

QuARCC: The Quality Assurance Research Reproducibility Collaborative

RL Hegstad-Davies, PhD¹, K Laube¹, C Bakker, MLIS², F Sayre, MLIS², and Y Shimizu, PhD³

¹ University of Minnesota College of Veterinary Medicine, St. Paul, MN, ² University of Minnesota Health Sciences Libraries, Minneapolis, MN,

³ University of Minnesota Medical Scientist Training Program (MD/PhD), Minneapolis, MN.

Introduction

Research Quality Assurance (RQA): A strategy for improving research rigor.

Scientists need risk-based and sustainable strategies to ensure data quality throughout the research process without restricting their ability to be innovative and flexible. Sound scientific principles and good quality practices are required to ensure credible research. (Figure 1). Unfortunately, research quality checkpoints are rare throughout the critical steps where data and metadata are generated.¹

	Sound Scientific Principles	Good Quality Practices	Credibility of Research
Study 1	No	No	No
Study 2	No	Yes	No
Study 3	Yes	No	No
Study 4	Yes	Yes	YES

Figure 1: How sound scientific principles and good quality practices contribute to the credibility of results. (World Health Organization: Quality Practices in Biomedical Research Handbook, 2006)

The integration of RQA programs into research settings is a recommended best practice² for institutions that conduct exploratory research because they ensure that data are fit for purpose, free from defects, traceable, and will meet a predetermined quality standard throughout the research life cycle.

The **Quality Assurance Research Reproducibility Collaborative** was designed to provide foundational training in RQA for MD/PHD trainees within the context of their specific research setting.

1. Reproducibility 2020: Progress and Priorities. LP Freedman et al. bioRxiv preprint first posted online Feb. 16, 2017; doi:<http://dx.doi.org/10.1101/109017>.

2. Robust Research: Institutions must do their part for reproducibility. CG Begley et al. Nature, 01 Sep 2015.

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Approach

Trainees: 12 MD/PhD and PhD pre-doctoral trainee volunteers [Laboratory Medicine & Pathology, Biochemistry, Neuroscience, Genetics, Microbiology, Immunology, and Cancer Biology].

Instructors: University of Minnesota Scientists with expertise in Quality Assurance (Quality Central Program), Educational Paradigms (Center for Education Innovation) and Data Management (Library).

Figure 2: Learning Objectives: Upon completion of this program, trainees will develop a process to:

