Whitepaper, Airez, HIPAA & PHI

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Airez in Healthcare: HIPAA-Compliant AI for Safer, Smarter Hospitals

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Executive Summary

Hospitals are at a crossroads: they must protect patient privacy, safeguard staff, and deliver higher-quality care in environments that are increasingly complex. Traditional surveillance and object-recognition systems have failed to meet this challenge. They are siloed, rules-based, and incapable of adapting to the nuanced realities of healthcare environments.

Airez represents a new generation of hospital intelligence: a **true artificial intelligence system** that perceives, understands, and responds in real-time. Built with HIPAA compliance as a foundation, Airez enables hospitals to deploy advanced monitoring without compromising patient trust or regulatory integrity.

Understanding HIPAA, PHI, and Visual Data

Protected Health Information (PHI) Defined

HIPAA defines PHI as any data that can identify an individual and relates to their health status, treatment, or payment for healthcare services. Traditionally, this covers medical records, billing data, and lab results.

Where Video and Sensor Data Intersect with PHI

While video footage or environmental data is not *inherently* PHI, the context can convert it into PHI:

- A patient wheeled into an oncology ward (implied diagnosis).
- A camera showing a specific patient awaiting dialysis.
- Sensor data that ties environmental conditions to specific patient rooms.

Thus, **visual and sensor data in hospitals must be treated as PHI-adjacent**, requiring safeguards equivalent to those mandated by HIPAA.

Why Traditional Object Recognition Falls Short

Most hospital video systems today rely on **rules-based object recognition**: algorithms that detect a "person," "object," or "motion." While useful in simple environments (e.g., retail theft detection), these systems are inadequate in hospitals:

1. **Context Blindness** – Traditional systems cannot distinguish between a visitor sitting in a lobby vs. a patient left unattended in a hallway.
2. **Static Rules** – Pre-programmed thresholds (e.g., "if person stops moving, send alert") produce false positives in complex care environments.
3. **PHI Risk** – Many legacy systems store raw video without HIPAA-aligned safeguards.
4. **Limited Scope** – These systems do not integrate environmental or operational data such as humidity, infection control metrics, or patient flow.

The Airez Advantage: True Artificial Intelligence

Airez is not a static recognition system—it is a **multi-modal, adaptive AI** designed to understand *context*.

Key Technical Differentiators

- **Perception + Reasoning** – Beyond "detecting objects," Airez interprets *why* an object or person is where they are, and whether their state represents risk.
- **Cross-Modal Analysis** – Fuses video, environmental sensors, access control, and IoT data streams into a single intelligence layer.
- **Edge + Cloud Processing** – Sensitive video analyzed on-site (edge AI) to reduce PHI exposure; aggregated, anonymized metadata sent to the cloud for analytics.
- **Adaptive Learning** – Models continuously improve, learning the difference between normal hospital behavior (patients waiting) and abnormal behavior (patients left too long unattended).
- **PHI-Conscious Design** – Instead of storing raw video indefinitely, Airez extracts actionable insights (alerts, event tags, anonymized metadata) to reduce compliance burdens.

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HIPAA Compliance Framework in Airez

To operate in hospital environments, Airez embeds compliance safeguards at every stage:

1. **Data Collection**
    - Cameras and sensors placed in non-sensitive zones by default.
    - Explicit exclusion of patient bathrooms, dressing rooms, and private treatment areas.
2. **Data Processing**
    - Edge AI analysis ensures PHI is not unnecessarily transmitted.
    - Selective storage of *events* instead of raw video streams.
3. **Data Storage**
    - AES-256 encryption for video at rest.
    - TLS 1.3 encryption for all data in transit.
    - Configurable retention policies aligned to hospital compliance rules.
4. **Access Control**
    - Role-based permissions, enforced by hospital IT.
    - Multi-factor authentication for administrative accounts.
    - Immutable audit trails for all access attempts.
5. **Data Minimization & Anonymization**
    - Where possible, Airez outputs metadata (e.g., “patient in hallway unattended for 14 minutes”) instead of identifiable footage.
    - Automated redaction of patient faces when video storage is required.

Use Cases in Healthcare Environments

1. Patient Safety & Care Quality

- **Unattended Patients** – Detect patients left in hallways, triggering timed alerts to staff.

- **Fall Risk Detection** – Recognize gait instability, sudden collapse, or wandering behavior.
- **Treatment Delays** – Identify bottlenecks in patient flow to ensure timely care.

2. Staff Safety

- **Aggression Monitoring** – Detect threatening postures or escalation in ER waiting rooms.
- **Lone Worker Protection** – Monitor when nurses are isolated in high-risk scenarios.
- **Duress Alerts** – AI-assisted detection of unsafe staff-patient interactions.

3. Infection Control & Environment

- **Humidity & Air Quality Monitoring** – Detect environmental conditions that elevate infection risk.
- **Hand Hygiene Compliance** – Track motion patterns at sink stations without storing PHI.
- **Contamination Risks** – Detect improper placement of biohazard or waste materials.

4. Operational Intelligence

- **Flow Analytics** – Measure patient throughput, wait times, and equipment utilization.
- **Asset Tracking** – Detect misplaced stretchers, beds, or critical equipment in hallways.
- **Predictive Insights** – Identify trends before they manifest as safety or compliance issues.

Technical Architecture Overview

Edge Layer

- AI inference performed locally, ensuring PHI-sensitive data does not leave the hospital network unless required.

Core Intelligence Layer (Airez OS)

- Fuses video, IoT, environmental, and workflow data.

- Applies reasoning models that interpret human behavior, not just motion.

Hospital IT Integration

- Interfaces with EMR/EHR where appropriate (without duplicating PHI).
- Customizable alert routing to nurse stations, mobile devices, or command centers.

Compliance & Governance Layer

- HIPAA-compliant encryption, access control, and audit logs.
- Policy-based retention and redaction systems.

Benefits to Hospitals

- **HIPAA-Aligned by Design** – Reduces regulatory risk by embedding PHI-conscious controls.
- **Improved Patient Care** – Prevents missed care events and supports safer environments.
- **Enhanced Staff Safety** – Protects nurses and physicians with real-time, AI-driven alerts.
- **Operational Excellence** – Data-driven intelligence optimizes throughput and resource use.
- **Future-Ready** – Scalable to support integration with next-gen hospital IoT and AI ecosystems.

Conclusion

Security and monitoring systems in hospitals can no longer remain simplistic or compliance-averse. Traditional object recognition fails to address the complexity of PHI, staff safety, and real-time operational intelligence.

Airez is the first platform to unify **artificial intelligence, compliance, and operational insight** in a way that respects patient privacy while empowering hospitals to act faster, safer, and smarter.

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By delivering real-time intelligence while protecting PHI, Airez enables healthcare systems to meet the dual mandate of **innovation and compliance**—paving the way for safer care, healthier environments, and a more resilient healthcare future.

Airez: Artificial Intelligence with HIPAA at its Core.

Let's talk

Huvr, Inc. (AIREZ)
Sales@airez.com
10770 E Briarwood Ave, Centennial, CO 80112 • (888) 743-0022
huvr.com / airez.com • demos & pilots available within 30 days in most organizations.