

The Need to Look Beyond Traditional Risk Factors in Medical Diagnoses

Diviyashree Kasiviswanathan¹, Julia Kumar B.S.², Umama Gorski M.D.³

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¹ *Medicine Baccalaureate Undergraduate Program, College of Medicine, University of Cincinnati, Cincinnati, OH*

² *College of Medicine, University of Cincinnati, Cincinnati, OH*

³ *University of Cincinnati Medical Center, University of Cincinnati, Cincinnati, OH*

Abstract

Each year, about 7.4 million patients are misdiagnosed in the Emergency Room, which leads to a delay or failure in treating the medical condition and it makes recovery difficult for the patient. Medical malpractice occurs because of short physician-patient interactions, overworked physicians, inexperience, and overconfidence. While the reasons for physician misdiagnosis are well-known, the magnitudinous effect medical malpractice on patients is not well documented. This case study involves a 29-year-old young male with no traditional risk factors for coronary artery disease (or plaque buildup in the walls of the arteries). The patient had a very stressful event a few hours before presenting to the emergency department with chest discomfort. His initial EKG did not meet the criteria for ST Elevation Myocardial Infarction or STEMI, and his initial Troponin level was borderline (0.1 ng/mL). When labs were taken in the morning, his Troponin level was elevated to about 4 ng/mL. The patient was immediately rushed to the Catheterization lab and a successful Percutaneous Coronary Intervention was performed. The patient was discharged with no complications but was advised to follow up with an outpatient cardiology clinic. Overall, this case highlights the need for physicians to look beyond the traditional risk factors and consider patient symptoms and prior history for accurate diagnosis.

Introduction

Did you know that in 2022 about 7.4 million patients were misdiagnosed in the ER? About 2.6 million patients received harm that could have been prevented, and 370,000 patients were left permanently disabled or dead due to misdiagnosis (*Kounang*). The top 5 clinical conditions that most commonly misdiagnosed are Stroke, Myocardial Infarction MI / Heart Attack, Aortic Aneurysm, Spinal Cord Injury, and Venous Thromboembolism (*Kounang*).



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According to the Institute of Medicine, misdiagnosis, also known as diagnostic error, is defined as a diagnosis that is delayed or incorrect as detected by some subsequent definitive test or finding (*Diagnostic Errors More Common, Costly and Harmful than Treatment Mistakes*). This definition has been broadened to also include clinical omissions, which is a failure to complete an unplanned action that should have been completed (*Balogh et.al*). Diagnostic errors lead to a delay or failure to treat the clinical condition, making recovery difficult for the patient, and countless malpractice lawsuits against the physician.

Medical malpractice occurs because of short physician-patient interactions, overworked physicians, inexperience, and overconfidence. Most physicians are paid using the production or productivity-based compensation model. Essentially, physicians' salaries are based on the Resource-Based

Relative Value Scale (RBRVS) units or the Relative Value Units (RVU), which assign different values to procedures and patient visits (*Parent*).

Figure 1.1: Different compensation models.

