Received: 4 December 2021 | Revised: 4 December 2021 | Accepted: 17 December 2021

DOI: 10.1002/acm2.13515

JOURNAL OF APPLIED CLINICAL MEDICAL PHYSICS

EDITORIAL

The need for dedicated time for medical physicists practice quality improvement efforts in radiation oncology department: A commentary

1 | INTRODUCTION

There is no universally accepted definition of quality improvement (QI). However, the American Board of Radiology (ABR) defines "QI" as "a systematic approach to the study of healthcare and/or a commitment to efforts to continuously improve performance and outcomes in healthcare". According to Kruskal et al.,[1] QI in radiation oncology includes "(a) quality assurance programs for continuous improvements in quality, (b) processes to improve staff and patient safety, and (c) procedures to improve the clinical, technical, and therapy performance of all staff".[1] Fundamentally, QI techniques are, well founded methods to drive change and improve efficiency. The goal of QI is therefore to create practical processes and structures that will introduce positive change into a work environment in a reproducible and sustainable way that is non-disruptive and at an acceptable cost. There are many forces that can drive the creation of QI programs in radiation oncology. The first is the desire to provide high-quality patient care, which is defined by the Institute of Medicine as "safe, effective, patient-centered, timely, efficient, and equitable care".[2] The second is the mandate of accrediting bodies such as the Joint Commission and the American College of Radiology (ACR), whose accrediting standards further support this goal. The third is the economic incentives to provide high-quality care at an affordable cost.[3]

Clinical medical physicists (MPs) are often viewed as the custodians of quality in radiation therapy department. Radiation therapy is a long-complicated process and therefore has numerous avenues for potential QI endeavors.[4,5] These QI initiatives demand time and resources to be successful. More often, when time is not reserved, these initiatives become administrative burdens on the staff adding to their already established workflow. To make QI relevant, feasible and sustainable, it is necessary to embed it into MP workflow. This act transforms QI from a burden, which places an extra demand on physicists' time, into an exercise of team ingenuity. Clinical MPs dedicated time is therefore recommended to support QI. The justifications for this recommendation are presented in this commentary.

2 | NEED FOR MPs' QI

2.1 | Accreditation requirements

Hospital accreditation is an external systematic assessment of a hospital's structures, processes, and results by an independent professional body using pre-established accepted optimum standards. Accreditation has an important role in establishing standards and in improving the quality, safety, effectiveness, and efficiency of hospital services.[6] There are three professional organizations that may provide radiation oncology accreditation: the American College of Radiology (ACR), the American Society for Radiation Oncology (ASTRO), and the American College of Radiation Oncology (ACRO).[7–9] The accreditation programs from ACR, ASTRO, and ACRO are Radiation Oncology Practice Accreditation (ROPA), Accreditation Programs for Excellence (APEX), and Practice Accreditation Program (PAP), respectively. These programs provide radiation oncologists with an independent and impartial peer review. Facility staff, equipment, treatment-planning, treatment records, patient-safety policies, and quality control/quality assessment activities are all assessed.[7–9] ACR established ROPA in 1986. ACRO's PAP was initiated in 1996 as a service to ACRO members.[7] ASTRO unveiled its accreditation program for excellence in late 2015.

2.2 | Maintenance of Certification

The American Board of Medical Specialties (ABMS) – a 24-member board, representing all medical

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2022 The Authors. *Journal of Applied Clinical Medical Physics* published by Wiley Periodicals, LLC on behalf of The American Association of Physicists in Medicine

subspecialties in the USA, in March 2000, agreed to initiate specialty-specific Maintenance of Certification (MOC) programs. Diplomats are no longer issued lifetime certification, instead they need to provide documentations of continued learning and QI. MOC recognizes that in addition to medical knowledge, several essential elements such as communication skills involved in the delivering quality care must be developed and maintained throughout one's career.[10,11]

The ABR representing diagnostic radiology, radiation oncology, and radiation physics has developed their own MOC program, which was approved by the ABMS, and initiated with full implementation for all three disciplines starting in 2007.[10,11] The ABR MOC has four components: professional standing, lifelong learning and self-assessment, cognitive expertise, and evaluation of practice performance. The self-evaluation of practice performance includes the process of continuing QI and is entitled "Practice Quality Improvement" (PQI).[12] The ABR's guidelines state that "every radiologic physics diplomate must complete a PQI project. The choice of PQI activities and projects are to meet the spirit of the definition of QI".[10,14] Medical Physics embodies a wide range of clinical aspects and ABR has identified five possible PQI areas: safety of patients, employees and public, accuracy of analysis and calculation, report turnaround and communication issues, and practice guidelines and standards and surveys.[10] In addition, the diplomate must demonstrate a commitment to maintaining competency as a radiologic physicist.[10] Effective from 15 March 2016, the ABR instituted the continuous certification and annual "look-back" processes which in part requires diplomates to have completed at least one PQI project in the previous 3 years. In a Medical Physics point/counter point article, Njeh et al.[15] argued that PQI project could provide background material for research and publication.

