Bioinformatics Summer School Report

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Project title: Refining and Evaluating the Usability of a Maternal Health Equity Dashboard

1. Introduction

In 2022 in the United States (US), 817 maternal deaths were recorded, with a disproportionate impact on racial/ethnic minority groups, as the maternal mortality rate among Black women was 2.6 times higher compared to non-Hispanic white women. Integrating equity dashboards within individual hospitals to identify and monitor racial variations in maternal health outcomes is one actionable step in addressing the issue. This study aims to refine and evaluate the usability of a previously developed maternal health equity dashboard.

2. Materials and Methodology

To develop the equity dashboard, we utilized incident reports and delivery dataset of a US-based academic health system from 2019 and 2020. Patient demographics were linked and disaggregated by race/ethnicity. Measures were selected based on area with previously identified disparities in maternal health outcomes, areas of concern identified through hospital level data analysis, and other measures modifiable through the delivery of care and those recommended by our collaborators. The dashboard was iteratively developed using Tableau Desktop (2023.2).

By implementing Python scripts on Jupyter Notebook, we optimized the process of raw data linking and cleaning such that each unique delivery data is linked with patient's race/ethnicity and stored in a designed data template. The dashboard interface was refined by gathering insights from clinical collaborators. Additional metrics, e.g. labor induction, were added based on their feedback.

Usability testing is being conducted with 10-12 maternal healthcare professionals to assess the dashboard's usability and gather feedback. The test will be structured around Task Performance, Interaction Workflow, Perceived Engagement, and Potential Utility.

3. Results and Discussion

The dashboard that will be tested includes 18 visuals on process, outcome, and morbidity indicator measures, and interactive elements like dropdown menus and text descriptions to improve comprehensibility. Following the usability testing, we will make improvements to the interface design, and the automation of data integration will make the dashboard more user-friendly and easier to implement. By enhancing these features, healthcare providers will have access to UpToDate, accurate data that allows them to promptly identify variations in the quality of care and make informed decisions on patient care and equity.

4. Skills and Knowledge Gained

I have learned more about ethics in research and how to deal with patients' private data. I also developed a deeper understanding of programming, specifically with Python. I also learned more about data presentation and how graphs can affect the perception of information. I have developed my teamwork skills and learned how to be a viable part of a larger team. I also learned how to communicate my thoughts better, and also got better at dealing with stressful tasks.

5. Challenges and Solutions

The major challenge I was facing was too much work. I taught myself how to manage my time and not spend it on something that is not useful. The solution for the problem I was facing is time management and clear communication.

6. Conclusion

Overall, this journey was a very fruitful experience where I learned so much about different topics in such a short time. I became more interested in bioinformatics and data science, and I can clearly see the importance of data science in our daily lives. After this program, I felt like I want to explore bioinformatics even further and might look into getting a master's degree in this field.

7. Acknowledgments

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8. References (if applicable)

Hoyert DL. Maternal Mortality Rates in the United States, 2022. 2024