

RP: A database that centralizes healthcare management and resource sharing in times of crisis

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Executive Summary

To support hospitals and clinics in times of crisis, we designed RP, a secure, transparent database that pools excess and underutilized resources from hospitals, non-profit organizations, and government agencies across regions and organizes them for healthcare systems serving vulnerable communities to pull from. This system increases overall healthcare system resilience and sustainability by encouraging hospitals to look within their workflows and reduce waste and underutilization and fosters a sense of community between healthcare systems. Once piloted in a region, this framework can be easily scaled and applied to greater scales.

Introduction and Problem Statement

Healthcare systems sit at the intersection of various levels of governance, and for a large part, these systems remain largely decentralized in day-to-day activities. Decentralization allows for decision-making power to be shifted from central to peripheral levels, which is meant to give hospitals and clinics the opportunity to shape their healthcare system to the local communities that they serve. This model works very effectively on an average day, but it can fall apart when it comes to extraordinary circumstances.

During times of crisis, hospitals and clinics can be left without adequate amounts of physical resources. For example, Hurricane Helene severely damaged Baxter International's North Cove facility, which supplies 60% of the nation's intravenous (IV) fluid, leaving healthcare facilities and vulnerable patients with limited reserves of the supply. Conservative measures were implemented to combat the supply shortages. With the influx of climate change, we are expecting more adverse weather events to impact hospital supply chains, which in turn has negative impacts on health outcomes. Rural healthcare facilities in the United States are at even greater risk due to geographic isolation and projected funding cuts due to Medicaid refinancing.

Resource sharing across healthcare systems is not a new concept. During the COVID-19 pandemic, the Washington State Department of Health created an incident management organization to help coordinate the response to the infectious disease. On more of a physical resource-sharing perspective, there is a nonprofit called MedShare that leverages multiple partners to collect surplus medical products from domestic hospitals and redistribute them to

resource-poor communities. Consolidating inventory across healthcare facilities has proven to be an effective measure to combat emergency situations and urgent needs.

When addressing extremely divisive situations like extreme weather events or policy change, healthcare systems need a platform to come together as a community and lean on each other for support. To our knowledge, we do not know of a dynamic inventory system that coordinates resource-sharing among different hospitals and clinics and is easily integrated into pre-existing software.

Solution Design

Our solution is to create RP, a plug-in to existing hospital electronic health record (EHR) systems, allowing hospitals to consolidate and redistribute excess resources to other hospitals in need. We envision this as its own user interface, with the intended client being hospital administrators.

Upon opening the plug-in interface and logging in to their respective account, administrators will have the ability to 1) view and make resource requests and 2) post their own hospital's overflow resources. Overflow resources will then be automatically allocated to open resource requests, first by urgency and then by recency. For EHR systems that support CSV exports, we intend to include a CSV upload option for admins to load their resources into the plug-in.

Once a request has been met, there are a variety of approaches that can be taken in terms of distribution. In one case, material pick-up could be left to the discretion of the receiving healthcare facility, with our platform only serving to connect and relay contact information. Alternatively, distribution could be integrated into an earlier point in the supply chain, allowing for requests to be dispersed alongside regular manufacturer deliveries. Regardless of the approach, the resource reallocation tool that our solution provides would lay the groundwork for more adaptable systems in healthcare.

Overall, this separate portal creates a comprehensive and intuitive space for hospitals to turn to in emergencies where having access to another hospital's excess supply could prove crucial. The automatic request fulfilling system also allows hospitals to see if their requested resources are available at another location without having to wait on a response.

Methodology

Data Model

Key entities: Hospital (ID, location), InventoryItem (name, unit), Availability (hospital-item stock), Offer (item share), Request (item, quantity, date), and Fulfillment (ties an Offer to a Request, with status). Hospitals have many Offers and Requests; each Request references offers when fulfilled. All actions generate audit entries.

Integration Approach

For Epic sites, RP runs as a SMART-on-Fast Healthcare Interoperability Resources (FHIR) app (OAuth2) embedded in Epic's interface. RP also supports standard FHIR/Health Level Seven (HL7) Application Programming Interfaces (APIs) (e.g. SupplyRequest/SupplyDelivery). For sites without APIs, RP can ingest Comma-Separated Values (CSV) and other formatted uploads of inventory data. Additionally, RP exposes a RESTful JavaScript Object Notation (JSON) API for real-time exchange.

