



The Royal Australasian
College of Physicians



ROYAL COLLEGE
OF PHYSICIANS AND SURGEONS OF CANADA



Royal Australasian
College of Surgeons

▶ Work-based assessment: a practical guide

Building an assessment system around work

Tri-Partite Alliance

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The purpose of this document is to provide a practical guide for Supervisors and Trainees.

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Introduction

Traditionally, assessment strategies designed for residents/trainees or specialists in practice have largely focused on rigorous paper-based evaluations of knowledge and technical skills within the CanMeds competency domain of medical expert. Such assessment strategies provided a foundation for the evolution of psychometrically robust summative assessment systems to establish whether residents had acquired the requisite scientific knowledge, clinical skills and ability to perform procedures so as to be judged competent to enter practice. Formal recertification processes have employed similar approaches to assessment with the aim of assuring the public that licensed specialists are able to demonstrate the competencies they profess to hold throughout the lifecycle of professional practice.

However, beyond discipline-specific knowledge and skills there exists a diverse range of competencies and professional values whose assessment can only be achieved by direct supervision and observation of measureable clinical behaviours. One approach is to integrate practical, flexible and formative strategies of assessment within the context of professional practice so that data are generated to enable feedback that fosters reflection and improvement. Such an approach is formative; enabling and guiding residents/trainees and practicing specialists to identify areas where further improvement is either desirable or required. These assessments contribute to the development of learning plans designed to close the gap between 'where one is' and 'where one ought to be'. Within this context, assessment is not a test that establishes a defensible pass-fail

grade, but an educational strategy that is anchored in the work-place of the profession and is based on real or simulated work scenarios that reflect important professional roles, responsibilities and activities. The identification and addressing of practice gaps across a range of competencies, including but not limited to communication, collaboration, professionalism, and health advocacy, serve as the basis for change and improvement that more effectively respond to the health needs of patients.

More recently, the shift towards Competency based Medical Education (CBME) has reframed the design, implementation, assessment and evaluation of residency education and continuing professional development programs using an organizing framework of competences. Within this context assessment has been focus either on the achievement of individual competences or conceptualized around the established milestones (defined as meaningful markers of profession of competence or abilities expected at a defined stage of development). In addition, the concept of 'entrustable professional activities' or (EPAs allows "faculty to make competency-based decisions on the level of supervision required by trainees" based on multiple competencies integrated into statements that reflect components of professional work. Competency frameworks such as ACGME, RACS, RACP, CanMEDS and other provide general descriptions of both generic competencies to guide learning and the integration of multiple assessment strategies and tools.

What is the purpose of assessment?

In general, the purpose of assessment can be divided under two general categories.

Summative assessment strategies utilize rigorously defined standards to enable decisions regarding whether participants passed or failed. Examples of summative assessments include traditional high stakes written or oral examinations at the end of a residency/training program that serves as the basis for initial certification and licensure. Summative assessments are one mechanism to protect or reassure the public that all licensed specialists have, at the time of assessment, met minimal professional competence expectations.

Formative assessment strategies employ a set of standards as a component of a continuing professional development or lifelong learning strategy to enable the identification (with or without feedback) of areas where further improvement is required. Examples of formative assessments include participating in team-based simulation scenarios where gaps in individual and team-based performance across a range of competencies are identified and plans for improvement are established to enhance the quality of care provided to patients.

Work-based assessment is often viewed as a component of assessment focused on the tools or approaches that evaluate how residents or specialists in practice perform within their actual workplace.

However, rather than viewing specific assessment tools or strategies in relative isolation from one another, this guide promotes “work-based assessment” as a central and integrating concept for the development of an assessment system whose purpose is both formative (educational) and summative (high stakes). The goal of this guide is to *build an assessment system around trainees’ and specialists’ work* rather than “fitting work”

around a disparate collection of assessment tools.

The figure below relates the types of assessment approaches to the four levels included in George Miller’s original framework described in 1990. Work-based assessments facilitate the development of an assessment system that is focused on the highest levels of the pyramid; ‘Shows How’ (assessment in contexts outside practice e.g. simulation centres) and ‘Does’ (assessments in the practice context).

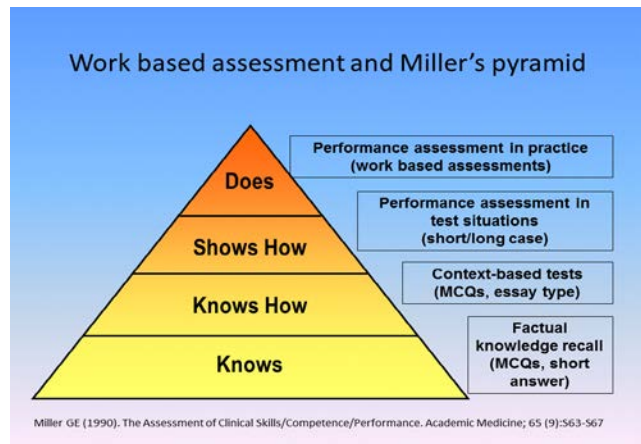


Figure 1: The relationship between assessment forms and Miller’s triangle

Some assumptions for the development of a work-based assessment system

A “work-based assessment system” must be:

- ▶ Relevant to the professional practice context of residents and specialists in practice;
- ▶ Able to generate data and provide feedback to promote personal or collective reflection on competence or performance;
- ▶ Support and contribute to summative assessment strategies that define successful achievement of curricular objectives, competence to entry into practice (certification leading to licensure and privileging) and continued competence in practice;
- ▶ Able to identify, where-ever possible, areas of practice where further learning should be focused;
- ▶ Conducted in environments that are safe, without threats of litigation or fear of failure;
- ▶ Feasible and acceptable to residents, practicing specialists and assessors;
- ▶ Supported by the health system(s) within which residents and specialists practice; and
- ▶ Relevant to each dimension of professional practice: clinical practice, educational practice, research practice and administrative practice.

These assumptions argue for and support the development of an assessment system that is:

Competency-based. The assessment system must be developed to assess observable behaviors across core and specialty specific competencies which are relevant to key process of care indicators or outcome measures including patient reported outcomes. For residents assessment provides feedback on their

progression to acquiring the knowledge, skills and competencies they require to enter practice. For practicing specialists, assessment provides data to enable them to progress in competence towards expertise within their defined scope of practice. There are a number of competency frameworks that can serve as the basis for the development of assessment systems (see **Table 1** in Appendix).

Formative and Summative. Assessment tools, depending on the context, can be purposed to provide evaluation data that can make assessments of learning (summative) or assessments for learning (formative).

