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Radiation Treatment Quality Based Procedures (RT-QBP)

Expert Panel – Hematology

NOVEMBER 6, 2019

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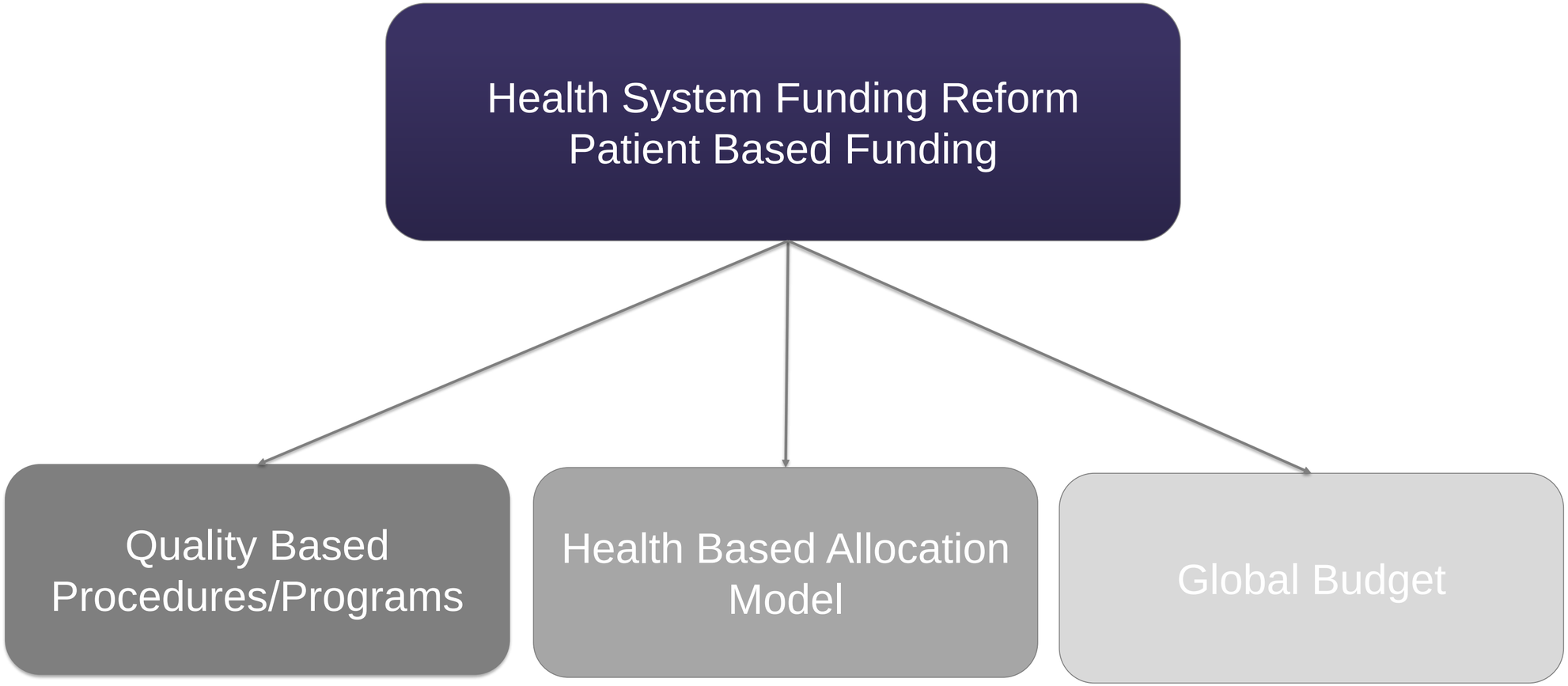
Objectives for Today

Expert Panel Hematology meeting #1:

- To provide an overview of the Radiation Therapy QBP (RT-QBP) process ✓
- To review the dose/fractionation data for Hematology ✓
- To come to a consensus about RT protocols for hematology, including dose/fractionation ranges for each protocol ✓
- Discuss quality metrics for RT QBP, and assign “leads” for the quality metrics work ✓
- Discuss any question or concerns about the RT QBP and provide feedback ✓
- Identify and record RT-QBP risk registry items ✓

Overview of HSFR

Health System Funding Reform (HSFR)



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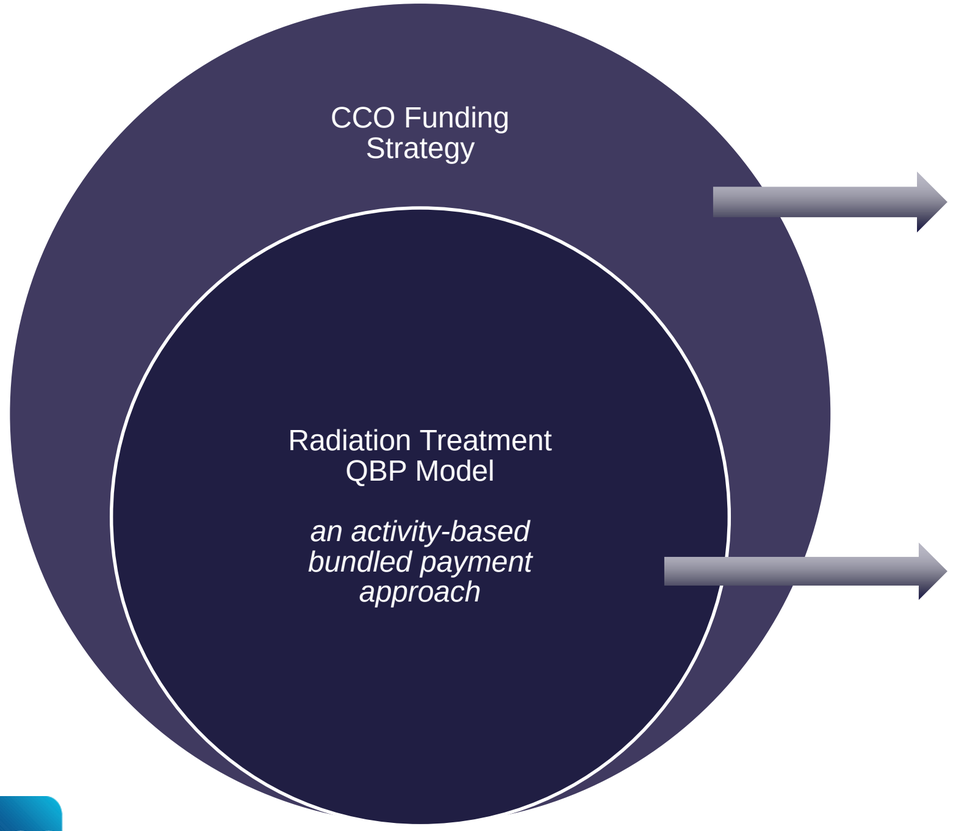
Radiation Treatment QBP Overview