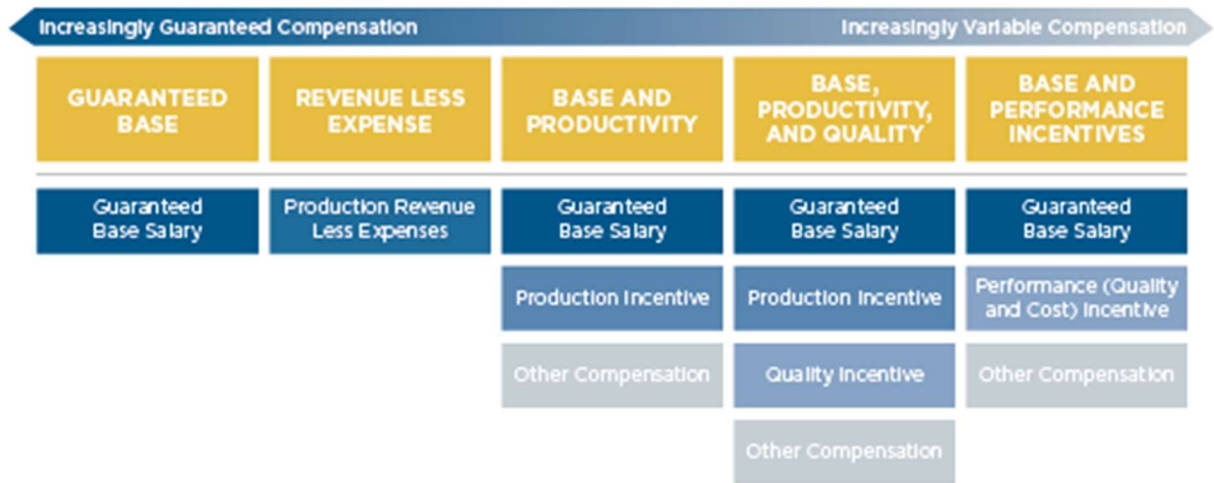
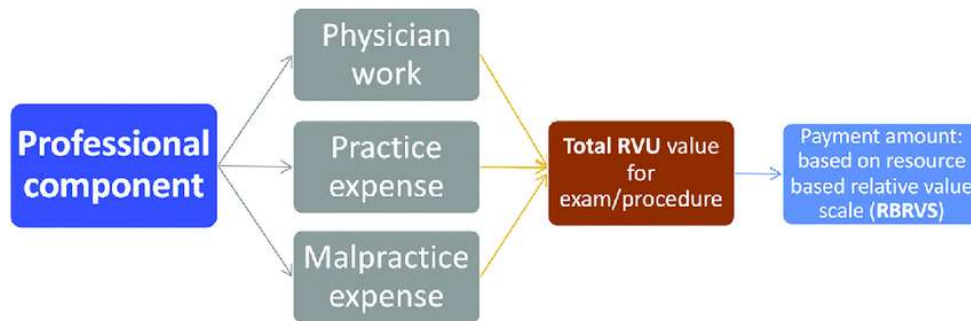


Figure 1.2: Productivity-based compensation model.



Therefore, physicians’ salaries are based on the number of patients they see in an hour; hence, physicians tend to spend about 13 minutes on a patient, to fit as many patients as they can within an hour (*Young et al.*) This compensation model is detrimental to a physician’s practice and for patients because it has been associated with higher rates of misdiagnosis due to physicians not spending enough time completely understanding patient medical history, symptoms they’re experiencing, potential diagnoses, and plausible tests. Furthermore, working an average of 50-60 hours a week and the lack of sleep stemming from overworking can lead to healthcare professionals misreading

important diagnostic tests and failing to note important symptoms (*Chang et al.*). In a recent study conducted on a subset of the members of the American College of Surgeons, showed a strong correlation between malpractice suits and burnout. Specifically, most of the recent malpractice suits involved surgeons who were younger and worked longer hours (*Balch et al.*).

Lack of experience, overconfidence, and confirmation bias can also lead to medical misdiagnoses. Healthcare professionals are known to make medical mistakes due to their lack of clinical experience. Inexperienced physicians may not have enough knowledge or background to order specific diagnostic procedures to rule out certain diagnoses or they might diagnose without having sufficient evidence. In fact, according to the American Medical Association, about 11% of liability lawsuits included residents and fellows, although failure of proper supervision was one of the main causes (*Murphy*). In order to decrease this percentage, Dr. Laura Myers asserts “trainees are only allowed to take on more responsibility after demonstrating complete mastery of previous year’s material” (*Murphy*). On the other hand, overconfidence fueled by the confirmation bias can lead to physicians ignoring prominent patient’s symptoms after they have determined the diagnosis. Confirmation bias is a psychological phenomenon where individuals seek information that supports their existing beliefs and ignore information that opposes their beliefs, in order to preserve their self-esteem. Unfortunately, healthcare professionals are not immune to this bias. Physicians typically misdiagnose patients with obesity, stress, or other lifestyle changes, rather than carefully inspecting patient’s symptoms and keeping an open mind (“*How Does Medical Misdiagnosis Happen?* | *Belt, Bruner & Barnett P.C.*”).

While the reasons for physician misdiagnosis are well-known, what is often not well documented is the magnitudinous effect medical malpractice can have on a patient, such as the existing condition worsening over time. This is most often seen in critical illnesses, specifically Cancer, where a delay in diagnosis can lead to Cancer that has metastasized to multiple organs. Moreover, misdiagnosed

patients can be given the wrong treatment. This is especially detrimental, given the improper treatment will not only fail to treat the current medical condition, but it also has the potential to make current symptoms worse (“*How Does Medical Misdiagnosis Happen?* | *Belt, Bruner & Barnett P.C.*”).

