Investigation into quality incidents and peer review in radiology in BC, 2011-2017.

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Executive Summary

In 2011, a series of events called into question the quality of diagnostic imaging in four health authorities (HAs) in BC. Dr. Doug Cochrane, BC Patient Safety and Quality Officer, was commissioned to review these situations and produce recommendations to prevent similar events occurring in the future. Chief amongst those recommendations were the creation of a single province-wide credentialing and privileging system, and the creation of a peer review system for radiology.

A seemingly similar incident also occurred in BC in late 2016, calling into question the effectiveness of work to implement the Cochrane recommendations from 2011. This review analyses progress with that work, and the systems and processes which allowed this incident to occur, across the six health authorities (HAs) which privilege physicians in BC.

Physician administrative processes

Physician administrative processes comprise recruitment, credentialing, reference checking, privileging, and performance review. Effective information sharing should also be included as a prerequisite for the effectiveness of all these processes.

Recruitment varies somewhat between HAs, but revealed no major cause for concern.

Substantial progress has been made with the introduction of CACTUS, the provincial system for managing physician human resources, and its incorporated dictionaries for credentialing and privileging. Although there is scope for greater consistency, credentialing and privileging worked properly in this instance.

This situation could have been detected sooner if key information had been available for reference checking, or had been shared. Concerns about privacy and working relationships limit the ability to seek information, even when this impacts patient safety.

Present arrangements for locums do not track where an individual has worked or how his/her work was perceived. This does not support physician leaders seeking to fill service gaps, nor the HAs, nor ultimately the locums themselves. Being able to determine where a physician has worked, and, with the physician's permission, to seek relevant information from those sites, makes an essential contribution to patient safety.

Performance review also emerged as warranting attention. All HAs have made progress since 2011, but none fully complies with Cochrane recommendations or the requirements of the existing medical staff bylaws. Most fall well short. To be effective, performance review should be a supportive and educational process, requiring investment in medical leadership capacity and training for reviewers and participants.

Supportive performance review for locums at the end of attachments is almost unheard of. This incident might have been detected sooner if review processes had included locums.

Peer review in radiology

The Radiology Quality Improvement System (RQIS) for peer review of was developed in response to Cochrane recommendations. Currently the system covers only CT scans; these are considered the most difficult modality to read.

Progress with RQIS has been slow and difficult. Picture Archiving and Communication System (PACS) upgrades delayed implementation in two HAs, with Fraser Health Authority implementing the system in late 2017, and Vancouver Coastal Health planned for 2018. Low trust between radiologists and HAs led to a requirement for technical anonymization within the RQIS system, in addition to normal mechanisms of procedural and cultural anonymization, and this has complicated system build, rollout and maintenance.

Participation in RQIS is an expectation in those HAs using it The radiologist in this incident had been in post only a few months; the RQIS team had not been notified that he should be set up to use the system. If he had been participating, this might have contributed to earlier detection.

General considerations about physician quality

Many physicians, and the Doctors of BC (DoBC), think in terms of a clear division between "quality improvement", and "quality assurance", defining the former as carried out by physicians themselves, and the latter as mechanisms whereby the public, Board and Ministry can be assured that physicians are providing quality care. Current good practice is that a reflective focus on quality in an environment which allows learning will provide more benefit than simply seeking underperformers.

Assurance that the whole system is working requires that three conditions should be met:

- all physicians must participate in improvement activities;
- there must be effective professional mechanisms to support those in difficulty; and
- there must be clear escalation mechanisms for use when a problem is serious or when professional mechanisms are not working. These will trigger investigation, and performance management if necessary.

All clinicians have a duty under the Health Professions Act to report concerns about clinical care, but this is ineffective for marginal performance concerns. This situation could have been detected earlier if a series of small signals had been assembled into a picture of poor performance, instead of coming to light through a significant patient safety incident, ultimately affecting thousands of British Columbians. Better information sharing is the key to early detection.

Finally, this review makes observations about the need for coherent policy in this difficult area, and makes recommendations about how the findings may be addressed.

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1.   Introduction

In 2010 there were three separate incidents in BC which called into question the quality of diagnostic imaging in four health authorities. Specifically, the incidents involved situations where radiologists misread computerized tomography (CT) scans, calling into question the quality of care received by thousands of British Columbians. As a result, the BC Ministry of Health directed Dr. Doug Cochrane, BC Patient Safety and Quality Officer, to undertake a two-part investigation into the specifics of these incidents, and, more broadly, the quality of diagnostic imaging in the province, both parts of which reported in 2011. In essence, these events resulted from inadequate training in these complex techniques, and this deficit had not been picked up by medical administrative processes such as credentialing and privileging. The recommendations from Dr. Cochrane's reports were all accepted by the BC Ministry of Health.

In November 2016, clinicians in Northern Health Authority (NHA) noted discrepancies in the interpretations of CT scans read by a radiologist practicing at Mills Memorial Hospital in Terrace, BC. An initial NHA review was performed on January 29, 2017, reviewing a random selection of CT scans read by the radiologist on November 21, 2016. This found discrepancies in 10 of 22 scans read that day.

On January 30, 2017, NHA initiated a formal review of the radiologist's work and informed the Ministry of Health of the potential quality incident. The radiologist, who was on staff at NHA from October 3, 2016, until January 27, 2017, was placed on voluntary leave.

Prior to working in Terrace, the radiologist worked as a locum at:

- Interior Health Authority (IHA) for two one-month periods in 2011 and 2014
- Island Health (Vancouver Island Health Authority (VIHA)) doing several locums over a three-year period from 2013 until 2016 in the North and Centre Island
- Vancouver Coastal Health Authority (VCH) for a one-month period in 2012 in Powell River

Leadership Council considered this matter in June 2017 and commissioned this review to investigate systems issues which may have contributed to the incident; to determine progress with implementing the Cochrane recommendations from 2011; to review medical affairs processes in the affected Health Authorities (HAs): and to make recommendations on what further improvements should be made. Terms of Reference for this review are included at Appendix A. The scope was broadened to also include Fraser Health Authority (FHA) and the Provincial Health Services Authority (PHSA), to enable recommendations for all BC health authorities which privilege medical staff.

2.   Key Findings

Although much progress has been made since the Cochrane reports, some aspects warrant further work. All findings are further examined in the full text.

1. There is clear evidence that medical HR processes are much stronger than they were 2011, although these complex processes remain and sequential, thus intrinsically prone to error – a chain is only as strong as its weakest link. The introduction of the CACTUS system has provided a common core (but see below), and all the six HAs investigated now operate processes which can be considered robust for physicians with Active and Provisional privileges, including International Medical Graduates (IMGs). This is an important step forward.

2. Information sharing remains limited, inconsistent and often slow, across the whole system. Effective and timely sharing of high-value information between HAs and between facilities still depends primarily on personal trust relations between medical leaders, credentialing & privileging staff, and their counterparts elsewhere with whom information is being shared or from whom it is sought. Information sharing between the College and HAs is also perceived from both sides as incomplete and often delayed. This information, which has a direct bearing on patient safety and care quality, is poorly documented in HAs and hard to trace across organizational boundaries, due ultimately to concerns about privacy being more pressing than concerns about potential risk to patients.

3. The management of locums emerged as a challenge. Processes are burdensome to those trying to operate the system, and bureaucratic and duplicative for physician leaders and the locums themselves. Credentialing and privileging of locums is fairly robust within individual HAs; reference checking remains problematic; information sharing about locums remains weak and ineffective. The present situation does not adequately support medical leaders trying to secure locum coverage or the locums themselves.

4. The Radiology Quality Improvement System (RQIS) was introduced in BC in response to the Cochrane recommendations, but has not yet been implemented in all HAs. Although participation is an expectation where the system is implemented, the radiologist in this incident was never registered for RQIS.

5. RQIS allows participating radiologists to receive feedback from colleagues and improve their individual performance. Sampling currently comprises only 2% of CT (Computerised Tomography) scans (more for locums and new appointees). CT is only one of 18 imaging modalities; plain films should be included in RQIS later in 2017, and MRI (magnetic resonance imaging) in 2018. RQIS may contribute to detection of a pattern of underperformance over time.

6. Progress with implementing RQIS has been slow and laborious, and an analysis of the reasons for this reveals a range of views as to why or what should be done to move forward. RQIS has technical difficulties compounded by substantial trust issues. Worthwhile progress has been made, but resolving the trust issues is key to the

system realizing its full potential across all imaging modalities and all practice contexts.

7. This incident has also revealed challenges about the reproducibility of image interpretation between radiologists from different practice contexts. Concordance rates between first and second read reported through the Radiology Quality Improvement System (RQIS, see below) are typically around 95%, but the second reader has access to all previous images and reports, inviting confirmation bias. Where re-reads have been conducted blind during the investigation of this incident, concordance rates for positive findings have been found to be lower.

8. There is a suggestion that environmental factors, particularly interruptions, may also cause errors by disrupting the reading of complex CT scans. Interruptions are likely to compound other factors affecting performance, such as an unfamiliar environment for a new locum, and add to the cognitive burden facing a radiologist challenged by tiredness, aging, or ill-health. This is likely to be particularly important in a small department. Some of these environmental factors are readily amenable to improvement.

3.   List of Recommendations

RECOMMENDATION 1: That locums be managed provincially, and a mechanism be set up to do this. This would receive potential candidates of all specialties from HealthMatchBC and other recruiting sources, then provide a common pathway for induction, credentialing, and initial reference checking, documented in CACTUS. It would track locums working in BC to provide a single "source of truth"; and liaise with HAs or sites to ensure that an appropriate review is conducted, shared with the physician, and documented in CACTUS at the end of the locum. To succeed, such a mechanism would have to be efficient and timely. [From Section 6.1.1]

RECOMMENDATION 2: That the Provincial Medical Services Executive Council (PMSEC) commission work to define a common approach to eliciting references for recruitment of physicians including locums. This would include circumstances under which additional references may be sought, with the physician being made aware, if references provided appear inadequate. [From 6.1.2]

RECOMMENDATION 3: That PMSEC commission work to develop, produce and implement a risk-assessment tool, based on administrative data which is largely already collected, to guide the process of recruiting medical staff including locums. [From 6.1.2]

RECOMMENDATION 4 – That CACTUS is standardized across the province, with a requirement specifically for standardization in the way in which data fields are used and what information is uploaded to the system. This process, and prevention of future drift into inconsistency between HAs, may best be accomplished by a single province-wide configuration; at the least it will require strong agreements about how data fields are used. [From 6.1.3]

RECOMMENDATION 5 – That PMSEC and HAs should agree on a shared approach to the most important additional training required of physicians as a condition of receiving privileges, such as hand hygiene or violence prevention, so these can be standardized across the province, with completion recorded in CACTUS and available as required as part of the medical staff member's credentialing file.   [From 6.1.3]

RECOMMENDATION 6: That the SOLAR module (see 5.3.3) is implemented in CACTUS in all HAs at the earliest opportunity. Once SOLAR is in place, tested and stable, all written references and notes of verbal references should be stored in CACTUS and be available where required to those managing applications for other posts including locum positions. Such access should be subject to regular audit. [From 6.1.4]

RECOMMENDATION 7: That a medical leader or member of medical affairs staff handling a recruitment should briefly annotate written or verbal references in CACTUS to confirm accuracy and add information as required. [From 6.1.4]

RECOMMENDATION 8: That the BC Medical Quality Initiative (BC MQI) and its working groups be asked by PMSEC to develop an approach to enable physician appraisal material to be incorporated into a privileging application and stored in CACTUS when this is requested by the applicant. This would allow a physician to elect to use, for example, a 360-degree

appraisal or other quality-related improvement work to inform a privileging application, thus reducing the need to duplicate effort or activity. [From 6.1.4]

