

Guide to Standardized Peer Learning Rounds in Radiology



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Learning Rounds in Radiology

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Welcome.

Many have come to learn from the radiologic literature and from personal experience that case review through a peer learning process is a powerful adjunct to both didactic continuing medical education and peer review programs that are currently in place. We hope that this guide will provide alternative insights on how best to conduct structured periodic peer learning rounds to complement those initiatives that have already been in place in most radiology departments or practice groups throughout the province.

Radiologist eligibility and obligations to participate in the peer learning process

All radiologists who are currently in part-time or full-time practice are both eligible and obliged to participate in a standardized peer learning process. As has been set out in the Diagnostic Radiology & Nuclear Medicine – Clinical Privileges – Renewal of Privileges section of the 2021 BC MQI Privileging Dictionary: among other criteria, “the applicant must be currently registered/enrolled and maintain satisfactory participation in RQIS or another institutionally approved medical imaging peer review system AND the applicant must maintain satisfactory institutionally-set standards of participation in periodic scheduled peer learning rounds within the last year.”

Peer learning groups or “cells”

Peer learning rounds (formerly known by the more restrictive term, morbidity and mortality rounds) should be both an interactive and an intimate process where discussions can often be sensitive and of course, always confidential. As such, creating an environment of safety and respect can only be achieved if it is self-assembled and invitations are extended to and with those whom the group feels most comfortable.

Most commonly, such a *peer learning group* or “cell” would logically occur within a local practice group in an institution or region where there is a size of four practitioners or greater. In cases where practice group was smaller i.e., by mutual agreement, a cell might form between these one to three radiologists (or greater) and an adjacent group of larger size to form a group total of at least four radiologists and up to 20 or 30 radiologists.

If a group were of significant size, i.e., possibly 20 members or greater, one may consider forming more than one cell or “sub-cell.” For example, a group of interventional radiologists may wish to form their own peer learning group or sub-cell within a larger group which may best reflect their practice or peer learning needs. This is not to say that they would not also happily participate in their umbrella larger cell of diagnostic radiologist’s peer learning rounds cell. Similarly, it would be entirely reasonable to have diagnostic radiologists participate in the subgroup’s rounds if mutually agreeable.

There may be a circumstance where a sole radiologist/medical imaging specialist or small group of same may wish to be participate in a particular peer learning group that may be a complete separate group from a practice or geographic perspective. For example, a physician(s) participating in nuclear medicine in a smaller practice may wish to part of a larger group of nuclear medicine specialists in a practice geographically very distant. The radiologist would inquire and request an invitation to the larger or distant group or cell. This is entirely reasonable and encouraged and easily achievable virtually. (see below)

It should also be noted that current plans are underway to create a user-centric web-based system whereby one confidentially in invited through a BC MQI-managed system to register into a peer-learning cell which then notifies the user of upcoming peer learning dates for that cell. The system will provide a conduit to request invitation to peer learning groups outside their primary place of practice and also confidentially view their own rounds attendance over time.

Peer learning rounds (formerly known by the more restrictive term, morbidity and mortality rounds) should be both an interactive and an intimate process where discussions can often be sensitive and of course, always confidential.

Peer learning groups or cells: a self-assembled group of about 4-20 radiologists, who convene for the purpose of interactive and confidential peer learning discussions. While they most commonly occur within a location practice group with four or more practitioners, cells may also be developed to encompass distinct geographic regions or practice specialties. Cells are created by invitation to support an environment of safety, respect, and to support practice or peer learning needs.

Convenor: The “convenor” is a person within a group or cell that is interested and charged with the responsibility of organizing peer learning rounds. They are central in not only to moderating the peer learning rounds themselves, but are the essential mover in the initiation, coordination, and record keeping of the rounds.

Just culture: A just culture builds trust through fair treatment of health care providers after a patient safety incident, which improves patient safety because providers are more willing to help the organization identify and correct systemic hazards and risks.

Central role and responsibilities of the convenor

The *convenor* is a person within a group or cell that is interested and charged with the responsibility of organizing peer learning rounds. They are central in not only moderating the peer learning rounds themselves, but are the essential mover in the initiation, coordination, and record keeping of the rounds.