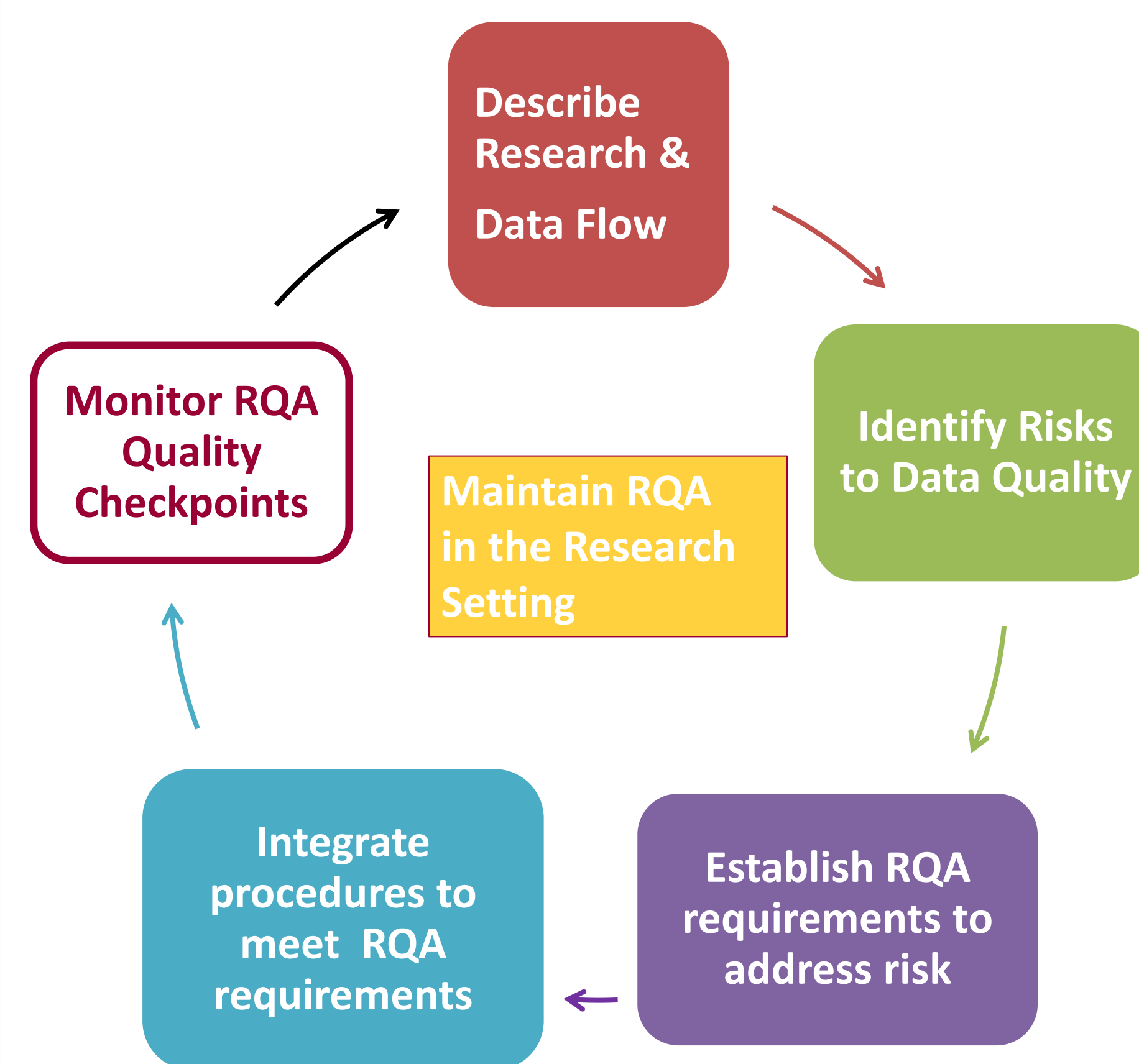
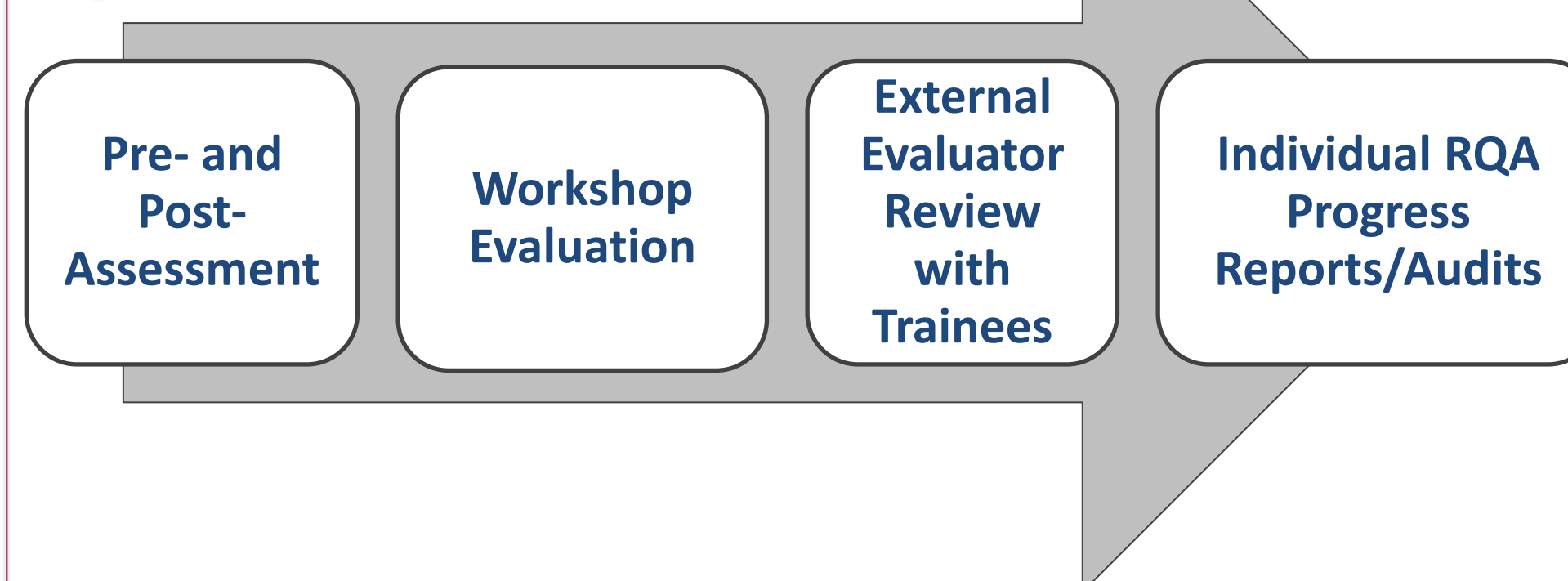


