Quailty Improvement—Improved with R

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Suggested length of workshop is **2 hours**.

What might the attendee be able to do after being in your session?

In this workshop, attendees will learn how to use R[1] to create, analyze, share, and publish the results of quality improvement (QI) projects based on tools[2] published by the Institute for Healthcare Improvement and publishing recommendations from the Journal Of Graduate Medical Education.[3] This is a plug and play format that allows clinicians to directly create, analyze, and beautifully display their project and results with only a beginner's knowledge of R, R Markdown,[4] and spreadsheets.

Description of the problem or gap

Many clinical informaticians participate in QI projects as either project leads or in supporting roles—helping other clinicians collect data from EHRs or implement projects within an EHR. There are many tools and guidelines for QI projects, but the tools are not well integrated into a single, comprehensive workflow of a QI project.

Conclusion

At the end of the workshop, participants will have the knowledge and materials to create a QI project write-up and analysis all within a single R Markdown file. They will learn how to customize the project to suit many QI project proposals. This simplification of the QI project workflow will allow attendees to more quickly prepare QI project proposals and analyze their results. More advanced knowledge of R packages discussed at the workshop will allow users to create highly customized presentations of their work. A standardized tool to create QI projects will eliminate duplicated efforts in project workflows and allow results to be more quickly disseminated within an institution, posted online, or published in a journal.

Attendee's Take-away Tool

Attendee's will be able to access the QI tools through a publicly available GitHub repository, which they will be able to download and modify for their own purposes. They will also receive a curated selection of advanced resources for further learning.

Prerequisities

- Computer with internet connection
- Supported browser
- RStudio Cloud account—*free*
- Review preparatory materials to learn Markdown basics—*optional, but useful*

Level of content

All content will be accessible to a beginner R user. However, each section of the **Play** part of the workshop will have intermediate and advanced topics embedded in the code for more advanced users to manipulate.

Instructor's experience teaching similar content

Mara Alexeev is a pediatrician and clinical informatics fellow. She is also a graduate student working on her Masters in Biomedical Informatics at Harvard Medical School. She was part of the organizing committee for the 2020 R/Medicine conference and is a co-organizer for R-Ladies Boston, where she recently hosted a workshop on how to make and maintain a CV in R.

Outline of topics

Systems check *~15 minutes*

- Confirm accounts set up
- Discuss pre-workshop materials

Introduction *~30 minutes*

- R Markdown demo
- Knit a document
- View a demo GitHub Page

Play *~30 minutes*

- Modify cause and effect diagrams within R
- Customize tables and graphs for a Failure Modes and Effects Analysis (FMEA) and a Pareto Chart
- Learn how to make scatter plots (Figure 1) and histograms (Figure 2) with ggplot2
- Create runcharts that can update as data is collected with a click of button
- Use the automated bibliographic capabilities of R

Wrap Up and Discussion *~20 minutes*

- Discussion of participants questions
- Watch demonstration of publishing to Github Page
- Preview of advanced materials

Use of Knowledge Acquired at Previous AMIA Events

No.

References

1. R Core Team. R: A language and environment for statistical computing [Internet]. Vienna, Austria: R Foundation for Statistical Computing; 2020. Available from: https://www.R-project.org/

2. Quality Improvement Essentials Toolkit [Internet]. 2017 ;[cited 2021 Jan. 13] Available from: http://www.ihi.org/resources/_layouts/download.aspx?SourceURL=%2fresources%2fKnowledge+Center+Assets%2fTools+-+QualityImprovementEssentialsToolkit_e14261f9-05ff-4a7b-ba25-58c85c4c9e9a%2fQIEssentialsToolkit.pdf

3. Wong BM, Sullivan GM. How to Write Up Your Quality Improvement Initiatives for Publication [Internet]. Journal of Graduate Medical Education. 2016 May ;8(2):128–133.[cited 2021 Jan. 12] Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4857497/

4. Allaire J, Xie Y, McPherson J, Luraschi J, Ushey K, Atkins A, Wickham H, Cheng J, Chang W, Iannone R. Rmarkdown: Dynamic documents for r [Internet]. 2020. Available from: https://github.com/rstudio/rmarkdown

