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The Ontario
Diagnostic Imaging

PEER LEARNING COMMUNITY

September 2019

Diagnostic Imaging Peer Learning Toolkit

Guide 2.0:
Diagnostic Imaging Peer Review
Workflow

Ontario 

How to Work Through the Toolkit Guides


Estimated Time to Complete Each Guide

The table below outlines the time required to work through each guide, along with the total time required to hold sessions with the radiologist working group.

Guide	Time to Complete*	Session Time
1.0 Readiness Assessment	1–3 months	--
2.0 Diagnostic Imaging Peer Review Workflow	1 month	1 session, ~1.5 hours
3.0 Learning and Education Process	1 month	1 session, ~2 hours
4.0 Discrepancy Management		
5.0 Governance and Accountability	3–4 months	--
6.0 Monitor and Sustain	1–2 months	--
7.0 Train Stakeholders	1 month	2 sessions, ~1.5 hours each

***Note:** There is some overlap between some of the guides to allow the last six guides to be completed in 4 months. For cross-organizational programs, please build in at least 3 additional months of pre-implementation work to enter into a data sharing agreement with partner organizations.

The following Gantt chart illustrates the estimated time required to complete each of the seven guides in the Diagnostic Imaging Peer Learning Toolkit and the overlap between some of the guides.

Pre-Implementation Activities				
Guide	Month -2	Month -1	Month 0	
1.0 Readiness Assessment				 Decision to implement Diagnostic Imaging Peer Learning Program
Implementation Activities				
Guide	Month 1	Month 2	Month 3	Month 4
2.0 Diagnostic Imaging Peer Review Workflow				
3.0 Learning and Education Process				
4.0 Discrepancy Management Process				
5.0 Governance and Accountability				
6.0 Monitor and Sustain Program				
7.0 Train Stakeholders				

Guides 2.0 to 5.0 Should Be Done in Parallel

After completing the Guide 1.0 Readiness Assessment, it is important to note that Guides 2.0, 3.0, 4.0, and 5.0 are highly interconnected. The guides were separated by theme for ease of use, but it is recommended that you work through some of these guides at the same time. It would be helpful to read through Guides 2.0 to 5.0 first so that you understand all of the connections before diving in.

Note: Guide 5.0 will also require key decisions from Guide 6.0, and Guides 6.0 and 7.0 also refer back to Guide 5.0. However, Guides 6.0 and 7.0 can be done independently of Guides 2.0 to 5.0. It is recommended that you formalize your Diagnostic Imaging Peer Learning Program Policy with your organization after completing guides 2.0 to 5.0 and then add the required information from Guide 6.0 later on.

Guide 2.0: Diagnostic Imaging Peer Review Workflow

Note: Since it is recommended that Guides 2.0 to 5.0 are completed in parallel, it would be helpful to read through the guides first to understand how they are all related.

Deliverable:

Guide 2.0: Diagnostic Imaging Peer Review Workflow will help you design the process by which radiologists complete an anonymous second read of a completed report.

Outcome:

After working through this guide, you will have defined a peer review process that facilitates radiologist-to-radiologist discussions and enables practice improvement.

Section	Supporting Tool	Page Number
2.1 Define a Process for Radiologists to Review and Assess Original Reports ^{5.5P}	2.1 Peer Review Workflow Process Map and Standard of Work	6
2.2 Determine If Reports Will Be Reviewed Retrospectively or Prospectively ^{5.5P}	Table 1: Key Considerations of Peer Review Methods	7
2.3 Select Assessment Categories ^{5.5P}	2.3 Diagnostic Imaging Peer Learning Cases	8
<i>For Cross-Organization Programs Only:</i>		
2.4 Define Peer Review Relationships Between Organizations	2.4x Cross-Organization Peer Review Matrix	10
2.5 Identify Which Reports Will Be In-scope for Peer Review ^{5.5P}	2.5 Sub-Group and Lookback Matrix	11
	<i>For Cross-Organization Programs:</i> 2.5x Cross-Organization Sub-Group and Lookback Matrix	11
2.6 Determine the Frequency for Radiologists to Complete Peer Review ^{5.5P}	2.6 Case Assignment Calculator	13
	<i>For Cross-Organization Programs:</i> 2.6x Cross-Organization Case Assignment Calculator	13

^{5.5P} Indicates that a key decision from this section will need to be included in tool 5.5 *Diagnostic Imaging Peer Learning Policy Template*.

