



# Research in the Intensive Care Unit

Many advances in medical care have been discovered in the modern intensive care unit (ICU). In the ICU, doctors, nurses, respiratory therapists, and other health care professionals help patients survive illnesses which until recently, would have caused certain death.

Not long ago, serious medical conditions like pneumonia, leukemia, and massive trauma would have resulted in death for many people. With advances in ICU care, many deaths can now be avoided and many patients are living longer, safer, and more productive lives. The improved care in the ICU is the result of research in lung and other diseases.

## Is lung disease a common problem in the ICU?

You have probably heard of chronic lung diseases like asthma and emphysema. However, you may not know that complications from other conditions often affect the lungs as well. For example, many patients with severe, life threatening illnesses may also suffer from a condition called **acute lung injury (ALI)**.

## What is Acute Lung Injury (ALI)?

ALI is a lung condition that causes a severe form of respiratory failure. This means that the lungs are not able to take in enough oxygen from the air to meet the body's needs. This happens because thick fluid builds up in the airspaces (the area in and around the air sacs) of the lungs. This thick fluid makes the lungs become "stiff" and hard to take air into the lungs.

Causes of ALI can be almost any serious insult to the body. People for example can develop ALI from: pneumonia, massive bleeding, a serious car accident or a life-threatening infection. When a patient has ALI, they are cared for in the ICU by pulmonologists (lung specialists) and critical care specialists.

## What has been learned about ALI from medical research?

Research has taught health care providers *who* gets ALI and *who* is *at risk* for getting it. Using animal models (research results from animals), scientists have shown how ALI develops and have begun to unravel the complex links between molecules, cells, and tissues that lead to this form of life-

threatening lung failure. It is known that ALI results from either direct injury to the lung (such as with pneumonia), or indirect damage to lung tissue from a problem not directly connected to the lung (such as after a major surgery).

## How has treatment for patients with ALI improved as a result of medical research?

Research has taught health care providers how to best care for patients with ALI. Many patients who develop ALI need mechanical ventilation (a machine to help them breathe). ALI research has shown how to use ventilators more safely and effectively. For example, researchers showed that a simple change in the settings on the ventilator can decrease deaths from ALI by more than 20%.

Advances in medical care have also decreased the chances of a patient with ALI having complications. Patients with ALI are critically ill for long periods and are at risk for complications. Research has given vital insights into how to quicken their recovery, while limiting the risks patients face in the ICU. Clinical research has shown safer ways to provide pain control, more accurate ways to know when a patient is ready to breathe on their own, better ways to avoid blood infections, and better ways to prevent ALI patients from dying from new complications such as gastrointestinal bleeding or blood clots in the lungs.

Research has brought major advances in the care of patients with the most severe forms of lung disease. While we celebrate these advances, new breakthroughs are still necessary. We are eager for the day when severe lung failure can be reversed before a patient requires mechanical ventilation. We hope to have specific treatments that can be given based on a better understanding of each individual patient. Finally, we must continue research on lung diseases so that even more patients with ALI and other serious lung diseases can survive and return to a meaningful life.

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