

## **The Power and Pitfalls of Increasing Access to Data**

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### **Story From the Front Lines**

A middle aged man with end stage liver disease presented to the emergency department with worsening shortness of breath over the preceding three days. He had noticed some weight gain as well as decreased responsiveness to his usual diuretic regimen. He denied fevers or chills, nausea or vomiting, cough, sore throat, or any sick contacts. Other than the worsening shortness of breath he had felt at his normal baseline. Initial evaluation in the emergency department (ED) was significant for increased bilateral lower extremity edema and bilateral crackles on auscultation of his lungs. The patient was afebrile, blood pressure of 88/57, heart rate of 103, respiratory rate of 22, and hypoxic requiring 4L by nasal cannula. A chest x-ray was consistent with bilateral patchy infiltrates consistent with edema or possibly infection as well as small bilateral pleural effusions. Per hospital protocol a sepsis alert was triggered based on vital signs and initial laboratory (tachycardia, tachypnea, SBP <90) available in the Electronic medical Record (EMR). This alert alarmed the ED physician prompting additional evaluation and protocol driven management. Blood cultures were drawn, fluid resuscitation initiated, and IV antibiotics were started per protocol. The patient's respiratory status subsequently declined, he became more tachypneic and required increasing levels of oxygen prior to being placed on CPAP. He was subsequently admitted to the medical ICU where he eventually required intubation for hypoxia and increased work of breathing. With diuresis his respiratory failure resolved and he was discharged home with an increased diuretic regimen for management of hypervolemia.

### **Teachable Moment**

Though initial management may be appropriate for this high risk patient with potential pneumonia, this case is representative of several issues that are becoming increasingly important as the medical field integrates new and vast amounts of data. As with many other medical conditions early detection and early therapy is a key component in treating sepsis. With advent of the EMR there has been increasing access to data. Laboratory data, minute to minute vital signs, and imaging are all accessible from virtually anywhere with just a few keystrokes. Along with this increase in accessibility there has been a recent push to use electronic data and computer driven algorithms to increase patient safety and treatment efficacy in the form of Computerized Clinical Decision Support Systems (CDSS). These advances have manifested as alerts, prompts, and user statistic data found in most EMRs. There has been proven benefit in several disease processes (1) but it is important to be cognizant of the potential downfalls in the same setting such as paradoxical overuse and bias.

Though CDSSs have been found to improve provider performance on certain identified tasks ranging from vaccinations to antibiotic choices in both the outpatient and inpatient setting, the data for improved patient outcomes is lacking (1). Interestingly, this case demonstrates how attempts to reduce underuse can simultaneously drive overuse when protocols are applied broadly. Early intervention with IVF and antibiotics has been shown to dramatically improve outcomes in patients with severe sepsis/septic shock (2). Well founded concerns over underuse of these proven interventions has led to sensitive early warning systems and protocol driven care with attendant risks of overuse and downstream harm from false positive alerts.

In the setting of an extremely busy emergency department with high patient volumes, and automation/algorithmic approaches meant to improve patient outcomes, immediate treatment decisions are often necessary though can be biased in favor of action especially when prompted electronically. In a scenario where two disease states are difficult to discern from each other and may require careful observation rather than immediate action, the slower approach eg repeat evaluation or even hospital admission may still be preferred.

There is incredible value in the implementation of CDSS but it will remain essential to ensure such protocols improve clinical outcomes before applied across systems. In order to prevent complications it will be necessary to understand the ideas of under and over use and be cognizant of how biases toward action can have unintended consequences. Overutilization can lead to harm just as underutilization does, which is why identifying areas of high value implementation will be necessary. Data is incredibly powerful and has proven to aid in patient care; however it is important to be cognizant of the growing pains associated with both the increasing access and the ways in which we implement the use of increasing and unprecedented amounts of clinical data.

## References

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