Stakeholders to Engage:

Radiologist Working Group: Assemble a group of radiologists who will design the peer review processes and ensure that impact to existing workflow is minimal (see Guide 1.0: Readiness Assessment, section 1.5).

Steering Committee: Obtain final approval of the radiologist peer review workflow (developed by the radiologist working group) from the steering committee.

IT Support: While there is not one prescribed information technology (IT) solution to support peer review, it is recommended that you consider including digital systems such as Picture Archiving Communication System (PACS), and/or Radiology Information Systems (RIS).ⁱ If you choose to implement a technical solution, reach out to your IT team for support in customizing IT-enabled peer review processes.ⁱ

Estimated Time to Complete:

Time to Complete Guide 2.0:

- 1 month

Note: As mentioned earlier, it is recommended that Guides 2.0 to 5.0 be completed in parallel. It would be helpful to review the guides first to understand how they are all related.

Featured Activity:

- Radiologist Working Group Session (1 x ~1.5-hour session):
Facilitate a session with the radiologist working group using tools 2.1 to 2.6 to develop and document the processes for your Diagnostic Imaging Peer Learning Program
- It is recommended that you familiarize yourself with tools 2.1 to 2.6 and collect the required data inputs prior to facilitating the radiologist working group session

Things to Consider:

Impact to Patient

Peer review should minimize delays to patient diagnosis or treatment plan.ⁱ Reports may be peer reviewed either before or after they are verified, but in either case, the processes of peer review should be designed to maximize patient benefit.

Learning and Education

Successful peer review is education-focused and non-punitive. This promotes an environment of learning by creating a platform for communication among peers. The provision of feedback and the opportunity for improvement among peers is intended to improve overall learning within the profession.ⁱ

Disruption to Workflow

To support long-term sustainability, the final peer review process should integrate easily into the existing daily workflow.

Mandatory Participation

Peer review should be mandatory across all sites and modalities within your organization(s) and should be part of an overall quality management program.ⁱ

Use of an IT Solution

If an IT solution will be used to enable your peer learning program, it should be identified prior to designing peer review workflows so that your processes align with the functionality of the selected system.

For Cross-Organization Programs:

The use of an IT solution is essential to enable anonymous sharing of images and reports across separate organizations. Please see Guide 1.0: Readiness Assessment, section 1.6 for further information.

Anonymity

Peer review must be confidential in all aspects and, where appropriate, anonymous. Cases reviewed for the purposes of learning and education should be anonymous. There may be added value in maintaining anonymity between reporting and reviewing radiologists.ⁱ

2.1 Define a Process for Radiologists to Review and Assess Original Reports

This Section Will Help You: Determine a process for radiologists to receive, access, and submit a double-read of a diagnostic imaging report.

Supporting Tool: [2.1 Peer Review Workflow Process Map and Standard of Work](#)

How to Use the Tool(s)

Recommended User(s): Radiologist working group

1. Review tool *2.1 Peer Review Workflow Process Map* with your radiologist working group.
 - Page 1 and 2 summarizes the steps that constitute a peer review workflow from start to end
 - Answer the “Key Questions” to customize the process

Note: *The tools in sections 2.2 to 2.6 will support decisions that are required to design your workflow process. It is recommended that you familiarize yourself with these tools and collect the required data inputs prior to facilitating the radiologist working group session.*

2. Document your decisions in tool *2.1 Standard of Work* template found on pages 3 to 4 of the tool. This document can be used for training and communication purposes.
3. Once you have completed this section, include the *2.1 Peer Review Workflow Process Map* in your Diagnostic Imaging Peer Learning Program Policy (tool *5.5 Diagnostic Imaging Peer Learning Program Policy Template, Appendix 1*).

