

EXECUTIVE SUMMARY

MRI and the Critical Care Patient: Clinical, Operational, and Financial Challenges

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Neuroimaging in intensive care units (ICU) is essential for diagnosing potential toxic-metabolic or structural brain injuries. However, transporting an ICU patient for neuroimaging involves potential risks and costs. Numerous

studies have indicated a prevalence of adverse events during patient transport, with rates ranging from 22% to 79%. This paper uses a base rate of 33%, implying that roughly one-third of patients experience an adverse event during transport. The risks include adverse events due to the physicality of transport, environmental changes, and repositioning of monitoring equipment. These interruptions can lead to treatment delays, disrupt critical care, and result in issues such as deterioration of respiratory function after returning from transport—extending ICU stays, and potentially resulting in worse long-term outcomes.

Despite its inherent challenges, neuroimaging remains a crucial part of care for neurocritical patients, with computed tomography (CT) and magnetic resonance imaging (MRI) being the primary modalities used. However, transporting patients for MRI scans is time-consuming, costly, and laden with multiple risks, such as physical separation between the patient and nurse, posing a potential delay in case of an emergency.

While the risks associated with transport need to be carefully considered, there is also a downside to delays in obtaining an MRI that can impact patient outcomes negatively, especially in traumatic brain injury cases. Hospital turnaround times for ICU MRI results vary widely, but logistical and clinical challenges often add hours to this

process. Furthermore, aborted transport for MRI occurs more frequently than other imaging modalities, indicating the need for careful evaluation before transport.

The paper also discusses costs associated with transporting ICU patients for MRI scans, including direct imaging costs, personnel costs for transportation, and the costs per adverse event. Each extra hour a patient stays in the ICU increases costs. Thus, minimizing adverse events and other risks during transport can reduce overall ICU costs and the duration of hospitalization.

From the patient's perspective, the primary goals of ICU care involve minimizing treatment delays, reducing the length of stay, and decreasing morbidity and mortality. About 5 million patients are admitted to the ICU annually in the U.S., with around 20% requiring transport for MRI procedures. The associated costs lead to an estimated annual expense of \$1.79 billion for the U.S. healthcare system related to MRI transport-associated adverse events in ICU patients.

This paper calls for further research into advancements such as portable MRI machines and risk minimization strategies to improve patient care. The need to balance the benefits of obtaining neuroimaging with the associated risks and costs emphasizes the urgent need for new technologies and improved procedures in ICU care.

We invite you to access the full paper using the QR code above. We also invite you to explore our website to learn more about the benefits of the Hyperfine, Inc. *Swoop® Portable MR Imaging®* system.