HURRICANE

SEMANTIC INTEROPERABILITY IN DISASTER PREPAREDNESS

Lessons from Hurricane Harvey

Overview

When Hurricane Harvey struck Texas in 2017, over 19 trillion gallons of rain fell on the Houston area (FEMA, 2023). A number of hospitals experienced major disruption to operations. However, due to semantic interoperability (SI) some EHRs were sustained and accessible (Elation Health, 2017).

Semantic interoperability (the ability of systems to exchange and interpret information consistently) keeps critical care connected (Palojoki et al., 2024).

- Enables real-time data sharing between hospitals, EMS, and public health
- Prevents information loss during patient transfers
- Supports coordinated, patient-centered disaster response

Challenges During Harvey

While facilities with EHRs avoided major data losses, those records without SI were not easily accessible when the need was critical (Cohen, 2017).

- Patients arrived without medication histories
- Fragmented EHRs slowed triage and treatment
- Limited interoperability delayed resource coordination

Why Semantic Interoperability Matters

SI can allow responders to see accurate patient data, which is critical in disaster situations (Palojoki et al., 2024).

- Improves triage and transfer decisions
- Tracks vulnerable populations efficiently
- Reduces duplicated work and medical errors

Semantic Interoperability in Action

SI ensures that data translates across platforms (HL7 International, 2023; Palojoki et al., 2024). To achieve this, EHR systems must use both FHIR and standardized terminologies like SNOMED CT .

- FHIR: for data structure and transmission
- Standardized Terminologies: consistent language use for lab, medication, allergies, etc.
- Common language = consistent interpretation
- Enhances accuracy and speed of communication

Lessons & Future Directions

Disasters like Hurricane Harvey highlight the need for all EHRs to support SI, so that patient data can be shared rapidly when lives depend on it (de Mello et al., 2022).

- Develop globally universal health standards
- Promote adoption of terminologies and semantic web technologies
- Create methods to integrate legacy health data
- Establish standardized evaluation metrics for interoperability success

When healthcare systems share information seamlessly, patient lives are protected. Interoperability turns confusion into collaboration and coordinated care.

Generative AI Attestation

I attest that I used a generative AI tool in accordance with course guidelines and assignment-specific permissions. I utilized ChatGPT (OpenAI, 2025) on October 28, 2025, for the purpose of suggesting ideas for the various sections of the infographic. Thumbnail graphics were generated by ChatGPT to visually represent the key concepts. The prompt(s) used included: “I need general ideas for six fields for an infographic,” and, “Can you give me six high quality thumbnail images relating to hurricane disaster response?” I also asked ChatGPT to help me compare the finished infographic with the rubric.

All AI-generated content was critically reviewed, edited, and appropriately integrated with my own academic and clinical reasoning.

References

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