Comprehensive. The assessment systems must be relevant to the interaction between teachers and learners and provide data with feedback against a wide range of competencies.

Regular. Whenever possible, assessment systems should provide learners with opportunities to receive regularly receive feedback on their performance.

Rigorous. The assessment tools and strategies must meet defined characteristics (reliable, valid, cost-effective etc.)

System-enabled. The ability to link assessment to a diverse set of competencies and performance metrics presumes the need for thoughtful collaboration between residents, teachers, assessors, educational organizations and the health systems within which residents and specialists work. The development of tools, training of assessors, how to embed assessment within the work-place and providing the data required for decision are some of the key issues that must be considered.

The development of this guide reflects the commitment of the Royal Australasian College of Physicians, the Royal Australasian College of

Surgeons and the Royal College of Physicians and Surgeons of Canada to develop and implement a practical work-based assessment system for residents in training and specialists in practice. The development and implementation of assessment strategies that are reliable, valid, and acceptable must be balanced with the efficient use of resources and evaluating the educational impact of assessment in meeting defined goals or metrics. Although many areas discussed in this guide reflect assessment strategies already in place, this guide promotes the development of a practical and integrated approach to assessment and identifies areas where further change is required.

Therefore this guide will begin with a rationale for the creation of a work-based assessment system, provide a brief review of theoretical concepts that underline the development of any assessment strategy (formative, summative or both), and describes generic approaches to assessing competence and performance of individuals, groups of specialists or inter-professional health teams in the work place.

The guide will then describe the assessment tools or strategies being used by each College, discuss the practical steps or strategies that must be considered to design, develop and implement work-based assessment strategies and end with a series of recommendations for pilot studies to facilitate a work-based assessment system, the need for development of new assessment tools and support strategies, and measures for success.

Work-based assessment: rationale

The first rationale for the development of a work-based assessment system is embedded within a broader discourse related to competency-based medical education. The ability to demonstrate acquisition of the competencies required to enter independent practice within a specific discipline is a key organizing principle for the development of curriculum and has profound influences on the process and outcomes of teaching and learning. Competency-based medical education requires competency-based assessment. The competencies specialists require to assume their professional roles and responsibilities and meet public expectations of the medical profession are one component of the rationale for an assessment system that is timely and relevant to what ‘specialists actually do’.

In medical specialist residency/trainee education the educational process is a shared responsibility between curriculum planners, teachers and learners and guided by the specialty requirements of each discipline. In practice, learning and assessment should be founded on clear, effective and measurable competencies for practice that guide the planning and implementation of lifelong learning to enhance performance, improve quality of care and enhance the effectiveness of our health systems.

The second rationale for the development of work-based assessment derives from the literature that recognises the inaccuracy of physician self-evaluation compared to external

measures of performance in practice. The inability to accurately evaluate our performance in practice without participating in a process that provides data with feedback to assess if practice is generally consistent with current evidence will inevitably limit the pursuit of learning activities to the questions, issues or problems specialists perceive as needs and establish limits on their ability to transform their knowledge, competence, performance and practice in areas where other needs remain largely unknown. The integration of performance data with feedback facilitates the identification of needs that were previously unperceived and forms an important component of an lifelong learning strategy anchored in practice.

The third rationale for the development of work-based assessment is that engaging in assessment is a public expectation of the profession for the continued privilege of professional self-regulation. Assessment enables the profession to demonstrate their accountability and commitment to reflect professional practice standards, sustain competence, improve performance, and engage in continuous quality improvement. The assessment of performance could include participation in multi-source feedback programs, simulation activities, audits with feedback from peers on adherence to established process of care variables or measures of patient outcomes (such as morbidity, mortality, adverse event rates, or patient satisfaction).

These principles, values and expectations have been increasingly embedded within national regulatory frameworks such as revalidation, recertification and maintenance of certification (see **Table 2** in Appendix) which have linked engagement in continuing professional development (for which assessment is a

fundamental component) to licensure (on-going registration), hospital credentialing which provides the privilege and right to practice.

The intentional integration of “top down” assessment strategies designed by educational organizations or health system regulators with “bottom up” approaches where residents and practicing specialists are able to independently access data related to their performance or the health status or outcomes of the patients may provide the appropriate balance to ensuring competence of the profession and promoting quality through assessment.

Assessment: theoretical concepts

Assessment strategies or tools whether designed for implementation within residency/specialist training education programs or systems of continuing professional development for fellows must consider the following questions:

- ▶ What competencies or abilities are to be assessed?
- ▶ What characteristics define effective assessment strategies?

Defining the Competencies for Assessment

The scope or domains of competencies that can be assessed vary based on specific tools or strategies being used. Initially assessment strategies were primarily focused on discipline specific knowledge and skills, the traditional domain of the ‘medical expert’. However, more

recently a number of competency frameworks have defined a range of competencies that collectively reflect 'good medical practice'. For example, specialists are expected to effectively communicate with patients and among health professionals, collaborate with other health professions to deliver coordinated team-based care, manage resources, and contribute to and/or improve the quality and safety of the health systems within which they work. Specialists are equally expected to demonstrate professionalism in all of their roles, responsibilities across each dimension of their professional practice.

Characteristics of Effective Assessment Strategies

Assessment strategies, regardless of their focus or emphasis, should strive to focus on those dimensions or metrics that are essential to the quality of healthcare provided by specialists to patients. Assessment strategies can focus on the processes of care or the efficiency, appropriateness, and achieved outcomes of care. However, focusing exclusively on such quality measures alone will be insufficient as such measures are not currently available for all conditions, and in some conditions are based on conflicting or contradictory guidelines. Finally quality of care measures are less relevant to the assessment of diagnostic error and the professional and ethical challenges relevant to patient preference within models of shared decision making.

Although there are increasing examples of assessment strategies or tools focused on a range of competencies or performance measures, the selection of any assessment strategy should be based, at least in part, on the

following 5 characteristics which are based on Van der Vleuten's Utility Index (1996).

Reliability

Assessments that are reliable are able to consistently demonstrate reproducible results (accuracy or precision) over time. In other words the measurements of individuals on different occasions, or by different observers, produce the same or similar results. However, in addition to the reproducibility or accuracy of measurements, the concept of reliability includes the ability of measurements to differentiate between individuals. Reliability measures the proportion of the variability in scores that are due to true differences between individuals.

