

# Critical Data Literacy: Addressing Race as a Variable in a Preclinical Medical Education Session

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## 1. Background

### Course Background

At the Himmelfarb Health Sciences Library, librarians conduct instruction sessions on various aspects of evidence-based medicine for first- and second-year medical students. One of these sessions, the Chest Pain Formative Observed Simulated Clinical Experience (FOSCE), introduces the Framingham Study, later cohort studies, and the Atherosclerotic Cardiovascular Disease (ASCVD) Risk Calculator to first-year medical students. This calculator includes race as an input and over or underestimates risk for certain groups. This session previously mentioned the need to diversify study populations and described the evolution of the algorithm, but it did not highlight these as critical issues for discussion. Beyond noting this discrepancy and moving on, Himmelfarb librarians saw an opportunity to introduce critical data literacy concepts and examine the use of race as a variable in clinical algorithms.

*When compared with non-Hispanic whites, estimated 10-year risk of ASCVD is generally lower in Hispanic-American and Asian-American populations and higher in American-Indian populations; hence, the lack of race/ethnicity-specific risk algorithms is an important gap in our efforts to understand and prevent ASCVD in these populations. Although the development of algorithms specific to these racial/ethnic groups is encouraged, in the interim, providers may consider using the equations for non-Hispanic whites for these patients. When doing so, the estimated risks may be overestimates, especially for Hispanic and Asian Americans.[1]*

### Race as a Variable

Medical students at George Washington University are educated on race as a determinant of health [2, 3]. As clinicians, medical students will need to understand the clinical algorithms they use in their practice. They will need to be able to think critically about the data that created these algorithms and thus underlies any clinical applications. In gathering the data used to create these algorithms, researchers and clinicians tend to use the five races and two ethnicities recommended by the Office of Management and Budget [4]. Alternatively, the NIH offers six racial and ethnic categories “to promote uniformity and comparability of data on race and ethnicity” [5]. While these categories are useful for descriptive statistics, when used in prescriptive clinical guidelines race can exacerbate inequalities by “cement[ing] racism into practice and policy” [4]. Students are questioning the use of race in clinical decision making [6], and those questions need to be addressed during the course of their education. Fostering discussion while encouraging critical data literacy is a worthy aim for library instruction.

## 3. Session Delivery & Reflection

In February 2021, six librarians led fourteen 50-minute sessions via WebEx for approximately 200 students.

Librarians reflected on the session via email. Some librarians omitted discussion of critical thinking questions:

- Time was a limitation to engaging in conversations: Navigating WebEx features and setting up breakout rooms took more time than leading in-person sessions
- Librarians acknowledged difficulties encouraging conversation in virtual settings: Students did not engage in the virtual session as compared to years past in person



### Students raised questions:

- Where is the evidence that the calculator over- or underestimates risk for some groups?
- When working through practice scenarios including ethnic identifiers, students asked, Is this patient “white”?

### Key messages resonated with students:

- Be aware of the composition of the dataset and possible limitations, areas for improvement
- Use the evidence to treat the individual patient

Materials will be added to 2022 teaching manual and slides:

To address *Where is the evidence that the calculator over- or underestimates risk for some groups?*

- Validation studies [7]
- 2019 Guidelines [8]
- Show continuous evolution of evidence and guidance

When students ask, *Is this patient “white”?*

- *NOT-OD-15-089: Racial and Ethnic Categories and Definitions for NIH Diversity Programs and for Other Reporting Purposes* [5]
- Discuss race as a social construct [6, 9]
- Explore challenges, opportunities, and obligations in data collection, analysis, and application, i.e., *AHRQ RFI: Use of Clinical Algorithms That Have the Potential to Introduce Racial/Ethnic Bias into Healthcare Delivery* [10]

### CVD Risk Enhancers

- Calculators overestimate risk in some groups (Mexican-Americans, East Asians)
- Calculators underestimate risk in some groups (Puerto Ricans, South Asians)
- Consider
  - Family history of early ASCVD
  - Current high cholesterol
  - Metabolic syndrome
  - Chronic kidney disease
  - Chronic inflammatory conditions
  - History of pre-eclampsia or early menopause
  - High-risk ethnicity (e.g. South Asian Ancestry)
  - High lipid biomarkers
  - Triglycerides  $\geq 175$  mg/dL
  - High-sensitivity C-reactive protein  $\geq 2.0$  mg/dL
  - Elevated lipoprotein (a)  $\geq 50$  mg/dL or  $\geq 125$  nmol/L
  - Elevated apolipoprotein B  $\geq 130$  mg/dL
  - Ankle-brachial index (ABI)  $< 0.9$