In the initial peer learning rounds paradigm being trialled in the Vancouver Island Health Authority, the BC MQI Radiology Peer Learning Rounds Work Group, through Dr. Robert Johnson and appropriate representation and consultation have appointed initial convenors for the various radiology groups or cells.

Dr. Julia Howard	Campbell River / Comox Valley
Dr. Rob Johnson	Nanaimo / Parksville / Port Alberni
Dr. Kristina Sharma	Duncan / Ladysmith
Dr. Nicola Finn	Victoria / Saanich

Each group can appoint a convenor in perpetuity or may otherwise decide to have a convenor established on a rotating basis either yearly or possibly rotating (quarterly) every peer learning round. As often is the case, the convenor is chosen from the pool of radiologists serving as the official or unofficial quality and safety officers of a group or cell who are very motivated regarding matters of quality and safety.

The essential duties of the convenor are as follows:

- To consult with other members of their own peer learning cell to establish at least one date per each quarter of the calendar year to hold radiology peer learning rounds. The rounds would reasonably be between one to two hours long at a time of day best suited to the groups practice. This can be achieved by way of:
 - The peer learning cell establishing regular fixed dates for rounds, e.g., the second last Wednesday of the last month of the quarter;
 - Transmitting a Doodle poll to all participants to set the best date and time options; and
 - Mass email requesting input or setting a date to relevant participants.
- To distribute peer learning rounds date and time information formally and electronically to all participant in the group/cell, (including those that might be outside the practice group) hopefully in as far in advance of the date of rounds a possible.

- To also notify the Regional Head of Radiology and Department Head of the date and times of upcoming peer learning rounds and list of those invited within the learning cell (including those that might be outside the practice group).
- To field any inquiries from other individual radiologists outside the practice group (or cell) that are requesting permission to participate in the peer learning rounds. It would be responsibility of the convenor, in consultation with other members of their peer learning cell, to decide if the requesting radiologist should participate in such rounds. It is important for both parties to acknowledge that the peer learning experience is intimate and sensitive, and its candidness and effectiveness can be impacted by over-inclusive invitation.
- The convenor must create or at a minimum manage a system whereby cases are *confidentially* collected and curated in advance of the peer learning rounds. There a number of methods whereby this can be achieved:
 - In its simplest form, one can request that each radiologist participating must be prepared to have ready for presentation, one case that represents an “M&M or good catch” that involves themselves. The disadvantage of this system is that it is random and does not allow for the curation of cases that would allow for maximum learning for the maximum number of participants. Additionally, if the presenting radiologist is not the one involved in the case, this does not allow for courteous and adequate notification of the involved radiologist.
 - The convenor may put a notice of a call for interesting “misses,” “adverse event,” or “good catch” cases to all radiologists in that learning cell and to have them submit the patient information to them in advance of the rounds to create a list. This can be submitted in direct conversation or via confidential hospital-based email.
 - The convenor or learning cell may create, provide notification of, and maintain a self-perpetuating system of case submission by:
 - Assigning or creating a dedicated email managed by a convenor to accept interesting cases; and
 - Using a hospital-based PACS with the ability to create confidential case lists or files that can be antegradely populated with cases that can be curated by the convenor in preparation of rounds.
 - The convenor, with consultation of his practice coup/cell may request and manage having every radiologist in their cell to provide at least one case per calendar year.
 - In cases where the workload of the convenor is considered too onerous, one can appoint a “monitor” who’s sole responsibility is to “encourage” and “monitor” the submission of appropriate cases to the convenor.
- The convenor should, wherever possible, notify the radiologist involved in a particular case to be discussed at rounds in advance of rounds, and to encourage that radiologist’s participation.