RECOMMENDATION 9: That HAs require an in-depth review or equivalent to be completed and documented in CACTUS when a physician moves from Provisional to Active staff. [From 6.1.5]

RECOMMENDATION 10: That an agreement be put in place between the Ministry of Health, HAs, and the BCRS to confirm that identifiable RQIS data cannot be used for performance management, that assurance of the function of the system will be provided by anonymized reporting at HA and provincial level, and that in exchange BCRS will move to reliance on the DVRC and a collegial approach to anonymization and remove the special requirement for technological anonymization. The agreement would be crafted using mechanisms already in place, such as the Medical Imaging Quality Improvement (MIQI) Working Group of BC MQI, and/or MIAC. [From 6.2.1]

RECOMMENDATION 11: That PMSEC ask BC MQI, through its Medical Imaging Quality Improvement (MIQI) working group, in partnership with BCRS, DVRC, the UBC Department of Radiology, and the College, to develop working guidance for those using RQIS, to cover definitions of low impact errors, consistent underperformance, determination that a situation warrants escalation or reporting, and mechanisms for doing so. This is intended to create the conditions where a pattern of underperformance or worsening underperformance can be detected and supportively managed through professional channels, thereby averting patient care incidents, the likelihood of having to retrospectively re-read imaging examinations, and public loss of confidence in radiology and the BC health system. This guidance would not alter the obligation to report under Section 32 of the Health Professions Act (see earlier in this section). [From 6.2.1]

RECOMMENDATION 12: That HAs regularly (at least quarterly) audit the names of those with any type of privileges in radiology and those registered on the RQIS system, to ensure that all radiologists are included in the RQIS system. The report should be presented to the credentialing and privileging committee or equivalent. [From 6.2.1]

RECOMMENDATION 13: That HAs include good standing in RQIS participation as part of the requirement for the annual review for those with privileges in radiology. Once the system is properly in place, good standing in RQIS will become a privileging requirement (see also Recommendation 15, below). [From 6.2.1]

RECOMMENDATION 14: That HAs make registration and participation in RQIS a requirement for the granting of any type of privilege in radiology. When a locum appointment is required as an emergency measure this can be done retrospectively, but as a minimum RQIS registration and training should be checked to confirm they are in place as papers are prepared for Board approval. [From 6.2.1]

RECOMMENDATION 15: That RQIS participation be incorporated by BC MQI into the privileging dictionary for Medical Imaging at its next refresh. This will need to take account of progress with different diagnostic modalities. [From 6.2.1]

RECOMMENDATION 16: That the Medical Imaging Quality Improvement (MIQI) working group of BC MQI work with radiologists, the BCRS and the UBC Department of Radiology to consider how best to improve the reproducibility of retrospective reads and make recommendations through BC MQI to PMSEC for best practice in the conduct of these reviews in future. [From 6.2.2]

RECOMMENDATION 17: Specialist physicians working at small sites should be part of a geographically distributed professional and quality peer group with a minimum of four members, formed in collaboration between physicians working in different sites. These groups would compare cases, share learning, and discuss other quality improvement work, and this activity would qualify for CPD credits. Participation in such a peer quality group would be a regular item to be included in annual and performance reviews. N.B. This arrangement will not work if there is competition for funding or resources between physicians or their sites. This situation should be avoided. [From 6.3.1]

RECOMMENDATION 18: HAs responsible for small sites should consider conducting a human factors analysis with the radiologists to optimize the reading environment and work schedule in such sites. [From 6.3.1]

RECOMMENDATION 19: That the College develop a Limited License category which could be used in various circumstances including as an end of career stepdown for physicians who want to continue in limited clinical practice. [From 6.3.2]

RECOMMENDATION 20: That the Ministry of Health develop a strategic approach and a coherent policy framework for medical quality, in the context of whole health system quality. This should include systems to provide public, Board and Ministry assurance, and predictable ongoing annual funding to support this objective. [From 6.4]

4.   Methodology

A review of documentation related to implementation of the Cochrane recommendations was followed by a series of structured interviews with key informants, listed in Appendix G.

The findings (Section 5) were then analyzed thematically, with any need for clarification and corroboration leading to additional interviews as required.

The themes (Section 6) were used for discussion and to develop a series of recommendations, also presented as a list in Section 3.

5. Findings

Most of the findings in this report relate to work done since the Cochrane report and how medical administrative tasks are carried out in health authorities. Some observations relating specifically to this incident are presented first.

5.1 About this incident.

At first sight, the occurrence of another incident in BC where the reading of CT scans fell below an acceptable standard raises the question of whether anything has been learned or put into place since that incident. There are important differences between this incident and those which precipitated the Cochrane report in 2011. The original Cochrane incidents related either to physicians operating outside their training or outside their license. In this incident, the physician was working within his license and training. Matters relating to peer review are common to both, and this incident also highlights some new issues.

5.1.1 Contextual observations

The incident was discovered as the result of a non-radiologist disagreeing with the interpretation of a CT in one of his patients. Further enquiry reveals a pattern of low level concerns that all was not well, and these surfaced in different places. Until that case discussion, none of these individual signals were of sufficient strength to raise the alarm, and none were communicated to where they could produce action. The analysis in this section is based on information from the HAs in which this radiologist worked.

Each of the following items alone is not significant. Together they constitute a pattern:

- Although this physician had glowing references from Ontario, there was some lack of clarity about why he left.
- He held locum licenses simultaneously in multiple jurisdictions across Canada.
- He worked at Powell River in 2012 as a locum, and applied for a permanent appointment. He was not offered the position, for reasons which are not documented.
- He had worked in a number of places in BC, doing locums, but no reference was provided from anywhere in BC.
- Although he apparently had no problems whilst working as a locum in Campbell River, concerns were raised about his competence very soon after he started a locum in Nanaimo. These resulted in him not being hired into a permanent role, i.e. concerns were acted upon but not communicated.
- He wanted to work as a locum in Victoria, but was not accepted, for reasons which are apparently not documented.

So the picture emerges of an individual, with glowing references from out-of-province, moving through a series of short locums in different jurisdictions, never getting a permanent position. This highlights two different problems from those reported in the Cochrane series. Firstly, although systems for recruiting, credentialing and privileging locums are mostly sound and have been greatly improved since Cochrane, those for managing locums are

much less robust than those for permanent staff. Locum privileges are often granted for a year, and do not reflect time actually worked – in this case, actual time worked in Island Health could only be determined by the dates on which he reported on images. Similarly, the visibility of a particular locum **lacks continuity** over time or over the trajectory of the locum's career. Thus, the system is not well positioned to learn from experience. Secondly, the incident highlights multiple failures to effectively share information, between physician leaders themselves, and between physician leaders and regulators – both Medical Affairs departments in their role as the physician-regulatory part of the HA, and also CPSBC and regulatory colleges in other jurisdictions.

5.1.2 Participation in RQIS

The Radiology Quality Improvement System (RQIS), is the delivery of the concurrent peer review system developed in response to Recommendation 1 of the first Cochrane report. **This radiologist did not participate in RQIS** during the time he worked in BC. Reasons for this relate to the individual, to processes in the HAs, and the system itself.

Participation in RQIS is a requirement for radiologists working in those HAs where it is operating, although this has not been fully realized at the time of the incident. Locums and new appointees need to be specifically identified to the RQIS team, and **a process needs to be in place to ensure this happens** – it has not in the past been automatically part of HA "onboarding" processes. Induction into RQIS takes a few days and has two components – being set up on the system, and receiving Picture Archiving and Communication System (PACS) training which is specific to each HA.

General findings relating to RQIS are covered in Section 6.2.1, below.

5.1.3 Retrospective re-reads

RQIS has a quoted second-reader concordance rate of about 95% (see Section 4.2.1, below). However, two sets of retrospective reads were carried out on the Campbell River CT scan set, so that positives were re-read first by specialist radiologists from VCH and then by VIHA generalist radiologists. Concordance between the two was much lower than that reported for RQIS second reads. For example, for those cases rated by specialists as in the most serious category of error, generalists agreed with that rating in only 15 of 23 cases (65%). Most commonly, the generalists rated discrepancies as less serious than did specialists. The implications of these observations are further discussed in Section 6.2.2, below.

5.1.4 Environmental issues

One other factor which has emerged relates to interruptions during reading of complex examinations, particularly CTs with hundreds of slices. Ironically, the development of technology to support reporting has probably made this worse – previously, departments had transcriptionists who could answer the phone and triage calls for urgency. Now, reporting uses voice recognition, and the radiologist gets interrupted by the phone for whatever reason.

Opinion amongst those consulted varies about this issue. Some consider that interruptions are inevitable for a radiologist, and should even be encouraged since this fosters active clinical consultation. However, this is a particular issue in small departments, where there is

no administrative support to triage calls, and other demands such as PIC lines and biopsies have to be accommodated along with the routine reading. There is extensive literature about the adverse impact of interruptions in complex clinical settings, such as nurses doing medication rounds. Interruptions may not bother the experienced radiologist working in his home department at the height of his/her career, but may be a particular issue for a new appointee or stressed locum working with unfamiliar systems in a small department. This issue is eminently remediable without great cost, using such mechanisms as having specific time periods for routine calls, or telephone triage.

5.2 Implementation of the Cochrane recommendations

During the four years 2011-15, PQASC (the Physician QA Steering Committee, a subcommittee of the Physician Specialist Services Advisory Committee (which became PMSEC)) led the work on implementation of the Cochrane recommendations. The approach was refined in 2015 with the development of the BC Medical Quality Initiative (BC MQI). BC MQI's early focus was heavily on taking the CACTUS project to completion and into regular use, on the credentialing and privileging dictionaries, and on setting up a broader consultative mechanism which embraces QI as well as QA. BC MQI reports to PMSEC, which also guides its workplan.

Progress with implementing the Cochrane recommendations from the Phase 1 report is summarized in Appendix B, and those from the Phase 2 report in Appendix C.

An interim work program from PQASC, with milestones in 2015 and projections to 2017, is included at Appendix D. Progress is assessed as of September 2017. This approach was chosen to emphasize the more difficult areas from Cochrane which had not been completed by 2015. Lack of progress between 2015 and 2017 is probably an indication that the approach is not working.

There are six work areas in this plan:

PQASC work area	Summary of progress	
RQIS	Delayed. See Sections 5.2.1 and 6.2.1.	
Provincial Practitioner Credentialing & Privileging System	Good progress. Issues remain with worsening inconsistency between HAs and limitations on use for confidential information.	
Privileging Standards	Good progress. Delays in implementation between HAs have delayed assessment of effectiveness.	
Credentialing Core Data Set	Largely complete, but ground is being lost due to worsening inconsistency between HAs.	
Physician practice enhancement	Limited progress since 2015 due to sensitivities about QI or QA, and lack of capacity for BC MQI engagement work.	
Review of regulatory framework	Review completed. This work has not progressed since 2015. Solutions require legislative and regulatory change.	

Key findings are discussed below, grouped under the themes in the Phase 2 report.

5.2.1 Quality assurance and peer review in diagnostic imaging

Recommendation 1 from Cochrane Phase 1, and 17 from Phase 2 relate to the development of a provincial system called RQIS – the Radiology Quality Improvement System. The change of emphasis – from Cochrane's "Quality assurance and peer review" to "Radiology Quality Improvement System" reflects that this element took a different route from that envisaged by Cochrane early in its development. The timeline for RQIS is shown in Appendix E.