Radiation Treatment QBP Overview

Vision: Implement a new funding model that will drive consistent, equitable, and high-quality care for patients being treated with radiation



- Cancer treatment is typically one of, or a combination of, three modalities Cancer Surgery, Systemic Treatment QBPs have been completed
- Completing the third modality, RT-QBP will:
  - Allow CCO to better coordinate the up-stream care elements, which could lead to a diagnostic-type QBP for cancer patients in the future
  - Control areas of overlap and potential duplication of funding during treatment phases (i.e. patients requiring concurrent chemo/radiation therapy)
  - Lead to more integrated approaches to post hospital care, such as a community care QBP for cancer patients

- Improve patient outcomes and experiences
- Align with best practices based on clinical evidence and expert consensus
- Improve appropriateness of care and reduce variation in care
- Facilitate efficient use of resources, increase both the transparency and accountability of resource utilization
- Increase accessibility to services including new technologies to ensure that Ontarians receive high quality and safe radiation treatment services, regardless of where they reside in the province

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Scope and Outline for RT-QBP

Ontario Health System Funding Reform:

Shift to patient-based funding

Scope: Ambulatory Care Radiation Treatment

Activities related to direct patient care at all radiation treatment facilities

Goal: Implement a new episode-based funding model which:

-Ensures funding follows the patient

-Reduces inequities in funding

- Ties funding to evidence-informed practice

The following are **in scope** for now:

- All in-scope adult and pediatric volumes
- In-patient & Out-patient activities
- Benign (where appropriate)
- Costs associated with ongoing maintenance of radiation equipment and associated software/hardware
- Systemic Treatment by ROs (hormones)
- Psychosocial support
- Clinical Trials (fund as per standard of care)

The following are **out of scope** for now:

- Physician Compensation
- Capital Replacement Grant
- Home Care
- Laboratory & diagnostic imaging
- Ontario non-OHIP activity: Any procedure that is completed for an Ontario resident who does not have a valid Ontario Health Insurance Plan (OHIP) or where funding is provided from a source other than OHIP
- Out-of-province/country activity: Any procedure that is completed for a non-Ontario resident.

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Data Source: ALR (Linkage to others as required- OHIP, NACRS, DAD, etc.)

Radiation Treatment Overview

Previous Lifetime Model

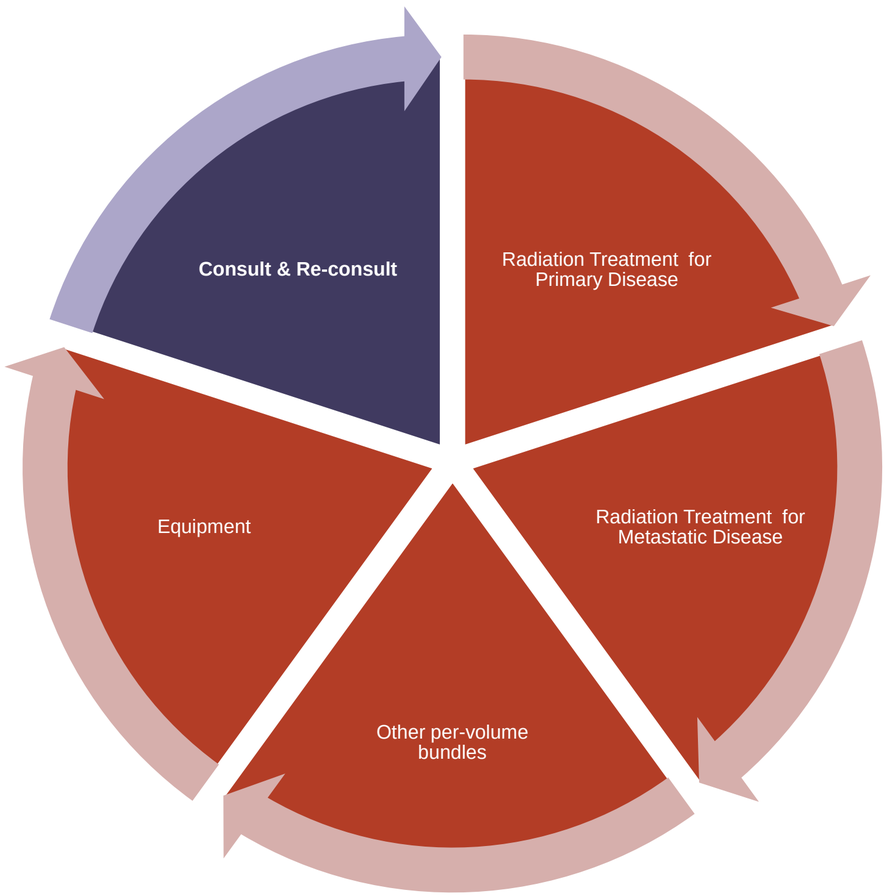
LIFETIME PER CASE FUNDING
CCO funding C1R
PCOP per visit Funding
Hospital base

Carve-out

Radiation Treatment QBP

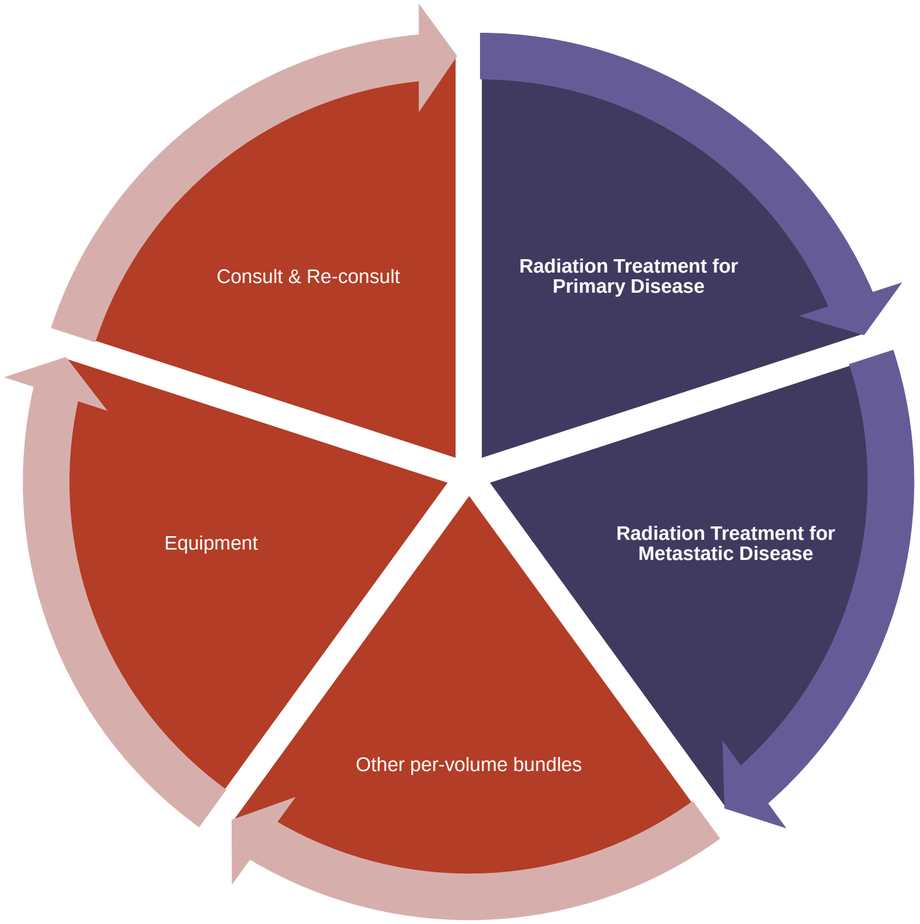
247 team members are involved in RT-QBP development- thank you to your teams!

