

JOHNS HOPKINS PATIENT SAFETY TEAM FINDS DIAGNOSTIC “FATAL FLAWS” IN THE ICU MAY ACCOUNT FOR AS MANY ANNUAL DEATHS AS BREAST CANCER

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Each year as many as 40,500 critically ill U.S. hospital patients die with an unknown medical condition that may have caused or contributed to their death, Johns Hopkins patient safety experts report in a recent study.

In a discussion of their findings, described online in *BMJ Quality & Safety*, researchers say that although diagnostic errors in the intensive care unit (ICU) may claim as many lives each year as breast cancer, they remain an underappreciated cause of preventable patient harm.

“Our study shows that misdiagnosis is alarmingly common in the acute care setting,” says Bradford Winters, M.D., Ph.D., lead author and associate professor of anesthesiology and critical care medicine and neurology and surgery in the Johns Hopkins University School of Medicine. “To date, there’s been very little research to determine root causes or effective interventions,” Winters says, noting that less lethal patient safety risks have received greater attention.

By reviewing studies that used autopsy to detect diagnostic errors in adult ICU patients, the experts in the Johns Hopkins Armstrong Institute for Patient Safety and Quality discovered that 28 percent of patients — more than one in four — had at least one missed diagnosis at death. In 8 percent of patients, the diagnostic error was serious enough that it may either have caused or directly contributed to the individual’s death and, if known, likely would have changed treatment, researchers say. Infections and vascular maladies, such as heart attack and stroke, accounted for more than three-quarters of those fatal flaws.

Overall, the medical conditions most commonly missed by diagnosticians included heart attack; pulmonary embolism, an artery blockage in the lungs; pneumonia; and aspergillosis, a fungal infection that most commonly affects individuals with a weakened immune system. Cumulatively, these four conditions accounted for about one-third of all illnesses that doctors failed to detect. Their review of 31 studies included 5,863 autopsies from a wide range of ICU types. The prevalence of autopsy-detected misdiagnoses, which were stratified by severity, ranged from 5.5 to 100 percent by study. Winters and his team categorized misdiagnoses based on four categories: vascular, which included conditions involving vessel blockages and bleeding, such as heart attack and stroke; all bacterial, viral and fungal infections; mechanical pathophysiological, a broad range of organ malfunction such as congestive heart failure and bowel obstruction; and cancer/other. After collecting and classifying all error data, the researchers calculated how frequently misdiagnoses would be discovered if every patient who died in the ICU underwent an autopsy. Although autopsy is more frequently performed in complex patient cases in which the clinician may have a lower level of diagnostic certainty, the authors took this potential bias into account. Based on those adjustments, they say their calculations are conservative estimates.

Winters and his colleagues also found that, when compared with adult hospital patients overall, individuals in the ICU face up to a twofold risk of suffering a potentially fatal diagnostic mistake. “It may be counterintuitive to think that the patients who are the most closely monitored and frequently tested are more commonly misdiagnosed, but the ICU is a very complex environment,” Winters says. Clinicians face a deluge of information in a distracting environment in which the sickest patients compete for attention, most without being able to communicate with their medical team. “We need to develop better cognitive tools that can take into account the 7,000 or more

pieces of information that critical care physicians are bombarded with each day to ensure we're not ruling out potential diagnoses," Winters says.

Although two-thirds of discovered misdiagnoses did not directly contribute to the patient's death, Winters says they're an important indicator of accuracy and aren't without costs. Patients may endure lengthened hospital stays, unnecessary surgical procedures and reduced quality of life because of non-fatal diagnostic mistakes, Winters adds.

The Armstrong Institute patient safety experts say the study points to the need for additional research to pinpoint the causes of misdiagnosis and identify tools to help diagnosticians more accurately assess patients.

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Other Johns Hopkins researchers who contributed to this study include Jason Custer, M.D.; Samuel M. Galvagno Jr., D.O., Ph.D.; Elizabeth Colantuoni, M.S., Ph.D.; Shruti G. Kapoor, M.D.; HeeWon Lee, B.A.; Victoria Goode, M.B.A., M.L.I.S.; Karen Robinson, M. Sc., Ph.D.; Atul Nakhasi, B.A.; Peter Pronovost, M.D., Ph.D.; and David Newman-Toker, M.D., Ph.D.