Implementation of RQIS has been slow, partial and problematic   Recommendation 1D from the first Cochrane report, that the system generate reports for the HAs and Boards, has still not been achieved (planned for late 2017-early 2018).

Each of the key groups involved in RQIS has a different view as to why progress has been so laborious. These include: genuine technical issues, particularly with PACS system implementation in some HAs; vendor lack of continuity and loss of key programming staff; an insistence from radiologists about technical anonymization within the system, as well as the more usual cultural mechanism of collegial agreement to protect anonymity; and severely limited resources.

The following observations have been made:

1. The PeerVue software on which RQIS is based is widely used and accepted. In Alberta, PeerVue is used for radiologists and professional & technical staff, and has 20 full-time staff compared with 0.6 FTE in BC, despite the much greater technical complexity in BC.
2. The insistence on technical anonymization has required a much more complex implementation with extensive customization of the software in BC. Most of the builds have been delivered late and with multiple problems. The maintenance burden of this additional complexity is substantial and will be expensive.
3. RQIS is currently in use in Island Health, IHA, and NHA, with FHA coming on this Fall, and VCH (see 10, below) next year.
4. Participation in RQIS is an expectation for radiologists where the HA uses the system. The system currently has a high take-up where it is in place.
5. The system as presently implemented aims to sample 2% of one of eighteen imaging modalities (CT), although sampling rates are increased (to 8%) for new appointments and locums. There are plans to introduce review of plain films during 2017, and of MRI in 2018.
6. It takes less than a week after a request is received by the RQIS team to get a new radiologist put on the system; specific PACS training (provided by the HAs) is also required, and may also take a week or more.
7. Concordance between first and second reads in RQIS is a reassuring 95% (but see Section 5.1.3). The likely reason for the discrepancy between this figure and findings noted in 5.1.3 is confirmation bias – the second reader has access to the report and all previous material. This is further discussed in Section 6.2,2, below.

8. Insistence by radiologists and their professional society, the BC Radiological Society (BCRS), on a technology fix for anonymization has seriously limited the ability to extend RQIS coverage to other modalities. Some modalities have metadata which identifies at least patient and site; some modalities require specific types of monitor; some subspecialties are small, so deductive disclosure would not be difficult.

9. Progress with RQIS had come to a standstill by 2016 due to extreme sensitivities about whether the principle here is peer-driven quality improvement, or regulator-driven quality assurance. The stalemate was resolved at that time by the BC MQI Three Compartment Model (see Appendix F), which distinguishes and clarifies the relationship between QI, QA, and performance management. See also Section 6.2.1.

10. Vancouver Coastal has not yet been able to implement RQIS due to issues with its PACS system, and anticipates being able to do so in 2018. Instead, it has developed a spreadsheet-based system based on collegial agreement to protect anonymity, enabling it to bring 100% of its radiologists into a system of regular peer review. This does report through channels to the VCH Board. For this reason, it could currently be argued that this system out-performs RQIS. This is a direct result of the extreme sensitivities around anonymization in RQIS.

Thus RQIS has made substantial progress under difficult conditions, and a huge amount of work has gone into it, but it does not currently meet the requirement for multimodality concurrent peer review as a tool for both quality improvement and quality assurance as laid out in the Cochrane report. The system does not currently provide public, Board and Ministry assurance of quality in terms other than vague generalizations. It is not clear whether it will ever do so as currently configured.

Although RQIS has a contribution to make to detecting performance outliers, it is primarily supportive, encouraging, and incremental for participants, working primarily through feedback to the individual first-reporter. A serious error could be picked up in the 2% sample and raise a cautionary flag, but feedback about less serious errors takes time, and requires self-reflection and the development of understanding, consultation with peers, and maybe additional training, before it will produce improvement. Options for resolution are discussed in Section 6.2, below.

5.2.2 Adverse event management in HAs

Recommendations 22 and 23 were completed some years ago, and did not appear in the PQASC work plan in 2015. Experience during this incident suggests that systems work well within HAs. This incident was not coordinated more broadly other than for media coverage – this was appropriate given that the physician worked in different HAs at different times over a protracted period.

5.2.3 Physician credentialing, privileging and review

Recommendations 24 to 29 of the Cochrane report led to the development of the CACTUS system (Section 5.3.2) and credentialing & privileging dictionaries (Section 5.3.4) which have together achieved significant improvement in the quality of credentialing and privileging across the province.

Although some progress has been made with physician review, this is piecemeal and remains a challenge in many parts of the province (Section 5.3.5).

5.2.4 Recommendations for other organizations

Recommendations 30 – 35 have been completed except for those for the Ministry of Health.

Recommendation 34 is that the Ministry develop funding models to support quality improvement, including comprehensive retrospective reviews and performance and in-depth reviews. This has not been completed. These reviews are viewed by DoBC as QA, and thus will not receive funding through the JCCs. The second part of Recommendation 34 is about the payment schedule for medical administration positions, work which is largely complete although not yet fully implemented.

Recommendation 35 was to review implementation of the Cochrane recommendations and report to the public in September 2012. This was not done.

5.3 Medical administrative processes

Medical administration is used here to include recruitment, credentialing, reference checking, privileging, performance review, and also in this context information sharing (which is required at several places in this sequence). This section of the review was, after consultation, broadened to include all the HAs which provide physician services, rather than only the four HAs involved in this incident, to enable recommendations to be inclusive. For physicians with privileges, some of these functions are typically discharged by HA departments of medical affairs, and others by sites or local hospitals, or medical departments. The process is complex and sequential, with different elements distributed to different departments or leaders, and is thus potentially prone to error. The whole process is ultimately the responsibility of the Chief Medical Officer and VP Medicine. Some elements have benefitted from the introduction of the CACTUS system for credentialing and privileging, and from the introduction of the privileging Dictionaries, as a result of Cochrane recommendations.

There is variation in the organization of different HAs and their medical leadership structures, so, for example, a Department Head may have regional responsibilities for a specialty or group of related specialties, with many physicians under his/her leadership. Alternatively, the same title may be used in a small hospital for the medical leader of a very small department, with very different responsibilities.

5.3.1 Recruitment

There are quantitative differences in the main routes for recruitment across the four HAs, and some differences in routes for permanent medical staff compared with locums. In some places, potential recruits approach their colleagues directly, others respond to postings placed by HealthMatchBC. The term locum refers to a physician covering the absence of a specific permanent physician, but some physician groups have established "locum pools", with some variation in the arrangements or their formality. Temporary privileges are for fixed-term augmentation of capacity.

In all cases, the requirement for either a permanent post (new or replacement) or a locum should come from a need identified by the Department Head or the local site in the context of the HA's Medical HR Plan (there should be one), and the process of ensuring resource availability should be a prerequisite to recruitment. In some HAs this process has not been rigorous, and Locum or Temporary privileges have served as an entry route to the permanent staff.

5.3.2 Credentialing

The HA-based process of applying for an appointment begins with the physician-applicant completing a web-based online application in the CACTUS system, with supporting documentation including a Certificate of Professional Competence from the College of Physicians and Surgeons of BC (CPSBC), insurance coverage from the Canadian Medical Protective Association (CMPA), the names of three referees, and the privileges requested, based on the privileging dictionary or dictionaries, although FHA still occasionally allows paper applications. References are elicited, and additional information is sought as required.

The application is then checked for completeness and any apparent problems by a credentialing coordinator. It is then sent, with flags indicating any area of concern if necessary, for review by a medical leader with experience in this area. References are again checked, and may be followed up by 'phone – done diligently by some, rarely by others. Normally applications are then reviewed again and (if no problems are detected) approved by a credentialing committee (there are some variations between HAs). The application then passes for approval to the Health Authority Medical Advisory Committee (HAMAC), and thence for Board approval.

In cases of clinical urgency, such as a locum to cover unplanned absence, emergency approval may be sought from the HA CEO, or often a high-level delegate such as the CMO, who then takes responsibility for approving the package, including calling referees. This bypasses the committee stages, although these are done retrospectively.

The College part of the credentialing process is expected to take 8 weeks if there are no issues, longer if from outside BC; and the HA component also takes substantial time. Thus, a potential applicant could spend 4 months awaiting approval, during which time (s)he is unable to work and thus would be without income. This can be a major challenge in a small community.

A decision was taken fairly early in the process of procuring and setting up CACTUS to allow different configurations of CACTUS in each HA. This has substantially undermined Cochrane's recommendation for a consistent provincial process. It has led to a number of unsatisfactory consequences – some data fields are used differently in different HAs, including date fields, and practitioners may have to complete multiple applications, although most fields will populate from a single HA record allowing for manual processing time (the HA first receiving an application has to check then upload the record before it is available to others).

Some HAs use CACTUS to record completion of various quality-related training, such as hand hygiene or violence prevention training – although these are considered best practice in the originating HA, each HA has a different approach.

Trust in the consistency of information in CACTUS has been badly eroded. This issue is currently the subject of a study commissioned from BC MQI by PMSEC.

5.3.3 Reference checking

Reference checking is one of the most problematic parts of the medical on-boarding process. From the perspective of those seeking to recruit a physician, references are approached with some reservation. Referees are nominated by the applicant. The written reference may be entirely accurate and truthful, and the person writing it may have a good and impartial knowledge of the individual; or neither of these statements may be true.

In addition, many medical leaders are reluctant to be too honest when writing references, in case the reference is seen by the subject and regarded as unhelpful or even defamatory. They may also be keen to be rid of the individual, so would not wish to undermine a chance to do so by giving anything other than a positive reference. However, as well as references being inaccurately positive, so too they may occasionally be unfair or unjustly harsh (e.g. where there is personal animosity).

Thus written references are problematic, and there is now an expectation in all the HAs surveyed that telephone references are sought, although this was not the case until about 2014 in Interior Health, and 2015-16 in Island Health. Prior to these dates, and sometimes now, calls only take place if there are specific concerns, or if the medical leader knows the referee personally. In practice this means that **verbal references are obtained almost exclusively for applicants from BC**.

Responsibility for making reference calls falls to different medical leaders – sometimes in Medical Affairs departments, or the Site Chief or equivalent, or a Department or Section Head. The quality of the information may be variable, as well as whether the call is actually made at all. In an emergency privileging situation responsibility for making the call may fall to a Credentialing Coordinator, or to the CMO, or even to the CEO.

There is also variability around how or even if the call or its content is recorded. This information is currently not held in CACTUS due to concerns about confidentiality, an issue which should be technically resolved by the SOLAR (Symplr Online Logging and Application Reporting) module, due to be introduced in April-June 2018, which will log access to a

record in CACTUS, and thus permit audit. This will not resolve cultural or legal concerns about how the information should be handled.

Prior to the introduction of CACTUS, the provincial reference form identified that the HA could contact persons other than the stated referees, but this was removed on legal advice. Additional references can be sought if the applicant is informed. (This contrasts, for example, with the situation for UBC faculty, where the applicant nominates referees who are then contacted to identify, without the applicant's knowledge, others with whom the applicant has worked. Some of those individuals are then approached for verbal references.)

Thus, references are a weak link in the chain of recruitment, both for permanent medical staff and locums, but can be enhanced by a conversation with a trusted colleague who knows the applicant. NHA already supplements them with a requirement for a site visit before a letter of offer is issued. The situation could be improved by adding other measures, with the applicant's agreement, such as 360-degree feedback, PROMS & PREMS, or even their CPD plan (i.e. their identified training or updating requirements). This would produce a richer and more objective picture, and would also inform the process for bringing a physician into an organization (onboarding).   Ideally, this information would be provided and uploaded to CACTUS by the physician. Perfection is not required –identified learning points should be incorporated into training arrangements for the physician during their first months in the organization.