Consultations for Radiation Treatment



- Modelled based on ST-QBP
- Time range: from initial consultation to decision to treat
- Number of visits: assumed 2 (data validation under way)
- Assumed activities (under validation): Patient education, PSO, support for patient decision-making
- Resources involved: Nurses, managers and clerical, PSO disciplines, radiation therapists
- Triggers: C1R (consult), change in RT protocols (re-consult)
- Price points: expectation is 1 price point, similar to ST-QBP
- Outstanding considerations: Overlap with patients receiving systemic treatment, confirmation of list of non-malignant diagnoses (likely Z codes that includes Genetic Counselling)

Radiation Treatments for Primary and Metastatic Diseases



- Clinical experts in process of finalizing list of evidence-informed treatment protocols and the associated Quality Metrics (best practice) (to be completed by December)
- Costing discipline-specific teams are micro-costing protocols for all treatment phases (treatment request processing, simulation, treatment planning, pre-treatment, delivery, post-treatment support)
- Costing includes: MRT, Physicists, Nursing, Clerical, Manager
- Protocols for clinical trials will include funding for standard of care
- Data triggers: treatment visit, RT protocol
- Price: multiple price points- protocols will be banded
- Outstanding issues: accommodations during treatment (lodging)

Other non-volume bundles

- There may be other volume-based bundles. This could include (pending further analysis):
  - Hormonal treatment
  - Follow-up (well/unwell)
  - Active surveillance
  - Other (TBD)

Funding for Major Equipment Maintenance and Minor Equipment

- Includes major equipment support and maintenance, minor equipment and HR required to support the equipment (e.g. engineers, medical physicists, physics associates)
- Funding will not be per-volume: approach is TBD
- Costing is based on data provided through facilities - submitted already for major equipment support and maintenance costs. Feedback on staffing and clinical equipment support due at the end of October

Summary of Facility Requests for RT-QBP Development

Carve-out Validation

- Ministry has indicated support, however, process is still moving through various approval groups at the Ministry.
- In the next few weeks, CCO will provide a template which shows all revenue associated with radiation.
- Facilities will be asked to review and provide confirmation via email or request for call to review.
- Target completion date: Mid-November

Staffing and Clinical Activity Template

- Supports development of equipment bundle. Template due end of October.

Protocol Coding-

- Funding will be triggered for treatment bundle based on RT protocol.
- Currently an optional field in ALR. List of protocol codes available in databook for GU, other protocols will be posted as developed.
- **Facilities should start processes now to start submitting. At this time no facility is submitting.**

Thank you for your ongoing support!

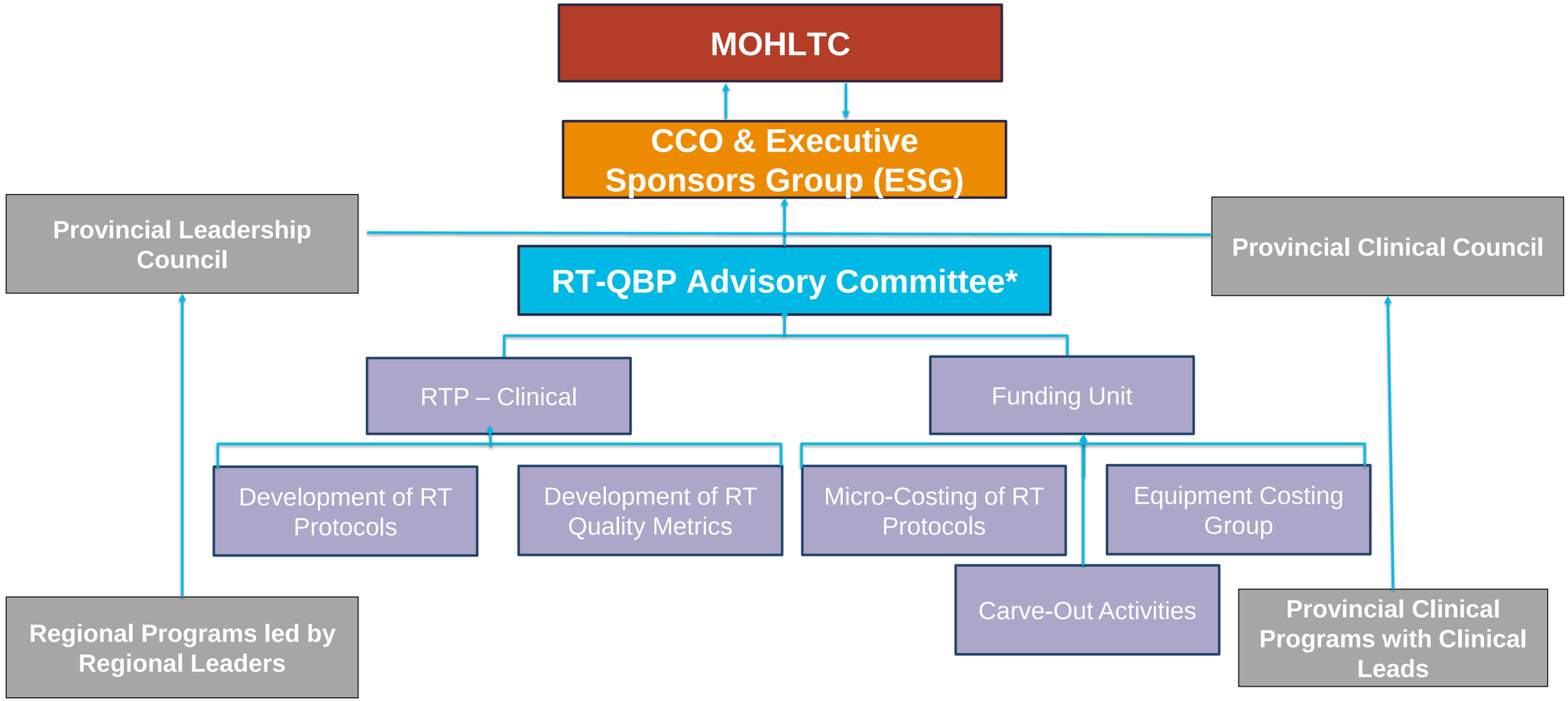
Overview of RT-QBP Committee and Group Membership

