Acute myocardial infarction (MI) manifests in various forms and types, each having different clinical implications for a patient’s prognosis, medical management, and nursing care. All critical care nurses are familiar with the need to distinguish between acute versus prior/old MIs, anterior versus inferior wall MIs, ST-segment elevation MIs (STEMI) versus non-STEMIs, transmural versus nontransmural MIs, and the like. A recent study published in *JAMA* suggests that it may be time to add yet another categorical fork in the MI lexicon to distinguish patients who present with or without chest pain.

**Description of Study**

The *JAMA* study received considerable attention a few months ago in the media partly due to its findings that women with acute MI—especially young women—had considerably higher mortality rates than young men. Rather than viewing women as relatively protected from significant cardiovascular disorders for perhaps 8 to 10 years longer than men, this study showed evidence that when younger women experienced MI, their younger age not only failed to improve their survival but was directly and inversely associated with a substantially higher risk of death. That finding was not new; it was described more than a decade ago as manifesting in an age-related pattern: the younger the women’s age, the higher the risk of death from MI compared to men in the same age group. In the youngest age group under 50 years, the mortality rate among women was 6.1%—more than twice the 2.9% mortality rate for men. These gender disparities in mortality diminished with increasing age and were no longer statistically significant after age 74.

Another distinguishing aspect of the *JAMA* study was its investigation of the possible role that patient presentation might play in these outcomes. In contrast to the wide agreement that chest pain/discomfort represents the hallmark clinical presentation for acute MI in both men and women, previous work by this research team and others’ revealed that when women with MI do not experience chest pain/discomfort, they tend to disregard their symptoms, delay seeking medical care, be mistakenly diagnosed, treated less aggressively, or even be discharged and subsequently endure nearly double the short-term mortality of those who presented with the more classical symptoms of acute MI. The current study’s objective was to determine whether a patient’s age accounted for any differences between the genders relative to clinical presentation and mortality.

The researchers employed an observational design, using data from the National Registry of Myocardial Infarction, a registry that analyzes and reports data on patients admitted with confirmed MI at 1977 participating hospitals between 1994 and 2006. From a total of 2.16 million registry patients, researchers excluded transfer patients, those with MI as a secondary diagnosis, and those with incomplete data related to the variables of interest, leaving a study population of 1.14 million patients, 42% of whom were women. In addition to patient age and gender, the primary variable documented was the presence/absence of chest pain. In this study, chest pain/discomfort was operationally defined as “any symptom of chest discomfort, sensation,
pressure or tightness or arm, neck, or jaw pain occurring before or during hospital admission. (The term “chest pain” will from this point forward encompass all of these descriptions.) Patient age was sorted into 5 intervals: younger than 45, 45 to 54 years, 55 to 64 years, 65 to 74 years, and 75 years or older.

**Primary Findings**

*Presentation With/Without Chest Pain.* Of the total of 1.14 million patients with acute MI, the proportion that presented without chest pain was significantly higher for women at 42.0% (95% CI, 41.8%-42.1) compared to men at 30.7% (95% CI, 30.6%-30.8%; \( P < .001 \)). The preponderance of women presenting without chest pain was confirmed both for the overall patient population and persisted in a linear and inverse relationship throughout the first 4 age groups. It was highest in the youngest age groups, narrowed through the next 2 age groups, then reversed in the oldest age group. More specifically, in the youngest group (<45 years), only 10.2% of men but 15.3% of women presented without chest pain, reflecting an increment of over 50% for women. Only in the eldest (≥75 years) group did the proportion of men presenting without chest discomfort (23.6%) exceed that of women (21.8%). The study supported that women with acute MI are much more likely to present without chest pain than men through age 74 and that this presentation is more likely the younger a woman is.

*Mortality.* The second major finding was that the overall in-hospital mortality rate for acute MI was significantly higher for women than for men (14.6% vs 10.3%; \( P < .001 \)). When these results were further analyzed for patient presentation, the lowest mortality rates (1.3%, 1.7%) were found in the 2 youngest age groups of men who presented with chest pain, whereas women in those same age groups who also presented with chest pain had mortality rates nearly twice that high (2.0%, 2.7%).

An even more striking distinction of gender- and presentation-based differences was derived by comparing the 1.3% and 1.7% mortality rates of the youngest men who presented with chest pain with the 15.3% and 14.5% mortality rates experienced by the youngest women who presented without chest pain. As with the findings related to gender and presentation, differences in mortality between the genders were most pronounced in the youngest age groups, attenuated inversely with increased age, and reversed in the oldest age group (Figure 1).

**Secondary Findings**

In addition to outcomes related to gender, age, and presentation differences in mortality from acute MI, this study provided additional support for previous research in this area:

- Although chest pain was the most common symptom identified by both men (69%) and women (58%) with acute MI, a substantial (35.4%) proportion of patients with acute MI did not present with that finding.
- Women were significantly older than men when they were hospitalized for acute MI. The mean age for women at hospital presentation was 73.9 years versus 66.5 years for men (SD, 12.4 vs 13.2 years; \( P < .001 \)).
- MI patients who entered the health care system without a history or complaint of chest pain received less aggressive medical care. Patients in this category were significantly less likely to receive acute reperfusion therapies (fibrinolytics, antiplatelet agents, heparin), \( \beta \)-blocker therapies, or percutaneous coronary interventions in a timely manner compared with MI patients who had presented with chest pain (\( P < .001 \)).

The authors offered 2 conclusions to the study: affirmation that women with acute MI were more likely than men to present without chest pain and that within the same age groups, women had higher mortality from acute MI than men, though these gender differences in presentation and mortality diminish with advancing age.