5.3.4 Privileging
The six years since the Cochrane report have seen great strides made in the privileging process. Although privileging is site-specific, the credentialing and privileging dictionaries (in CACTUS), have provided consistency and better control over what procedures should be provided at a site, and thus the resources required.

One group of physicians have directly refused to use their dictionary, namely dermatologists in Vancouver. In this case, there is an implied threat of withdrawal of services from the HA if the dictionary is implemented, as the physicians depart to practice exclusively in the private sector. This example of different standards in different health sectors is currently unresolved.

The dictionaries are now in their first revision and updating cycle, starting with the most problematic. The dictionary serves both to guide which skills are required and services provided at a particular site, and to act as a framework for review conversations between a medical leader and the physicians over whom (s)he has oversight. There has been a shift in how current experience is considered. Where there is evidence available to support the use of numbers (e.g., of procedures) in the dictionaries then these are incorporated. Where there is no such evidence, early dictionaries sometimes used arbitrary numbers. Second round dictionaries use figures if these have an evidence base; if not, panels are recommended to incorporate language to prompt a conversation about measurement – thus "maintain an adequate volume of current clinical experience and demonstrate competency based on results of ongoing professional practice evaluation and outcomes".

This focus on a supportive approach to produce improvement in quality, with serial data-driven conversations with a medical leader or peer is regarded as current best practice. A similar approach has been recommended by FEMRAC (the Federation of Medical Reguatory Authorities of Canada) and adopted by CPSBC for their Physician Practice Enhancement Program (PPEF).

This is an important point. For both those with privileges and those in the PPEF, **quality assurance comprises all physicians participating in effective quality improvement with regular review in a supportive environment, with mechanisms in place to flag concerns**. Where such concerns arise, they are dealt with under separate processes. This is described in the "Three compartment model" from BC MQI (Appendix F); see also the discussion under RQIS in Section 6.2.1.

5.3.5 Performance review

Regular performance review is described in the Medical Staff Bylaws as a requirement every 3-5 years for all physicians with privileges, and is synonymous with the in-depth review in CMPA (Canadian Medical Protective Association) publications. Its importance was re-emphasized in the Cochrane report. In community practice, the PPEF operated by the College and described above, serves the same function. Performance Review should be distinguished from the Annual Review, which is a largely administrative process to check license, CMPA coverage, and update privilege requests based on the dictionaries, although an Annual Review should also involve a conversation with the medical leader prior to renewal of privileges. Performance Review should also be distinguished from performance appraisal, which is currently used for a regular voluntary process of a physician reflecting on his/her practice with a medical leader or peer. There is variation between HAs in the way in which the term Performance Review is used, and in the processes themselves. The concept of a review every 3-5 years remains sound and is generally accepted as what should happen. In many places, however, Performance Reviews have historically not happened at all or not well. Substantial progress has been made in some places, but much remains to be done. Results are summarized below (next page):

HA	Approach to regular physician reviews
VCH & PHC	In radiology, four year cycle for in-depth reviews, using a VCH-specific scorecard with indicators such as time to dictated review. This is broader than just peer review. Other specialties have similar arrangements.
PHSA	Formal in-depth review at Provisional to Active then every 3 years, but substantial backlogs at both Provisional to Active, and for Active staff. Main challenge is getting responses to 360-degree feedback ("360"), with no consequences to it not being completed. Noted that small subspecialties cannot maintain anonymity for a 360.
FHA	Physician "report card", incorporating performance metrics, introduced in three specialties so far, with remainder expected by the end of this fiscal year. Rate limiting step is the capacity of department leadership. There is currently no 3-5 year in-depth review.
IHA	Site-specific annual review on 2-page checklist. Includes goals, courses, 360. No 3-5 year in-depth review.
Island Health	Sound process at Provisional to Active. Major increase and reorganization of medical leadership under way to enable compliance with performance reviews for all medical staff.
NHA	Currently no process for induction performance review. Provisional to Active is automatic at 1 year, sooner if applied for. Annual review includes meeting with Medical Director. No In-depth review at 3-5 years.

No HA mentioned performance appraisal as part of an induction process, although new appointees in radiology are sampled at higher frequency in RQIS (16 cases per week rather than 4). There is no common approach to how or where results are recorded – this information is not currently in CACTUS.

A substantial number of medical leaders are required in order to do Performance Review properly. Island Health has tackled this directly, by increasing the number of medical leaders so that no one leader has more than 30 physicians to review. (Prior to this reorganization, one medical leader in primary care had 400 physicians to "review".) The cost of implementing this expansion has resulted in an increase of over $3m (almost 50%) on the Island Health medical leadership budget.

The Quality Assurance working Group of BC MQI currently has a subgroup developing a suite of tools for medical staff performance appraisal for use across the province. This work will be taken forward to PMSEC for further discussion, potentially leading to implementation, with consideration of the needs for standardization of the approach, and recording of the results.

The above discussion relates only to those physicians with Privileges at a BC Health Authority. Physicians working in the community are covered by the College's Physician Performance Enhancement Framework (PPEF).

5.3.6 Information sharing

Information collected through the credentialing process itself and that related to the credentialing & privileging dictionaries is stored in CACTUS and shared across the HAs once the record has been accepted into the system by a Credentialing Coordinator in the HA first receiving an application. CACTUS was intended to be the default repository for all information relating to medical administration processes for physicians, but currently the most important and useful information cannot be stored there because of concerns about privacy. As noted above (Section 5.3.3), this should be resolved by the implementation of the SOLAR module in 2018. However, there is now a good deal of discrepancy between HAs in the way in which individual fields in CACTUS are used – even date fields may have different meanings in different HA systems, so the situation is well short of Cochrane's vision of a single provincial system.

HAs often store confidential information relating to physicians on a shared drive or SharePoint site, but there are substantial areas such as reference checking or performance management where information is recorded merely as a tick-box, on paper, or not at all. Most HAs said that they would share performance information between their sites if it is requested – i.e. pulled. Whether specific confidential information about a physician would ever be released in response to a request from another HA is unclear and would probably require specific legal advice.

The College has specific agreements for information sharing with HAs. These are universally regarded by HAs as not currently satisfactory, principally because of the time taken to provide responses even where there is urgent clinical need for an appointment. This particularly impacts locums.

No example was found where information would be offered to another HA in the context of an application unless this was specifically requested.

6. Themes and Recommendations

Themes are grouped for ease of reference.

6.1 Medical Administration

Much of the concern around this incident focused on medical administration processes. These are much more robust than at the time of the Cochrane report. Credentialing and privileging worked as intended; the process of reference checking was satisfactory, but critical information was missing. There remain opportunities for improvement in medical administrative processes, particularly in the management of locums.

6.1.1 Locums

HAs regard short-term locums as potentially challenging due to their transience and tight timescales, and all HAs have taken steps to tighten up processes for credentialing, reference-checking, and privileging, although there are still weak areas and lack of consistency. Since locums move around, these processes are to some extent duplicative. What is also missing, both from the perspective of the HA and the locum him/herself, is a longer-term perspective, which at minimum should track where an individual has worked and when, and ensure that at least a brief review is completed, documented, and shared with the physician at the end of the locum. This has two functions: for the locum it provides supportive feedback to help them identify and address training needs; for the HA, it provides information for use in future applications. In this incident, the physician had done several locums in BC, but this fact was not known to those who employed him later.

> **RECOMMENDATION 1:** That locums be managed provincially, and a mechanism be set up to do this. This would receive potential candidates of all specialties from HealthMatchBC and other recruiting sources, then provide a common pathway for induction, credentialing, and initial reference checking, documented in CACTUS. It would track locums done in BC to provide a single "source of truth"; and liaise with HAs or sites to ensure that an appropriate review is conducted, shared with the physician, and documented in CACTUS at the end of the locum. To succeed, such a mechanism would have to be efficient and timely. [From 6.1.1]

Once in operation, the mechanism would make matters easier for Medical Affairs departments, for those seeking locums, and for the locums themselves – since there would be a single point-of-contact for queries. The creation of a single provincial process for credentialing, with a single annual renewal, would save potential locums having to make separate applications for different HAs.

Privileging must remain site-based. The mechanism would also be required to ensure that specialty locums were connected to the appropriate provincial quality mechanisms – such as RQIS for radiology locums.

Cochrane recommendation 24 was that the HAs establish a single provincial department of medical affairs. This has not been progressed. Creating a provincial mechanism for locums would enable the issues and economies of scale to be examined, and could serve as an

implementation route to provincial credentialing and reference checking if this was subsequently deemed appropriate.

6.1.2 Recruitment

Issues around references are discussed in Section 5.3.1, above. Generally reference checking is tighter than was the case in 2011, but progress is patchy and in some cases, particularly for locums, the requirement still seems simply to find a physician to fill an urgent clinical need.

There is still confusion about which references can be sought. Current legal advice is that specific additional referees can be contacted with permission from the physician. This is potentially a significant patient safety issue, as illustrated by this incident. However, the above recommendation about tracking and supporting locums over time should reduce the reliance placed on unsatisfactory references. If a locum gives no BC references (as in this incident), yet it becomes known that (s)he has previously worked in BC, then this should be questioned.

> **RECOMMENDATION 2**: That the Provincial Medical Services Executive Council (PMSEC) commission work to define a common approach to eliciting references for recruitment of physicians including locums. This would include circumstances under which additional references may be sought, with the physician being made aware, if references provided appear inadequate. [From 6.1.2]

There are indicators that certain physicians coming to recruitment warrant more attention. These administrative data points, which are already in the system, could be systematized to create a province-wide risk-rating tool. Such factors as training long ago; spending much of a career working single-handed; and providing no references from BC, especially if known to have worked here, would be possible indicators. Such a tool would allow resources, especially medical leader time, to be focused on those applicants who are highest risk, and would ensure that no step is missed for such applicants.

> **RECOMMENDATION 3**: That PMSEC commission work to develop, produce and implement a risk-assessment tool, based on administrative data which is largely already collected, to guide the process of recruiting medical staff including locums. [From 6.1.2]

6.1.3 CACTUS

CACTUS, introduced in response to the Cochrane report, is a major step forward for BC. However, CACTUS is neither fully utilized, nor implemented in a manner which realizes the advantages of standardization, and consistency is actually being lost as HAs diverge in the way in which they are using the system. Full utilization depends on two factors: agreement to use the system for confidential information, and the SOLAR auditing module, due April-June 18 (see Section 5.3.3).

The decision was taken early in the procurement process to allow separate configurations of CACTUS in each HA, and since then differences have multiplied and are increasing in the way that information is stored, with fields are used differently by different HAs, even date fields

used inconsistently, and a variable amount of information is held or duplicated outside CACTUS. BC MQI has already been tasked by PMSEC to conduct a review of differences between HAs and a feasibility study for a single provincial configuration, as a step back towards the goal of common provincial approach to credentialing.

> **RECOMMENDATION 4** – That CACTUS is standardized across the province, with a requirement specifically for standardization in the way in which data fields are used and what information is uploaded to the system. This process, and prevention of future drift into inconsistency between HAs, may best be accomplished by a single province-wide configuration; at the least it will require strong agreements about how data fields are used.   [From 6.1.3]

Different HAs have different mandatory training packages, yet everyone has a requirement for hand hygiene training, etc..