Overview of RT-QBP Committee and Group Memberships

	Advisory Committee	Disease Specific Working Group	Disease Specific Expert Panel Group
Purpose	- Provides ongoing advice and counsel to CCO on the development and implementation of the RT-QBP, with particular focus on the development of the clinical handbook	- Provides advice on clinical best practice, feedback and expertise on the selection of disease site Radiation Treatment Protocols, review quality metrics and provide input on RT resources to guide costing development	- Provide advice to the RT-QBP Clinical Lead and expertise in completing preliminary work on data analysis, quality metrics and literature scans specific to the disease site
Meeting Frequency	- In-person or teleconference every 6 weeks to 8 weeks including 1-2 in person meetings	- 1-2 full day, in-person or teleconference meetings - Members may be asked to review information via email and provide their feedback	- 2-3 teleconference meetings - Members may be asked to review information via email and provide their feedback
Membership Process	- Selected based on a nomination from each region's RVP or RCC Director	- Selected based on a nomination from each region's RVP or RCC Director	- Selected by the RT-QBP Clinical Lead - RVPs and RCC Directors will be informed of Expert Panel members via email
Reporting Structure	- Reports to CCO and the Executive Sponsors Group via the RT-QBP Project Team	- Reports to the Advisory Committee via the RT-QBP Project Team	- Reports to the RT-QBP Clinical Lead

RT-QBP Governance

The RT-QBP CCO Project Team is involved all levels



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**Membership includes administrative and clinical leadership from all regions*
***Working groups will have cross member representation and will report into the Radiation Treatment Advisory Committee which will report into the Project Team Committee.*
****Additional time limited working groups will be established as the QBP evolves*

Hematology Expert Panel Group Membership

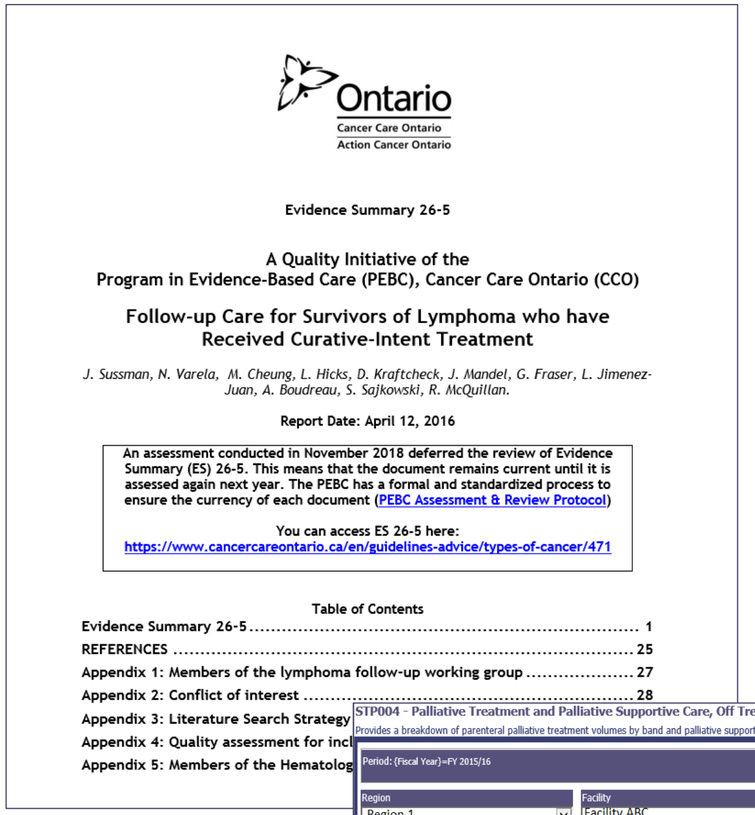
Hematology Expert Panel Members:

Name	Hospital
Richard Tsang	Princess Margaret Cancer Centre
Jonathan Sussman	Juravinski Cancer Centre
Rajiv Samant	The Ottawa Hospital
Matthew Follwell	North Simcoe Muskoka
May Tsao	Odette Cancer Centre
Youssef Youssef	Lakeridge
Catherine de Metz	Cancer Centre of South Eastern Ontario
Margaret Hart **(Advisory Committee Member)**	Cancer Care Ontario – Clinical Quality Lead RT
Michael Brundage **(Advisory Committee Member)**	Cancer Care Ontario – Clinical Quality Lead RO
Jean-Pierre Bissonnette **(Advisory Committee Member)**	Cancer Care Ontario – Clinical Quality Lead Physics

Evidence-based sources for RT protocols

Evidence-based sources for RT protocols

- Existing literature
- NCCN guidelines
- ASTRO guidelines
- Radiotherapy dose fractionation 3rd ed. UK
- Program in Evidence-Based Care, CCO
- American College of Radiology
- PEBC
- ILROG
- Provincial and RCC-specific data
- iPort
- Clinical expertise from Hematology Expert Panel



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Evidence Summary 26-5

A Quality Initiative of the
Program in Evidence-Based Care (PEBC), Cancer Care Ontario (CCO)

Follow-up Care for Survivors of Lymphoma who have Received Curative-Intent Treatment

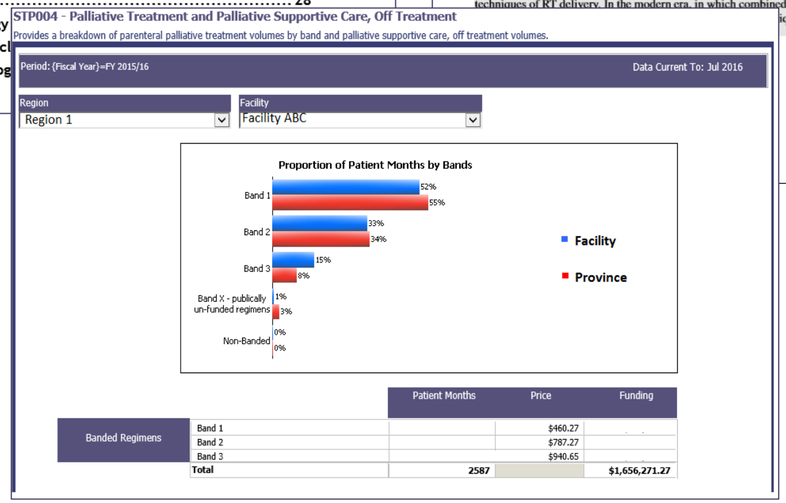
J. Sussman, N. Varela, M. Cheung, L. Hicks, D. Kraftcheck, J. Mandel, G. Fraser, L. Jimenez-Juan, A. Boudreau, S. Sajkowski, R. McQuillan.

