Scientists isolate biomarkers that can identify delirium risk and severity

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Regenstrief Institute and Indiana University School of Medicine researchers have identified blood-based biomarkers associated with both delirium duration and severity in critically ill patients. An estimated 7 million hospitalized Americans suffer from the acute confusion and disorientation, characteristics of delirium, including a majority of patients in medical or surgical ICUs. Credit: Regenstrief Institute

Regenstrief Institute and Indiana University School of Medicine researchers have identified blood-based biomarkers associated with both delirium duration and severity in critically ill patients. This finding opens the door to easy, early identification of individuals at risk for longer delirium duration and higher delirium severity and could potentially lead to new treatments of this brain failure for which drugs have been shown to be largely ineffective.

An estimated 7 million hospitalized Americans suffer from the acute confusion and disorientation, characteristics of delirium, including a majority of patients in medical or surgical intensive care units (ICUs). Individuals who experience delirium in the ICU are more likely to have more hospital-associated complications, longer stays and higher risk of readmission. They are more likely to experience cognitive impairment and also have a greater likelihood of dying for up to a year after their hospital stay than ICU patients who did not experience delirium.

"If you can tell which patients will have higher delirium severity and longer duration and therefore greater probability of death, there are important treatment implications," said Regenstrief Institute research scientist and IU School of Medicine faculty member Babar Khan, M.D., who led the research and is the president of the American Delirium Society. "Analyzing biomarkers to stratify risk for delirium is a promising approach with the potential to be applied regularly in ICU patients in the near future."

In a new observational study, Dr. Khan and colleagues report that biomarkers for astrocyte and glial activation as well as for inflammation were associated with increased delirium duration and severity and greater in-hospital mortality.

Biomarkers of the 321 study participants, all of whom experienced delirium in an ICU, were identified from samples obtained via simple blood draws. Delirium severity was determined using a tool developed by a team including Regenstrief, IU School of Medicine and Purdue College of Pharmacy scientists. The CAM-ICU-7, short for Confusion Assessment Method for the Intensive Care Unit 7—is easy to administer, even to patients on mechanical ventilators. More than half of ICU patients in the U.S. receive mechanical ventilation.

Each day with delirium in the ICU is associated with a 10 percent increased likelihood of death, according to Dr. Khan, so diminishing its duration and ultimately preventing it is critical. Regenstrief, IU School of Medicine and research scientists from other institutions have conclusively shown in several large trials that antipsychotics, such as the widely used haloperidol, are not effective for the management of delirium duration or severity.

Regenstrief and IU School of Medicine researchers are actively exploring other approaches to delirium.

Dr. Khan is co-principal investigator of an ongoing study that is the first to test whether listening to music, a non-pharmacological strategy that has been shown to decrease over-sedation, anxiety and stress in critically ill patients—all factors that predispose to ICU delirium—and lowers the likelihood of developing delirium. In a completed study, Regenstrief researchers determined that waking ICU patients and having them breathe on their own decreased acute brain failure.

The new study, "Biomarkers of Delirium Duration and Delirium Severity in the ICU" has been published online ahead of print in the journal *Critical Care Medicine*.

More information: Babar A. Khan et al. Biomarkers of Delirium Duration and Delirium Severity in the ICU, *Critical Care Medicine* (2019). DOI: 10.1097/CCM.0000000000004139

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