Validity

Validity is the degree to which an assessment truly measures what it intends to measure. There are multiple components of validity that drawn on different sources in evidence from different angles to enable or support a conclusion. For example, face validity is an expression of the degree to which the assessment appears 'on the face of it' to be a reasonable measure of competence or performance in a domain of interest. Content validity is an expression of the degree to which the assessment items reflects or represents the "whole testable domain". Content validity is typically assured by the use of various blueprint strategies or techniques. A sub-domain of content validity is the relevance of the items in measuring the important dimensions of the domain. Construct validity is an expression of the degree to which the new approach is able to differentiate between learners with more or less of the competence the measure is purporting to

measure (for example differentiating among learners with higher communication skills or problem solving skills). Finally, predictive validity is an expression of the ability of the assessment to predict performance (or competence) in the future.

Educational Impact

Assessments are not just tools to establish accountability but are central to the educational process in promoting discovery of areas where competence or performance is established and areas where improvement is required. Because assessment drives learning (for example the topics that are examined frequently will be perceived by learners as more important), there is an important link between assessment and the scholarship of teaching and learning. How assessment strategies promote learning and the translation of learning into practice is relevant to workplace-based assessments.

Cost effectiveness

Assessment strategies vary from simple to complex. Cost effective assessment programs can only be judged in the context where there is an explicit description of what is to be assessed and how it will be assessed. In the era of fiscal restraint the important considerations in developing any assessment system will include factors such as infrastructure requirements, administrative support, analytical expertise, training requirements for assessors (where relevant) in addition to the direct costs of a specific assessment strategy or tool.

Acceptability

Finally, acceptability, to the learners, the teachers and assessors as well as decision makers within educational institutions and regulatory bodies are important considerations

to ensuring there is a clear match between assessment and curricular reform as well as monitoring for relevance and unintended consequences. Methods of assessment must be feasible with clear standards that are understood by both assessors and learners.

These five characteristics are important to the evaluation of any individual assessment tool, process or strategy to ensure assessments promote teaching and learning and contribute to decision-making and quality of care.

An easy way of remembering these characteristics of effective assessment strategies is with the mnemonic CARVE (see text box).

C = Cost-Effectiveness

A = Acceptability

R = Reliability

V = Validity

E = Educational Impact

The next section of this guide provides a brief description of some of the work-based assessment tools used by each College, and also outlines the rationale for the need to integrate individual assessment tools within a comprehensive and coordinated work-based assessment system.

Work-Based Assessment: Current strategies

This section of the guide reviews common types of assessment strategies, illustrates each domain by providing a brief description of individual tools that have been implemented either within: residents enrolled in established training programs, specialists in practice and international medical graduates seeking certification or licensure.

Direct Observation

Direct observation is an approach to assessment that provides data and feedback to a resident or practicing physician on their performance with actual patients in their practice environment. Direct observation can be based on clinical supervisors with the expertise to observe and provide detailed feedback to individuals to facilitate learning and change. In addition, direct observation can be organized around coaches, whose role is to specifically observe performance and provide explicit feedback. Supervisors or coaches have a host of tools available for direct observation (Kogan et al) but many tools have not been thoroughly evaluated or tested. For example validity testing has been infrequently assessed and evidence for objectively measured changes in knowledge or skills have been infrequently reported.

Examples of tools that use direct observation include the following:

Mini-Clinical Evaluation Exercise (Mini-CEX)

Among the tools with the strongest validity evidence is the Mini Clinical Evaluation Exercise (Mini-CEX). The mini-CEX is designed to assess skills essential to the provision of good clinical care and to facilitate feedback in order to drive learning. The assessment involves an assessor observing the trainee interact with a patient in a normal clinical encounter. The assessor's evaluation is recorded on a structured checklist which enables the assessor to provide verbal development feedback to the trainee immediately after the encounter. The data and feedback enable the learner to assess themselves against important criteria as they learn and perform practical tasks.

Surgical DOPS (Directly Observed Procedural Skills)

Direct Observation of Procedural Skills in surgery (Surgical DOPS) is a method of assessing competence in performing diagnostic and interventionist procedures during routine surgical practice. It also facilitates feedback in order to drive learning. The assessment involves an assessor observing the trainee perform a practical procedure within the work place. The assessor's evaluation is recorded on a structured checklist which enables the assessor to provide verbal developmental feedback to the trainee. The data and feedback enable the learner to assess themselves against important criteria as they learn to perform specific diagnostic procedures.

Non Operative Technical Skills for Surgeons (NOTSS)

Non Operative Technical Skills for Surgeons is a course that provides performance markers for

operating room behaviours as a tool for self-development and for providing feedback to colleagues and trainees.

Non Operative Technical Skills for Surgeons (NOTSS) is a system that focuses on the non-technical skills underpinning safer operative surgery. Based on extensive research into operating room behaviors, these are workshops that provide training to identify, recognize, assess and give feedback on key performance markers. ([reference for NOTSS](#)) In tandem with the surgical workshop two other programs, ANTS (Anaesthetists' Non-Technical Skills) and SPLINTS (Scrub Practitioners' List of Intra-operative Non-Technical Skills) have been developed by the research group based in Aberdeen (Scotland). ([reference for NOTSS; ANTS & SPLINTS](#))

In 2014 RACS will trial a workshop, based within a clinical unit, in which the non-technical skills training for surgeons, anesthetists and scrub nurses will be integrated.

In-Training Assessment

Each specialty has developed an in-training assessment form in which the key performance indicators and standards of competence are defined. Residents are required to meet all of those standards, at every mid and end of term assessment. Verbal and/or written feedback is provided continuously to residents throughout the rotation and any deficiencies identified are discussed and a plan for improvement is developed in consultation with a supervisor. The booklet 'Becoming a competent and proficient surgeon' has been produced as a guide of expected progression from pre-vocational to proficient.

Multi Source Feedback

Multi-source feedback (MSF) is a questionnaire based assessment strategy that includes self-evaluation and feedback on observable behaviours from colleagues (peers and referring physicians), co-workers (such as nurses, pharmacists, psychologists etc) and patients. MSF has been primarily designed to provide feedback to individual physicians or surgeons not groups of specialists. MSF has been used in conjunction with other assessment tools and has been used primarily for formative, not summative decision-making. There is evidence in the CPD research literature for the reliability of many MSF tools developed to date. In general instruments that include 15-40 items answered by 8-12 colleagues and 25-40 patients achieve generalizability co-efficient of 0.7. MSF participants have used the data to make changes in practice but the changes are typically small. MSF are reasonably inexpensive, particularly with electronic data capture analysis and reporting. Costs increase associated with inclusion of mentoring, coaching or other forms of peer support. MSF is acceptable to regulatory authorities, medical organizations and individual patients.