Report Date: April 12, 2016

An assessment conducted in November 2018 deferred the review of Evidence Summary (ES) 26-5. This means that the document remains current until it is assessed again next year. The PEBC has a formal and standardized process to ensure the currency of each document (PEBC Assessment & Review Protocol)

You can access ES 26-5 here:
https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer/471

Table of Contents



STP004 - Palliative Treatment and Palliative Supportive Care, Off Treatment

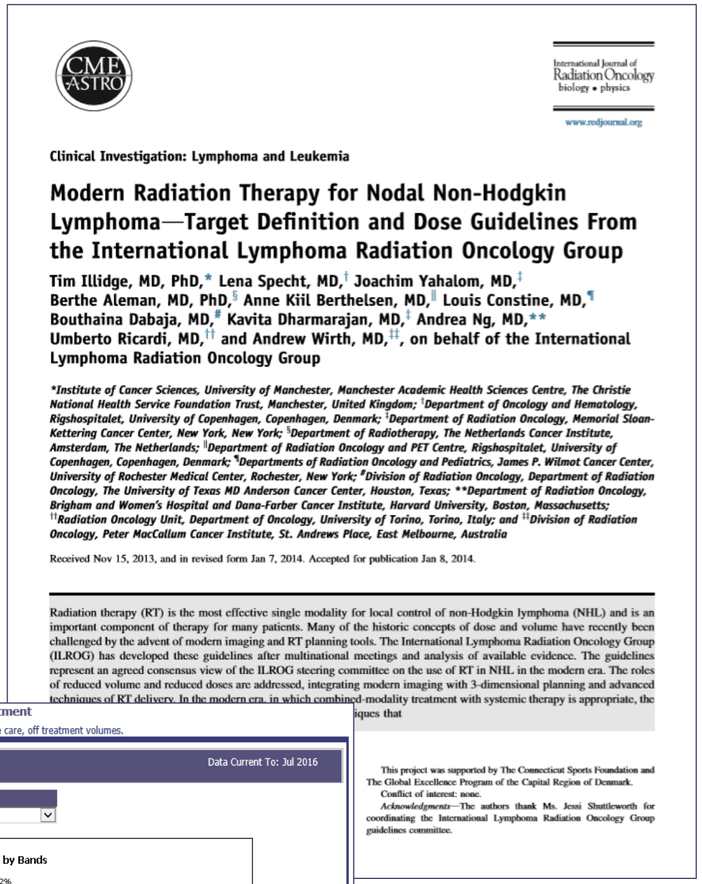
Provides a breakdown of parenteral palliative treatment volumes by band and palliative supportive care, off treatment volumes.

Period: {Fiscal Year}=FY 2015/16 — Data Current To: Jul 2016

Region: Region 1 — Facility: Facility ABC

Proportion of Patient Months by Bands

		Patient Months	Price	Funding
Banded Regimens	Band 1		$460.27	
	Band 2		$787.27	
	Band 3		$940.65	
	Total	2587		$1,656,271.27



CME ASTRO

International Journal of Radiation Oncology biology • physics
www.redjournal.org

Clinical Investigation: Lymphoma and Leukemia

Modern Radiation Therapy for Nodal Non-Hodgkin Lymphoma—Target Definition and Dose Guidelines From the International Lymphoma Radiation Oncology Group

Tim Illidge, MD, PhD,* Lena Specht, MD,† Joachim Yahalom, MD,† Berthe Aleman, MD, PhD,‡ Anne Kiil Berthelsen, MD,‖ Louis Constine, MD,¶ Bouthaina Dabaja, MD,# Kavita Dharmarajan, MD,† Andrea Ng, MD,** Umberto Ricardi, MD,†† and Andrew Wirth, MD,‡‡, on behalf of the International Lymphoma Radiation Oncology Group

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Received Nov 15, 2013, and in revised form Jan 7, 2014. Accepted for publication Jan 8, 2014.

Radiation therapy (RT) is the most effective single modality for local control of non-Hodgkin lymphoma (NHL) and is an important component of therapy for many patients. Many of the historic concepts of dose and volume have recently been challenged by the advent of modern imaging and RT planning tools. The International Lymphoma Radiation Oncology Group (ILROG) has developed these guidelines after multinational meetings and analysis of available evidence. The guidelines represent an agreed consensus view of the ILROG steering committee on the use of RT in NHL in the modern era. The roles of reduced volume and reduced doses are addressed, integrating modern imaging with 3-dimensional planning and advanced techniques of RT delivery. In the modern era, in which combined-modality treatment with systemic therapy is appropriate, the ...iques that

This project was supported by The Connecticut Sports Foundation and The Global Excellence Program of the Capital Region of Denmark.
Conflict of interest: none.
Acknowledgments—The authors thank Ms. Jessi Shuttleworth for coordinating the International Lymphoma Radiation Oncology Group guidelines committee.

