CRITICALLY APRAISED TOPICS

Trainee completes the Critically Appraised Topics (CATs) form (Treatment, diagnosis & harm) and presents their findings to an assessor (DoT or Clinical Supervisor).

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Assessor completes the RANZCR CAT Exercise Assessment Score Sheet and provides feedback to the trainee. Assessor should keep a copy of the CATs assessment and give the original to the Trainee.

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Trainee is to retain the completed assessment and return to the College using the **Trainee Assessment Summary Submission Form** between 21 January 2022 - 31 March 2022.

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The College will review the CATs form and the RANZCR CAT Assessment Score Sheet and if approved this assessment will be deemed as complete.

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Evidence Based Medicine and Critically Appraised Topics

What is it?	Evidence Based Medicine (EBM): Learning of evidence-based medicine principles as they apply to Radiology. This will be delivered primarily through online learning resources. Critically Appraised Topics (CAT): One-page rapid review of an imaging-related peer-reviewed research publication, usually an RCT or similar study, to determine if the study should be taken seriously and where its flaws lie. These can be for the areas of Treatment, Diagnosis and Harm.
What's involved?	Ideally the CAT presentations are best conducted in a group forum, perhaps a departmental Journal Club or regular meeting where educational material is presented. A presentation should take about 10-15 minutes, and the CAT should be presented using the completed CAT submission form. Once presented, the CAT is open for discussion to the group.
When / how often is it done?	Trainees are required to complete two (2) CATs at the end of Year 2 and at the end of Year 3. Non completion of four (4) CATs is a barrier to progression into Year 4.
How does a trainee receive their results?	Results are provided directly to trainees from their DoT. The assessment outcome will be documented on the RANZCR CAT Assessment Score Sheet.
What feedback is provided to the Trainee?	The trainee will be provided with a completed copy of the RANZCR CAT Assessment Score Sheet which is used to assess the performance of the trainee as well as the quality of the CAT presented. Both assessor comments and any pertinent comments or questions from others at the CAT presentation may be recorded.
Submission	To meet the assessment requirement, the trainee must retain both the completed CATs form (Treatment, Diagnosis or Harm) and the RANZCR CAT Assessment Score Sheet and return to the College using the **Trainee Assessment Summary Submission Form** between 21 January 2022 - 31 March 2022. The College will review the CATs form and the RANZCR CAT Assessment Score Sheet and if approved this assessment will be deemed as complete.

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Critically Appraised Topics in Radiodiagnosis Curriculum

What is a Critically Appraised Topic?

There are different ways to interpret the term "Critically Appraised Topic". Within the RANZCR Radiodiagnosis Curriculum, the term "CAT" applies to critical analysis of ONE research article into a specific clinical question, with the express aims of:

- Deciding if the appraised article has been well-performed
- Analysing the results presented in the article using a structured methodology
- Concluding if the article provides believable results
- Deciding whether such results can and should be translated into clinical practice

This makes a CAT very different to a Review, Systematic Review or Meta-analysis, all of which require considerably more work, expertise and judgement to perform and analyse. Such detailed analysis of a theme or full topic is usually the subject of months or years of work, requires the support of a clinical epidemiologist, and would be appropriate for an advanced project.

Why Are CATs Important?

The pace of change in medical knowledge is progressing more and more rapidly. Every year, thousands of journal articles relevant to radiology and hundreds relevant to a specific subspecialty are published.

However, trainees learn "received wisdom" as axiomatic facts that are current at a certain point in time in their training, in order to get through their work and to pass the exams. They rarely critically analyse or even check the source of such knowledge, other than in a textbook or website; such "facts" may be inappropriate, out-dated, or even plain wrong.

Over the professional lifetime of the radiologist, skills in evidence-based medicine and critical appraisal of the literature are essential in order to refresh and update knowledge and to ensure continuing safe clinical practice. The new RANZCR Radiodiagnosis Curriculum prescribes that each trainee must perform two CAT exercises in each of Years 2 and 3. This has one primary and three secondary goals:

Primary

- To demystify and develop the use of Evidence-Based Medicine in training and clinical practice in diagnostic and interventional radiology.

Secondary

- To help trainees learn the basics of Evidence-Based Medicine and how to apply them to radiology questions.
- To help trainees learn to analyse, explain and present the findings of a journal article using CATs methodology, and thus appraise the quality and applicability of the published results.
- To train supervisors and teachers in basics of EBM, in order to assess trainee presentations and discussions in a formal manner, and in order to help incorporate CATs conclusions into routine clinical practice.

