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Investigating Critical Disparities in USMLE Step 1 Resources: Myocardial Infarction Symptoms in Women

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Abstract

Introduction: Coronary heart disease (CHD) is the leading cause of death in the United States. Myocardial infarction (MI) is a major complication of CHD and often fatal. Women with MI are at risk for underdiagnosis due to unique symptoms such as fatigue, nausea, and shortness of breath. Younger women under 55 have a higher risk of death from MI compared to men. Early recognition of these symptoms is essential but may not be adequately taught in medical education.

Methods: We conducted a cross-sectional analysis on November 13, 2023. The study examined the most recommended Step 1 resources listed in *First Aid for the USMLE Step 1 2023*. We performed a search for terms such as “women,” “female,” and “myocardial infarction” to identify content on biologic sex differences in MI symptoms.

Results: None of the evaluated resources, including *First Aid for the USMLE Step 1 2023,* UWorld Question Bank, and National Board of Medical Examiners Practice Exams, discussed biologic sex-specific MI symptoms.

Conclusions: The findings reveal a gap in medical education. USMLE Step 1 resources do not address the unique presentation of MI in women. This oversight may affect students’ ability to recognize MI symptoms in clinical practice. Medical curricula and licensing exams should include this topic to better prepare students. Improving education on biologic sex-specific symptoms can lead to better care and outcomes for women with CHD.

Introduction

In the United States, coronary heart disease (CHD) is the leading cause of mortality in both men and women.[1] Myocardial infarction (MI) is a common and potentially fatal complication of CHD. Women who present with chest pain are at risk of underdiagnosis.[1,2] Literature has shown that women may present with unique symptoms of myocardial infarction, and this may lead to delays in seeking care, being provided appropriate care, and resulting in poorer outcomes.[2-4] These unique symptoms include fatigue, nausea, and shortness of breath, along with the typical chest pain or discomfort associated with MI.[2-4] Other unique symptoms include confusion, syncope or presyncope, and vague abdominal symptoms.[2] Among women aged 55 or less is an

increased mortality risk of acute MI compared to men of the same age.[3] Prompt recognition of acute MI symptoms for women are crucial to optimizing outcomes.[3] One method of improving care begins as early as the foundational medical learning stages. Because students frequently work on the care team as early as their first year of medical school, being able to recognize these differences in symptomatology between biologic sexes is critical.

Medical school in the United States is 4 years and typically split into two stages. The first stage is typically 2 years and is dedicated to learning the basic sciences with moderate to minimal patient interaction, although exceptions exist in certain curricula. The second stage is also 2 years in which students rotate through different surgical and primary care specialty services, including but not limited to emergency medicine, family medicine, general surgery, and internal medicine. The United States Medical Licensing Examination (USMLE) Step 1 exam measures students' knowledge and ability to apply fundamental sciences to the practice of medicine. Typically, passing this exam signifies the transition from preclinical learning to clinical learning. To pass this exam and begin their final 2 years of clinical training, students often use Step 1 resources, which include books, videos, flash cards, and assessments.[5] The purpose of this study was to analyze whether the most used and recommended resources for the Step 1 exam featured a mention of the unique presentation of myocardial infarction in women.

Methods

We conducted a cross-sectional analysis of the selected Step 1 resources on November 13, 2023. The Step 1 resources were based on the most recommended resources compiled and rated by the editorial staff of *First Aid for the USMLE Step 1 2023*. This search of resources included question banks, mobile apps, comprehensive resources, pathology, and physiology resources that had ratings of A–, A, or A+. Table 1 features a complete list of all resources analyzed. The terms "woman," "women," "female," in combination with "myocardial infarction," "acute coronary syndrome," "heart attack," "cardiovascular disease," "STEMI," "chest pain," "NSTEMI," "myocardial injury," and "heart disease" were searched throughout each resource with a computer search function (Cmd+F for Mac users and Ctrl+F for Windows users). Following the computer search, the cardiology section of each resource was manually searched for any mention of differences in presentation of myocardial infarction between biologic sexes. Specific attention was further given to the myocardial infarction subsections of each resource to analyze any discussion of the search terms. For resources that did feature a discussion about the presence of differences between biologic sexes, the content was written and recorded in an Excel document. A list of these resources featuring the differences in presentation also was recorded.