Examples of Multi-source feedback tools include:

Physician Achievement Review (PAR).

This MSF tool has been developed for the College of Physicians and Surgeons of Alberta (a provincial regulatory authority in Canada) and assessed in collaboration with an academic office of CME. This instrument has now been introduced in one additional province (Nova Scotia) with plans for introduction in Manitoba. PAR is designed to provide licensed practitioners with feedback on their practice based on the observations of colleagues, peers, and patients.

Every 5 years, each licensed physician is required to have their performance reviewed by 8 physician colleagues, 8 non-physician health care workers and 25 patients. The surveys focus on topics ranging from clinical knowledge and skills, office management, communication skills, collegiality and patient management. The surveys are summarized and the feedback provided enables the identification of learning needs and areas for improvement. The process has demonstrated reasonable reliability, validity, acceptability, and cost effective (administrative costs have been estimated to be \$40 per year and are included in the annual re-licensure fee).

360 Degree Survey or MINI-PAT (Peer Assessment Tool)

The mini-PAT is a method of assessing competence within the remit of a team. It also facilitates feedback in order to drive learning. As part of a multi-professional team surgical trainees work with other people who have complementary skills. They are expected to understand the range of roles and expertise of team members in order to communicate effectively to achieve an excellent service for the patient. At times they will be required to refer upwards and at other times assume leadership appropriate to the situation. This tool enables surgical trainees to assess themselves against important criteria of team-work and compare their self-assessment with their peer assessment and against the performance of others at their level in the same specialty.

MSF of the Royal Australasian College of Surgeons

The Royal Australasian College of Surgeons has developed a MSF process where assessments of aspects of performance can be obtained by a

range of colleagues including department heads, medical directors, peers, trainees, nursing, other staff and/or patients.

Audit and Feedback

Audit and feedback is an assessment strategy that provides performance data (typically from clinical records) with feedback generally to individual, units/firms or teams of physicians and surgeons. They inform the audit individual or group as to their performance and how closely they adhere to established standards or practice metrics (dichotomous or continuous variables) across a range of processes of care delivery or patient outcomes. The data generated from audit and feedback generally have high face validity and content validity, can be verified by others, and there is evidence in the published literature for modest overall positive changes to individual physician behaviours. The evidence is particularly strong where baseline compliance is low prior to the audit; the data is of high quality and from a trusted source; and the frequency and intensity of the feedback is high (Cochrane systematic review). The cost effectiveness of audit and feedback for groups has not been established but may provide more cost effective alternatives to individual feedback. Acceptability is greater when audit and feedback is focused on group performance than individual performance. Measuring the performance of a group of surgeons or physicians provides a peer review process for identifying the reasons for under performance or exemplary performance.

Examples of various audit and feedback approaches or strategies include:

Peer Review

Reviews of a physician's practice by trained peers based in part on a review and discussion of the medical records of individual patients enables assessors to glean insight in understanding a physician's approach to patient care and the overall quality of care provided to patients. These chart reviews enable an assessor, where appropriate, to evaluate the physician's ability to take adequate histories, conduct appropriate examinations, order necessary diagnostic tests, identify appropriate courses of action and conduct necessary interventions, and monitor patients, as necessary.

For example, the Practice Visit program was piloted by Orthopaedic surgeons in New Zealand in 2011. Conducted through the New Zealand Orthopaedic Association (NZOA), it was considered that by involving the whole association both as visiting and visited surgeons, the process would enhance collegiality, provide colleague support and generally enhance performance by reducing the aversion of external scrutiny. Evaluation of the pilot comprising 16 practice visits, indicated value in the process and a strong support for its continuation. Mandatory Practice Visits have now been incorporated into the NZOA CPD program.

Morbidity and Mortality Reviews

Morbidity and mortality reviews, particularly when assessing a series of patients over a defined period of time can provide adequate data about the performance of an individual physician, groups of physicians or surgeons, or inter-professional health teams against standard expectations for morbidity and mortality based on historic norms. Examples include assessing

morbidity and mortality for various surgical procedures (CABG) or patient types (birth morbidity or mortality rates) against regional, national or international expectations.

Chart Audits

Audits of specific practices can be developed for a wide range of topics or conditions within acute care, chronic care or preventive care. The effectiveness of chart audits is based on their ability to generate data and provide feedback. Chart audits may focus on core competencies, specialty specific competencies, process of care measures (particularly those that are closely linked to an outcome measure), practice indicators and patient reported outcomes. Audits can be conducted for an individual or group but are frequently developed and supported by hospitals, regional health authorities, educational institutions or government agencies that Chart audits are now a requirement within many mandatory system of continuing professional development (for example the Patient Improvement Modules of the American Board of Internal Medicine) as part of a commitment to continuous quality improvement.

Chart Stimulated Recall

Chart stimulated recall (CSR) is a strategy that leverages a physician's own charts or patient records to explore the reasoning around clinical judgment, decision making related to diagnostic, investigative, and management decisions, and the application of medical knowledge to patient care. Further, CSR permits an exploration of specific patient, environmental and system factors that influence decision-making. The standardization of the criteria has been assessed to ensure objectivity with high reliability and

validity and can serve as the basis for provision of feedback to drive learning or part of summative assessments of competence.

Case Based Discussion

A Case-based Discussion between a trainee and an assessor involves a comprehensive review of one or more clinical cases in which the assessor evaluates the level of professional expertise and judgment exercised by the trainee. The assessor provides feedback across a range of areas relating to clinical knowledge, clinical decision making and patient management.

Specifically, Case-based Discussion is designed to:

- ▶ guide the trainee's learning through structured feedback
- ▶ help improve clinical decision making, clinical knowledge and patient management
- ▶ provide the trainee with an opportunity to discuss their approach to the case and identify strategies to improve their practice
- ▶ be a teaching opportunity enabling the assessor to share their professional knowledge and experience.

The cases selected for discussion should be ones in which the trainee has had a significant role in clinical decision making and patient management. The discussion can be focused on a single complex case or a series of cases that cover a wide range of clinical problem areas. The discussion should reflect the trainee's level of experience and be linked to the relevant Training Program Curriculum.

Patient Registries

The development of patient registries has provided another strategy for the assessment of performance in practice. Patient registries have been developed around specific procedures (for example joint replacement registries) where individual patient characteristics, risk factors, procedures applied, and outcomes achieved can be summed over a range of patients or time period to define 'average' performance in comparison to one's peer group.