> **RECOMMENDATION 5** – That PMSEC and HAs should agree on a shared approach to the most important additional training required of physicians as a condition of receiving privileges, such as hand hygiene or violence prevention, so these can be standardized across the province, with completion recorded in CACTUS and available as required as part of the medical staff member's credentialing file.   [From 6.1.3]

6.1.4 Information Sharing

Eliciting and sharing information has emerged as a major issue in this incident. Had information been shared effectively, this physician would probably have been detected sooner, perhaps preventing harm to patients. Acknowledging that information is of variable quality and varying usefulness, its utility needs to be maximized.

> **RECOMMENDATION 6:** That the SOLAR module (see 5.3.3) is implemented in CACTUS in all HAs at the earliest opportunity. Once SOLAR is in place, tested and stable, all written references and notes of verbal references should be stored in CACTUS and be available where required to those managing applications for other posts including locum positions. Such access should be subject to regular audit. [From 6.1.4]

> **RECOMMENDATION 7:** That a medical leader or member of medical affairs staff handling a recruitment should briefly annotate written or verbal references in CACTUS to confirm accuracy and add information as required. [From 6.1.4]

> **RECOMMENDATION 8:** That BC Medical Quality Initiative (BC MQI) and its working groups be asked, on behalf of PMSEC, to develop an approach to enable physician appraisal material to be incorporated into a privileging application and stored in CACTUS when this is requested by the applicant. This would allow a physician to elect to use, for example, a 360-degree appraisal or other quality-related improvement work to inform a privileging application, thus reducing the need to duplicate effort or activity. [From 6.1.4]

The ability to provide additional and objective information should enhance recruitment processes, and enrich the professional appraisal conversation between a medical leader and

a new physician recruit. It is consistent with the three compartment model (Appendix F). The arrangement should not add significantly to the administrative burden of either the medical leader or physician applicant – indeed, by providing better information up-front, it should reduce this.

6.1.5 Provisional to Active

Comments made above about greater provincial consistency for medical administrative processes also apply about the important step from Provisional to Active. In some HAs this is handled with some rigour, in others it is almost a formality.

> **RECOMMENDATION 9**: That HAs require an in-depth review or equivalent to be completed and documented in CACTUS when a physician moves from Provisional to Active staff. [From 6.1.5]

6.2 Radiology

6.2.1 RQIS

Although the terminology is usually regarded as unhelpful, RQIS was conceived as a quality assurance system but designed and implemented as a quality improvement system. The tension between "QA" and "QI" infects discussions about medical quality in BC, and partly describes why RQIS has been so difficult to develop. The other reason is that radiologists feel that they, and their specialty, have suffered reputational damage due to incidents of this type being more readily detected and investigated than has been the case for other specialties. With regard to the QA/QI issue, it seems to be a fact of life and thus has to be taken into account. It should also be noted that there is a requirement on every professional covered by the Health Professions Act to report registrants whose continued practice might constitute a danger to the public. [HPA Section 32.2(1).]

This extreme sensitivity around use of peer review data has led to RQIS having three levels of anonymization: technical anonymization, which has greatly increased the complexity of the build and costs of maintenance; data anonymization, with the Diagnostic Validation Review Committee (DVRC) holding this role; and collegial anonymization, the agreement between professionals to respect the work of colleagues. The DVRC is noteworthy – it has Section 51-protection from each of the participating HAs, and its membership excludes those in medical leadership positions, thus providing assurance to participants that peer review data will only be used for "QI", and will not be accessible to those managing them.

If we are to meet the spirit of the Cochrane recommendations in the reality of the present medical quality environment in BC, we need to navigate this issue of "QI" and "QA". RQIS has the potential to be a good and inclusive peer review tool to produce improvement in quality. To be able to assure the public, Boards and Ministry of the integrity of the system, three conditions need to be met:

- RQIS must be inclusive, with all radiologists involved. *Assurance lies in knowing that coverage is complete, and confirmation that this is indeed so.*
- There must be good processes in place whereby peers manage and provide support to those making low impact errors or who are marginally underperforming. This

would include additional sampling frequency. The primary aim of the system is to improve patient care quality. *Assurance here is provided by knowing that the mechanism is in place, and by the provision of anonymized reports which confirm activity.*

- There must be effective mechanisms in place whereby those rare instances where there is consistent or repeated underperformance, or deterioration, are identified and reported; similarly if peer review uncovers a single high-impact error. This reporting is a statutory responsibility (see first para in this section, above), either through HA lines or to the College. The investigation would not be able to utilize RQIS results at all. *Assurance lies in knowing that this process is understood by radiologists and that it works.*

This is an over-simplification, but it allows work to be done **in advance of an incident** to define standards for what constitutes a low-impact error, and how to determine consistent underperformance or progressive deterioration. Physician insight and willingness to respond to peer review should also be considered – those without insight are likely to pose a higher risk.

> **RECOMMENDATION 10**: That an agreement be put in place between the Ministry of Health, HAs, and the BCRS to confirm that identifiable RQIS data cannot be used for performance management, that assurance of the function of the system will be provided by anonymized reporting at HA and provincial level, and that in exchange BCRS will move to reliance on the DVRC and a collegial approach to anonymization and remove the special requirement for technological anonymization. The agreement would be crafted using mechanisms already in place, such as the Medical Imaging Quality Improvement (MIQI) Working Group of BC MQI, and/or MIAC. [From 6.2.1]

This would allow BC to use a more conventional installation of the PeerVue software, rather than requiring major customization. It would reduce the complexity of future developments of RQIS, reduce the costs of system build and maintenance, make the system more stable and thus reduce user frustration, and allow extension of RQIS into other modalities to be accomplished much more easily. Extension into other modalities should enable RQIS to meet College requirements for facility accreditation.

> **RECOMMENDATION 11**: That PMSEC ask BC MQI, through its Medical Imaging Quality Improvement (MIQI) working group in partnership with BCRS, DVRC, the UBC Department of Radiology, and the College, to develop working guidance for those using RQIS, to cover definitions of low impact errors, consistent underperformance, determination that a situation warrants escalation or reporting, and mechanisms for doing so. This is intended to create the conditions where a pattern of underperformance or worsening underperformance can be detected and supportively managed through professional channels, thereby averting patient care incidents, the likelihood of having to retrospectively re-read imaging examinations, and public loss of confidence in radiology and the BC health system. This guidance

would not alter the obligation to report under Section 32 of the Health Professions Act (see earlier in this section). [From 6.2.1]

Mandated participation in RQIS is essential for the system to be able to provide public, Board and Ministry assurance.

> **RECOMMENDATION 12**: That HAs regularly (at least quarterly) audit the names of those with any type of privileges in radiology and those registered on the RQIS system, to ensure that all radiologists are included in the RQIS system. The report should be presented to the credentialing and privileging committee or equivalent. [From 6.2.1]

> **RECOMMENDATION 13**: That HAs include good standing in RQIS participation as part of the requirement for the annual review for those with privileges in radiology. Once the system is properly in place, good standing in RQIS will become a privileging requirement (see also Recommendation 15, below). [From 6.2.1]

> **RECOMMENDATION 14**: That HAs make registration and participation in RQIS a requirement for the granting of any type of privilege in radiology. When a locum appointment is required as an emergency measure this can be done retrospectively, but as a minimum RQIS registration and training should be checked to confirm they are in place as papers are prepared for Board approval. [From 6.2.1]

> **RECOMMENDATION 15**: That RQIS participation be incorporated by BC MQI into the privileging dictionary for Medical Imaging at its next refresh. This will need to take account of progress with different diagnostic modalities. [From 6.2.1]

6.2.2 Retrospective reviews in radiology

One of the more concerning findings in this incident is that relating to the reproducibility of repeat CT examinations (Section 5.1.3). The finding of differences between reads by specialists compared with generalist radiologists has previously been reported in the literature. The finding obviously has significant implications, and not only for the methodology used for retrospective reviews. It also speaks to the importance of confirmation bias, for example in the 95% concordance rate reported in RQIS. On the one hand this is primarily a professional matter for radiologists, but we need a better and defensible methodology for retrospective reviews.

> **RECOMMENDATION 16**: That the Medical Imaging Quality Improvement (MIQI) working group of BC MQI work with radiologists, the BCRS and the UBC Department of Radiology to consider how best to improve the reproducibility of retrospective reads and make recommendations through BC MQI to PMSEC for best practice in the conduct of these reviews in future. [From 6.2.2]

6.3 In Practice

6.3.1 Small hospitals

A number of issues related to maintenance of radiology services in small hospitals emerged during the review. There are challenges with maintaining the viability of services and at the

same time maintaining quality. The scope of services provided in small hospitals may have also increased, with such service developments as PICC (peripherally inserted central catheter) lines or biopsies. However, peer review is critical in maintaining quality, including in small sites where there are too few radiologists to allow the formation of a quality group. One example uncovered during the review relates to standards in Powell River, where the radiologists are part of a professional/quality peer group with the North Shore. Historically this type of arrangement has not worked due to tensions relating to small vs large site and imbalance in earnings from FFS. In the Powell River – North Shore instance, the arrangement is purely professional / quality, money is off the table, and the arrangement works well. Having a group of peers with whom to share issues, discuss cases, and work on quality improvement is a key practice support.

> **RECOMMENDATION 17**: Specialist physicians working at small sites should be part of a geographically distributed professional and quality peer group with a minimum of four members, formed in collaboration between physicians working in different sites. These groups would compare cases, share learning, and discuss other quality improvement work, and this activity would qualify for CPD credits. Participation in such a peer quality group would be a regular item to be included in annual and performance reviews. N.B. This arrangement will not work if there is competition for funding or resources between physicians or their sites. This situation should be avoided. [From 6.3.1]

The role of interruptions is discussed in Section 5.1.4, as an example of the type of environmental factor which may influence quality, particularly for a physician who is a new locum, tired, or otherwise not at the top of his/her game. A human factors analysis with the radiologists and leading to changes in the work schedule or environment may be an inexpensive way to enhance quality and safety in sites with only one or two radiologists.

> **RECOMMENDATION 18**: HAs responsible for small sites should consider conducting a human factors analysis with the radiologists to optimize the reading environment and work schedule in such sites. [From 6.3.1]

6.3.2 What to do with the physician whose competence may be fading

Some arrangements are already in place to provide additional support and oversight for physicians whose age makes them more likely to suffer fading clinical skills – for example, the College reviews physicians aged >70 annually, rather than every 3 years. More difficult is the situation where a physician leaves regular employment, stepping away from the support of colleagues, departmental oversight and in-depth review, but wants to continue to do locums. Such physicians warrant additional support and oversight. This is in the physician's interest, as well as that of their patients and the HA. No physician wants to be operating beyond their competence, with the stress, risk to reputation, and legal risk which accompany such situations.

The College is already considering introducing a Limited License, similar to a Provisional License but long-term, for IMGs who have worked in Canada for years, who make a worthwhile contribution to the healthcare system, but who cannot pass the RCPSC exams.

This approach could be extended to also incorporate a step-down role for a physician at the end of their career, allowing them to continue to practice but to mitigate the risk and stress of finding themselves out of their depth. Ideally moving to a Limited License in this situation would be at the request of the individual physician – insight is a key requirement.

There are challenges to such arrangements – only certain practice contexts would be suitable for those with a Limited License, so this would be more suited to a regular step-down arrangement than to someone wanting to do locums. How to fund them is another issue. However, the system would be made safer by providing a more palatable alternative these physicians than continuing to practice at risk. The burden of proof of poor competence is high and so inevitably involves reputational damage – better to make the choice to take a managed transition to lower-risk practice in a supported environment.