Deployment

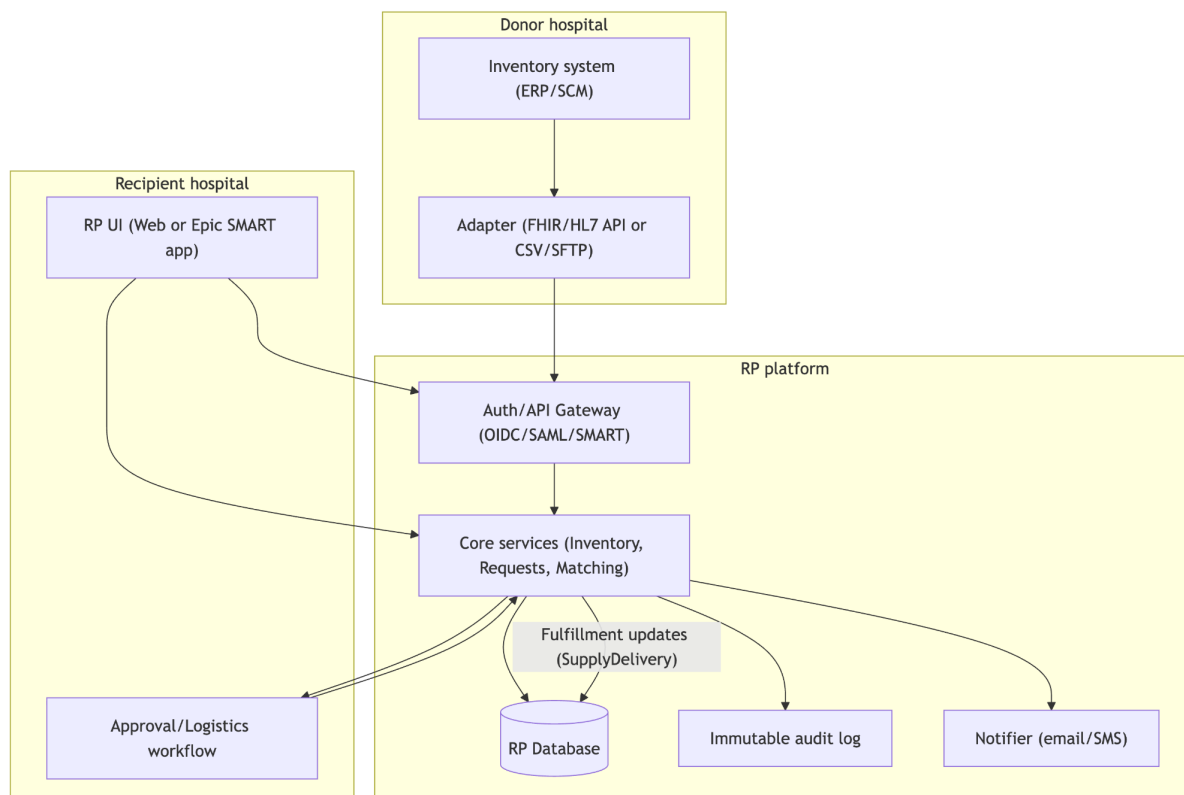
Hosted in a Health Insurance Portability and Accountability Act (HIPAA)-compliant cloud (AWS/Azure) under a Business Associate Agreement (BAA); scales easily (Transport Layer Security (TLS) via AWS Certificate Manager).

Access Control

RP uses tenant-based Role-Based Access Control (RBAC). Example roles: Publisher (post offers), Requestor, Approver, Logistics Coordinator. Hospitals authenticate via their identity provider (Security Assertion Markup Language (SAML)/OAuth). All actions are logged for auditing (meeting HIPAA technical safeguard requirements).

HIPAA Compliance

RP handles no Protected Health Information (PHI) (only inventory counts and schedules). Thus, HIPAA Security Rule does not apply.



Goals

The main aim of RP is to strengthen healthcare system resilience by creating a centralized platform that allows hospitals and community organizations to coordinate and share resources in times of need. If implemented, RP would make it easier for hospitals to see what resources are available and what other clinics need, rather than each facility working separately. This would help hospitals share supplies and services more efficiently when one location has an excess and another faces shortages.

RP would also reduce waste by encouraging healthcare facilities to identify areas of underuse, better track what is available, and redirect to other institutions when possible. In addition, RP aims to improve access to relevant healthcare support and information through a narrative-style online platform that helps individuals determine what resources are most helpful based on their respective situations.

Over time, the goal of RP is to build a model that can be used across states so different healthcare systems can coordinate before a crisis. Ultimately, RP seeks to shift healthcare resource management towards a more connected system in which various hospitals can identify available resources, anticipate shortages, and support one another when local resources are stretched thin.

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Resources

1. P,; Grosman-Rimon L;Li DHY;Collins BE;Wegier. "Can We Improve Healthcare with Centralized Management Systems, Supported by Information Technology, Predictive Analytics, and Real-Time Data?: A Review." *Medicine*, U.S. National Library of Medicine, pubmed.ncbi.nlm.nih.gov/37960822/.
2. "Interoperability." *Epic*, www.epic.com/software/interoperability/.