2.2 Determine If Reports Will Be Reviewed Retrospectively or Prospectively

This Section Will Help You: Determine whether radiologists will complete peer review before or after original reports are verified and sent to the referring physician.

Supporting Tool: Table 1: Key Considerations of Peer Review Methods

Table 1: Key Considerations of Peer Review Methods

Method	Retrospective Peer Review	Prospective Peer Review
Definition	Peer review completed after a report has been verified and sent to the referring physician by the original reading radiologist. ⁱⁱ	Peer review completed before a report has been verified and sent to the referring physician by the original reading radiologist. ⁱⁱ
Key Considerations	<ul style="list-style-type: none"> Does not have an impact on report finalization timelines Effective method to conduct peer learning with little interruption in workflow Should be completed soon after the report is sent to the referring physician (time-limited) in order to maximize patient benefit Review of discrepancies retrospectively can introduce biases including hindsight biasⁱⁱⁱ 	<ul style="list-style-type: none"> Allows radiologists to identify clinically significant errors that could have an adverse effect on patient outcome before the report is sent to the referring physician^{iv} Allows the opportunity for timely addendums directly with the original reporting radiologist for all agreed-upon discrepancies^v Requires that peer review is performed within the same day^{iv} to avoid any delay to report delivery and patient care; Radiologists cannot batch completion of peer reviews

Note: While there are advantages and disadvantages to both approaches, the majority of programs described in the current body of literature are retrospective.^{ii,v} The Canadian Association of Radiologists (CAR) highlights that participation will be maximized by a peer review process that is seamlessly integrated into daily workflow,^v which is more easily achieved with a retrospective peer learning program.

Implementation Recommendation: Retrospective peer review^v

How to Use the Tool(s)

Recommended User(s): Radiologist working group

1. If you have chosen to use an IT solution to support your peer review workflow, contact the software vendor to understand functionality of completing peer reviews either retrospectively or prospectively.
2. Review key considerations for retrospective versus prospective approaches and determine which best meets your program goals. Once the decision has been finalized, document this in tool 2.1 *Standard of Work* provided in section 2.1 of this guide.
3. Once you have completed this section, include key decisions in your Diagnostic Imaging Peer Learning Program Policy (tool 5.5 *Diagnostic Imaging Peer Learning Program Policy Template, section E: Peer Review Data Management: Definition, Access, and Approved Use*).

2.3 Select Assessment Categories

This Section Will Help You: Determine the categories that radiologists will use to assess their level of agreement with the original report when completing a second read.

Implementation Recommendation: Implement a consistent approach to assess cases with the ability to add notes or comments.ⁱ Provide education and training to promote consistent application of assessment categories.ⁱ

The Canadian Association of Radiologists (CAR) recommends implementing an approved and consistent classification of peer review findings that categorizes various level of agreement (e.g., a four-point scoring scale)^v. See Appendix 3 for assessment categories discussed in the [CAR Guide to Peer Review Systems](#) (2011).

Consider including a separate classification for “good catches” to identify difficult or subtle findings. These cases are of high teaching value and promote a positive, non-punitive culture.

Table 2: Proposed Peer Review Assessment Categories

Category	Description	Optional Subcategory
0	Great Catch <i>Difficult or subtle findings; high teaching value</i>	
1	Overall Agreement <i>Concur with interpretation</i>	
2	Minor Discrepancy <i>Discrepancy in interpretation (findings not ordinarily expected to be made; understandable miss)</i>	a. Unlikely to be clinically significant b. Likely to be clinically significant
3	Major Discrepancy <i>Discrepancy in interpretation (findings should be made most of the time)</i>	a. Unlikely to be clinically significant b. Likely to be clinically significant

Adapted from the CAR Guide to Peer Review Systems (2011)

Note: The current CAR guidelines refer to a four-point system for assessing peer review cases. However, these guidelines may be updated in the near future. Please visit the [CAR Guides webpage](#) regularly for the most up-to-date recommendations.