Overview of convenor duties

- Schedule the rounds
 - Distribute the schedule to the cell
 - Notify the regional or department head
 - Manage the cell size and queries/invitations
 - Manage the collection and curation of cases
 - Connect with the rad whose case is to be used
 - Manage meeting technology
 - Moderate the round, applying just culture principles
 - Maintain and submit cell attendance
 - Record round minutes
 - Provide support or coverage for transition of convenor duties
 - Ensure rounds conclude with unique descriptor for CME applications
 - Survey to identify areas of improvement for future rounds.
- The convenor should confirm that all audio-visual media required for the rounds are in order and that any web-based conference links i.e., Zoom have been distributed safely and to the correct individuals. As such, it is the convenor's duty to ensure that all on a Zoom meeting are identified as members of that learning cell at the outset of the meeting or as they are admitted.
 - The convenor should oversee and serve as the moderator (or appoint a moderator) for the conduct of rounds (see the following section on the conduct and methodology of peer learning rounds) and ensure *just culture* and an optimal learning environment is maintained.
 - The convenor must maintain attendance and confidentially submit this information to the Department Head and Regional Head. This can be confidentially accumulated on a yearly basis and submitted at year-end if Rounds are conducted by the same convenor, however, if convenors serve on an alternating basis, this information should be transmitted at the conclusion of each of the rounds.
 - The convenor should record minutes on the cases discussed in Rounds (see the following section on the conduct and methodology of peer learning rounds).
 - The convenor must inform their learning cell if they wish to no longer serve as a convenor or will be absent at an upcoming rounds. If the conveyor serves on a rotating basis, this next convenor should be decided at the present peer learning rounds prior to the upcoming rounds.
 - The rounds should conclude with a unique descriptor and instructions that will allow the attendee to apply for MainPort Category 3 CME credits with the Royal College of Physician and Surgeons of Canada.
 - The convenor should provide participants access to a confidential standardized evaluation survey to allow identification of areas of improvement for future rounds as included in Appendix 1. The convenor should also confidentially provide this information back to the Department or Radiology Health Care Authority Head where appropriate.

Conduct and methodology of peer learning rounds

The conduct and methodology of peer learning rounds can vary widely and should be decided upon by the individual participants based on needs, geography, available infrastructure, and tradition.

- Rounds must be scheduled and conducted at least quarterly.
- Adequate notification and opportunity for participation must occur.
- Rounds should last one to two hours to allow adequate discussion of cases. Based on time of day, the provision of beverages or even food is often advisable.
- *Just culture* must be always observed.
- Rounds can be conducted “in person,” via hospital-secured videoconferencing software such as Zoom, or in a hybrid manner using both.
- Maximum learning opportunity for the participants can be achieved if a case is presented in manner that most closely approximates “real life.” A case should be presented chronologically, with the presentation of imaging accompanied with similar historical data that was presented to the original reader or operator. Similarly, wherever possible, showing a “stack” of image slices or other representative imaging in a scenario representing the original reader is advisable to avoid “augmenting” a particular missed finding.

However, in the interests of brevity and allowing the presentation of the maximum number of cases, one may consider a PowerPoint or Keynote presentation of one, some, or all cases mixed with text that allows ensuring the appropriate anonymization of images. Please note that the presentation itself is otherwise a confidential document and must be treated as such. Please also note that “non-destructive” cropping of images to exclude patient vital statistics is not confidential.

- Wherever possible, adverse events should be categorized in the discussion using the RadPeers criteria (see Appendix 2) and in the case of procedures, Society of Interventional Radiology Criteria (see Appendix 3).
- A link or access to a confidential standardized questionnaire or evaluation survey should be provided to the attendees at the conclusion of the rounds (see Appendix 1).

A case should be presented chronologically, with the presentation of imaging accompanied with similar historical data that was presented to the original reader or operator.

- Minutes can be maintained for the peer learning rounds and should contain a minimum of information in anonymized format that should contain:
 - Name of rounds;
 - Date;
 - Attendees; and
 - Cases discussed: may include one or more of patient initials, nature of event, learning value, actions taken etc.
- Irrespective of the degree of detail of data recorded in the minutes, these must be recorded and stored in a medically secure environment as would any other patient record. Options include a locked environment within the convenor's office or Department Head.

