated arc treatments) and are concerned whether the TPS can successfully transfer such plans to your TMS and then from your TMS to your linear accelerator (TDS) for delivery, the IHE-RO Helper would identify whether such a connectivity problem has been identified to which a connectivity solution has been developed, and finally which vendors have successfully passed an IHE-RO Connectathon proving their adherence to the solution. IHE-RO Helper is currently under development and will be available soon to the community.

Conclusions

IHE-RO is dedicated to identifying and solving the connectivity problems that arise in radiation oncology clinics on a daily basis. As the demands to integrate newer technologies into existing clinics increase from patients, clinicians, physicists, and the hospital administration alike, the challenge of successful integration of these systems will become increasingly complex. Greater support for IHE-RO by the radiation oncology community at large is essential to the identification and solving of these problems before clinic workflow and patient safety is compromised. If successful, this initiative will result in an improvement of the quality and efficiency of the care that can be delivered to patients with cancer.

Acknowledgments

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References