Results

We found that none of the Step 1 resources made a differentiation in MI symptoms between biologic sexes across all resources. The resources analyzed in the study included *First Aid for the USMLE Step 1 2023,* USMLE Outline, UWorld Question Bank, and NBME Practice Exams, among others. When discussing the symptoms of acute myocardial infarction, most of these resources included diaphoresis, nausea, vomiting, retrosternal pain, and pain in left arm or jaw. Table 1 features a full list of the resources, their respective editions and descriptions, and their provided ratings by First Aid.

Discussion

The findings of this study highlight an important issue in medical education and clinical training. Studies indicate that the majority of medical students prepare for the Step 1 exam using resources such as *First Aid for the USMLE Step 1 2023* and the UWorld Question Bank.[2,5] These resources, along with the list of resources

provided by the "Top-Rated Review Resources" section of *First Aid for the USMLE Step 1 2023*—particularly the A-level resources—are the gold standard in preparing for this licensing exam.[2,5] This list is compiled by the editorial team of First Aid, which consists of medical students, residents, and physicians. This team gathers input from the broader medical student community, incorporating feedback from users of the resources. The recommendations are based on surveys, reviews, and evaluations to ensure that they reflect the most widely used and highly rated tools for Step 1 preparation.

Despite the increased mortality risk for young women with acute MI and the known unique presentation of symptoms in women overall,[3,4] none of the most used and recommended resources for the Step 1 exam in medical school address this discrepancy. This finding is of concern given the importance of the Step 1 exam in transitioning from preclinical to clinical learning and the frequency with which students use these resources. Medical students' clinical rotations provide valuable opportunities for medical students to observe and learn about patient histories and presentations, including the unique symptoms of MI in women. If not adequately educated on this topic, particularly during licensing examination and its preparation, students may miss important clues during patient interactions. Additionally, improving education of this topic can help balance and shape the biases students develop while preparing for licensing exams.[6] Addressing this knowledge gap is crucial for future physicians.

One limitation of this study was the reliance on the most recommended resources, because other resources may exist that do address the unique presentation of women with MI. The search was conducted manually, and this method may be prone to human error. Some resources may also feature information in an embedded format, which can limit their ability to be identified. Additionally, the nature of this study is cross-sectional, and the resources possibly have been updated since the completion of the data collection. However, that the highest rated resources for Step 1 exam do not feature such an important discussion is concerning.

Conclusions

Moving forward, efforts should be made to address this gap in common USMLE Step 1 study resources to help improve recognition of unique symptoms of myocardial infarctions in females. These efforts could involve incorporating this topic into medical school curricula, providing additional resources, or even modifying licensing exam content to ensure that it is more representative of the diverse presentations of acute MI. Improved education can play a role in improving care of female patients. Future research also should explore the prevalence of biologic sex education disparities in other areas of medical education and clinical practice, and identify interventions to promote more equitable care. Ultimately, improving recognition of unique MI symptoms in women can lead to better trained physicians and better outcomes. Medical education must continue to evolve to address emerging issues in clinical practice and ensure that future generations of physicians are equipped with the knowledge and skills necessary to provide high-quality, patient-centered care to all individuals.