Types of CAT

Critically appraised topic analysis has been applied to many different types of journal articles, with a variety of formats that typically include Treatment, Diagnosis, Systematic Reviews, Harm and Prognosis. There are very few available systematic reviews of diagnostic and interventional radiology; partly because in general radiology as a discipline has conducted so few controlled trials of any type. Also, Radiodiagnosis is not often concerned with prognosis except in the field of interventional radiology. Trainees in their 2nd and 3rd years will not often be involved at that level.

As a consequence, the College has elected to focus the CAT exercise on three specific formats most relevant to Radiodiagnosis: Treatment, Diagnosis and Harm. For each of these types, there are two associated documents:

1. A worksheet that asks specific questions about the selected article and that walks the trainee through the numerical steps needed to appraise that article. This is for the trainees use only, and acts as a step-by-step prompt through the process.

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2. A CAT form that should be used for presentation of the article in CAT format, should be filled out after the worksheet has been completed. It should act as a formal 1–2-page summary of the characteristics of the presented study, the numerical results, the key analyses, and conclusions about the study's validity.

In addition, the supervisor assessing the CAT has a separate CAT Exercise Assessment Score Sheet to fill out, using the 5-point rating scale. The CAT must be completed satisfactorily in order for the trainee to progress. The supervisor and trainee must both sign the completed CATs Assessment Score Sheet.

Finally, to meet the assessment requirement, the trainee must retain both the completed CATs form (Treatment, Diagnosis or Harm) and the RANZCR CAT Assessment Score Sheet and return to the College using the **Trainee Assessment Summary Submission Form** between 21 January 2022 - 31 March 2022.

The College will review the CATs form and the RANZCR CAT Assessment Score Sheet and if approved this assessment will be deemed as complete.

Treatment CAT

The treatment CAT is conceptually the simplest type of all, and the most familiar format. It is aimed at answering a specific question, which of two (or more) therapeutic interventions will result in a superior outcome for the majority of patients?

One of the fundamental aims of a treatment CAT is to determine not only whether one treatment is superior to another, but also to evaluate the efficacy of that treatment, and to judge whether the cost and practicality of implementing such treatment, is justified by both the relative and absolute amounts involved.

In general, such CATs require randomised controlled trials (RCT's) to answer the clinical question, because only through such trials can inherent selection and other baseline biases be adequately compensated for. However, in radiology there are often situations where there are no adequate RCT's to address the issue (e.g. is RF ablation superior to surgical resection for metastatic colorectal carcinoma in the liver?); for such questions case-controlled or retrospective studies may still warrant analysis and presentation if these represent the best available evidence.

Diagnosis CAT

The Diagnosis CAT appears initially simple but is conceptually sophisticated. On the surface it appears to ask a simple question: Is diagnostic test A superior to diagnostic test B?

Unfortunately, the answer differs depending on the context where clinical practice takes place. The answer to the question "what is the best test for diagnosing pulmonary embolus?" is very different depending on the clinical presentation, the patient population with dyspnoea, the age and clinical history of the patient, the acuteness and severity of the disease, the clinical setting (outpatient or inpatient, emergency or ward), the availability of specific imaging tests at different times of the day and year, the expertise of the radiologist or nuclear physician interpreting the diagnostic test, and the clinical impact of not making the diagnosis, or even making a different diagnosis.

In the setting of acute dyspnoea, a 20-year-old asthmatic, a 32-year-old chronic cystic fibrosis patient, a 50-year-old plane traveller and a 70-year-old patient with prior myocardial ischemia, all have different pre-test probabilities for pulmonary embolism, and the "best test" performance will depend not so much on the absolute accuracy of the test, but on the likelihood of the proposed disease being present.

Therefore, the research question must be framed in a very specific way in order to deal with issues such as differences in clinical practice environment, differences in clinical presentation, differences between patients, etc.

Harm CAT

The CAT on harm is highly relevant to radiology, and has become increasingly topical, particularly with recent publicity surrounding radiation exposure and contrast-related adverse side-effects.

The CAT is used to evaluate treatments and interventions that may result in increases or reductions in patient harm, which are the negative effects of what we do routinely. In effect, the aim of such a CAT is to ask, "Which treatment/ intervention/technique results in a greater

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incidence of harm or adverse events in this patient group?”