**Clinical Practice Implications**

As a nurse reading this study, I immediately consider the clinical practice implications of these findings. Some
of the implications for critical care nurses are obvious and reinforce familiar issues worthy of reiterating:

- Cardiovascular disease persists as the primary cause of death for both men and women in the United States and warrants our utmost attention to its potential lethality.
- A majority (about 66%) of patients with acute MI demonstrate classical clinical symptoms of that disorder upon their arrival, so critical care nurses need to assess for and recognize those findings: (1) severe, crushing, precordial chest pain that may radiate to the arm, neck, jaw, epigastrum, or back; (2) shortness of breath, diaphoresis, nausea or vomiting, weakness, and lightheadedness; and (3) symptoms exacerbated by stress or physical exertion and relieved by rest or nitroglycerin.
- A substantial percentage (about 35%) of patients with acute MI may not have chest pain upon their arrival, but the absence of chest pain does not mean the patient is less likely to be having an MI. To the contrary, critical care nurses need to be fully aware that, especially for women with MI younger than 55, the absence of chest pain is associated with a 15% mortality rate, compared to rates of 1.3% to 1.7% for men with chest pain.
- Although nearly 31% of men present without chest pain, a much higher proportion of these patients (42%) are women. Women are more likely to present with a number of atypical findings that may require more careful nursing assessments of patient history to elicit: (1) aching, burning, positional, pleuritic, or localizable discomfort that is neither prolonged nor severe; (2) pressure in the lower chest or upper abdomen, back pain, or nausea, vomiting, or diaphoresis; (3) shortness of breath, weakness, unusual fatigue, or dizziness; and (4) prodromal symptoms such as unexplained fatigue, shortness of breath, anxiety, sleeping difficulties, or mild chest discomfort that may occur 6 weeks to a year preceding an MI.

Additional Observations

Although the study focused on examining the relationship of age on gender differences in presentation and mortality in patients hospitalized with MI, I made an observation that I did not see noted anywhere in the findings nor highlighted anywhere in the discussion:

In every age group for both men (Figure 2) and women (Figure 3), the mortality rate for patients who presented “without chest pain” substantially exceeded that of patients in the same age group and of the same gender who presented “with chest pain.”

In addition to the influence of presentation on mortality in younger women (“the absence of chest pain may be a more important predictor of death in younger women with MI compared with other similarly aged groups”), these data suggest that on a number of levels, not experiencing chest pain in association with acute MI is a formidable risk factor that heralds a significantly greater chance of death for both men and women and at every age. For men in this study, the difference in mortality for those having versus not having chest pain was greatest in the 65 to 74 years age group, in which men

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Figure 2: Hospital mortality for acute myocardial infarction in men with and without chest pain.

Figure 3: Hospital mortality for acute myocardial infarction in women with and without chest pain.
with chest pain had a mortality rate of 6.9% and those without chest pain had mortality of 18.9%, a difference of 12%. For women, the absence of chest pain exacted the highest penalty in the youngest group, in which women with chest pain had mortality of 2.0%, while those without chest pain died at a rate of 15.3%, a difference of 13.3%.

**Additional Implications**

If the additional observations cited here are supported by other studies, then it becomes important that critical care practitioners assess patients for chest pain and document its presence or absence in the medical record. A few other clinical caveats may also be worthy of consideration for nursing management:

- Raising awareness among critical care practitioners regarding the clinical implications of this potentially lethal negative finding for all MI patients, including (1) awareness that in patients suspected or having acute MI, the absence of chest pain represents a red flag associated with significantly higher mortality; (2) awareness that women need to be viewed as a high-risk category of MI patients; and (3) awareness that the younger the woman who denies having chest pain, the greater her risk of death from acute MI.

- Providing patient, family, and community education that includes recognition of both the classic and atypical symptoms of acute MI and emphasizes that the highest mortality is experienced by the one-third of MI patients who do not experience chest pain.

- When a patient suspected of having an acute MI presents without chest pain, nurses need to advocate for the patient by mentioning the potentially lethal implications associated with that presentation and attempting to refocus the team on preventing death from that disorder.

- Because the absence of chest pain in acute MI is so strongly associated with higher mortality for both genders and all ages, standardized patient history and assessment forms for pre-hospital, emergency department, and cardiac and critical care units should include required documentation of the presence or absence of this finding. While that assessment element is being introduced, forms might include a footnote that succinctly summarizes the salience of this finding and reminds staff of the imperative for astute patient monitoring and adherence to all therapeutic protocols.

- Another recent study found that younger women’s significantly greater risk of dying was linked to their having STEMI rather than non-STEMI, so such differentiations are often clinically meaningful.

- To ensure that this presentation distinction is recognized throughout an MI patient’s hospitalization, it might also be useful to add that distinction to the existing nomenclature for labeling MIs. Just as we manage care based on whether patients have STEMI versus non-STEMI or have transmural versus non-transmural MIs, critical care staff could introduce the distinction between a chest pain—MI and a no—chest pain MI so this important finding is documented.

If evidence continues to affirm that acute MI presentations without chest pain are strongly associated with lethal outcomes, then instituting and acting upon this categorization seems like a tiny effort that critical care nurses could do to improve survival for those patients.

**Editor’s Note**

This issue includes an OnlineNow article discussing coronary artery disease in young women. Go to the CCN website at www.ccnonline.org to read “Spontaneous Coronary Artery Dissection: A Rare Threat to Young Women” by Linda Martinez.