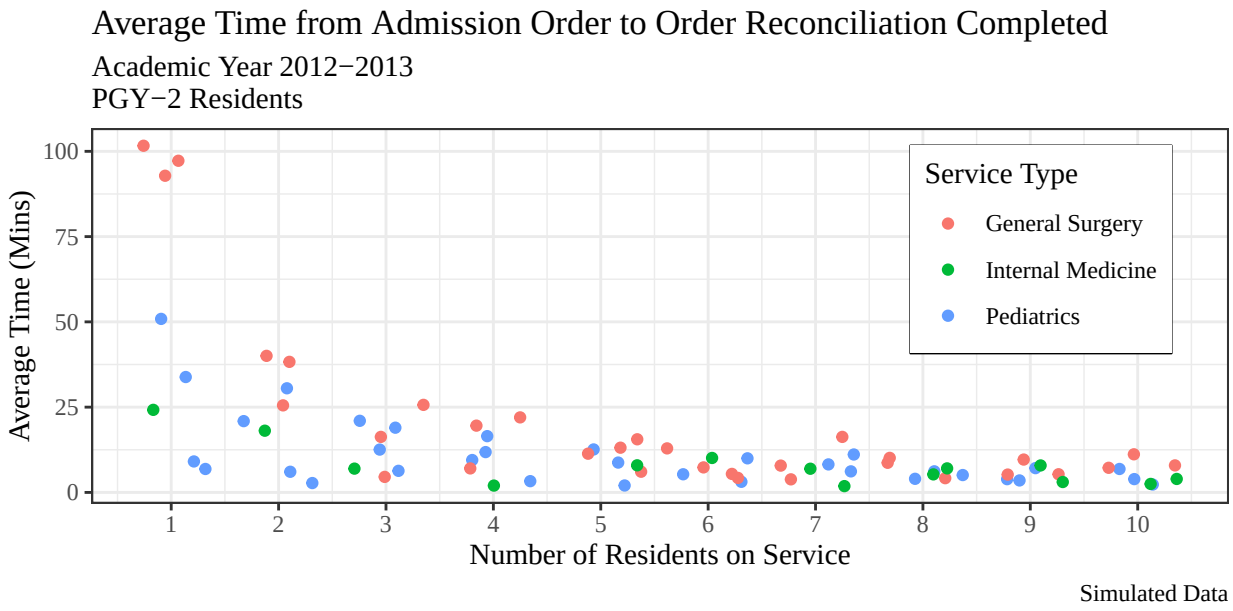

Figure 1: Example scatter plot made in R

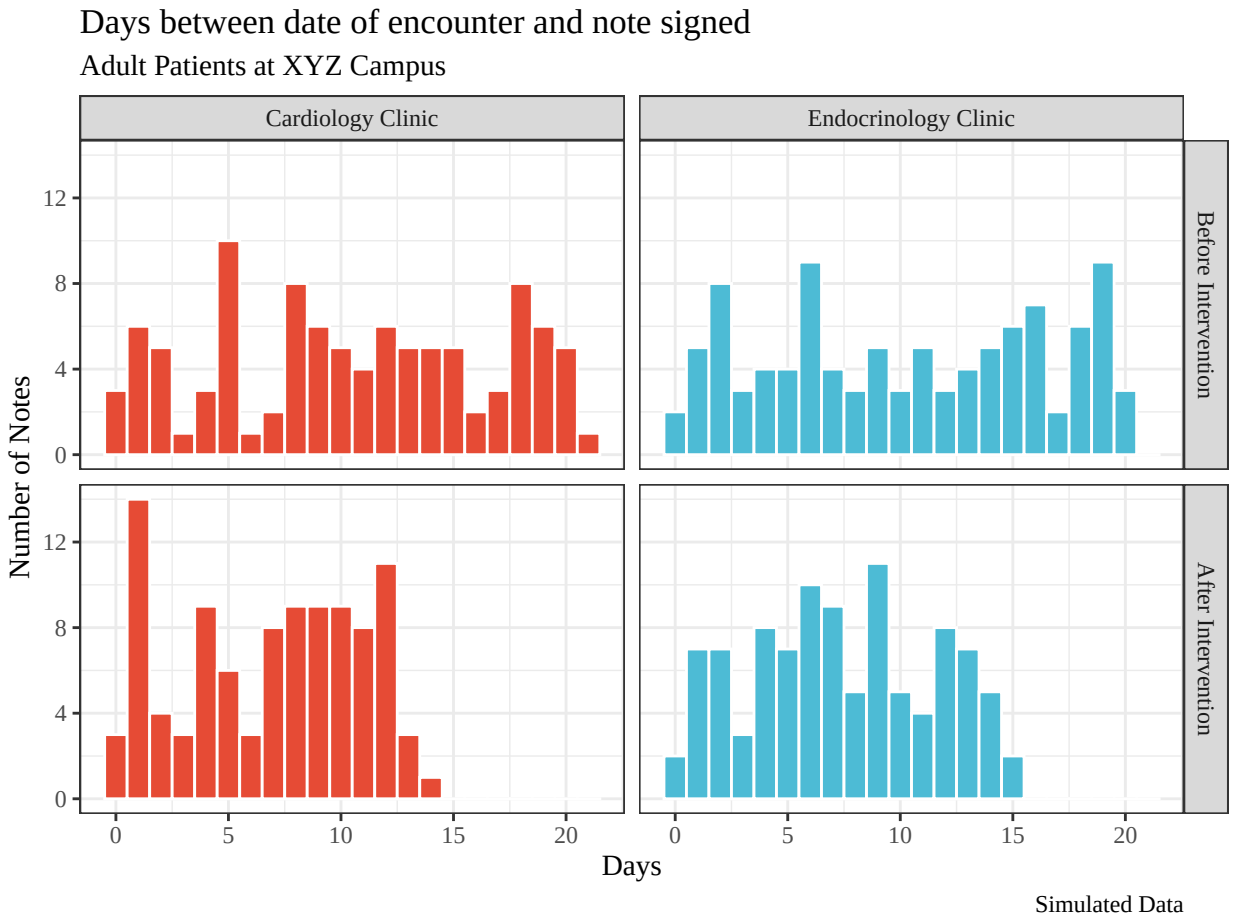

Figure 2: Example histogram created in R