Roles and responsibilities of the individual radiologist

- As outlined above, all radiologists who are currently in part-time or full-time practice are both eligible and obliged to participate in a standardized peer learning process. As has been set out in the Diagnostic Radiology & Nuclear Medicine – Clinical Privileges – Renewal of Privileges section of the 2021 BC MQI Privileging Dictionary: among other criteria, “the applicant must be currently registered/enrolled and maintain satisfactory participation in RQIS or another institutionally approved medical imaging peer review system AND the applicant must maintain satisfactory institutionally-set standards of participation in periodic scheduled peer learning rounds within the last year.”
- As such, it is the obligation of every practicing radiologist who has their primary practice (at a locale on Vancouver Island) to seek out the convenor in their particular work environment at become part of a that peer learning group or cell.
- If the individual radiologist wishes to join a particular peer learning cell either because they do not have their primary practice on Vancouver Island or they are merely interested learning more from a particular learning cell that has relevance to their practice, they may contact the convenor of that cell a request an invitation, either for an individual peer learning rounds or in perpetuity.
- Attendance data will be provided to each practitioner at year end by the Regional Head of Radiology. It is expected that each individual practicing radiologist, whether part-time or full-time must participate in 50 per cent of quarterly peer learning rounds i.e., two rounds per year. In the case where an individual radiologist has access to a greater number of peer learning rounds as provided by their department/

institution, their Department or Regional Head may decide on a different minimum number or percentage participation. Participation by invitation can be included in attendance calculations.

- It is expected that each radiologist will submit at least one case to peer learning rounds per year.

Roles and responsibilities of the Departmental or Regional Head

- In coordination with BC MQI/RQIS radiologist census data, the Departmental or Regional Head responsible for credentialing and renewal of privileges will receive, tabulate, and present to the participating radiologist, yearly attendance data. This information will be containing in their biennial renewal of privileges discussions.
- The Regional or Departmental Head, in coordination with BC MQI/RQIS, will identify those radiologists functioning as locums that do not have their primary practice on Vancouver Island and ensure that they are in compliance with their peer learning obligations at their home or primary institution.
- The Departmental or Regional Head will review submitted rounds evaluation surveys and make recommendation where and when appropriate (see Appendix 1).

Roles and responsibilities of the BC MQI

- Continue to develop electronic web-based system to allow for a convenient and efficient one-stop enrollment and management tool for peer learning rounds, cells, scheduling, and participation rates for the benefit of the individual radiologist's self-assessment and credentialling.
- Integrate and feedback through software to convenors, radiologist, and Heads to provide ability to create, populate, and maintain cells, identify non-compliance, announce rounds, maintain attendance.
- Availability to receive and answer all questions and disputes related to radiology quality and peer learning.