Relevant topics include adverse outcomes from radiation exposure, contrast-induced nephropathy, and contrast-related reactions, for example. They can also include adverse events arising from interventions, such as infection or thrombosis rates from central line insertions, bleeding, and false aneurysm formation rates at groin puncture sites, complications from percutaneous biopsies, and so on.

Doing a CAT

Performing a CAT should be a step-by-step process aimed at answering a specific research question that arises from a clinical scenario, using a carefully selected and appropriate analysed research article.

The supervisor is any radiologist involved in the training of the trainee. He/she can be a staff radiologist or VMO, and ideally should NOT be either the Director of Training or the Clinical Director of Radiology.

The trainee should ideally initiate each step, with advice and support from the supervisor where appropriate.

Clinical Scenario

The CAT starts with a clinical scenario, which can be imagined or taken from clinical practice. It should be succinct and should raise a specific clinical problem that is relevant and that can potentially be answered through research.

It is also possible to “reverse engineer” this scenario from a selected article, but ideally this should be the first step in the process.

Research Question

The CAT should pose a specific research question arising from the scenario that an evidence-based medicine approach may be able to answer. This will usually be a direct comparison between one test or intervention and another, ideally in the form of a prospective randomised controlled trial.

Although RCT is always preferred, case-controlled series or retrospective study may well be the only evidence available for some questions. It is still relevant to analyse and present such studies, if for no other reason than to highlight their deficiencies and weaknesses, and to show what research is required in order to address the problem. Such analysis can still help to inform current clinical practice and aid in decisions to improve practice.

Selecting and Obtaining an Article

Selecting an article for a CAT should ideally be prospective, using a structured electronic search of databases such as Ovid or PubMed. The search should be in response to the formulated research question.

It is not ideal, but certainly possible, to select an appropriate article first and retroactively synthesise the research question and clinical scenario. This may occur especially if a supervisor recommends a specific article to the trainee for the CAT.

Ideally the trainee will be able to access the appropriate article directly through an online search and hospital library resources. If necessary, the full text of the desired article may have to be obtained through inter-library loans, or with the assistance of the supervisor.

Worksheets

For each of the Treatment, Diagnosis and Harms CATs forms, there is a corresponding worksheet that is meant to act as a step-by-step prompt for the trainee in going through the paper. There are specific questions that need to be answered. There are specific tables and/or calculations that are described and tabulated for the trainee to work through using data in the publication.

The worksheets are not for presentation but rather to help the trainee think through the CAT exercise and to enter the preliminary data and thoughts needed to complete the CAT.

CAT Forms

There are specific CAT forms for Treatment, Diagnosis and Harm. Each form asks for a description of the clinical scenario, the research question and the name of the analysed article. Each form asks the trainee to enumerate the study characteristics using the Patient, Intervention, Comparison, Outcome (PICO) format. This format can be used to search for studies and articles using “Search MEDLINE/PubMed via PICO” (http://pubmedhh.nlm.nih.gov/nlmd/pico/piconew.php).

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Using the worksheet, the appropriate matching CAT form should then be filled out neatly, ideally by typing on the Microsoft Word template provided. This form can then be printed or presented from the computer screen.

Presenting the CAT

The aim of presenting the CAT is to ensure that not only can trainees show how to analyse a specific article using a structured approach, but also to ensure that trainees can be openly quizzed and queried about the article presented, whether the numerical analysis presented appears correct, and whether the conclusions the trainee has come to are sound and appropriate.

The presentation is best conducted in a group forum, perhaps a departmental journal club or regular meeting where educational material is presented. Ideally all other trainees, all supervisors and the Director of Training should be present.

The presentation itself should take about 10-15 minutes, and the CAT should be presented using the completed CATs form. If necessary, the trainee can refer to specific graphs or tables within the article if this is needed to emphasise a point; however, in general the CAT should stand alone without requiring such reinforcement.

Discussion

Once presented, the CAT is then open for discussion to the group. Discussion after the presentation should be open to all present.

Discussion should focus on:

- Relevance of the selected article to the scenario and the research question
- Accuracy and appropriateness of the presented CAT analysis
- Validity of the conclusions presented
- Relevance and practical aspects of the article to routine practice
- Whether the CAT conclusions can be used to improve routine practice

Assessment

The CAT assessment supervisor need not be the same as the guiding supervisor.

The assessment can be carried out by any supervisor or teacher, though ideally, he or she will have had some EBM training prior to this assessment.

The College provides a CATs Assessment Score Sheet which the supervisor must complete. It uses a 5-point scale to rate the trainee's presentation.