Supporting Tool: [2.3 Diagnostic Imaging Peer Learning Cases](#)

How to Use the Tool(s)

Recommended User(s): Radiologist working group

1. Determine which assessment categories best meet your program goals. Once the decision has been finalized, document it in tool *2.1 Standard of Work* provided in section 2.1 of this guide.
2. Review the tool *2.3 Diagnostic Imaging Peer Learning Cases* when developing your peer review workflow with the radiologist working group.

Note: *These examples represent the four-point scale in the Proposed Peer Review Assessment Categories in Table 2 above.*

3. Develop a similar inventory of learning cases using examples from each organization in your Diagnostic Imaging Peer Learning Program. These examples can be used in the future for training purposes, as well as to establish program-specific definitions of each assessment category. There may be a learning period required for radiologists in the program to distinguish between each of the categories.
4. Once you have completed this section, include key decisions in your Diagnostic Imaging Peer Learning Program Policy (tool *5.5 Diagnostic Imaging Peer Learning Program Policy Template, section C.3: Peer Review Assessment Categories*).

2.4 Define Peer Review Relationships Between Organizations

For Cross-Organization Programs:

Section 2.4 applies to cross-organization programs only.

This Section Will Help You: Determine which participants in a cross-organization peer learning program can, and will, complete peer review cases—both internally and for other organizations.

Supporting Tool: [2.4x Cross-Organization Peer Review Matrix](#) (see tab 2.4x of the linked document)

How to Use the Tool(s)

Recommended User: Radiologist working group

1. List each of the participating organizations in column B of tool [2.4x Cross-Organization Peer Review Matrix](#). You may need to add/delete rows and columns depending on the total number of organizations in your cross-organization program.
2. Document the total number of radiologists at each organization in row 8.
3. Determine which organizations will peer review for one another by selecting “yes” or “no” from the dropdown menus. It is recommended that decisions be made based on the following principles:
 - **Critical Mass:** The Canadian Association of Radiologists (CAR) recommends that an organization should have a minimum of four radiologists in order to complete peer review within the organization.¹ Organizations with fewer than four radiologists should not peer review cases from their own organization (tool *2.4x Cross-Organization Peer Review Matrix* will automatically suggest “no”). This will also support anonymity within the program.
 - **Appropriate Peer-Matching of Radiologists:** Radiologists should peer review cases that are reflective of their actual clinical practice. Consider sub-groups of clinical practice (e.g., modality) and whether your organization has a critical mass of four radiologists within each sub-group. If critical mass is not met within the organization, you may seek to achieve the threshold of four radiologists across participating organizations.

2.5 Identify Which Reports Will Be In Scope for Peer Review

This Section Will Help You: Determine which imaging modalities and/or divisions (sub-groups) will be included in your Diagnostic Imaging Peer Learning Program and the “lookback period” for each sub-group.

- “Lookback period” is defined as the time between the verification of a report and the time when the report enters the peer review process. A shorter lookback period will reduce likelihood of a patient incident resulting from a major discrepancy because action can be taken more quickly to resolve any discrepancy that may arise.

Note: Lookback period is only relevant in retrospective peer review.

Implementation Recommendations:

- Peer review should be mandatory across all modalities and/or divisions.ⁱ
 - Where a quality mechanism already exists for a specific sub-group, you may choose to exclude this sub-group from the Diagnostic Imaging Peer Learning Program (e.g., Ontario Breast Screening Program).
- Peer review is most effective when reports being reviewed are reflective of the **actual clinical practice** of each radiologist^v (i.e., radiologists sub-specialized by modality or division only review cases within their sub-specialty).
 - CAR recommends a minimum of four radiologists to participate in a peer learning program.^{i,ii} It is recommended that all sub-groups seek to achieve this threshold to enable a critical mass of randomized reports to be reviewed for each radiologist.
- For retrospective peer review: minimize lookback periods as much as possible to reduce the potential impact to the patient in the event of discrepancies.ⁱ
- Sub-groups with lower volumes and/or lower numbers of radiologists may require longer lookback periods in order to maintain anonymity in the peer review process (e.g., the anonymity of the reading radiologist would be compromised in a situation where there is only one reading radiologist over a period of 3 days and lookback period is less than 3 days).
- Interventional radiology: Consider whether to include the interventional radiology sub-specialty (if applicable) in the peer review program.