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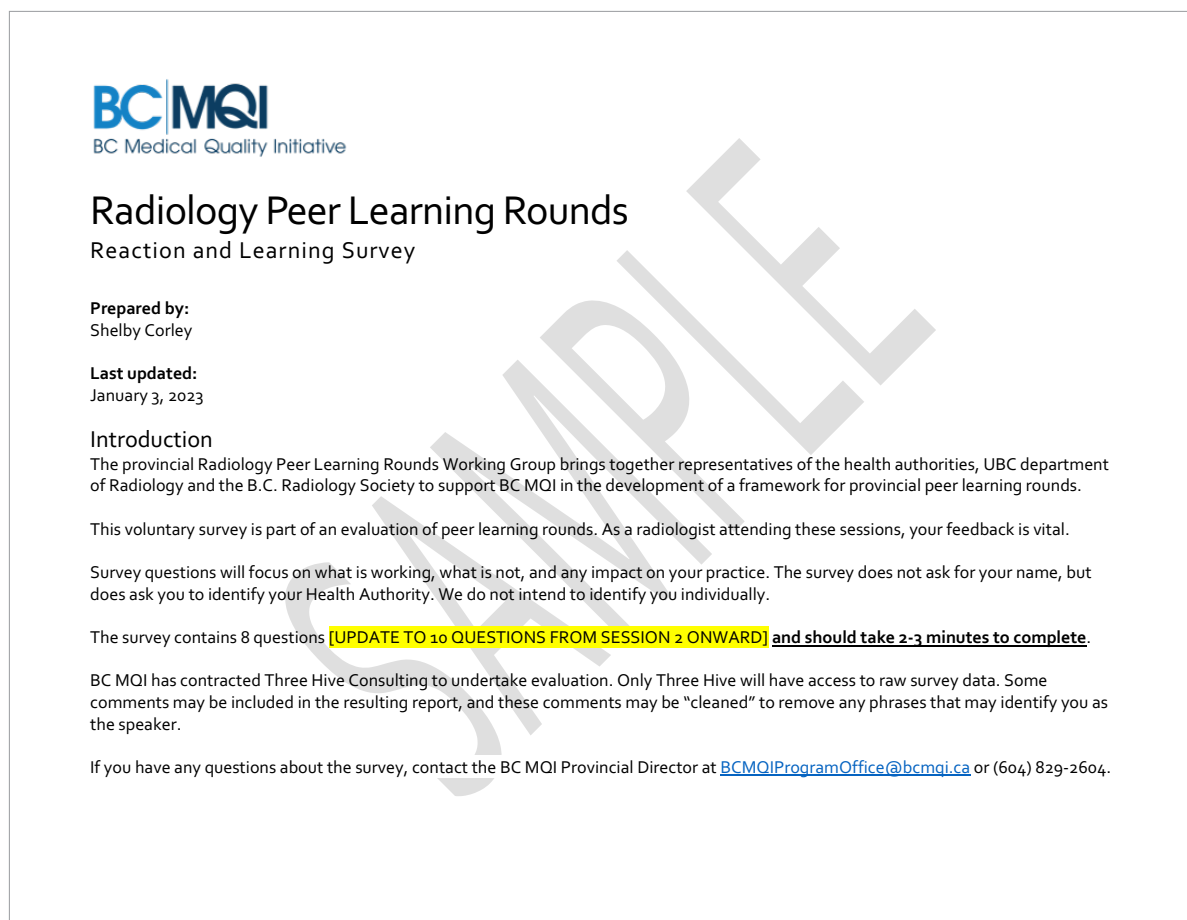
Recommended Reading

1. Torres, F. S. *et al.* CAR Peer Learning Guide. *Can Assoc Radiologists J* **73**, 491–498 (2022).
2. Ngo, A.-V. *et al.* Practical considerations when implementing peer learning conferences. *Pediatr Radiol* **49**, 526–530 (2018).
3. Broder, J. C., Scheirey, C. D. & Wald, C. Step by Step: A Structured Approach for Proposing, Developing and Implementing a Radiology Peer Learning Program. *Curr Problems Diagnostic Radiology* **50**, 457–460 (2021).
4. Chetlen, A. L. *et al.* Collaborative Learning in Radiology: From Peer Review to Peer Learning and Peer Coaching. *Acad Radiol* **27**, 1261–1267 (2020).
5. Liao, M. & Tan, N. Collective Intelligence of Peer Learning: Promoting Culture of Learning and Improvement Among Radiologists. *Curr Problems Diagnostic Radiology* **50**, 761–763 (2021).
6. Trinh, T. W., Shinagare, A. B. & Khorasani, R. Yield of Learning Opportunities From a Radiology Random Peer Review Program. *Ajr Am J Roentgenol* **211**, 630–634 (2018)6. Donnelly, L. F., Dorfman, S. R., Jones, J. & Bisset, G. S. Transition From Peer Review to Peer Learning: Experience in a Radiology Department. *J Am Coll Radiol* **15**, 1143–1149 (2018).
7. Bowman, A. W. *et al.* Implementation of peer learning conferences throughout a multi-site abdominal radiology practice. *Abdom Radiol* **46**, 5489–5499 (2021).
8. Haas, B. M., Mogel, G. T. & Attaya, H. N. Peer learning on a shoe string: success of a distributive model for peer learning in a community radiology practice. *Clin Imag* **59**, 114–118 (2020).
9. Chow, R. A., Tan, N., Henry, T. S., Kanne, J. P. & Sekhar, A. Peer Learning Through Multi-Institutional Case Conferences: Abdominal and Cardiothoracic Radiology Experience. *Acad Radiol* **28**, 255–260 (2021).
10. Chaudhry, H., Jamil, O., Beidas, A.-K., Shah, D. & Abujudeh, H. H. Peer Review to Peer Learning in Radiology: Where Have We Been, What Have We Learned and Where Are We Headed? *Curr Radiology Reports* **6**, 31 (2018).