3 | MEDICAL PHYSICISTS' PQI

Methodical PQI has never been a mainstream MPs' activity, but the forgone sections have established the need for MPs to be active participants in these projects. This has been echoed in the growing request for PQI training to be included in the medical physicist residence syllabus.[16] The benefits to patients, clinicians, and healthcare providers of engaging in PQI are considerable, but there are many challenges involved in designing, delivering, and sustaining a QI intervention.[17] However, to have successful PQI projects some of these challenges need to be addressed: training, leadership support, time allocation, appropriate tools, mechanism for data collection, financial resources, human resources, and selecting the right project.[13,17]

3.1 | Training

MP needs to be trained in the process and procedures of PQI as they affect an individual's practice of radiologic Physics.[10] This education requirement is echoed by Medical Physics residency programs accrediting agencies. Nonetheless, recent surveys indicate that most programs lack a formal program to support this learning.[16,18] The success of a PQI project depends on proper training on effective use of QI methodology.[13] Six Sigma and Lean are more common QI methods.[5,19] Six Sigma reduce process variation by decreasing defects to a specific statistical measure. Six Sigma projects use a five-phased process known as DMAIC (define, measure, analyze, improve, and control).[20] The main emphasis of Lean is on cutting out unnecessary and wasteful steps in the delivery of a service. Lean uses a technique called value stream mapping. The next step is to apply the 5S (sort, simplify, sweep, standardize, and self-discipline).[21–23] Six Sigma and Lean have a complementary relationship with each other and can be combined as Lean Six Sigma. The synergetic adoption of these methods allows the creation of a continuous process flow that eliminates waste (Lean) and reduces process variation (Six Sigma), to achieve and maintain the best quality.[24]

Education and training are also required in other quality control tools like root cause analysis (RCA), failure mode and effect analysis (FMEA),[25] and incident reporting and learning (IRL). RCA is a reactive retrospective approach used to ascertain the "root cause" of a problem that has already occurred, whereas FMEA is a proactive prospective systematic approach that is used to identify and understand causes, contributing factors, and effects of potential failures on a process, system, or practice. IRL is about using the opportunities from reported actual or potential incidents and analyzing them to determine the systemic and human factors involved.[22,26,27] IRL is a reactive and retrospective look at a known error.

3.2 | Leadership support

Critical elements in any quality program include leadership willingness to experiment and take risks. Institutional leadership and support send the message that all quality-related efforts are valued and constitute a central component of the institution's mission. This important message should be enhanced by tangible support. This support may be financial such as the provision of human resources such as a departmental quality coordinator, or administrative, such as establishing and facilitating interdepartmental quality forums or adverse event reporting systems. Further leadership support can be demonstrated by the acknowledgment of efforts and successes.[1,13,28–30]

Leadership support is more critical when there is a bump in the road. As Hawkins[31] eloquently states "There will be moments during all performance improvement projects when things do not go as planned or unforeseeable obstacles arise. If there is not a buy-in from leadership—from people to whom members of your department look for guidance—then the initiative will fail. Simply engaging these individuals is likely not enough. As a QI project leader, you must clearly show key leadership stakeholders why the desired change is necessary, and how you plan to achieve the desired results. Hopefully, they have established a culture that supports such efforts".[31]

3.3 | Time resources

The magnitude of resources required to support quality improvements is often underestimated, but without adequate financial support, infrastructure, managerial skills, and dedicated time, efforts to improve quality can quickly run into difficulties.[17] Time has been identified by many as a critical component of successful PQI projects.[3,17,30,32–34] Broder et al.[3] advocated in their article that extra staffing is a prerequisite for successful QI projects. Extra staffing can then be used to give the required time needed to – identify and define the process or problem, collect and analyze the data, generate and prioritize solutions, and finally implement change and monitor results.[1] After determination of the proper staffing and skills needed, roles and time allocation should be clearly defined.[3] Kaplan et al.[32] conducted a literature review of factors affecting the success of QI projects. The most frequently examined contextual factors were funding, general resources, and time. Studies that assessed time resources for QI found positive associations in 60% of the associations tested.[35] Choudhery et al.[33] examined radiology resident participation in PQI projects and reported that resident with dedicated time were more likely to complete a PQI and to publish their results. In a survey of 25 healthcare professionals who had recently carried out PQI projects, having limited time to perform the initiative was considered the most important barrier.[30] In day-to-day activities, one is likely to have competing priorities and will need support to make time for QI.