Simulation

Simulations are persons, devices or sets of conditions which attempt to present problems authentically for the purposes of education or assessment. Simulation activities range from low (e.g. task trainers or standardized patients) to high (e.g. computer programmed mannequins) fidelity and address a wide range of abilities including non-technical competencies. Simulation is relevant for the education of individual learners, groups of learners or inter-professional health teams. There is reasonable evidence for reliability and validity for individual physicians, surgeons, and groups of specialists. The educational impact as measured by several meta-analyses demonstrates that simulation-based medical education with deliberate practice yields improved educational outcomes including skills acquisition and transfer compared to traditional clinical education. There are very few studies examining cost effectiveness but there are several studies demonstrating positive acceptance of simulation

by individuals. Examples of types of simulation include:

Standardized Patients

Standardized patients, or standardized, case scenarios provide a consistent, realistic learning resource for learning and assessment of students, residents and physicians in practice. Standardized patient provide the opportunity for demonstration and instruction, deliberative practice and assessment across a broad range of competencies focused on a range of skills and abilities including communication skills, counseling, physical examination skills and assessment of performance of physicians in practice. Standardized patient can present complex scenarios and can be reliably trained.

Virtual Simulation

A number of written or virtual self-assessment programs have been created to provide participants with data and feedback on their performance across multiple domains of knowledge (or application of knowledge), clinical decision-making, test ordering etc. The data generated from these programs allows participants to compare their 'performance' with their peers and identify gaps in relation to current evidence by identifying the evidence for answers that were answered incorrectly.

High fidelity simulation

High fidelity simulations utilize computer programmed mannequins to enable individuals or teams to perform in realistic scenarios and receive feedback on their decision making, collaboration and communication skills with other team members. High fidelity simulations

are useful for teaching and assessment in domains outside the "Medical Expert" role.

Portfolios and Reflective Learning Tools

Portfolios are technological tools that span the educational continuum and provide formative assessment of the proficiency of individual learning and improvement where scores and judgments are based on the individual data elements. The value of portfolios is highly dependent on the content, structure and purposes of the tool. Portfolios exist in two basic formats: paper based (for example folders, notebooks or diaries) or electronic (web based or ePortfolios). Portfolios are frequently designed to include functional elements from one or more of the following 4 categories: reflective portfolios, assessment portfolios, developmental portfolios and showcase portfolios. Although the design of portfolio typically support recording, reflection, planning and goal setting the content of a portfolio can be used for assessment based on evidence from a variety of sources (self-reported and external) with or without the input of a peer, coach or mentor.

Learning portfolios are primarily focused on the individual with some evidence for reliability and high validity (based on the content). The cost effectiveness of a learning portfolio varies depending on its structure, functionality and user-friendliness as well as the costs of its initial development, adaptability and maintenance. There is good applicability for certain types of data across individuals and such data can be useful for assessment, triangulation with other assessment methodologies to increase the acceptability of the data over time. Electronic

learning portfolios require participants to reflect and record what they have learned, the activities they are planning to complete and the achievements they have realized over time.

Tables 3, 4, and 5 in the Appendix to this guide describe the **assessment strategies** currently in place or being developed by some College residency/specialist training programs, among practicing specialists, and for international medical graduates seeking certification.

Work-based assessment systems, if they are to succeed, need to be feasible and acceptable to users – the trainees/residents, practicing physicians /surgeons and assessors. They should be able to be supported by the health system(s) within which residents and specialists practice.

This guide argues for the development of a system of assessment that is embedded within and relevant to the work of residents and practicing specialists.

Principles for creating an assessment strategy

The creation of any assessment system should be based on the following principles:

Use multiple modalities, multiple samples, and multiple assessors.

If one accepts that knowledge is domain specific and performance of the same individual varies across different types of cases then no one approach, tool or modality of assessment will be

adequate to evaluate the spectrum of competencies required for achieving, sustaining or progressing in competence towards expertise. All assessment strategies and tools have specific advantages and limitations. A work-based assessment system intentionally integrates a wide variety of tools based on their:

- ▶ established characteristics (reliability, validity, etc)
- ▶ strengths and limitations in measuring specific observable competencies.
- ▶ ability to be implemented within the work-place or a simulated work environment.

The key questions to guide the selection of tools include:

- ▶ What competence or competencies am I attempting to measure?
- ▶ Does this assessment tool enable me to gather data about these competencies?
- ▶ With what accuracy or ability?

A work-based assessment system requires the development of an array of assessment tools within each of the five generic approaches described from pages 7-13. How the individual strategies or tools are selected and integrated depends partly on the context, purpose, options for data collection and capacity of the faculty/supervisors required to support the assessment described below:

Context is important – tailoring assessments to practice settings

Assessments occur in multiple circumstances over time. Within each assessment domain, any assessment system will need to identify which assessment strategies are appropriate for

- ▶ specific practice contexts (acute care hospital settings, ambulatory care

clinics, operating rooms, simulation centers)?

- ▶ actual patients, simulated patients, virtual patients or task trainers?
- ▶ Computerized assessment strategies?
- ▶ Episodic or continual assessment strategies?

In addition to the context of assessment, any assessment strategy will need to be aligned to its primary purpose.

Clarity of purpose: formative or summative?

There is a difference between assessment of and assessment for learning.

Assessment of learning is by design about the ability of assessment tools to identify differences (or variance) between residents and practicing specialists where the pass/fail test score is one variable in defining who is above and below a pre-established minimal performance standard or metric.

Assessment for learning provides each individual resident or practicing physician with feedback on their personal progress regarding the achievement of specific goals that are guided and defined in collaboration with the curriculum the learner and the learner's mentor, supervisor or coach. If assessment enables learning, it will be guided in part by the quality and intensity of the feedback and the opportunity to identify and define a path to improvement. Formative assessment moves learners from unconscious competence to conscious competence and guides a period of learning and experience to become consciously competent!

Formative assessment strategies may equally reveal whether residents or practicing specialists are able to use the data and feedback to identify

areas for further improvement. The lack of congruence between the data (and its inferences) and the learner's perceptions of the data reinforce the need for the assessment system to be based on clear performance metrics that are relevant to the quality of care standards experienced by patients. Although formative assessment typically leads to the identification of learning plans, in contexts where motivation or insight is lacking, further assessments will be required coupled with enhanced learning support to break through conceptual barriers.

Data Collection Options

Many assessment strategies are based on a retrospective review of data collected on patients seen and evaluated by an individual or team. This is the classic approach to chart audits. However, the ability to embed assessment within a specific work context may require a data collection strategy that is more prospective than retrospective.