11. Awan, O. A. Peer to Peer Learning: Its Importance and Benefits. *Acad Radiol* **28**, 747–748 (2021).
12. Moriarty, A. K., Cedeno-Kelly, K. & Hioe, T. Private Practice Radiologists' Perceptions of Peer Learning. *J Am Coll Radiol* **17**, 1509–1514 (2020).
13. Naringrekar, H., Flanders, A. E. & Roth, C. G. The Value of Transitioning From Scoring-Based Peer Review to Peer Learning. *Contemp Diagnostic Radiology* **45**, 1–5 (2022).
14. Larson, D. B. *et al.* Transitioning From Peer Review to Peer Learning: Report of the 2020 Peer Learning Summit. *J Am Coll Radiol* **17**, 1499–1508 (2020).
15. Larson, D. B. *et al.* Peer Feedback, Learning, and Improvement: Answering the Call of the Institute of Medicine Report on Diagnostic Error. *Radiology* **283**, 231–241 (2017).
16. Trinh, T. W., Shinagare, A. B. & Khorasani, R. Yield of Learning Opportunities From a Radiology Random Peer Review Program. *Ajr Am J Roentgenol* **211**, 630–634 (2018).

Appendix 1: Survey

Please note the following standardized evaluation survey that can be used at the conclusion of peer learning rounds, to be found here: [Radiology Peer Learning Rounds Reaction and Learning Survey](#),



BC MQI
BC Medical Quality Initiative

Radiology Peer Learning Rounds

Reaction and Learning Survey

Prepared by:
Shelby Corley

Last updated:
January 3, 2023

Introduction

The provincial Radiology Peer Learning Rounds Working Group brings together representatives of the health authorities, UBC department of Radiology and the B.C. Radiology Society to support BC MQI in the development of a framework for provincial peer learning rounds.

This voluntary survey is part of an evaluation of peer learning rounds. As a radiologist attending these sessions, your feedback is vital.

Survey questions will focus on what is working, what is not, and any impact on your practice. The survey does not ask for your name, but does ask you to identify your Health Authority. We do not intend to identify you individually.

The survey contains 8 questions **[UPDATE TO 10 QUESTIONS FROM SESSION 2 ONWARD]** and should take 2-3 minutes to complete.

BC MQI has contracted Three Hive Consulting to undertake evaluation. Only Three Hive will have access to raw survey data. Some comments may be included in the resulting report, and these comments may be "cleaned" to remove any phrases that may identify you as the speaker.

If you have any questions about the survey, contact the BC MQI Provincial Director at BCMQUIProgramOffice@bcmqi.ca or (604) 829-2604.

View online at https://survey.ca1.qualtrics.com/jfe/form/SV_abJvMvRs1VglvhA?jfefe=new

Survey Questions and Evaluation Question Alignment

Survey Question	Question Format	Response Options	Evaluation Question
1. Did you experience any challenges with registration?	Single response	<ul style="list-style-type: none"> No, I had no challenges registering Yes, I had some challenges registering (please describe): _____ 	
2. To what extent do you agree with the following statements: <ul style="list-style-type: none"> The facilitator ensured everyone could participate There was enough time allocated for today's session I felt I could participate without fear of judgment The case selected for today's session was relevant to my practice I intend to make one or more changes to my practice based on today's session Peer Learning Rounds are a valuable part of the continuing learning process 	Matrix; single response	<ul style="list-style-type: none"> Completely agree Somewhat agree Somewhat disagree Completely disagree Not applicable 	1.2 2.4 3.1
3. Have you submitted or considered submitting a case for review at a Peer Learning Round?	Single response	<ul style="list-style-type: none"> Yes, I have submitted a case No, but I am considering submitting a case No, I am not considering submitting a case 	2.2