4 | CONCLUSIONS

By providing MPs dedicated time for PQI projects, management upholds its core values which include a commitment to excellence, by ingraining QI into the fabric of all clinical processes and in all aspects of the services we provide, excellence in quality and safety of clinical care, and service to our patients and customers and adherence to regulatory compliance for QI initiatives. Furthermore, it demands accountability for the dedicated time and thus more likely the success of the PQI projects. Most of the PQI projects will result in improved patient care and reduce costs in the provision of radiation therapy. Some PQI projects will generate background data for research and publications. Last, clinical MP will meet their MOC part IV requirement.

ACKNOWLEDGMENT

We thank Deputy Editors-in-Chief Timothy Solberg and Per Halvorsen for their valuable and perceptive comments.

AUTHORS CONTRIBUTIONS

All authors contributed significantly to the drafting and the final manuscript.

CONFLICT OF INTEREST

None to declare.

Richard Zellars
Christopher Njeh
Scott Marquette

Department of Radiation Oncology, Indiana University, School of Medicine, Indianapolis, Indiana, USA

Correspondence
Christopher Njeh, Department of Radiation Oncology, Indiana University, School of Medicine, 535 Barnhill Drive, RT054, Indianapolis, IN 46202, USA.
Email: cnjeh@iu.edu

REFERENCES

1. Kruskal JB, Eisenberg R, Sosna J, Yam CS, Kruskal JD, Boiselle PM. Quality initiatives: Quality improvement in radiology: basic principles and tools required to achieve success. *Radiographics*. 2011;31(6):1499-1509.
2. Wolfe A. Institute of Medicine Report: Crossing the Quality Chasm: A New Health Care System for the 21st Century. *Policy, Politics, & Nursing Practice*. 2001;2(3):233-235.
3. Broder JC, Cameron SF, Korn WT, Baccei SJ. Creating a Radiology Quality and Safety Program: Principles and Pitfalls. *Radiographics*. 2018;38(6):1786-1798.
4. Chera BS, Mazur L, Jackson M, et al. Quantification of the impact of multifaceted initiatives intended to improve operational efficiency and the safety culture: a case study from an academic medical center radiation oncology department. *Practical Radiation Oncology*. 2014;4(2):e101-e108.
5. Kapur A, Potters L. Six sigma tools for a patient safety-oriented, quality-checklist driven radiation medicine department. *Practical Radiation Oncology*. 2012;2(2):86-96.
6. Viswanathan HN, Salmon JW. Accrediting organizations and quality improvement. *Am J Manag Care*.2000;6(10):1117-1130.
7. Cotter GW, Dobelbower RR, Jr. Radiation oncology practice accreditation: the American College of Radiation Oncology, Practice Accreditation Program, guidelines and standards. *Crit Rev Oncol Hematol*. 2005;55(2):93-102.