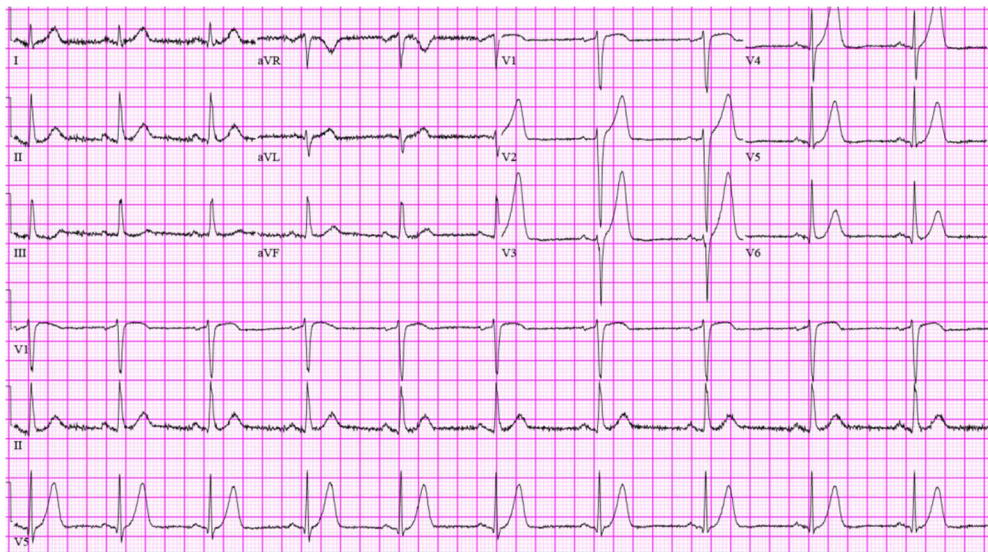
Case Report

Given the definition of medical misdiagnosis, potential causes, as well as the long-term effects on patients, I am presenting a rare case of Wellens Sign in a young patient presenting with no traditional risk factors. To begin, Wellens sign is often seen as an abnormal ECG pattern with deeply inverted T waves in the leads V2 and V3. Typically, patients present to the ER claiming no pain, and labs typically indicate normal or slightly elevated cardiac enzymes (*Miner et al.*).

The Story

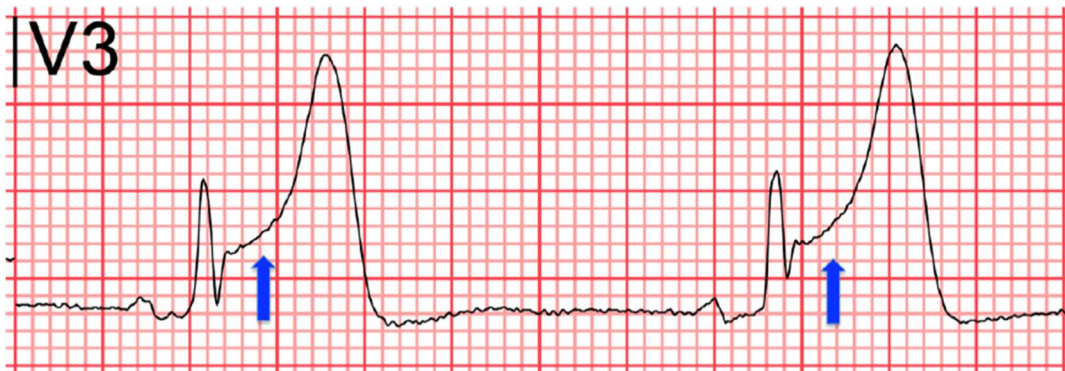
A 29-year-old male with no traditional risk factors for coronary artery disease (or plaque buildup in the walls of the arteries) had a very stressful event a few hours before presenting to the emergency department with chest discomfort. An initial EKG was performed, and it showed peaked T waves.

Figure 1.3: EKG of 29-year-old male when he first arrived at the hospital.



His EKG did not meet the criteria for ST Elevation Myocardial Infarction or STEMI. A STEMI is a heart attack that is caused by a total occlusion of the coronary artery (*Cleveland Clinic*). Typically, the EKG for a patient experiencing STEMI shows an elevated ST segment.