Note: Organizations have identified challenges in including interventional radiology because of its procedure-based nature.^{vi}

Supporting Tools: [2.5 Sub-Group and Lookback Matrix](#) (see tab 2.5)

For Cross-Organization Programs:

Supporting Tool: [2.5x Cross-Organization Sub-Group and Lookback Matrix](#) (see tab 2.5x)

How to Use the Tool(s)

Recommended User(s): Radiologist working group

1. List all modalities or divisions offered within your organization in column B of the tool.
2. List number of radiologists and annual volumes for each sub-group in columns C and D.
3. Use the information gathered in steps 1 and 2 to answer the “Key Questions” provided within the tool.

4. Document responses in columns F and H.

For Cross-Organization Programs:

- 4a. Once participants in a cross-organization program have determined who will complete peer review cases from other organizations (see section 2.4 of this guide), it can be assumed that those reviewing relationships apply to all sub-groups. If organizations choose to be excluded from specific sub-groups, document decisions in column I.
 - 4b. Document the information required in steps 1 to 4 for each participating organization. The tool will automatically consolidate the information into in a summary table.
5. Use the information from this tool to complete section 2.6 of this guide (Determine the Frequency for Radiologists to Complete Peer Review).
 6. Once you have completed this section, include key decisions in your Diagnostic Imaging Peer Learning Program Policy (tool 5.5 *Diagnostic Imaging Peer Learning Program Policy Template*, section C.1: *Peer Learning Program Design*, section C.4 *Peer Learning Educational Rounds*, AND section E: *Peer Review Data Management: Definition, Access, and Approved Use*).

2.6 Determine the Frequency for Radiologists to Complete Peer Review

This Section Will Help You: Determine how often radiologists will complete peer review

Implementation Recommendation: Aim to peer review 2 to 5%^{iv,vii,viii,ix} of annual volumes for all modalities/divisions that are in-scope for the program. Frequency of completing peer reviews is based on:

1. Total volume of cases to be peer reviewed in order to meet target.
2. Distribution of total volume of cases across radiologists participating in peer review.

Supporting Tools: [2.6 Case Assignment Calculator](#) (see tab 2.6)

For Cross-Organization Programs:

Supporting Tool: [2.6x Cross-Organization Case Assignment Calculator](#) (see tab 2.6x)

How to Use the Tool(s)

Recommended User(s): Radiologist working group

1. Collect the following organization-specific inputs prior to your radiologist working group session:
 - Annual report volumes, overall
 - Annual report volumes, by sub-groups identified using the [2.5 Sub-Group and Lookback Matrix](#) or [2.5x Cross-Organization Sub-Group and Lookback Matrix](#) (tab 2.5 and tab 2.5x, respectively; described in section 2.5)
 - Number of radiologists
 - Average working weeks per year (to account for vacation)
2. Determine your annual volume benchmark (proportion of total reports to receive a second read; e.g., 2%).
3. Determine whether your Diagnostic Imaging Peer Learning Program will achieve the volume benchmark by:
 - **Organization:** Seek to achieve volume benchmark for the organization. Use Table B.1
 - **Overall Cross-Organization Program:** Seek to achieve volume benchmark across all participating organizations. Use Table B.1.1 (Applicable to cross-organization programs only)
 - **Sub-Group:** Seek to achieve volume benchmark for each sub-group (e.g., 2% of MRI volumes, 2% of General Radiography volumes). Use Table B.2

For Cross-Organization Programs:

Recommendation: Seek to achieve volume benchmark across all participating organizations (e.g., 2% of total performed volumes rather than 2% of each organization's volumes). If you choose this option, distribution of peer review workload will be equal across all radiologists at all organizations.