Tables and Figures

Table 1. Evaluation of the Top Rated Step 1 Resources for Discussion of Myocardial Infarction in Women

Step 1 resource	Description of resource	Discussion of unique presentation of myocardial infarction in women	Rating
First Aid for the USMLE Step 1 2023 (33rd ed.)	Comprehensive review book for USMLE Step 1	No	N/A
USMLE Outline (2025 ed.)	Summary of the content covered on USMLE Step 1	No	N/A
UWorld Question Bank (2025 ed.)	Test preparation tool that provides practice questions and explanations for USMLE Step 1	No	A+
Free 120 (2025 ed.)	Set of 120 practice questions provided by NBME that represent material on USMLE Step 1	No	A+
Pathoma (2022 ed.)	Comprehensive pathology review book and online resource for medical students preparing for USMLE Step 1 exam	No	A+
NBME Practice Exams (2025 ed.)	Practice tests developed by NBME that simulate the format and content of USMLE Step 1	No	A
AMBOSS Library (2025 ed.)	Comprehensive medical resource that provides practice questions, articles, and videos for medical students and health care professionals	No	A
Anki (2025 ed.)	Conglomerate of virtual flash-card style content based on multiple Step 1 resources	No	A
Boards and Beyond (2022 ed.)	Online video resource that provides comprehensive coverage of basic and clinical medical sciences for medical students	No	A
Sketchy Medical (2025 ed.)	Visual learning tool that uses sketch-style illustrations to teach medical concepts and diseases	No	A
Rx Bricks (2025 ed.)	Digital resource that provides concise, high-yield information on basic medical sciences for medical students	No	A
First Aid for the Basic Sciences: General Principles (3rd ed.)	Review book for medical students that covers basic medical sciences	No	A
First Aid Cases for the USMLE Step 1 (4th ed.)	Review book that provides case studies and practice questions for USMLE Step 1	No	A
First Aid for the Basic Sciences: Organ Systems (3rd ed.)	Review book for medical students that covers basic medical sciences organized by organ system	No	A
USMLE Step 1 Secrets in Color (5th ed.)	Study guide that uses a question-and-answer format to help students prepare for the USMLE Step 1 exam	No	A
Pixorize (2025 ed.)	Online learning platform that uses visual mnemonics to help students learn complex medical topics	No	A
OnlineMedEd (2025 ed.)	Video-based resource that covers concepts for Step 1	No	A

Table 1: continued

Step 1 resource	Description of resource	Discussion of unique presentation of myocardial infarction in women	Rating
Rapid Review: Pathology (5th ed.)	Concise, high-yield review of essential pathology concepts with emphasis on clinical correlations and USMLE-style questions	No	A–
Robbins and Cotran Review of Pathology (5th ed.)	Comprehensive, question-based review of pathology fundamentals	No	A–
Crash Course: Pathology (5th ed.)	Visual introduction to pathology, using animations and case studies to simplify complex concepts	No	A–
Physiology (4th ed.)	Introductory textbook that covers the principles of physiology for undergraduate and graduate students	No	A–
Color Atlas of Physiology (7th ed.)	High-quality illustrations and accompanying text for efficient comprehension of key concepts	No	A–
Pulmonary Pathophysiology: The Essentials (7th ed.)	Concise textbook that covers the basic principles of pulmonary pathophysiology for medical students	No	A–
USMLE-Rx Qmax (2025 ed.)	Test preparation tool that provides practice questions and explanations for USMLE Step 1	No	A–
Physeo (2025 ed.)	Video resource that provides comprehensive coverage of basic medical sciences for medical students	No	A–
Dirty Medicine (2025 ed.)	Comprehensive collection of high-yield medical education videos, often featuring mnemonics	No	A–
Osmosis (2025 ed.)	Medical education platform with video lectures, practice questions, and high-yield learning tools	No	A–
USMLE-Rx Step 1 Express (2025 ed.)	Video-based USMLE Step 1 review course covering more than 800 high-yield topics	No	A–
USMLE-Rx Step 1 Flash Facts (2025 ed.)	Comprehensive digital flash-card deck with more than 15,000 cards for USMLE Step 1 preparation	No	A–

Abbreviations: USMLE, United States Medical Licensing Examination; NBME, National Board of Medical Examiners

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