> **RECOMMENDATION 19**: That the College develop a Limited License category which could be used in various circumstances including as an end of career stepdown for physicians who want to continue in limited clinical practice. [From 6.3.2]

6.4 Funding

There is general recognition of the principle that improving the quality of care across the physician spectrum will have a greater impact on the whole system than merely ensuring that the worst outliers are removed. However, quality improvement without quality assurance is akin to providing safe driving classes without speed limits – good drivers will travel at appropriate speed, but not everyone will do so. Investment in quality improvement needs to provide assurance measures as well.

These activities, providing unglamorous but essential processes for medical staff, are part of the cost of providing a safe health system in which the public can justifiably have confidence. As noted above, Island Health has increased its expenditure on physician leadership by 50% to fund more, better distributed posts, a change driven largely by the need to meet Cochrane requirements for regular review of physicians. Yet funding is a major ongoing challenge. BC MQI and its working groups have no defined funding arrangements, and even funding for physician participation from the Joint Collaborative Committees has been extremely problematic. Similarly, CACTUS and RQIS are funded year to year by the HAs, hampering long-term planning. The approach to quality outlined above also demands robust and fair processes for investigating exceptions and possible underperformance.

Cochrane recommendation 34 was that the Ministry develop funding models to support quality, including comprehensive retrospective reviews and performance and in-depth reviews of medical professionals. This has not been completed, but the real problem is the **lack of a strategic approach and coherent policy framework for medical quality**, which reflects the requirement from the Auditor General and Cochrane for key systems to support quality to be properly planned and funded. This is an essential component of maintaining a public health system.

> **RECOMMENDATION 20**: That the Ministry of Health develop a strategic approach and a coherent policy framework for medical quality, in the context of whole health system quality. This should include systems to provide public, Board and Ministry assurance, and predictable ongoing annual funding to support this objective. [From 6.4]

Dr. Martin Wale

BC Medical Quality Initiative

September 2017.

Appendix A. Terms of Reference for a provincial review of radiology

Version 6, 15 September 2017

This review was prompted by recently reported quality incidents attributed to a radiologist who had worked in four health authorities (HAs) in British Columbia over a six-year period ending in January 2017. These were Interior Health Authority, Vancouver Coastal Health Authority, Vancouver Island Health Authority (Island Health), and Northern Health Authority. The review process was broadened to also include the other BC health authorities which have medical staff, namely Fraser Health Authority and the Provincial Health Services Authority, to enable the recommendations to be inclusive. The review considers these incidents from the perspective of the systems and processes in place during this period.

The review will:

I.   Consider the salient features and lessons from the incident itself, including those relating to the Radiology Quality Improvement System (RQIS), the process of retrospective re-reading, and factors relating to radiology in small hospitals.

II. Consider the recommendations from Dr. Doug Cochrane's 2011 review of medical imaging, credentialing and quality assurance in BC, and determine which have or have not been fully implemented, any barriers that have been encountered, and provide further advice to achieve their full and complete implementation.

III. Determine how this radiologist was managed through the processes of credentialing, privileging, reference checking, and peer review in each health authority (HA). This will include specifics of the processes in each of the four HAs at the time when the radiologist worked there and now, the same processes in other BC health authorities with medical staffs, and mechanisms to ensure consistency and appropriate information sharing between sites within each HA and between HAs.

IV. Identify the causes of difficulties HAs may have had in identifying quality issues concerning this radiologist and provide recommendations for strengthening medical imaging quality assurance and medical quality, including learning which is generalizable to the other BC HAs and to specialties other than medical imaging.

The review will present its report to the Associate Deputy Minister Health Services by September 30, 2017. The report is not protected under S51 of the BC Evidence Act.

Dr. Martin Wale
15 September 2017.

Appendix B. Cochrane phase 1 Recommendations

#	Item	Status
1.	**Province-wide Prospective Concurrent Peer Review System**. It is recommended that the Ministry of Health Services, the College of Physicians and Surgeons and the health authorities create a province-wide concurrent peer review system for diagnostic imaging for quality review and monitoring of image interpretation and technical image quality. It is envisaged that such a system would:	
1A.	Define a process that requires a proportion of studies initially read by each radiologist in the health authority to be re-read by another radiologist. The image reports would be compared and inconsistencies classified. Interpretative differences would be reported to the original reporting radiologist and others for the purpose of improving reporting quality. Where the review found differences of clinical importance; a supplementary report would be issued and appropriate parties, including the patient, notified.	🟩
1B.	Facilitate the selection of random images for peer review and distribution of the images to peer reviewers across the province; facilitate report comparison, adjudication and summary reporting.	🟧
1C.	Be incorporated into the provincial e-health strategy focused on professional clinical quality assurance.	🟩
1D.	Generate reports for the health authority and its Board describing the quality of image interpretation in their facilities.	🟥
2.	**Retrospective Screening Peer Reviews to Support Quality**. Until province-wide prospective concurrent peer review (Recommendation #1) is fully implemented, it is recommended that the College through its Diagnostic Imaging Quality Assurance Committee undertake retrospective screening reviews of imaging services in selected facilities beginning immediately. Determination of the facilities to be reviewed is seen as a joint responsibility of the health authority and the College. Criteria for a screening review might include facilities whose radiologists request such a review and those where the peer support has been limited or absent.	🟩

3.	**Diagnostic Accreditation Program Medical Reviews**. It is recommended that the Diagnostic Accreditation Program immediately undertake the medical review for any facility that has not yet had this completed as part of the last DAP diagnostic imaging review. The program should use the published 2010 standards for these assessments, the results should be made known to the responsible health authority.	■
4.	**Health Authority Board Responsibility**. It is recommended that health authority boards instruct their Medical Advisory Committees or equivalent to implement clinical audit and peer review programs for all medical staff members, including regular in-depth performance reviews as described in their medical staff rules. The results of these reviews should be reported as part of the regular appointment and reappointment process or as necessary when performance concerns and remedial actions are necessary. Medical staff member participation in these reviews should be reported to the Board quarterly.	■

Notes

1. From the perspective of the College, the continued delay implementing a provincial multimodal peer review system is having a significant impact on the ability to assure the quality of radiology services. The delay will prevent accreditation (under the Diagnostic Accreditation Program, (DAP)) of all medical imaging facilities including those operated by health authorities.

1A. Although this ("define a process") is graded complete, the system is presently incomplete both in modalities covered and HAs included.

1B. Partly in place for CT. Summary reporting has not yet happened.

1C. CHECK. Assume this is complete or it wouldn't get funded.

1D. No summary reports have, to date, been generated, even for sharing with the contributing radiologists.

2. The College has reviewed all radiologists who currently work only in private facilities (currently 14), under their QA program and more recently their PPEF (Physician Practice Enhancement Framework). This has been achieved with great difficulty and at cost using radiologists from out-of-province, after BC radiologists were unwilling to support the process.

3. This was completed at the time. As noted above, the DAP program is contingent upon a robust province-wide multimodal peer review system.

4. There is general awareness at Boards and Medical Advisory Committees of the review requirements in the Bylaws, but regular in-depth reviews are not consistently carried out and are currently not being done at all in three HAs.

Appendix C. Cochrane phase 2 Recommendations

	Item	Status
1.	That Lower Mainland Medical Imaging require the presence of an ultrasound technician during non-emergency hours so that a structured ultrasound examination is performed and relevant images and parameters are recorded in addition to the study interpretation.	
2.	That VCH develop health authority departments to provide support to the medical leadership working in all facilities. The responsibilities of such departments should include quality monitoring and improvement of services, peer review, performance monitoring for professional staff, coverage for vacancies and professional back up in emergencies.	
3.	That Lower Mainland Medical Imaging move promptly to review the management of the department including the working relationships of the staff and address deficiencies that may exist so that the work environment is improved and recruitment efforts are more likely to succeed.	
4.	That SJGH develop relationships with VIHA or a denominational partner that ensure that department heads have access to support in carrying out the duties required of their position.	
5.	That SJGH develop relationships with VIHA or a denominational partner that ensure that department heads have access to support in carrying out the duties required of their position.	
6.	That SJGH participate in the province-wide credentialing, privileging and medical staff review process described elsewhere in the report.	
7.	That FHA review its practice of delegating to practice groups health authority responsibilities including medical staff recruitment, hiring, staffing in health authority facilities and service quality assessment.	
8	That the relationship of a Local or Regional Department Head with a practice group should be reviewed to ensure that there is no real or perceived conflict of interest between the role as department head and any administrative or business responsibilities to the group. Where such conflicts are found, the Local or Regional Department Head should resign from practice group administrative responsibilities while in the health authority Department Head role.	
9.	That FHA clarify the use of temporary and locum appointment categories when applications for medical staff membership are being evaluated.	

10.	That FHA finalize the section in its Medical Staff Rules describing in-depth review.	
11.	That FHA review its Medical Staff Rules to ensure that the authority and responsibilities of the Regional Department Head and Local Department Head are clearly described.	
12.	That FHA provide further communications to the public regarding the status of the review and changes made as a result of the review. In the development of communications to the public, the language used should be appropriate for patients and family members.	
13.	That the FHA Medical Imaging Regional Department collect detailed practice experience information for all applicants for appointment and all members and locums working in the department. The information will be reviewed by the Local Department Head and the Regional Department Head as part of the appointment and reappointment processes and prior to the individual commencing service in the health authority.	
14.	That Fraser Health ensure that all medical staff providing speciality services that require special qualification or certification, have these qualifications before privilege is granted or that the board knowingly appoints and privileges with conditions.	
15.	That the health authorities and College develop a comprehensive retrospective review process that can be used in the health system or the private sector should the need arise.	
16.	That the College and the health authorities develop a standardized retrospective peer review process designed for quality improvement in the health authorities and private facilities.	
17.	That the Provincial Medical Imaging Advisory Committee (MIAC) establish a provincial management system for diagnostic imaging peer review in BC and that this system manage both concurrent and comprehensive retrospective peer review processes. The boards of the health authorities and the College retain the responsibility to commission reviews and to act on performance issues that become apparent.	
18.	That each health authority establishes a Diagnostic Imaging Quality Assurance Committee with authority vested by the board, to provide oversight for diagnostic imaging services provided by the health authority.	
19.	That the BC Radiological Society (BCRS), in conjunction with the MIAC and the College establish a library of images that reflect difficult interpretations and common errors that can be used for teaching purposes (resident and continuing professional education) and for proficiency testing.	

20.	That the BCRS, the Canadian Association of Radiologists and the Royal College establish modality specific performance benchmarks for diagnostic radiologists that can be used in concurrent peer review monitoring.	
21.	That the health authorities develop a program whereby short-term vacancies in the radiology technical and professional staff can be filled by using staff from other facilities, as permitted by collective agreements. When such services are needed, expenses incurred by the technician or radiologist should be reimbursed.	
22.	That the health authorities in conjunction with the Provincial Ethics Committee, the public, represented by two members of the health authority boards, the Office of the Provincial Health Officer and other stakeholders should develop a guideline for the management of adverse events that affect many patients or when there is a threat to public safety. Issues to be addressed by this group include communication planning for patients and providers, technical assessments, review logistics, implementation management and appropriate payment for those harmed and those doing the reviews.	
23.	That the health authorities undertake a risk assessment of their preparedness to deal with a retrospective review in a clinical area, taking into consideration the provincial guideline on adverse event management involving many patients and the difficulties encountered by VCH and FHA in executing their diagnostic imaging reviews. These assessments should be presented to the health authority boards and shared amongst the health authorities.	
24.	That the health authorities and affiliates create a single medical staff administration that will be governed by and serve all of the health authorities and affiliated organizations. This organization should have information sharing agreements with the College so that the results of licensing, credential review and privileging are available to all parties.	
25.	That the health authorities and affiliates standardize their processes for medical staff appointment, credential review and privileging and physician review. Included would be common definitions for core and speciality privileges, common reporting formats for medical advisory committees and health authority and affiliate boards. These activities should be supported by a single information system.	
26.	That the health authorities, affiliates and the College develop a performance assessment and review process for all physicians. The health authority medical staff rules provide a foundation for this work. Health authority boards should approve the review process and how it is applied so that they are assured that the process provides a suitable foundation for the recommendations being brought to them for decision.	