Figure 3: QuARCC Evaluation



Methods

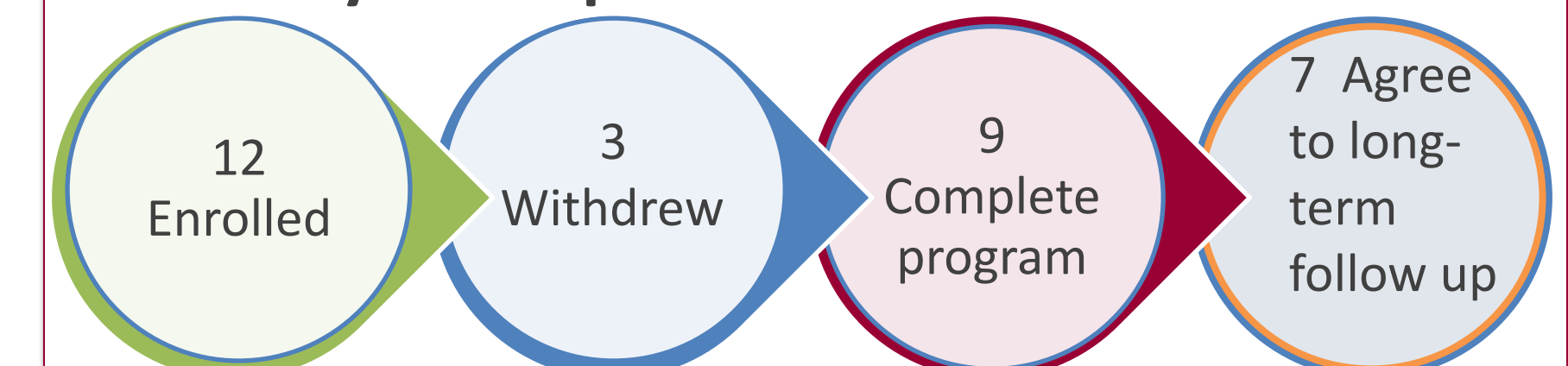
Training Event	RQA Topic
Kick Off Event	Introductions, Research Scientist Panel Discussion; Pre Training Assessment
Workshop 1 1 hour	Research Description Data Flowcharts
Workshop 2 1 hour	Risk Assessment
Workshop 3 1 hour	Introduction to RQA Quality System Elements and Management
Workshop 4 1 hour	Data storage, documentation and organization
Workshop 5 Individual consultation	Applying RQA within your setting Generating a RQA Checklist Progress Report Meetings (5 meetings over 3-6 months)
Workshop 6 2 days	Data Carpentry Workshop: computational skills needed for data management and analysis
Workshop 7 1 hour	Using RQA requirements to maintain and monitor progress within the research lab setting.

Figure 4: The elements of RQA that generate credible evidence of research quality and integrity.



Early Outcomes

Voluntary Participation Outcomes



Withdrew	When	Reason
1	After Kick-Off Event	Questionable Value
1	After Workshop 1	Questionable Value
1	After Workshop 4	Time Constraints

Early Lessons Learned

1. Consider identifying additional training targets [lab managers and technical staff] to support the research scientist and ensure that RQA best practices are embedded within the lab culture.
2. Scheduling and work load is difficult for trainees.
3. Trainees appreciate the focus on their research setting [research-in-context].

Future Goals

1. Create blended training program using online content and training – in- context.
2. Create fewer, but longer group workshops followed by individual support.
3. Develop a long-term and supportive monitoring program.
4. Develop RQA training program for lab managers and technicians.
5. Encourage centralized support of Research Quality Assurance within exploratory research settings.