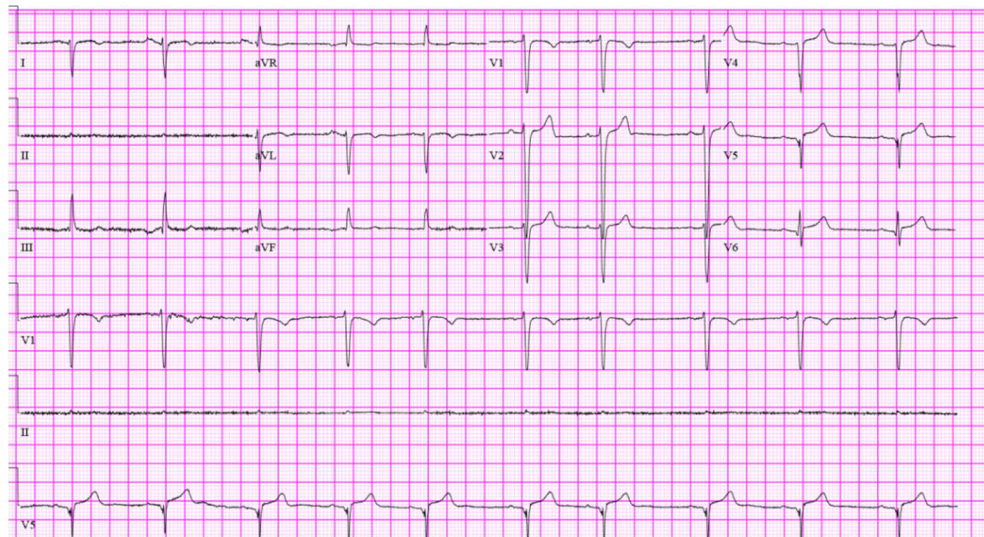
Figure 1.4: EKG of an individual experiencing STEMI. Blue arrow points to the elevated ST segment.



Since patient's EKG did not meet criteria for STEMI, he was subsequently observed in the ER overnight. His initial Troponin level was borderline (0.1 ng/mL) and when labs were taken in the morning, his Troponin level was elevated to about 4 ng/mL. Troponin is a protein muscle that is found exclusively in the heart muscles not in the blood stream. When heart muscles become damaged, Troponin is released into the blood stream ("*Troponin Test: MedlinePlus Medical Test*"). The normal range of Troponin levels is between 0 to 0.04 ng/mL. If Troponin levels are greater than 0.04 ng/mL, then the patient will experience a non-STEMI heart attack. Due to his elevated Troponin levels, the patient was administered IV Nitroglycerin, which is typically administered to reduce the workload of the heart.

After labs were taken, the patient reported having some residual left arm pain, despite receiving some IV nitroglycerin. EKG was performed again and revealed only a poor R-wave progression.

Figure 1.5: EKG of 29-year-old male morning after administration.

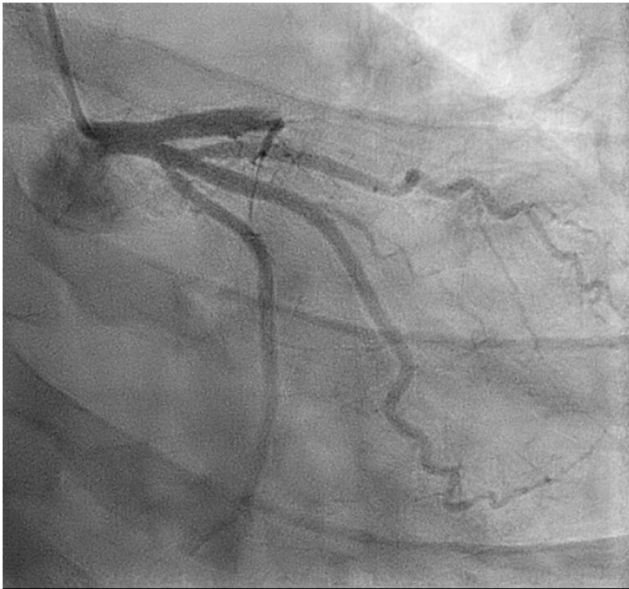


Provided his ongoing symptoms, the medical team decided to bring the patient to the Catheterization lab on an urgent basis. The Catheterization lab is a specialized area in the hospital where the medical team performs minimally invasive tests and advanced cardiological procedures to diagnose cardiovascular disease (“*Cardiac Catheterization Laboratory (Cath Lab)*”).