Prospective collection of data enables residents or practicing surgeons or physicians to collect data for the purposes of assessment as one is practicing. Such processes facilitate the ability to pause, summarize and review the data collected at a future point in time (for example after a specific number of patients or procedures have been completed). Examples of prospective data collection strategies include logbooks, encounter cards and portfolios.

Faculty Development and Supervisor Support

Work-based assessment systems must include strategies to educate, support and enhance the skills of clinician-teachers, mentors, and coaches. Assessment requires the effective integration of

multiple faculty development initiatives that are designed to enhance the knowledge, skills and abilities of faculty to make observations, provide feedback, and develop learning plans. A summary of faculty development strategies could include:

- ▶ Training and supporting cohorts of Clinician Educators, Simulation educators and CPD Educators.
- ▶ Designing and developing faculty development courses or seminars.
- ▶ Creating collaboration strategies among faculty to sharing tools and experiences.

Barriers to implementation of work-based assessment

When introducing new or more formalized and structured approaches to work-based assessment, there are a number of potential barriers that training program directors need to be aware of. These include:

Competing work priorities and a general lack of time for teaching and supervision.

Trainees and supervisors may perceive that there is insufficient “protected time” for educational activities such as work-based assessments given their overall workloads and competing priorities.

For individual trainees and specialists, the work-based assessment needs to be seen as relevant

and valuable to them; not just something that has to be complied with as part of training or CPD requirements.

Local program directors have a role in advocating locally with the health service administration to promote the value of work-based assessment and feedback in improving performance of clinicians and making the case that time invested in these educational activities will ultimately translate into improved patient care.

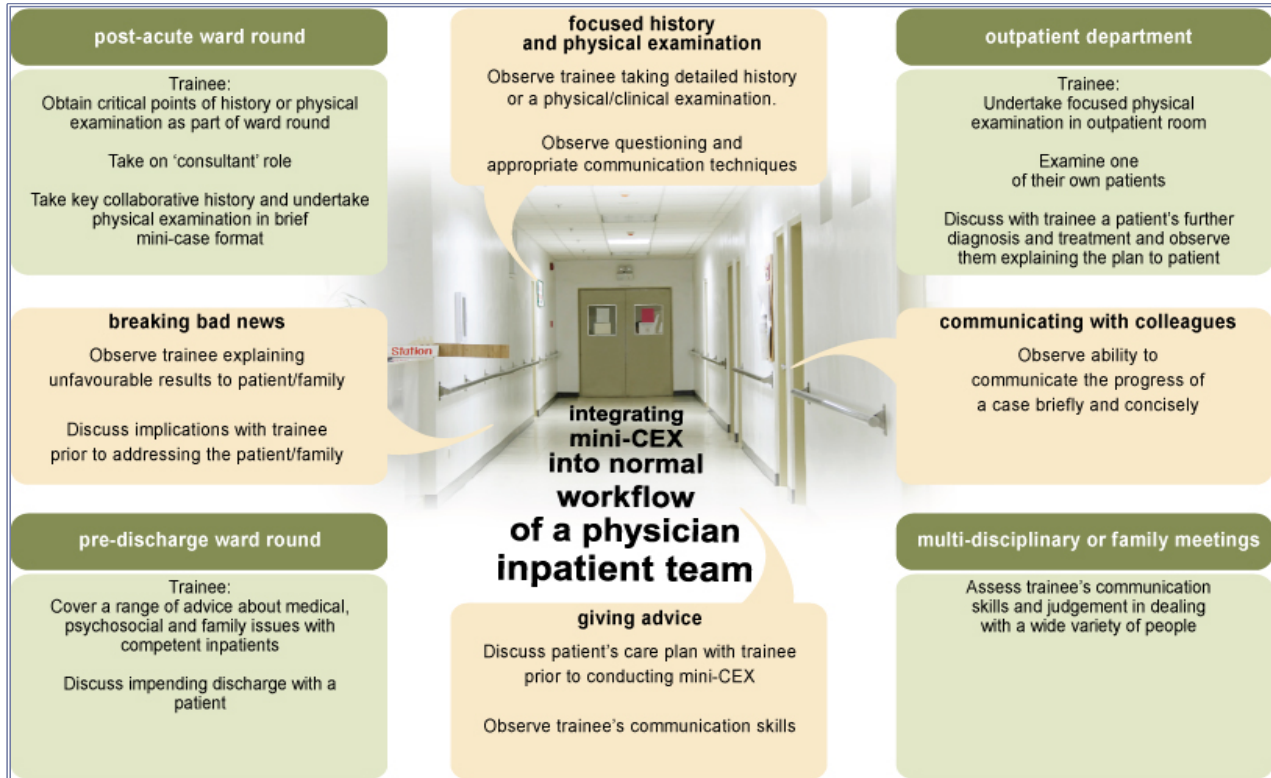
Colleges have an important role to play by ensuring accreditation standards for training settings incorporate “protected time” in a way that is reasonable and defensible and in providing guidance and training in how to use work-based assessment tools efficiently and effectively.

Lack of alignment between work-based assessments and the workplace setting

As noted previously, it is important to design assessment systems around work not the other way around. Work based assessment must be integrated into existing workplace routines and be related to day-to-day practice. This is an important message for trainees and supervisors as there may be a tendency to approach work-based assessment as a “mini-exams” rather than authentic in-the-moment assessments.

Colleges can provide guidance and examples for supervisors and trainees on how to incorporate work-based assessment into a typical working day (See Figure 2).

Figure 2: Integrating work-based assessment into the daily routine. (with permission from Dr Paul Reeve, Director of Physician Education, New Zealand)



Lack of supervisor engagement: inadequate numbers of supervisors willing to take on expanded roles in education and assessment

Introducing new work based assessments places increasing demands on existing faculty supervisors, all of whom were trained in an era before work-based assessments were formalized.

When introducing new work based assessments, it is important to think about the number of additional faculty supervisors that need to be recruited and trained in order to be able to implement the changes. They need to be convinced of the value, reliability and validity of the assessments to ensure their participation.

Formative work based assessments may be overshadowed by high stakes written and clinical examinations

Trainees are used to directing their energies towards passing summative examinations and many do not see value in participating in formative work-based assessments that are optional. The uptake of formative work based assessments is low when such assessments are optional. Mandating work based assessment as a program requirement is effective when integrated within decisions related to a trainee's progression through training. However, there is a significant risk that compliance with a mandatory formative work-based assessment strategy will result in a "tick-box" mentality that detracts from the purpose of assessment for learning.

Lack of consultation and communication when introducing change

If new work based assessment tools are introduced without adequate consultation, a negative reaction is the likely outcome. In addition, early consultation can identify ways in which work-based assessments can be designed to integrate into workplace routines.

