Seismic Instrumentation of Healthcare Facilities

By the

Hospital Building Safety Board Instrumentation Committee

Presented to the California Department of Health Care Access and Information (HCAI) | 2026

Introduction and Purpose

California sits on some of the most earthquake-prone land in the world, and its hospitals — facilities that people depend on most in times of emergency — have suffered significant damage in past earthquakes. When a major earthquake strikes, hospital managers must quickly decide whether to keep the facility open, reduce services, or evacuate. Currently, making that decision often means waiting days for engineers to physically inspect the building — time that neither patients nor communities can afford to lose. Unnecessary evacuation can put patient health at risk.

In October 2023, the Hospital Building Safety Board Instrumentation Committee prepared a white paper on the importance and benefits of earthquake sensing systems — known as seismic instrumentation — in hospital buildings. This document provides a summary of that white paper's key findings, with an emphasis on the real-world benefits these systems deliver. Readers seeking full technical detail are encouraged to consult the complete white paper.

What Is Seismic Instrumentation?

Seismic instrumentation is a network of small sensors — similar in concept to the motion sensors inside a modern smartphone — installed in selected locations within a hospital building. These sensors measure how strongly the building shakes during an earthquake.

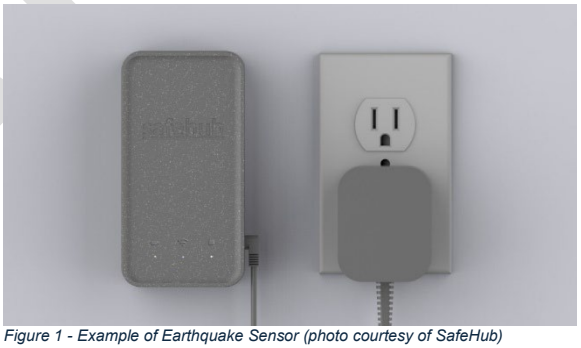

Figure 1 - Example of Earthquake Sensor (photo courtesy of SafeHub)

The data collected by these sensors can be transmitted electronically and analyzed almost immediately after an earthquake. Paired with modern software, the data can provide a rapid picture of building damage —without waiting for an in-person inspection.

As of 2023, approximately 90 hospital buildings in California have been equipped with these sensing systems through an ongoing partnership between HCAI and the California Strong Motion Instrumentation Program. However, California has over 3,000 hospital buildings in total, meaning less than 5% are currently instrumented — underscoring the need for wider adoption.

Key Benefits of Instrumentation

There are two broad categories of benefit from hospital instrumentation, as explained below.

1. Faster, Better Decisions After an Earthquake

The most immediate and life-saving benefit is the ability to assess a hospital's safety quickly and accurately. After a major earthquake, a hospital administrator faces urgent questions: Is the building safe? Can we keep treating patients? Do we need to evacuate? Without instrumentation, answering these questions requires waiting for engineers to travel to the site and inspect the building floor by floor — a process that can take days.

A real-world example illustrates this clearly. In the 1994 Northridge earthquake, the new Sylmar County Hospital (now Olive View-UCLA Medical Center) was one of the few California hospitals already equipped with sensors. The building itself was structurally sound after the earthquake, but there was extensive damage to interior elements — including overturned equipment, collapsed ceiling tiles, and disrupted medical systems — forcing the hospital to close for an extended period.

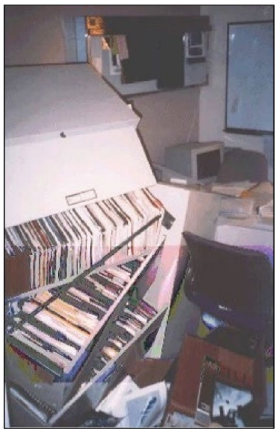

Figure 2 - Example of nonstructural damage at the Sylmar County Hospital during the 1994 Northridge Earthquake

The sensor data recorded during that earthquake showed exactly which floors experienced the most intense movement. Researchers later demonstrated that if modern software had been connected to those sensors in 1994, the damage to both the structure and the building's interior components could have been estimated within minutes of the earthquake — not weeks. Hospital managers could have received an immediate evaluation of the potential structural damage based on the sensor data and reported the results to hospital management.

These immediate insights allow decision-makers to:

- Keep the hospital open when the data confirm it is safe — avoiding unnecessary evacuations that put patients at risk;
- Focus inspection resources first on the specific floors or areas most likely to have damage;
- Confidently redirect patients and emergency services to safe facilities when serious damage is confirmed; and
- Resume healthcare services faster once the data show that affected areas have been addressed.

2. Safer Hospitals Now and in the Future

Beyond immediate post-earthquake response, sensor data collected over time have been essential in making all California hospitals safer. Engineers and building code officials use earthquake recordings from instrumented hospitals to understand what actually happens inside buildings during strong shaking — and to update the rules that govern how hospitals are designed and built.

Looking Ahead: More Coverage, Smarter Technology

Advances in sensor technology are making widespread hospital instrumentation more affordable than ever. Smaller, lower-cost sensors can provide many of the key safety benefits at a fraction of the cost of traditional systems. Paired with cloud-based software and artificial intelligence tools, these sensors could give any hospital a near-instant safety dashboard to selected users on the cell phones after an earthquake.

Why This Matters to Everyone

When a major earthquake strikes California, its hospitals will be under enormous pressure — from patients injured in the earthquake itself, from the loss of power and communications, and from the uncertainty about whether buildings are safe to occupy. Seismic instrumentation is a relatively modest investment that can dramatically improve a hospital's ability to respond wisely in those critical first hours.

Unnecessary evacuations cost lives. Keeping a damaged building open also potentially risks lives. Accurate, fast information — the kind that seismic instrumentation provides — is the tool that lets hospital leaders make the right call.

The Hospital Building Safety Board encourages all California hospital owners and administrators to consider seismic instrumentation as an investment in patient safety, staff safety, and the continuity of care that communities depend on when they need it most.

For More Information

This document is a summary. For additional technical detail, please refer to the original white paper: Seismic Instrumentation of Healthcare Facilities (October 26, 2023), available from the California Department of Health Care Access and Information (HCAI) at hcai.ca.gov.