## 2. Session Materials & Preparation

*“Students learn to validate data sources, observe and question data gathering methods, and question data quality—practices that improve both critical data literacy and evidence-based decision making” [11]*

Librarians have been teaching the chest pain FOSCE session since 2015. The curriculum has changed little over the five years, except to accommodate the development of the risk estimator tool based on the pooled cohort equations. The session includes practice cases with racial and ethnic identifiers. To better align with school guidelines for the use of race, ethnicity, and other cultural groups, new materials provided critical thinking questions on whether identifiers were “relevant to disease pathophysiology” or “whether there is an epidemiologic association that is related to a genetic risk factor or is related to social or structural causes of racial health disparities, or both” [3].

For spring 2021, session materials were updated to

- discuss racial and ethnic identities used for data collection
- describe development of clinical algorithms from trial data
- encourage critical thinking and questioning of how commonly used tools are developed.

Session materials were updated to discuss algorithm development and to encourage discussion.

Students are asked to think about the composition of the dataset on which an earlier risk assessment tool was based. The librarian illustrates how guidance for risk assessment evolves:

*“the Work Group decided not to use the Framingham 10-year risk score for CHD risk assessment] in its 2013 recommendations because of the algorithm’s derivation in an exclusively white sample population and the limited scope of the outcome” [1]*

Students practice using the ASCVD Risk Estimator Plus. The calculator has an “Other” option, with a warning of the potential to over- and underestimate risk for different groups.

Librarians were provided with updated session materials and background readings (Supplemental Materials) and attended a preparatory meeting to discuss new materials.

- Discussion emphasized critical data literacy lens
- Concerns, including sensitive discussions and time constraints, were expressed

A final slide listed critical thinking questions inspired by “Hidden in Plain Sight” [4]

- How are race and ethnicity data collected? What categories are used?
- Is your patient population (P) represented in the derivation data set? An external validation data set?
- In what other algorithms is race used?

## 4. Future Directions

Additional materials and references will be added to the slides for next year’s session.

With the first session delivered, librarians can evaluate the success of the current updates and further develop the curriculum. Additional references and materials will be added to the session to respond to student and librarian feedback. Critical data literacy is a necessity in relation to more than just clinical algorithms. Broader applications and wider integration will be pursued. Librarians will further develop curriculum with an eye towards algorithmic bias, artificial intelligence, data donation, and other emerging issues.

Additional considerations for expanding the discussion in these and other sessions include

- Emphasizing the evolution of algorithms and representation in clinical trials and biomedical research
- Emphasizing the connection of understanding the originating dataset to applying clinical guidance and algorithms to individual patients, particularly coupled with use of the PICO framework, i.e. consider the population, the risk factors studied, and the outcomes tracked
- Emphasizing the importance of interrogating training data used in AI/ML

Beyond these specific considerations, more generally, we hope to

- Examine materials for other librarian-led sessions and courses with a critical lens
- Continue the conversations of critical data literacy, collection, and use among librarians
- Expand critical data literacy instruction to other audiences

*The revised FOSCE session offers an opportunity to raise awareness and encourage critical questioning and use of clinical algorithms*

Critical thinking about the development and use of clinical algorithms and race correction factors is a key skill for students to develop and can be applied across medical specialties, as illustrated by the examples in the table:

Tool	Clinical Utility	Race Variable Options and Calculator Warnings	Equity Concerns
The American Heart Association’s Get with the Guidelines—Heart Failure	Cardiology	Black race yes/no. Calculator Warning: “Race may/may not provide better estimates of in-hospital mortality; optional”	Race correction factor estimates lower risk for black patients, potentially leading to hesitancy in using clinical resources for black patients.
The Society of Thoracic Surgeons Short Term Risk Calculator	Cardiac Surgery	Race: Asian; Black/African American; American Indian/Alaskan Native; Native Hawaiian/Pacific Islander. Hispanic, Latino or Spanish Ethnicity.	Correction factors for race and ethnicity estimate increased risks, potentially discouraging doctors and patients from pursuing surgical treatment options.
Pulmonary-function tests, especially Spirometers	Pulmonology	Spirometers require race- or ethnic-based corrections for Black and Asian patients.[12]	Race correction factors lower the normal values for black and Asian patients, which may lead doctors to miss diagnoses of disease and impairment

Table adapted from [4]. For additional clinical tools, see the full table in the Supplemental Materials.

## References & Acknowledgements

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