The introduction of new work based assessment tools needs to be preceded by a comprehensive communication and consultation plan.

Perceived lack of evidence to support work based assessments

Supervisors may question the validity of new work-based assessment tools especially if the tools are viewed by supervisors and trainees as cumbersome, bureaucratic or, worse still, "edu-babble" with no apparent value over the traditional apprenticeship model of learning in medicine.

Proof of effectiveness is an important consideration for supervisor and trainee buy-in. The evidence for the clinical effectiveness of many work based assessments is modest although there is reasonable face validity, a sound theoretical basis and sufficient evidence for the reliability of the tools. Taking time to explain the case for work-based assessment and using plain English rather than educational jargon can help build understanding and reduce skepticism among supervisors and trainees.

Inadequate training of supervisors in how to use and get the most out of work based assessment

The strength of work based assessment as a formative learning experience derives not so

much from the observation of the trainee by the supervisor but from the quality of the feedback and discussion that follows. Good observation and feedback skills are essential to getting the most out of work-based assessment.

Faculty development or supervisor training is a critical success factor for implementing new work-based assessments. Supervisor guides, workshops and on-line resources such as demonstration videos are some examples to support the development of faculty supervisors in refining their observation and feedback skills.

Managing change effectively

Introducing a system of work-based assessment often requires significant cultural change. If this change is not managed effectively, implementation will likely fail. There are a number of models that articulate the requirements for successful change initiatives at the organizational (Bolman and Terrence, 2003) and individual (Hyatt 2006) levels.

The following Table summarizes the potential challenges and suggested responses associated with implementing WBA at the individual trainee or Fellow, workplace/program director and institutional/College levels.

Level	Challenges	Responses
Individual trainee or Fellow (supervising trainees or participating in CPD)	Insufficient time, too busy, other priorities (clinical, research, administrative)	Make sure the WBA is relevant to individual learning needs. Develop a learning plan at the beginning of the assessment period identify specific domains, activities for work-based assessment (WBA).
	Don't have access to the relevant tools	Check with Training Program Director or College about the relevant tools and how to access these.
	Unsure/don't know what or how to participate in WBA	Attend local or College workshops on how to use WBA tools
	Uncomfortable giving or receiving performance based feedback	Attend local or College workshops on giving and receiving effective feedback.
Training Program Director or workplace	Lack of local support for WBA	Enlist support of influential peers to promote the value of WBA, Model active participation in WBA Reinforce the expectation that this is a "normal" part of practice

Level	Challenges	Responses
	Trainees and Fellows not engaged in WBA	Run local training sessions for trainees and Fellows, develop local promotional material, present at key meetings (grand rounds)
	Not enough supervisors to undertake WBA	Recruit advanced trainees to act as co-supervisors for more junior trainees,
Institutional (College)	Poor uptake of WBA Negative feedback from Trainees and Fellows	Ensure relevant tools and materials are available with good quality supporting documentation and guidance Develop on-line modules including video demonstrations about how to use WBA Publicize examples of WBA success stories (individuals or organizations) Include uptake of WBA as an accreditation standard for training programs/institutions Make participation in WBA a mandatory program requirement that is linked to progression through training.

Summary

This work based assessment guide describes the theoretical concepts and rationale for an assessment system that is organized around the work of the profession. The guide promotes “work based assessment” as a central and integrating concept whose purpose is both formative (educational) and summative (high stakes). The goal of this guide is to *build an assessment system around trainees’ and specialists’ work* rather than “fitting work” around a disparate collection of assessment tools. The development of such an assessment system must consider and overcome a number of implementation barriers

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Appendix

Table 1: Comparison of Standards Frameworks

Table 2: Continuing Professional Development Programs for Specialists Physicians

Organization	Royal College of Physicians and Surgeons of Canada	Accreditation Council for Graduate Medical Education	Royal Australasian College of Physicians	Royal Australasian College of Surgeons
Framework Name	CanMEDS	ACGME Competencies	Professional Qualities Curriculum (trainees) Supporting Physicians' Professionalism and Performance (Fellows) NB RACP Standards Framework in development	The Surgical Competence and Performance Guide
Typology	Roles	Core Competencies	Domains	Competencies
Descriptions	Communicator	Interpersonal and Communication skills	Communication Cultural Competency	Communication
	Collaborator		Collaboration and Teamwork	Collaboration and Teamwork
	Medical Expert	Medical Knowledge		Medical Expertise
			Decision Making	Judgment – Clinical Decision Making
				Technical Expertise
	Professional	Professionalism	Ethics	Professionalism
	Scholar	Practice based Learning and improvement	Teaching, Learning and Research	Scholarship and Teaching
	Manager	Systems-based Practice	Leadership and Management	Management and Leadership
	Health Advocate		Health Advocacy	Health Advocacy
		Patient Care	The Broader Context of Health	

	Australia RACP	Australia RACS	Canada	United Kingdom	United States of America
Responsible Organization	Royal Australasian College of Physicians	Royal Australasian College of Surgeons	Royal College of Physicians and Surgeons of Canada	The Royal Colleges in the UK	American Board of Medical Specialists
Program Name	My CPD	CPD Program	MOC Program	Varies by Royal College	Maintenance of Certification
Mandatory	Yes	Yes	Yes	Yes	Yes
Cycle Length	1 year	1 year	5 years	Typically 5 years	Varies from 7-10 years
Cycle Requirement	100 credits	Varies depending on surgical type	Annual: 40 credits Cycle: 400 credits	Annual 50 credits Cycle: 250 credits	Defined by each American Board
Taxonomy of Included Learning Activities	Educational development, teaching & research Group learning Self-assessment Structured learning projects Practice review and appraisal Other learning activities	Surgical Audit and Peer Review Hospital credentialing Clinical governance and evaluation of patient care Maintenance of Clinical Knowledge and Skills Teaching and examination Research and publications Other professional development Medical legal workshops	Group Learning: Accredited or unaccredited Self-Learning: Planned learning; Scanning; Systems learning Assessment: of Knowledge or Performance including simulation	CPD contributes to demonstrating 'Good Medical Practice' All CPD can include: Clinical CPD: specialty or subspecialty specific requirements Non-clinical CPD: training in educational supervision, management or academic careers	Licensure and Professional Standing Lifelong learning and self-assessment Cognitive expertise Practice performance assessment
Linked to Re-certification	No for Australia Yes for New Zealand	No for Australia Yes in New Zealand	No	No	Yes: defined by each American Board