1

View online at https://survey.ca1.qualtrics.com/jfe/form/SV_abJVmvRs1VglvhA?jfe=new

Survey Question	Question Format	Response Options	Evaluation Question
4. Do you know what criteria to think about when identifying cases for submission?	Single response	<ul style="list-style-type: none"> Yes, I have seen the criteria and they are very clear Yes, I have seen the criteria and they are somewhat clear No, I have seen the criteria, but they are not clear enough No, I have not seen the criteria 	2.2
5. Can you tell us what might inhibit you from submitting a case for review at a Peer Learning Round?	Open text		2.2
6. Can you tell us what might motivate you to submit a case for review at a Peer Learning Round?	Open text		2.2
7. Have you made any changes to your practice based on previous Peer Learning Rounds? [DO NOT INCLUDE UNTIL SESSION #2]	Single response	<ul style="list-style-type: none"> Yes No 	3.2
8. [If "yes" to #7] Can you share any details about the changes you have made?	Open text		3.2
9. How do you feel learning is different under Peer Learning Rounds vs. Peer Review, if at all? [DO NOT INCLUDE UNTIL SESSION #2]	Open text		3.1
10. Please share any other comments you think we should hear	Open text		



2

Appendix 2: RADPEER Scoring System

Categorization of adverse events in diagnostic radiology are best categorized as outlined in “Table 3. RADPEER Scoring System (Effective May 2016)” in:

Goldberg-Stein, S. et al. ACR RADPEER Committee White Paper with 2016 Updates: Revised Scoring System, New Classifications, Self-Review, and Subspecialized Reports. *J Am Coll Radiol* 14, 1080–1086 (2017).

Table 3. RADPEER Scoring System (Effective May 2016)

Score	Meaning	Optional
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

Appendix 3: Society of Interventional Radiology Adverse Event Classification System

For categorization of procedural adverse events, one might consider the revised Society of Interventional Radiology New Adverse Event Classification scheme as outline in Appendix A in:

Khalilzadeh, O. et al. Proposal of a New Adverse Event Classification by the Society of Interventional Radiology Standards of Practice Committee. *J Vasc Interv Radiol* 28, 1432-1437.e3 (2017).

1437.e1 ■ Proposal of a New SIR Adverse Event Classification System Khalilzadeh et al ■ JVIR

APPENDIX A. ADVERSE EVENT CLASSIFICATION

The classification system has two parts (A and B). Part A refers to adverse event (AE) description and severity characterization. It is suitable for scientific use (eg, presentations, publications), as well as for AE reviews within a practice, practice group, facility, or specialty.

Part B pertains to AE analysis. It is designed to enable a confidential and constructive review of any AE within an interventional radiology (IR) practice. Applicability of part B for scientific publications is limited, and there is none for other public use. The part B is meant to provide a strictly confidential, legally nondiscoverable, nonpunitive, objective, consistent, and clinically constructive analytic guide that may result in quality-improvement in IR.

Part A: Adverse Event Description

A. Description narrative of adverse event (AE; including sedation and anesthesia).

B. AE severity assessment^{*}: escalation of level of care.

1. Mild AE: No therapy or nominal (nonsubstantial) therapy (post-procedural imaging performed and fails to show manifestation of AE); near miss (eg, wrong site of patient prepared, recognized and corrected before procedure, wrong patient information entered for procedure);
2. Moderate AE: moderate escalation of care, requiring substantial treatment, eg, intervention (description of intervention and result of intervention) under conscious sedation, blood product administration, extremely prolonged outpatient observation, or overnight admission after outpatient procedure not typical for the procedure (excludes admission or hospital days unrelated to AE);
3. Severe AE: marked escalation of care, ie, hospital admission or prolongation of existing hospital admission for > 24 hours, hospital admission that is atypical for the procedure, inpatient transfer from regular floor/telemetry to intensive care unit, or complex intervention performed requiring general anesthesia in previously nonintubated patient (generally excludes pediatrics or in circumstances in which general anesthesia would primarily be used in lieu of conscious sedation, eg, in mentally challenged or severely uncooperative patients);
4. Life-threatening or disabling event: eg, cardiopulmonary arrest, shock, organ failure, unanticipated dialysis, paralysis, loss of limb or organ;
5. Patient death or unexpected pregnancy abortion.