27.	That the health authorities and affiliate boards agree that if an application for specialty privileges is beyond the ability of the available medical administrative officers to evaluate, the application would be assessed by an appropriately qualified administrative officer (for example, the relevant regional or health authority department head from the health authority or another health authority if required).	
28.	That the College augment their support for the integration of provisional registrants and international medical graduates (IMG) into practice by clearly specifying the expectations of IMGs and the requirements, roles and responsibilities of a sponsoring organization and the supervisor.	
29.	That the College, in conjunction with other provincial regulatory bodies, develop methods for clear communication of credentials and license information when individuals apply for a licence in another jurisdiction. This would include a consistent taxonomy for describing and communicating information now implied in a certificate of standing and a standardized process to share other relevant information.	
30.	That the Lower Mainland Medical Imaging complete the development of the quality plan for services that is alluded to in Services Standards and Performance Section 5.1 and 11 of the Master Services Agreement and in Appendix 2, section 2.2.	
31.	The boards of the member health authorities and Providence Health Care review Section 11 of the Lower Mainland Medical Imaging Master Services Agreement in light of the learnings from these reviews and that the boards review and approve the final Lower Mainland Medical Imaging quality plan.	
32.	That the BC Perinatal Program develop or adopt and promulgate standards for obstetrical ultrasound assessments in the first, second and third trimesters that are performed in community and tertiary facilities.	
33.	That the Ministry respond to the College with its assessment of the College's proposed bylaw changes as they pertain to the management of IMGs.	
34.	That the Ministry develop funding models to support quality improvement including comprehensive retrospective reviews and performance and in-depth reviews of medical professionals. The Ministry complete the revisions of the payment schedule for medical administration positions in the health authorities.	
35.	The Ministry of Health or delegate review the implementation of these recommendations and report to the public in September 2012.	

Key

Complete, or >80% complete	
Partially complete or under way	
Not done, or not progressing	

Notes

Numbers refer to the specific recommendation, above.

2.   In place for about 60% of departments at VCH, but a continual battle.

4-6.   SJGH acute is being incorporated into Island Health.

7.   Mostly resolved, see also note 9 below.

8.   Resolved at VGH, still an issue in FHA.

9-11   FHA has a Medical Staff Rules rewrite in progress which should resolve these.

17.   Not completed due to confidentiality concerns. Commercial equivalent available in US.

20.   Not done.

21.   Locally resolved. VCH cross-train sonographers and nuclear med technicians.

24.   Not done. See Sections 5.3.2, 6.1.3, and 6.1.4

25.   Some progress made, but there exists significant and increasing variation between processes in different HAs. Although CACTUS is a single information system, it is implemented as six different instances. These factors significantly undermine its usefulness.

26.   Some progress, but a patchwork of approaches.

34.   Payment schedule for medical administration positions completed, otherwise not done.

35.   Not done.

Appendix D. PQASC summary and forward look as at April 2015

There are five sub-tables, with notes after each.

Initiative	Element	Progress at Sept 2017
Radiology Quality Improvement System A single, standardized radiology peer review & quality improvement (QI) solution, and common QI workflows across all health authorities (October 2015)		Notes
Prior to April 2015	Completed contract (provincial implementation)	
	RQIS Program Governance Agreement signed	
2015 Milestones	Complete deployment to Radiologists at VIHA and NHA (go-live 1) and FHA (go-live 2)	1
	Complete remediation of outstanding technical issues	2
	Appoint Data Validation Review Committee Resource	
	Confirm Section 51 Protection	
2017 Milestones (2015 projection)	Complete deployment (VCH/PHC, PHSA in go-live 3)	3
	A single, standardized radiology peer review & quality improvement (QI) solution is in its second year	4
	RQIS includes more than CT diagnostic imaging	5
	Evidence shows RQIS and common QI workflows across all HAs are sustained and continuously improved	6

Notes

Delayed at FHA due to PACS implementation

Ongoing problem due to complexity of build.

VCH delayed due to PACS implementation. Planned complete in 2018.

Not yet fully implemented.

Plain films planned to be included in Fall 2017, and MR in 2018.

No summary data has yet been produced from RQIS. The system currently operates independently of other QI workflows.

Appendix D. PQASC summary and forward look as at April 2015 (continued)

Initiative	Element	Progress at Sept 2017
Provincial Practitioner Credentialing & Privileging System A single, standardized web-based software solution to store & retrieve current C&P information across all HAs (Fully functioning for all physicians practicing in BC - September 2017)		
Prior to April 2015	Developed future-state standardized C&P processes across all Has	
	Vendor (Cactus) staging and sandbox/testing environments set up; design/build phase completed; vendor delivered proposed implementation plan	
	Prepared change management strategy and communications plan with input from Has	
	Implementation plan finalized with vendor; HAs agree to roll out	
2015 Milestones	Full provincial privacy impact assessment completed; outstanding issues referred to work underway regarding a health information management act	
	Determination if other information (disciplinary and wellness) is stored in C&P	7
2017 Milestones (2015 projection)	A single, standardized web-based software system for C&P is fully functioning	8
	HA continuity plans exist	9
	Sustainability plan is accepted by PSSAC (PMSEC);	10

Notes

7. Awaiting deployment of SOLAR module in late fiscal 2017/18. See Section 5.3.3.

8. Partly functioning. Increasing lack of standardization between HAs is becoming problematic (Section 5.3.2). Full function also requires ability to securely share sensitive information (Note 7).

9. Individual HA business continuity plans. Status not known.

10. Funding for CACTUS is year on year. This lack of forward commitment hampers effective planning.

Appendix D. PQASC summary and forward look as at April 2015 (continued)

Initiative	Element	Progress at Sept 2017
Privileging Standards Privileging dictionaries which have objective, criteria-based privileges & associated standards for medical staff practicing in HA facilities (Panel work complete March 2015)		
Prior to April 2015	62 panels provide input to criteria-based privileging dictionaries	
	Implementation issues managed	
2015 Milestones	Integration of privileging dictionaries into Cactus	
	HAs ready to credential & privilege physicians delivering restricted diagnostic activities, Communications plan is in place	
	An implementation and review / refresh plan is described and accepted at MQOC	
2017 Milestones (2015 projection)	Evidence shows privileging dictionaries are sustained and continuously improved	11
	Physicians have identified opportunities for improvement and are supported through the performance enhancement networks	12

Notes

11.   Formal evaluation is pending, having been delayed awaiting the system's use for a complete cycle of appointment/reappointment in all HAs.

12.   Much work is going on in QI, through different mechanisms to those in place when this plan was made.

Appendix D. PQASC summary and forward look as at April 2015 (continued)

Credentialing Core Data Set A data set & supporting forms for medical staff appointment and reappointment, to support the Provincial Practitioner Credentialing & Privileging system (Completed October 2013)		
Prior to April 2015	Standard appointment and re-appointment forms accepted at the October 2013	
	Appointment and reappointment forms used in each HA; feedback about their use is reviewed, and recommendations about modifications brought forward	
	A process for maintaining data integrity is accepted at PQASC	
2015 Milestones	Standard Forms are included as part of CACTUS System	
2017 Milestones (2015 projection)	Common HA forms continue to be used; data integrity process supports appropriate access and use of confidential data	13

Note

13. Decreasing standardization across HAs, and no ability yet to use system for confidential information. See Notes 7 & 8.

Appendix D. PQASC summary and forward look as at April 2015 (continued)

Initiative	Element	Progress at Sept 2017
Physician Practice Enhancement A framework to clarify performance review and responsibility allocation between CPSBC, HAs, and individual physicians (Framework complete Spring 2015)		
Prior to April 2015	Framework presented to PQASC October 2013 with logic model for physician performance review;	
	New governance structure established to support QA (regulator-lead), QI (profession-lead) activities and linked through MQOC (Medical Quality Oversight Committee)	
2015 Milestones	Physicians identify performance indicators	14
	Agreement reached on what constitutes an acceptable performance review	15
	Clarity provided about practice enhancement and how it links to privileging conversations and contributes to performance review	16
	A physician engagement and onboarding strategy developed and shared	
2017 Milestones (2015 projection)	Evidence shows physicians use performance enhancement tools	17
	IT supports measurement activities and performance management	18

Notes

14. General acceptance that quality improvement and performance appraisal should be data-driven. Some good examples in specific localities, and progressing through other work such as the Mid Term Policy Collaboration.

15. Work being taken forward by a BC MQI working group. See Section 4.3.5.

16. Experience being acquired with using the tools; this overarching work not yet started.

17. Some evidence from some HAs. No coherent picture. Section 4.3.5.

18. Some examples of measurement activities, but not of linkage to physician performance management.

Appendix D. PQASC summary and forward look as at April 2015 (continued)

Initiative	Element	Progress at Sept 2017
Review of Regulatory Framework A refresh of key statues and regulations that govern health care delivery to strengthen quality assurance (ongoing)		
Prior to April 2015	Work focused on identifying legislative barriers to implementing the systems, and addressing gaps	19
	PQASC working group addresses recommendations in Osborne Margo review	20
	Model Medical Staff Bylaws consultation to begin in May of 2014	21
2015 Milestones	Model Medical Staff Bylaws are introduced and adopted by health authorities	22
	Health Information Management Act enables sharing of information between providers and provider organizations	23
2017 Milestones (2015 projection)	A health information management act introduced	24
	Other regulatory changes are made to enable health authorities to grant privileges based on competencies	25
	Evidence shows roles and responsibilities for exchanging information between the College and HAs are clear and effective	26

Notes

19.   Some work done prior to April 2015.

20.   No progress, none planned.

21.   No progress, none planned.

22 - 23. Some work underway currently.

24.   No progress, none planned.

25.   No progress, none planned.

26.   Roles and responsibilities are better understood. HAs consistently express concerns about the time taken by the College to respond to information requests.