8. Ellerbroek NA, Brenner M, Hulick P, Cushing T, American College of R. Practice accreditation for radiation oncology: quality is reality. *J Am Coll Radiol*. 2006;3(10):787-792.
9. Rustgi SN. Medical physics aspects in accreditation of radiation oncology practice. *J Med Phys*. 2016;41(3):157-161.
10. Frey GD, Ibbott GS, Morin RL, Paliwal BR, Thomas SR, Bosma J. The American Board of Radiology Perspective on Maintenance of Certification: Part IV: Practice quality improvement in radiologic physics. *Med Phys*. 2007;34(11):4158-4163.
11. Thomas SR, Hendee WR, Paliwal BR. The American Board of Radiology Maintenance of Certification (MOC) Program in Radiologic Physics. *Med Phys*. 2005;32(1):263-267.
12. Strife JL, Kun LE, Becker GJ, Dunnick NR, Bosma J, Hattery RR. The American Board of Radiology perspective on maintenance of certification: part IV–practice quality improvement in diagnostic radiology. *J Am Coll Radiol*. 2007;4(5):300-304.
13. Lee CS, Wadhwa V, Kruskal JB, Larson DB. Conducting a Successful Practice Quality Improvement Project for American Board of Radiology Certification. *Radiographics*. 2015;35(6): 1643-1651.
14. Donnelly LF. Invited Commentary: Changes to the ABR Policy on Requirements for Diplomates to Meet MOC Part 4–PQI Projects and Activities. *Radiographics.* 2015;35(6):1652-1654.
15. Njeh CF, Silosky MS, White G. As part of Maintenance of Certification (MOC), all clinical medical physicists should be expected to periodically demonstrate some clinical research in the form of meeting presentations and published articles. *Med Phys*. 2021;48(2):542-545.
16. Ford EC, Nyflot M, Spraker MB, Kane G, Hendrickson KRG. A patient safety education program in a medical physics residency. *J Appl Clin Med Phys*. 2017;18(6):268-274.
17. Dixon-Woods M, McNicol S, Martin G. Ten challenges in improving quality in healthcare: lessons from the Health Foundation's programme evaluations and relevant literature. *BMJ Qual Saf*. 2012;21(10):876-884.
18. Spraker MB, Nyflot MJ, Hendrickson KRG, et al. Radiation oncology resident training in patient safety and quality improvement: a national survey of residency program directors. *Radiat Oncol*. 2018;13(1):186.
19. Donnelly LF, Mathews VP, Laszakovits DJ, Jackson VP, Guiberteau MJ. Recent Changes to ABR Maintenance of Certification Part 4 (PQI): Acknowledgment of Radiologists' Activities to Improve Quality and Safety. *J Am Coll Radiol*. 2016;13(2):184-187.
20. Liu S, Bush KK, Bertini J, et al. Optimizing efficiency and safety in external beam radiotherapy using automated plan check (APC) tool and six sigma methodology. *J Appl Clin Med Phys*. 2019;20(8):56-64.
21. Amaratunga T, Dobranowski J. Systematic Review of the Application of Lean and Six Sigma Quality Improvement Methodologies in Radiology. *J Am Coll Radiol*. 2016;13(9):1088-1095 e1087.
22. Kelly AM, Cronin P. Practical Approaches to Quality Improvement for Radiologists. *Radiographics*. 2015;35(6):1630-1642.
23. Kruskal JB, Reedy A, Pascal L, Rosen MP, Boiselle PM. Quality initiatives: lean approach to improving performance and efficiency in a radiology department. *Radiographics*. 2012;32(2):573-587.
24. Mancosu P, Nicolini G, Goretti G, et al. Applying Lean-Six-Sigma Methodology in radiotherapy: Lessons learned by the breast daily repositioning case. *Radiother Oncol*. 2018;127(2):326-331.
25. Thornton E, Brook OR, Mendiratta-Lala M, Hallett DT, Kruskal JB. Application of failure mode and effect analysis in a radiology department. *Radiographics*. 2011;31(1):281-293.
26. Shaqdan K, Aran S, Daftari Besheli L, Abujudeh H. Root-cause analysis and health failure mode and effect analysis: two leading techniques in health care quality assessment. *J Am Coll Radiol*. 2014;11(6):572-579.
27. Gillan C, Davis CA, Moran K, French J, Liszewski B. The Quest for Quality: Principles to Guide Medical Radiation Technology Practice. *J Med Imaging Radiat Sci*. 2015;46(4):427-434.
28. Kruskal JB, Anderson S, Yam CS, Sosna J. Strategies for establishing a comprehensive quality and performance improvement program in a radiology department. *Radiographics*. 2009;29(2):315-329.
29. Miller C, Pronovost P, Nagy P. Five roles for quality leadership in radiology. *J Am Coll Radiol*. 2012;9(4):282-284.
30. van Tuijl AAC, Wollersheim HC, Fluit C, van Gurp PJ, Calsbeek H. Development of a tool for identifying and addressing prioritised determinants of quality improvement initiatives led by healthcare professionals: a mixed-methods study. *Implement Sci Commun*. 2020;1:92.
31. Hawkins CM. Assessing local resources and culture before instituting quality improvement projects. *J Am Coll Radiol*. 2014;11(12 Pt A):1121-1125.
32. Kaplan HC, Brady PW, Dritz MC, et al. The influence of context on quality improvement success in health care: a systematic review of the literature. *Milbank Q*. 2010;88(4):500-559.
33. Choudhery S, Richter M, Anene A, et al. Practice quality improvement during residency: where do we stand and where can we improve? *Acad Radiol*. 2014;21(7):851-858.
34. Lim C, Cheung MC, Franco B, et al. Quality improvement: an assessment of participation and attitudes of medical oncologists. *J Oncol Pract*. 2014;10(6):e408-414.
35. Kaplan HC, Provost LP, Froehle CM, Margolis PA. The Model for Understanding Success in Quality (MUSIQ): building a theory of context in healthcare quality improvement. *BMJ Qual Saf*. 2012;21(1):13-20.