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EXAMPLE: Breast Cancer Treatment Protocols and Quality Metrics

Proposed Treatment Protocols for Breast Cancer (External Beam)

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Number of Fractions	Dose per Fraction (Gy)	Estimated Provincial Frequency
Chest Wall/ Breast Tangent Hypo +/- boost	BREAST_HYPO	40 – 43.2	15 – 16	2.5 -2.88	3595 (46.49%)#
Chest Wall/ Breast Tangent +/- boost	BREAST_CF	45 -52	23 - 28	2	539 (6.97%)*
Partial breast hypo	BREAST_PAR_HYPO	40 – 43.2	15 – 16	2.5 -2.88	3595 (46.49%)#
Partial breast	BREAST_PAR_CF	45 -52	23 - 28	2	539 (6.97%)*
Chest Wall/Breast Tangent Hypo +/- boost + Nodal RT hypo	BREAST_FULL_HYPO	40 – 43.2 + 40 - 43.2	15 – 16 + 15 - 16	2.5 -2.88 + 2.5-2.88	341 (4.41%)
Chest Wall/Breast Tangent +/- boost + Nodal RT	BREAST_FULL_CF	50 - 52 + 45 - 49.99	25 – 28 + 23 – 25	2 + 1.6 – 2	2066 (26.72%)
Accelerated Partial Breast Irradiation (APBI)	BREAST_ACC_PAR	27.5 -40 (daily or BID)	10 - 13	3 - 3.85	46 (0.59%)
Nodal RT +/- boost	BREAST_NODAL_ONLY_CF	45 -52	23 - 28	2	78 (1%)

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Boost dose fractionation and bolus application as per institutional guidelines

Hematology Proposed Treatment Protocols

Lymphomas

Proposed Treatment Protocols- Hodgkin Lymphoma

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
Favorable Hodgkin Lymphoma ISRT, IFRT	HEME_HL_ISRT_IFRT	20-30 Gy	10-20	1.5-3 Gy	
Hodgkin Lymphoma ± boost ISRT, IFRT	HEME_HL_BOOST_ISRT_IFRT	30-40 Gy ± 10 Gy (total of up to 50 Gy)	15-20 ± 5	1.5-2 Gy	

Proposed Treatment Protocols- Non-Hodgkin Lymphoma

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
Indolent Non-Hodgkin Lymphoma ISRT, IFRT	HEME_NHL_ISRT_IFRT	20-36 Gy	10-20	1.5-3 Gy	Definitive treatment No chemo
Aggressive Non-Hodgkin Lymphoma ± boost ISRT, IFRT	HEME_NHL_AGG_ISRT_IFRT	30-40 Gy± 10 Gy (total of up to 50 Gy)	15-20 ± 5	1.5-2 Gy	
Thorax lymphoma ± boost ISRT	HEME_THORAX_LYMPH_ISRT	25-40 Gy ± 10 Gy (total of up to 50 Gy)	15-20 ± 5	1.5-2 Gy	ABC
Abdomen lymphoma ± boost ISRT	HEME_AB_LYMPH_ISRT	25-40 Gy ± 10 Gy (total of up to 50 Gy)	15-20 ± 5	1.5-2 Gy	4D CT

Proposed Treatment Protocols- Non-Hodgkin Lymphoma

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
CNS lymphoma 1 or 2 Phase With chemo ± boost ISRT	CNS_BRAIN_LYMPHO_2P_CHEMO±BOOST HEME_LYMPH_2P_CHEMO_BOOST	23-36 Gy (WBRT) ± boost to 45 Gy	12-20 ± 5	1.5-2 Gy	For less than complete response **taken from CNS working group**
CNS lymphoma No chemo ± boost ISRT	CNS_BRAIN_LYMPHO_2P_NOCHEMO±BOOST HEME_LYMPH_2P_NOCHEMO_BOOST	30-50 Gy (WBRT) ± boost	15-28 ± 5-12	1.5-2 Gy	**taken from CNS working group**
H&N lymphoma ± boost ISRT	HN_LYMPHOMA HEME_HNLYMPH_ISRT	25-40 Gy ± 10 Gy (total of up to 50 Gy)	15-20 ± 5	1.5-2 Gy	**taken from H&N working group**

Proposed Treatment Protocols- Lymphoma

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
Mycosis Fungoides Standard fractionation Total body skin electron beam therapy (TSEB)	HEME_MF_STD_TSEB	12 Gy	6-12	1.0-2.0 Gy	Over 2-3 weeks
Mycosis Fungoides Alternate fractionation Total body skin electron therapy	HEME_MF_AF_TSEB	24-36 Gy	24-36	1-1.2 Gy	Over 4-9 weeks
Mycosis Fungoides Patch radiotherapy	HEME_MF_PATCH	4-20 Gy	1-10	2-8 Gy	includes “boom-boom”
Mycosis Fungoides Active Surveillance					
Multiple Myeloma	HEME_MMYELOMA	8-40 Gy	1-20	2-8 Gy	
Solitary plasmacytoma	HEME_SOLI_PLASMA	30-50 Gy	10-28	1.8-3 Gy	

Proposed Treatment Protocols- Lymphoma ‘Other’

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
Lymphoma Other	HEME_LYMPH_OTHER	20-50 Gy	11-28	1.8-2 Gy	eg – extranodal NK/T cell lymphoma, nasal type

Proposed Treatment Protocols- short course lymphoma

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
Short course lymphoma	HEME_LYMPH_SHORT	4 Gy	2	2 Gy	Includes “boom-boom”
Other short course Single	HEME_LYMPH_SHORT_OTHER	4-8 Gy	1	4-8 Gy	
Other short course Multi	HEME_LYMPH_SHORT_OTHER_MULTI	12-30 Gy	4-10	3-4 Gy	

Leukemias

Proposed Treatment Protocols- Leukemia

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
Total Body Irradiation (prior to stem cell transplant) BID OR TID	HEME_LEUK_TBI_BID_TID	10-15 Gy	6-10	1.5-2	Over 3-4.5 days From ASTRO **Note to FU – TDL measurements will be required**
Total Body Irradiation (prior to stem cell transplant) 1x daily	HEME_LEUK_TBI	12 Gy	4	3 Gy	FROM ASTRO **Note to FU – TDL measurements will be required**
Total Body Irradiation (prior to stem cell transplant) Single	HEME_LEUK_TBI_SINGLE	2-5 Gy	1-2	2-5 Gy	
Pre-transplant testicular boost	HEME_LEUK_TESTICULAR	4-12 Gy	1-6	2-4 Gy	
Pre-transplant CNS boost	HEME_LEUK_CNS	4-12 Gy	1-6	2-4 Gy	
Low dose spleen (leukemia, MDS, or related conditions)	HEME_LEUK_LOW	2-6 Gy	1-10	0.3-6 Gy	Includes “boom-boom” and Baltimore Protocol

Proposed Treatment Protocols- Short course leukemia

RT Protocol Long Form	RT Protocol Short Form	Proposed Range (Gy)	Total Fractions	Dose per Fraction (Gy)	Comment
CNS leukemia Whole brain prophylaxis Short course	HEME_LEUK_CNS_WB_SHORT	12-24 Gy	8-16	1.5-2 Gy	
CNS leukemia Craniospinal Short course	HEME_LEUK_CNS_CS_SHORT	12-24 Gy	8-16	1.5-2 Gy	
Testicular leukemia	HEME_LEUK_TESTICULAR	20-24 Gy	5-12	2-4 Gy	
Short course leukemia	HEME_LEUK_SHORT	8-30 Gy	1-10	3-8 Gy	