Appendix E. Timeline for RQIS

Concept

- February 11, 2011: Ministry of Health commissions independent investigation into the credentialing of radiologists and medical imaging quality assurance in BC
- March 9, 2011: Dr. Cochrane publishes Phase 1 Report findings
- August 31, 2011: Dr. Cochrane publishes Phase 2 Report findings
- August 2011 to March 2013: Proof of Concept at Island Health Authority
- April 2, 2013: RQIS – Phase 1 Proof of Concept at Island Health Authority Final Report published

Vendor Relations

- April 2013: McKesson awarded as RQIS Vendor
- April 2013 – September 30, 2013: Negotiation of Software Agreement (HSSBC, on behalf of PSHA, and McKesson)
- February 18, 2014: Certificate of Approval from Ministry of Health to PHSA

RQIS Project

- September 2013 – September 2014: Initiation of RQIS Project
- September 2013 – March 2015: Vendor development of RQIS
- March 4, 2015: Vendor provides and implements RQIS

Initial Onboarding

- April 2015 – November 2015: Interior Health 98% adoption
- April 2015 – April 2016: Northern Health 98% adoption
- April 2015 – April 2017: Island Health 97% adoption

Remaining Health Authorities to be integrated to RQIS

- TBD: PHSA/VCH/PHC – Integration activities are on hold until PACS issues are resolved for these Health Authorities
- TBD: FHA – From April 2015 to March 2017, integration activities were on hold due to a FHA PACS upgrade. Current state integration activities are pending approval from FHA-specific project intake processes

RQIS Project: Radiologist onboarding and training workflow (Conceptual Diagram)
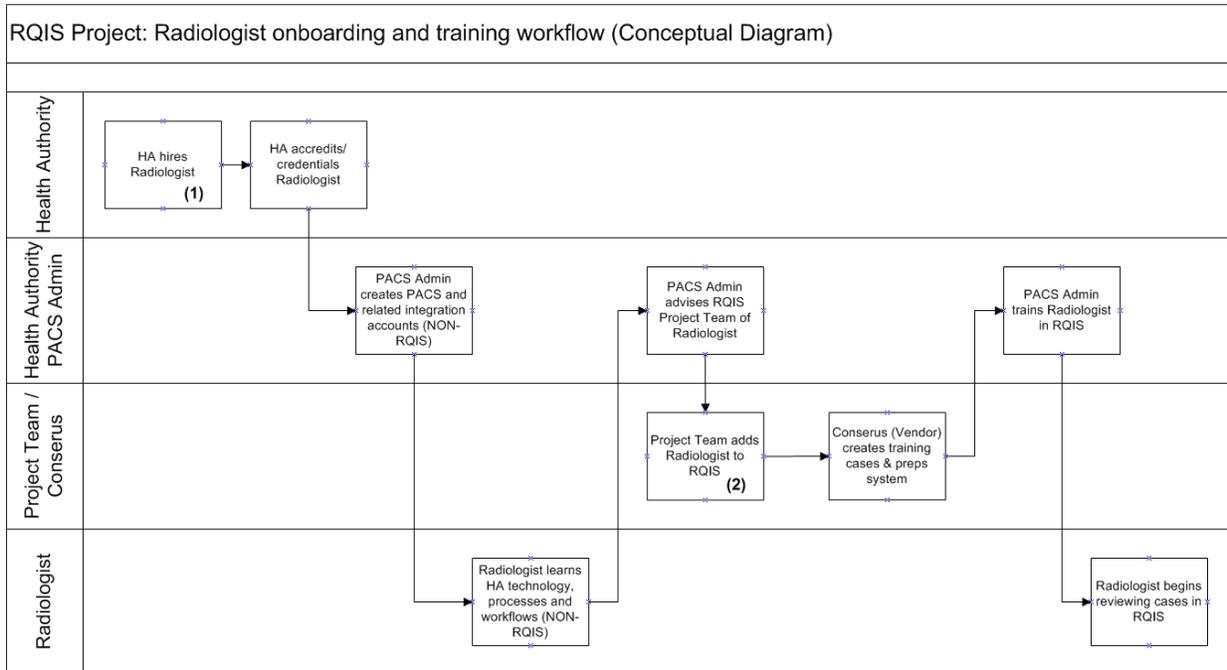
GAPS
- The Project Team has no visibility to when a Radiologist is hired at a Health Authority (1)
- There is no set time between when a Radiologist is hired to when the Project Team is advised that the Radiologist is ready for RQIS training. This process varies at each Health Authority and can be months in between (2)

## Questions from Ministry of Health

Recently reported quality incidents attributed to a radiologist who practiced in four health authority regions over a six-year period in British Columbia have raised concerns regarding medical imaging quality oversight and assurance. It is the understanding of the Ministry of Health that this radiologist practiced in the following regions during the following time periods:

- in Interior Health Authority for two, one-month periods in 2011 and 2014, respectively;
  - *RQIS was not live during this period*
- in Vancouver Coastal Health Authority for a one-month period in 2012;
  - *RQIS was not live during this period*
- in Vancouver Island Health Authority for a three-year period, from 2013 until 2016; and
  - *The RQIS Project Team is only made aware of Radiologists by the respective Health Authority (see diagram above)*
    - i. *The Radiologist, in question, was not reported to the RQIS Project Team as a participating Radiologist*
  - *Island Health did not onboard all of their Radiologists until April 2017*
    - i. *Island Health onboarded ~55% of their Radiologists by November 2015*
    - ii. *Island Health suspended further onboarding until March 2017*

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- in Northern Health Authority, from October 3, 2016, to January 27, 2017.
    - ***Northern Health advised the RQIS Project Team of the Radiologist, in question, on January 27, 2017***
        - i. ***The Northern Health representative advised the RQIS Project Team that training for the Radiologist would be on Thursday, February 9, 2017***
        - ii. ***The RQIS Project Team coordinated provisioning the Radiologist into RQIS on February 1, 2017***
        - iii. ***Test cases were provisioned for the Radiologist Tuesday, February 7, 2017***
        - iv. ***On Thursday, February 9, 2017 the Northern Health representative advised the RQIS Project Team that the Radiologist, in question, was not trained and was on "extended leave"***

Compiled by Jason Choi, Project Manager, RQIS.
10 August 2017

Appendix F. BC MQI Three Compartment Model
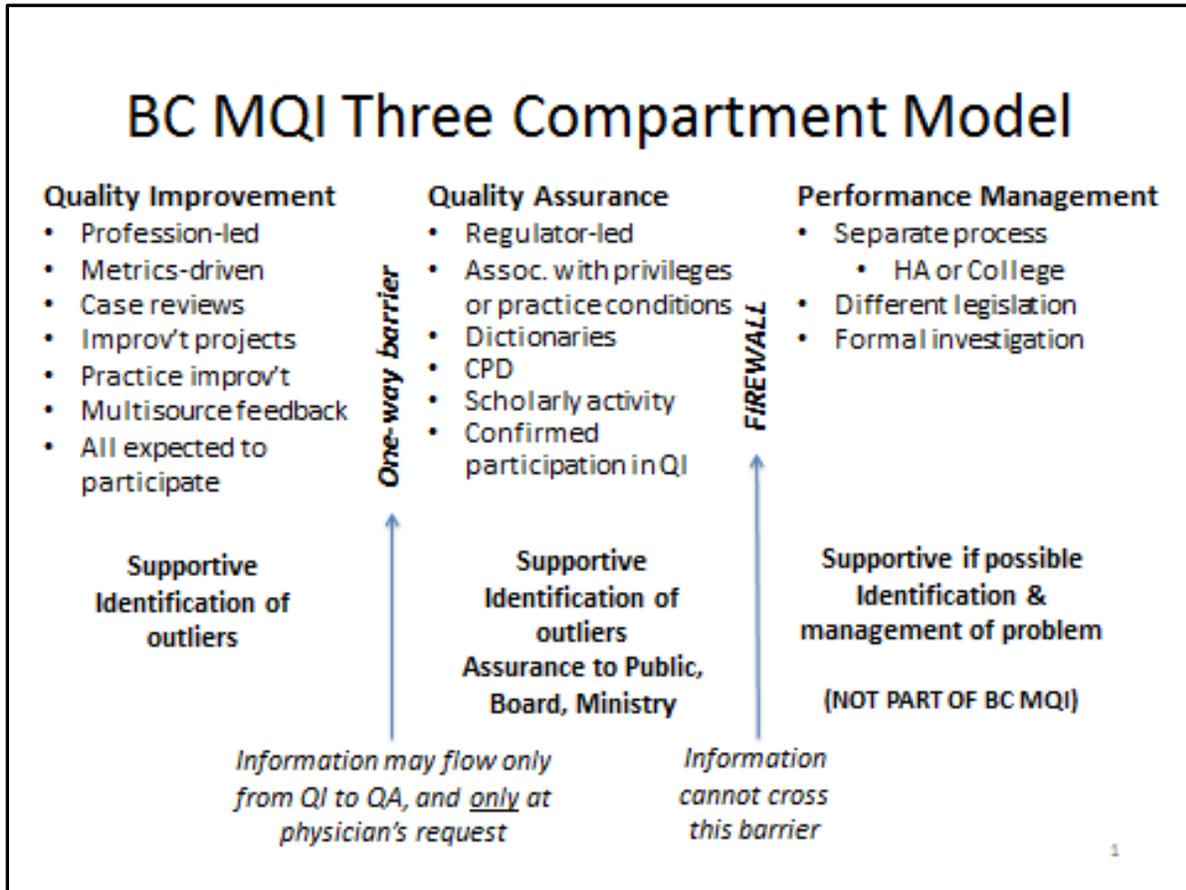
The model was developed collaboratively by the BC Medical Quality Initiative during 2015-16 to facilitate clarity in discussions about quality between physicians and others.

Appendix G. List of interviewees and key contributors

Northern HA	Drs. Ronald Chapman, Becky Temple
Island Health	Drs. Jeremy Etherington, David Robertson, John Mathieson, Rick Rogers, David Coupland, Joe Krysl, Margaret Kilshaw
Interior HA	Drs. Alan Stewart, Susan MacDonald. Maja Keast
Vancouver Coastal HA	Drs. Patrick O'Connor, Bruce Forster. Wendy Lo Paul Brownrigg, Dr. Jonathan Leipzig
Fraser HA	Drs. Roy Morton, Emil Lee
Provincial Health Services Authority	Georgene Miller, Jason Choi, Heather Paterson
Providence Health Care	Drs. Ron Carere, Jonathan Leipzig.
St. Joseph's General Hospital	Jane Murphy
BC Cancer Agency	Dr. Monty Martin
UBC Dept. of Radiology	Dr. Bruce Forster
College of Physicians and Surgeons of BC	Drs. Heidi Oetter, Michael Murray.
Lower Mainland Medical Imaging	Sue Avery, Paul Brownrigg. Drs. Jonathan Leipzig, Emil Lee
Radiology QI System (RQIS)	Georgene Miller, Jason Choi
RQIS Data Validation & Review Committee	Dr. David Coupland
BC MQI Medical Imaging Quality Improvement working group	Drs. Bruce Forster & Monty Martin (chairs) and the members
BC Ministry of Health	Tricia Braidwood-Looney and other colleagues
HealthMatchBC	John Mabbott, Deb Cannon

With thanks. Apologies for any omissions.

Appendix H. Glossary of Abbreviations

BC MQI	BC Medical Quality Initiative, took on the Cochrane work from PQASC in 2015
BCRS	The BC Radiology Society
CACTUS	The provincial credentialing & privileging system
CPD	Continuing Professional Development
CPSBC	The College of Physicians and Surgeons of BC. Also referred to as the College.
CT	Computerized tomography
DoBC	Doctors of BC, formerly the BC Medical Association
DVRC	Diagnostic Validation and Review Committee, part of RQIS
FHA	Fraser Health Authority
FMRAC	Federation of Medical Regulatory Authorities of Canada
HA	Health Authority
IHA	Interior Health Authority
MIAC	BC's Medical Imaging Advisory Committee
MIQI	The Medical Imaging Quality Improvement working group of BC MQI
MRI	Magnetic Resonance Imaging
NHA	Northern Health Authority
PACS	Picture Archiving and Communication System. Stores & transmits images electronically
PHSA	Provincial Health Services Authority
PICC line	Peripherally inserted central catheter line, for administration of e.g. cancer drugs
PMSEC	Provincial Medical Services Executive Council
PPEF	Physician Performance Enhancement Framework
PQASC	Physician Quality Assurance Steering Committee, led the Cochrane work from 2011-15
PREMS	Patient reported experience measures
PROMS	Patient reported outcome measures
RQIS	The BC Radiology Quality Improvement System
simplr	The company which produces CACTUS
SOLAR	An access auditing module for CACTUS. See Section 5.3.3
UBC	University of British Columbia
VCH	Vancouver Coastal Health Authority
VIHA	Vancouver Island Health Authority, now Island Health