Embedded within Revalidation Strategies	No revalidation process currently in Australia	No revalidation process currently in Australia	Yes. MOC Program meets Physician Revalidation requirements of FMRAC	CPD is a component of the GMCs Revalidation appraisal strategies	Linked to Maintenance of licensure of the FMSB
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Table 3: Assessment Strategies for Residents (Trainees)

Assessment Type	Royal Australasian College of Physicians	Royal Australasian College of Surgeons	Royal College of Physicians and Surgeons of Canada
Direct Observation	<p>Mini-CEX*</p> <p>]Direct observation of procedural skills*</p> <p>Direct Observation of Field Skills*</p> <p>Direct Observation of Practical Professional Skills*</p> <p>Clinical exams – short case and (some) long cases*</p> <p><i>* varies by training program</i></p>	<p>Mini-CEX - all 9 surgical specialties</p> <p>Direct Observation of Procedural Skills (DOPS) - all 9 surgical specialties</p> <p>Case based discussion (CBD)</p> <p>Procedural Based Assessment (PBA) (in some specialties senior years)</p> <p>Entrustable Professional Activities (EPAs) to be trialled in Paediatrics in 2014</p>	<p>Case discussion and review</p> <p>Structured practice oral examinations</p> <p>Procedural skills review</p> <p>STACERs</p>
Multi-source Feedback	<p>MSF tool not current used but progress reports and final supervisor reports may incorporate feedback from multiple sources</p>	<p>MSF tools have been implemented within several of the 9 surgical specialties</p>	
Audit and Feedback (includes end of rotation reviews)	<p>Case Based Discussion</p> <p>Progress Reports</p> <p>Final Supervisor Reports</p>	<p>Progress reports – every rotation (all 9 specialties)</p> <p>Research project (mandatory – all 9 specialties)</p> <p>Participation in weekly audits (some specialties)</p> <p>Audit of Surgical Mortality (some specialties)</p>	<p>Written assessments of knowledge</p>

Assessment Type	Royal Australasian College of Physicians	Royal Australasian College of Surgeons	Royal College of Physicians and Surgeons of Canada
Simulation	OSCE (selected programs) Oral Exam (selected programs)	OSCE s Fellowship Examination - Clinical vivas Surgical skills simulation courses (specialty specific) ASSET EMST TIPS	OSCEs Surgical skills simulation High-fidelity simulations Self-assessment modules (bioethics) OSATS ACLS / ATLS
Reflective Learning Tools and Learning Portfolios	Learning Needs Analysis Professional Qualities Reflection	Log books On-line logbooks (most specialties) On-line goal setting and self-assessment modules & tools	e-learning portfolios Procedural logs T-RES Lifelong learning curriculum modules

Table 4: Assessment Strategies for International Graduates (pursuing certification)

Assessment Type	Royal Australasian College of Physicians	Royal Australasian College of Surgeons	Royal College of Physicians and Surgeons of Canada
Direct Observation	<p>Mandatory peer review reports (two reviewers)</p> <p>Clinical exams – short case/long case*</p> <p>Practice visit*</p> <p>Top up training* includes relevant assessments including mini-clinical evaluation exercises, etc</p>	<p>Mini-CEX (some specialties)</p> <p>Direct Observation of Procedural Skills (DOPS) (some specialties)</p>	<p>Practice Eligibility:</p> <p>6 months of direct onsite practice assessment</p> <p>MRA (provincial) assessments vary in length</p> <p>Supervision during practice electives</p>
Multi-source Feedback	<p>Collected during practice visit*</p>	<p>Mandatory 360⁰ assessment</p>	<p>Practice Eligibility MSF tool (in development)</p> <p>PAR mandatory for physicians in specific provinces</p>
Audit and Feedback	<p>Peer review process requires regular meetings for feedback, plus peer review reports with written feedback and response at 3-monthly intervals.</p> <p>Practice visit* includes audit of case notes and verbal and written feedback.</p> <p>Top up training* includes formal audit and feedback by supervisor</p>	<p>Progress reports – every rotation (6 months) (mid-term and end of term – some specialties)</p>	<p>Practice Eligibility</p> <p>Chart stimulated recall</p> <p>Knowledge assessment (based on RC certification exam questions)</p> <p>Chief of Staff confidential report re: competence and performance</p> <p>Performance assessments based on practice scope</p>
Simulation	<p>Clinical exams – short case/long case*</p> <p>Top up training* may include simulation-based assessments</p>	<p>Fellowship Examination - Clinical vivas (those who are required to pass exam)</p>	<p>CEHPEA (Ontario) includes an OSCE</p>

<p>Reflective Learning Tools and Learning Portfolios</p>	<p>Mandatory Online Orientation Program requires reflection on self.</p> <p>Participation in College CPD program is mandatory.</p> <p>Top up training* includes reflective components such as learning needs analysis, logbook, etc.</p>	<p>On-line goal setting and self-assessment modules & tools</p>	<p>2-year CPD learning plan</p> <p>Documentation of learning activities and outcomes in MAINPORT</p>
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* Not all assessments are required of all SIMGs. Practice visits, which are an intensive review of the SIMG's practice, are only conducted when peer review suggests that there may be a problem (>5% of SIMGs). Top up training —an enrolment in a module of the RACP's advanced training program — is required for nearly 20% of SIMGs, and about 10% sit the RACP's clinical exam.

Table 5: Assessment Strategies for Continuing Professional Development

Assessment Type	Royal Australasian College of Physicians	Royal Australasian College of Surgeons	Royal College of Physicians and Surgeons of Canada
Direct Observation			Traineeships
Multi-source Feedback	Incorporated in regular practice review (not mandatory)	Surgical Competence and Performance guide for self and peer assessment. 360 ⁰ form (introduced July 2011)	Physician Achievement Review (PAR) – now mandatory in 3 provinces
Audit and Feedback	5% of CPD records are audited each year, with Fellows asked for documentation of all CPD activities. 10 hours peer review activities mandated by MCNZ in NZ. Participation in one clinical audit each year mandated in NZ.	All surgeons are required to participate in their specialty audits CPD (with random verification)	Credit Validation of CPD activities Self-assessment modules in Bioethics Performance assessment tools (in development)
Simulation			Surgical skills assessment Task trainers Virtual – online cases Standardized patients

Portfolios and reflective learning tools	Learning plan encouraged in MyCPD Reflection on learning rewarded with credit in MyCPD	On-line learning diary	MAINPORT: document learning activities and outcomes <i>Optional</i> tools: Goal setting tool CPD planning tool Lifelong Learning modules
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