Finally, to meet the assessment requirement, the trainee must retain both the completed CATs form (Treatment, Diagnosis or Harm) and the RANZCR CAT Assessment Score Sheet and return to the College using the **Trainee Assessment Summary Submission Form** between 21 January 2022 - 31 March 2022.

Responsibilities

The process diagrammed below describes an idealised workflow for the CAT exercises. The bulk of the responsibility for conducting the CAT lies with the trainee. The supervisor is to act as a guide, facilitator, and mentor, not as a teacher.

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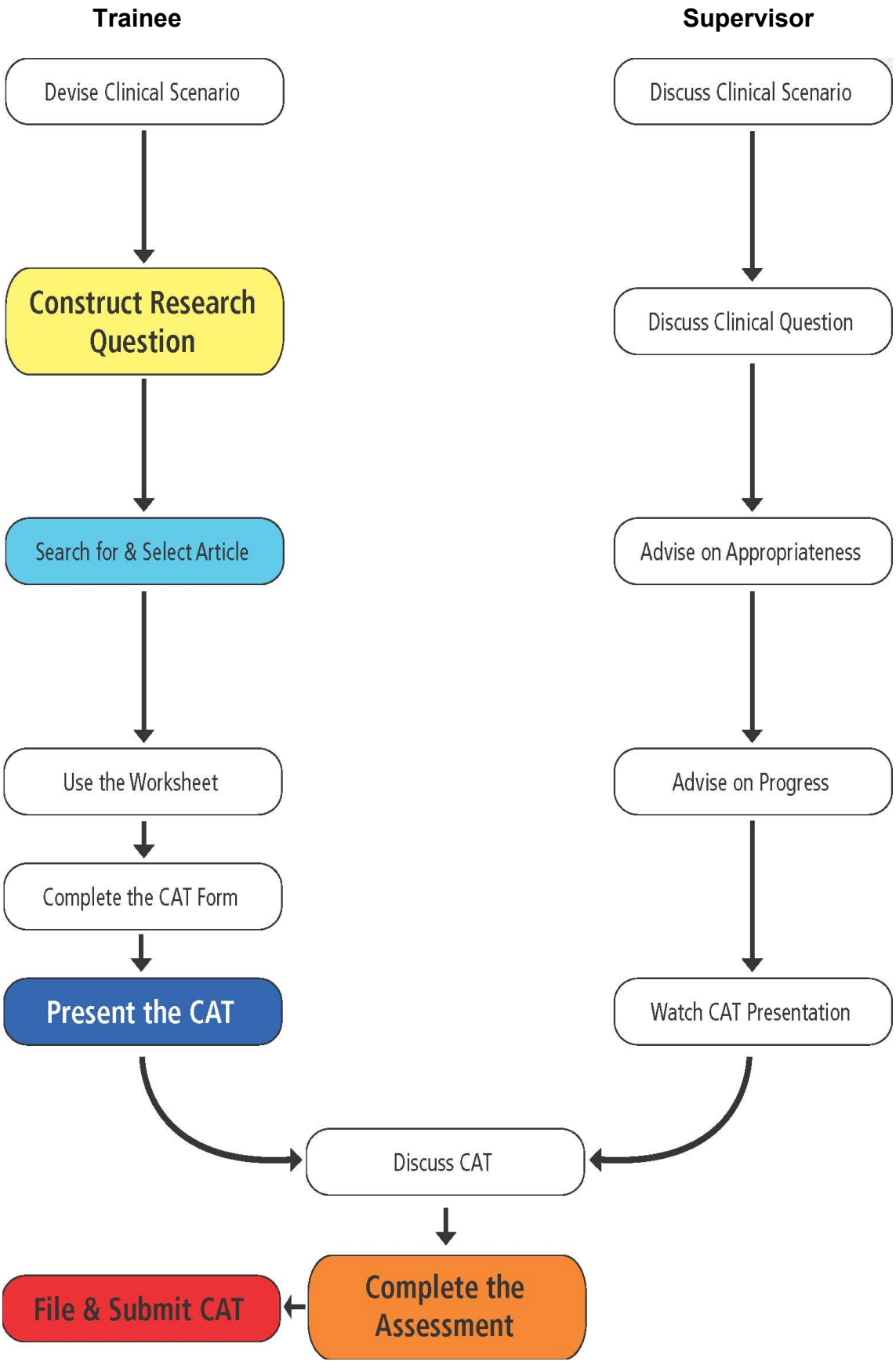

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