4. Enter your inputs into the **grey cells** of the tool's calculator. The annual peer review volume target and peer review frequency per radiologist (per year, month, and week) will automatically generate in **blue cells**.
5. When you have completed this section, document it in tool *2.1 Standard of Work* provided in section 2.1.
6. Once you have completed this section, include key decisions in your Diagnostic Imaging Peer Learning Program Policy (tool *5.5 Diagnostic Imaging Peer Learning Program Policy Template, section A: Policy Introduction AND section C: Peer Review Process*).
7. Once sections 2.1 to 2.6 are complete, obtain approval of your radiologist peer review workflow plan from the Diagnostic Imaging Peer Learning Program Steering Committee.

Appendix 1: Frequently Asked Questions

What is the difference between a minor discrepancy (Score 2) and a major discrepancy (Score 3)?

A *minor discrepancy* carries no significant impact for patient outcome. A *major discrepancy* carries the potential for impact on clinical management and outcome.

For more information, please see section 2.3 for definitions of each peer review assessment category and the supporting tool [2.3 Diagnostic Imaging Peer Learning Cases](#).

Appendix 2: Radiologist Peer Review Workflow Checklist

Completing this guide and checking off the items below confirm that you have successfully designed a process for radiologists to complete peer review.

- For Cross-Organization Programs:**
Determine which organizations will peer review cases from one another.
- Develop a peer review workflow and Standard of Work document.
- Determine whether peer reviews will be completed retrospectively or prospectively.
- Define assessment categories to be used to define the level of agreement with original reports.
- Decide which modalities and/or divisions will be in scope for peer review.
- Define volume benchmark for proportion of reports to receive double-read as part of a peer learning program.
- Calculate frequency of peer review to be completed by each radiologist.
- Obtain approval of your radiologist peer review workflow plan from the Diagnostic Imaging Peer Learning Program Steering Committee.
- Include key decisions in your Diagnostic Imaging Peer Learning Program Policy (tool 5.5 *Diagnostic Imaging Peer Learning Program Policy Template, sections A, C, C.1, C.3, C.4, E, and Appendix 1*).

Appendix 3: Assessment Categories

This guide follows the Canadian Association of Radiologists (CAR) guidelines, which recommends a 4-point scale for the assessment categories. However, the American College of Radiologists (ACR) has updated their recommendations (2016) to recommend a 3-point scale. Examples of both options are listed below. Your radiology working group can help determine which system would work best for your peer learning program.

Assessment Categories in the 2011 CAR Guide to Peer Review Systems¹

1. Concur with interpretation
2. Discrepancy in interpretation/not ordinarily expected to be made (understandable miss)
 - a. Unlikely to be clinically significant
 - b. Likely to be clinically significant
3. Discrepancy in interpretation/should be made most of the time
 - a. Unlikely to be clinically significant
 - b. Likely to be clinically significant
4. Discrepancy in interpretation/should be made almost every time—misinterpretation of finding
 - a. Unlikely to be clinically significant
 - b. Likely to be clinically significant

Assessment Categories in the 2016 ACR Revised Scoring System²

1. Concur with interpretation
2. Discrepancy in interpretation/not ordinarily expected to be made (understandable miss)
 - a. Unlikely to be clinically significant
 - b. Likely to be clinically significant
3. Discrepancy in interpretation/should be made most of the time
 - a. Unlikely to be clinically significant
 - b. Likely to be clinically significant

¹ Canadian Association of Radiologists. The CAR Guide to Peer Review Systems [Internet]. Ottawa: The Association; 2011 [cited 2019 Mar]. Available from: <https://car.ca/wp-content/uploads/CAR-Peer-Review.pdf>

² Goldberg-Stein S, Frigini LA, Long S, Metwalli Z, Nguyen XV, Parker M, Abujudeh H. ACR RADPEER Committee White Paper with 2016 Updates: Revised Scoring System, New Classifications, Self-Review, and Subspecialized Reports. J Am Coll Radiol. 2017;14(8):1080–1086.

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