The Procedure

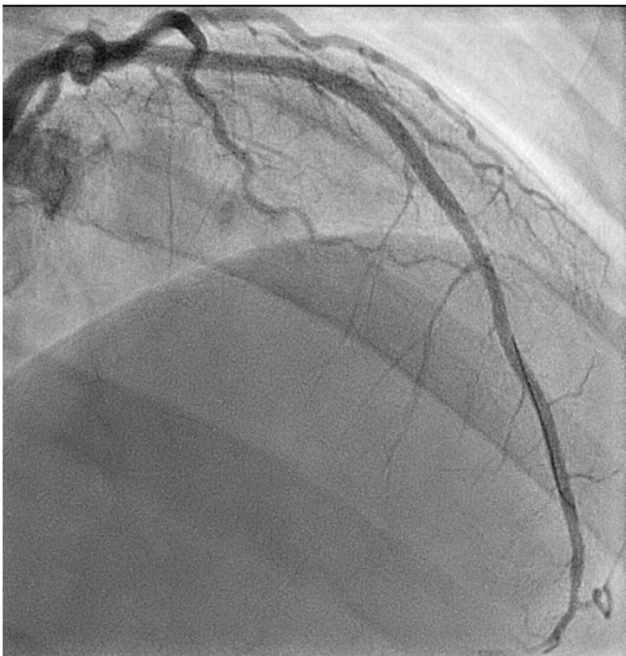
A Coronary Angiography, which is a procedure that utilizes X-ray imaging to see blood flows through the arteries, revealed a total occlusion of the mid Left Anterior Descending (LAD) artery, as well as a significant amount of thrombus or blood clots (“*Coronary Angiography: MedlinePlus Medical Encyclopedia*”). The site of occlusion occurred immediately after the origin of the first septal perforator.

Figure 1.6: Coronary Angiography result of the 29-year-old male. Shows a total occlusion of the mid LAD.



Successful Percutaneous Coronary Intervention (PCI) was performed, and the blood flow was restored in the vessel.

Figure 1.7: Coronary Angiography of 29-year-old male after successful PCI. Shows restored blood flow.



Discharge

The patient was returned and monitored in the CCU (Coronary Care Unit) for 48 hours. He was administered dual antiplatelet therapy with aspirin and Plavix, which helps prevent harmful blood clots from forming with the instruction to continue it for a year. A high intensity statin medication was also initiated to help lower his cholesterol levels. A low-dose beta blocker and an ACE inhibitor were also initiated. Beta blockers block the effects of adrenaline on the heart; thus, reducing irregular heartbeat or arrhythmia, and preventing future heart failure (*Marla Paul*). When given a low dose, patients have improved survival and a lower chance of future heart attacks. ACE inhibitors are a class of medications that help relax the veins and arteries of the heart, in order to decrease blood pressure (*Mayo Clinic*). The patient was discharged home from the CCU with no complications but was advised to follow up with an outpatient cardiology clinic.

Discussion

Wellens Sign or Wellens Syndrome (WS) is commonly known as the warning sign for acute anterior wall Myocardial Infarction / Heart Attack, which typically occurs due to the decrease in blood supply to the anterior wall of the heart. Prompt revascularization and adjunctive pharmacotherapy is critical to treat Wellens Syndrome (*Zhou et. al*). Some of the well-known diagnostic criteria for WS are ECG results, cardiac enzyme results, and a prior history of angina.

Conclusion

The patient described in the case report appeared to have met the diagnostic criteria for WS; however, *if the medical team had dismissed these apparent symptoms due to the patient's young age and overall good health, then the patient would have been misdiagnosed, and this could potentially lead to delayed admission and lifesaving treatment.* Thankfully, the team did not rely solely on the traditional risk factors and brought the patient to the Catheterization lab in time to save him from potential MI. By looking beyond, the medical traditional risk factors, physicians were able to

strategically analyze the appropriate interventional treatments. Overall, this case highlights the need for physicians to look beyond the traditional risk factors and consider patient symptoms and prior history for accurate diagnosis.

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