^{*}The Society of Interventional Radiology (SIR) AE Severity Scale is intended to approximate the surgical Clavien-Dindo scale and the National Cancer Institute Common Terminology Criteria for Adverse Events scale. The SIR scale is tailored toward the procedures and AEs encountered in IR practices. The grading of interventional oncology AEs can selectively incorporate relevant AE grading definitions published in the current Common Terminology Criteria for Adverse Events for oncologic interventions, which may be particularly relevant in the context of research publications. All AEs occurring within 30 days of a procedure should be included in the AE description and analysis, regardless of causality, in the interest of objectivity. The AE scale itself does not assess operator performance.

Note: A marker of "M" is used to indicate multiple AEs, each of which is counted and evaluated separately if possible.

Part B: AE Analysis

A. Causality

- Category 1: AE not caused by the procedure.
- Category 2: Unknown whether AE was caused by the procedure.
- Category 3: AE caused by the procedure.

B. Patient and procedural risk modifier

- Category 1: High-risk patient and technically challenging procedure.

Category 2: High-risk patient (eg, American Society of Anesthesiologists [ASA] status 4, uncorrectable coagulopathy, poor functional status [Eastern Cooperative Oncology Group performance status of 3/4], polypharmacy/polyintravenous therapy and transfusion, septicemia, hemodynamic instability, recent catastrophic event/intensive care unit admission/major surgery or interventions) or low-risk patient and technically challenging procedure (eg, transjugular intrahepatic portosystemic shunt with occluded portal vein, percutaneous biliary drain placement in nondilated biliary system).

Category 3: No modifier.

C. AE preventability

- Category 1: Rarely preventable, ie, well-described and "typical" for the procedure and occurring despite adequate precautionary and preventive measures.
- Category 2: Potentially preventable.
- Category 3: Consistently preventable, eg, inappropriateness of procedural indication (may use checklist; see below).

D. AE management

- Category 1: Most operators would have handled the AE similarly.
- Category 2: Some operators would have handled the AE differently.
- Category 3: Most operators would have handled the AE differently.

Examples of Consistently Preventable Event.

- Wrong patient
- Absolute contraindication for procedure
- Wrong side for procedure
- Wrong procedure
- Wrong medication/contrast agent/blood product (dose/administration route)
- Exposure to known allergens
- Intraarterial placement of catheter meant to be intravenous or non-venous placement of inferior vena cava filter
- Failure to follow up or communicate laboratory, pathology, or radiology results
- Use of known malfunctioning equipment or patient monitoring system
- Lack or inappropriate use of monitoring equipment during sedation

APPENDIX B. CLINICAL CASE SCENARIOS

Tunneled Hemodialysis Catheter Placement

A 58-year-old hemodialysis-dependent patient with end-stage renal disease is referred for tunneled hemodialysis catheter placement. He is classified as ASA status 3 because of a history of stroke, known coronary artery disease, and a cardiac ejection fraction of 15%. A tunneled hemodialysis catheter is inserted from a right internal jugular approach, with the catheter tip terminating at the lower superior vena cava. After placing the catheter, the operator does not aspirate and flush the catheter to assess the flow rate and attempt to determine its adequacy for performance of hemodialysis. During the patient's dialysis session the next day, the catheter flow rates are poor. The dialysis staff is told to reverse the lumens for performance of hemodialysis, and the dialysis session is continued but abbreviated. The patient returns the next day for catheter exchange with a serum potassium level of 5.5 mg/dL and pulmonary edema. During the catheter exchange, the patient experiences a fatal arrhythmia. No code is called and no resuscitation is attempted, as patient is classified as do not resuscitate/do not intubate.

Excessive Moderate Sedation

An 89-year-old woman with numerous comorbidities that include diabetes mellitus, coronary artery disease, peripheral arterial disease, and a left ventricular ejection fraction of 25% was classified as ASA status 3. During attempted percutaneous transhepatic cholangiography, apnea develops after