Quality Metrics (QM) Development

Quality Metrics Development

01 Infrastructure

02 Pre-Treatment Phase

03 Imaging and Planning Phase.

04 Quality Assurance Phase

05 Treatment Phase

06 Post-Treatment Phase.

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Quality Metrics

Quality Indicators that will apply across all RT Protocols

- Peer Review QA
- Physics and Therapy QA
- Etc…

Quality Indicators that may be RT Protocol Specific

- VMAT – may require patient specific measurements
- Brachytherapy may have specific quality metrics
- On Treatment imaging – may be disease specific – Daily for some but maybe not others

EXAMPLE: Proposed Quality Metrics - Breast Cancer

Proposed Quality Metrics - Breast Cancer (Intact Breast and Where Appropriate, Chest Wall/Nodal Areas)

Pre-treatment

The following should be considered:

- Bilateral diagnostic mammography prior to treatment
- Documentation of: family history, co-morbidities, smoking history, menopausal status, radiation therapy contra-indications, post-operative complications, presence of a pacemaker, discussion of breast reconstruction (if applicable), results of physical at consultation.
- Patient management discussion at a multidisciplinary team meeting.
- The first cancer centre oncologic evaluation within 4 weeks of the definitive surgery date.
- Imaging of the chest, liver and bones prior to definitive or adjuvant therapy for stage III patients.

Proposed Quality Metrics - Breast Cancer (Intact Breast and Where Appropriate, Chest Wall/Nodal Areas)

Imaging and Planning

- <u>Cardiac Delineation and Avoidance:</u>
- The heart should be contoured on the treatment planning computed tomography scan in accordance with Radiation Therapy Oncology Group guidelines. Tangent beams should be delineated to minimize the dose to the heart. The mean heart dose should be as low as reasonably achievable. Active Breath Control techniques/ Deep inspiration breath hold, prone positioning, and/or heart blocks should be used as appropriate to minimize normal tissue exposure.
- For patients unable to tolerate breath-hold, the reverse semi-decubitus technique is an alternative approach to reduce cardiac dose (for left breast and internal mammary chain irradiation).
- Cardiac DVH should be part of the published plan.

- <u>Normal Tissue Doses:</u>
- Treatment techniques should also minimize dose to the contralateral breast, lung, and other normal tissues. A lung DVH should be part of the published plan.

Quality Metrics – Hematologic Cancers

Institutional Expectations

Institutional Policies should be developed outlining:

1. Pre-treatment assessment and documentation
2. CT simulation protocols (MRI Simulation, where indicated) and planning protocols including dose targets and constraints. Imaging from PET should be used in planning, where possible.
3. Quality Assurance (QA)
4. Treatment protocols to include frequency of imaging and image matching strategies
5. Post-treatment follow-up

Proposed Quality Metrics - Hematologic Cancers

Pre-treatment

Documentation:

- Full history and physical examination (clinical history, baseline clinical examination and performance status, histology, FBC, CBC, LDH, biochemical profile, bone marrow evaluation)
- Institutions should have a clearly defined policy for cardiac implantable electronic devices (CIEDs), such as pacemakers and defibrillators

As an example: https://www.heartrhythmjournal.com/article/S1547-5271(17)30453-8/fulltext

Pre-treatment imaging

- CT head and neck, thorax, abdomen, pelvis. In some instances, MRI may be of value (e.g. CNS lymphoma, disease in H&N)
- FDG-PET scan – as per Provincial eligibility
- For patients receiving radiation after chemotherapy, PET-CT/CT scans before and after treatment are used to determine the involved sites and residual disease. PET-CT pre and post chemotherapy is advised for ISRT

References: London Cancer Org, Radiotherapy UK edition, ASCO

Proposed Quality Metrics – Hematologic Cancers

Imaging and Planning

Imaging for treatment planning

- CT scan is used for planning
  - Slices should be no thicker than 3mm
  - Contrast should be considered to improve identification of vasculature and assist in targeting nodal changes.
  - For more information on imaging practices in lymphoma, please see the guidelines by the International Lymphoma Radiation Oncology Group (ILROG):

Mikhaeel, N. G., Milgrom, S. A., Terezakis, S., Berthelsen, A. K., Hodgson, D., Eich, H. T., ... & Specht, L. (2019). The optimal use of imaging in Radiation Therapy for lymphoma–Guidelines from the International Lymphoma Radiation Oncology Group (ILROG). International Journal of Radiation Oncology* Biology* Physics.

Proposed Quality Metrics – Hematologic Cancers

Imaging and Planning

Breath Holds

- Consider 4D imaging or deep inspiratory breath-hold technique for disease sites significantly affected by respiratory motion. As an example, please reference ILROG:

Specht, L., Yahalom, J., Illidge, T., Berthelsen, A. K., Constine, L. S., Eich, H. T., ... & Ng, A. (2014). Modern radiation therapy for Hodgkin lymphoma: field and dose guidelines from the international lymphoma radiation oncology group (ILROG). *International Journal of Radiation Oncology* Biology* Physics*, *89*(4), 854-862.

- Consider ABC breathing control for patients with any thorax-related radiation therapy. As an example, please see:

Charpentier, A. M., Conrad, T., Sykes, J., Ng, A., Zhou, R., Parent, A., ... & Hodgson, D. C. (2014). Active breathing control for patients receiving mediastinal radiation therapy for lymphoma: Impact on normal tissue dose. *Practical radiation oncology*, *4*(3), 174-180.

Cardiac & Lung Delineation and Avoidance

- The heart and lung should be contoured for any thorax or any upper abdominal treatment planning in accordance with institutional guidelines. Beams should be delineated to minimize the dose to the heart and lung using the ALARA principle. Active Breath Control techniques/ Deep inspiration breath hold, prone positioning, and/or heart blocks should be used as appropriate to minimize normal tissue exposure.

Proposed Quality Metrics – Hematologic Cancers

Imaging and Planning

Dose constraints and contouring

- HL and NHL – as an example of dose constraints and contouring, please see ILROG guidelines:

Illidge, T., Specht, L., Yahalom, J., Aleman, B., Berthelsen, A. K., Constine, L., ... & Wirth, A. (2014). Modern radiation therapy for nodal non-Hodgkin lymphoma—target definition and dose guidelines from the International Lymphoma Radiation Oncology Group. *International Journal of Radiation Oncology* Biology* Physics*, *89*(1), 49-58.

Hoskin, P. J., Diez, P., Williams, M., Lucraft, H., & Bayne, M. (2013). Recommendations for the use of radiotherapy in nodal lymphoma. *Clinical oncology*, *25*(1), 49-58.

- As an example for TBI dose rates and OARs, please see:

Studinski, R. C. N., Fraser, D. J., Samant, R. S., & MacPherson, M. S. (2017). Current practice in total-body irradiation: results of a Canada-wide survey. *Current Oncology*, *24*(3), 181.

ALARA principle

- As low as reasonably achievable (ALARA) principle should be adhered at all times. As an example, please see:

Tsang, R. W., & Gospodarowicz, M. K. (2005). Radiation therapy for localized low-grade non-Hodgkin's lymphomas. *Hematological oncology*, *23*(1), 10-17.

Proposed Quality Metrics – Hematologic Cancers

Imaging and Planning

Position/immobilisation

- Chin up position for neck and SCF sites.
- For head sites clinician to indicate appropriate neck position.
- Appropriate immobilization for the site being treated is required. In head and neck regions this should include a customized immobilization shell.

Geometric distortion (MRI)

- Users should ensure that geometric fidelity is maintained for all images. Distortions due to field inhomogeneities and gradient nonlinearities should be minimized. MR sequences should be validated to minimize the likelihood of susceptibility artefacts.

Proposed Quality Metrics – Hematologic Cancers

Quality Assurance:

Peer Review:

- As per CCO Radiation Oncology Peer Review Guidance Document

https://www.cancercareontario.ca/en/node/56286

QA of treatment plans:

- QA of all treatment plans shall be performed by a medical physicist and radiation therapist, as per institutional guidelines.

Patient-specific QA (e.g. individual patient dosimetry for VMAT):

- As per CPQR guidelines.

QA for Radiation Programs

- CPQR Quality Assurance Guidelines for Canadian Radiation Treatment Programs
- CPQR Technical Quality Control Guidelines for Canadian Radiation Treatment Programs

Proposed Quality Metrics – Hematologic Cancers

Treatment

Treatment technique:

- Involved Site Radiotherapy (ISRT) is preferred treatment modality over Involved Field Radiotherapy (IFRT), when clinically appropriate.
- Conformal plan with field arrangements devised according to treatment site.
- Respiratory management should be considered. As an example, please see:

Aznar, M. C., Maraldo, M. V., Schut, D. A., Lundemann, M., Brodin, N. P., Vogelius, I. R., ... & Petersen, P. M. (2015). Minimizing late effects for patients with mediastinal Hodgkin lymphoma: deep inspiration breath-hold, IMRT, or both?. *International Journal of Radiation Oncology* Biology* Physics*, *92*(1), 169-174.

- For information on TBI in lymphoma patients, please refer to the ASTRO guideline:

Wong, J. Y., Filippi, A. R., Dabaja, B. S., Yahalom, J., & Specht, L. (2018). Total body irradiation: guidelines from the international lymphoma radiation oncology group (ILROG). *International Journal of Radiation Oncology* Biology* Physics*, *101*(3), 521-529.

- For Early Hodgkin's lymphoma, please refer to the PEBC guide:

https://www.cancercareontario.ca/sites/ccocancercare/files/guidelines/summary/pebc6-20s.pdf

Proposed Quality Metrics – Hematologic Cancers

Post-Treatment

Follow-up:

- Institutional policies, should have guidelines regarding follow-up. As an example of follow-up guidelines with any provider, please see the PMH guidelines below:

First year – visits every 3 months

2-3 years – visits every 4 months

4-5 years – visits every 6 months

>5 years – annual follow-up

- These follow-up treatments can be shared between providers.

PSO support:

- PSO support (psychology counselling) should be provided to patients post-treatment, particularly in survivorship. As an example, please see the PEBC Survivorship guidelines for curative intent: https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer/471
- Secondary cancers are of concern – high risk breast screening and surveillance/monitoring where appropriate.

Questions for consideration

Other things to consider for the Hematology RT-QBP

- Are there any group of patients which will be “active patients not on treatment” in radiation oncology clinics?
  - YES – MF patients.
- Clinical trials and the Heme RT-QBP
  - Yes, but not many trials in radiation (low dose prior to CAR-T).
- Cases seen in consultation for RT, but not treated with RT? (I.e. requires nursing, clinic time, etc)
  - YES – advanced-staged lymphoma
- PSO Support
- Oligomets
  - Could be treating numerous sites (hemi-body radiotherapy) - one fraction in bone mets for upper OR lower body
  - **FOR DISCUSSION**

Next Steps

- Finalize treatment protocols
- Members to review proposed quality metrics

Next meeting – TBD

Timelines

High Level RT-QBP Gantt-Clinical Development Activities

QBP completion ★ QBP go-live in RCCs ★

Fiscal Year	FY 2018-19				FY 2019-20				FY 2020-21				FY 2021-22			
Fiscal Year Quarters	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Phase 1																
GU	■	■	■	■												
Breast	■	■	■	■												
Gastrointestinal		■	■	■	■											
Lung		■	■	■	■											
Sarcoma		■	■	■	■											
Head & Neck		■	■	■	■											
CNS (primary)		■	■	■	■											
CNS (brain mets)		■	■	■	■											
Clinical Handbook Development			■	■	■	■	■									
Phase 2																
Skin			■	■	■	■										
Peds			■	■	■	■										
Endocrine			■	■	■	■										
Gynecological Cancers				■	■	■	■									
Hematology				■	■	■	■									
Bone Mets				■	■	■	■									
Other / Ongoing Discussion					■	■	■									
Clinical Handbook Development					■	■	■	■								
Additional Working Groups																
Physics Plan Check Group			■	■	■	■										
Equipment Costing Group				■	■	■	■									
Others as needed					■	■	■									
Reporting Working Group							■	■	■	■	■	■	■	■	■	■
Operations and Implementation							■	■	■	■	■	■	■	■	■	■
6 Months for Hospitals Prior to Implementation											■	■				

Notes / Assumptions

Clinical disease sites timeline estimates are based on progress with the first four disease sites underway and include all activities up to the completion of the patient level data review with the funding team

Timeline Reference	
Q1	Apr 1 - Jun 30
Q2	Jul 1 - Sep 30
Q3	Oct 1 - Dec 31
Q4	Jan 1 - Mar 31

Objectives for Today

Expert Panel Hematology meeting #1:

- To provide an overview of the Radiation Therapy QBP (RT-QBP) process ✓
- To review the dose/fractionation data for Hematology ✓
- To come to a consensus about RT protocols for hematology, including dose/fractionation ranges for each protocol ✓
- Discuss quality metrics for RT QBP, and assign “leads” for the quality metrics work ✓
- Discuss any question or concerns about the RT QBP and provide feedback ✓
- Identify and record RT-QBP risk registry items ✓

Questions?

Cancer Care Ontario