Harnessing Real-Life Data

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Agenda

Introduce real-world data

Review an exemplary improvement project that harnesses real-world data

Explore emerging uses case for AI + real-world data

Identify future opportunities for real-world data

Disclosure

As an independent consultant, I provide subject matter expertise to industry-based innovation projects that utilize real-world data

I commit to presenting today’s content in a vendor-neutral manner

What is real-world data?

AKA real-life data

Real-world data (RWD) is data collected during routine care, relating to delivery and/or patient status

Timeliness

- Often generated in near real-time as a byproduct of
  - Patient care tasks
  - Communication
  - Information system use

Content

- Is generated by many clinicians and/or patients
- Reflects what happens in real clinical settings
- Increases visibility of care-related activity

Challenges

- Can be disconnected and underutilized
- Reflects real world messiness – may require cleaning
- Structure & standardization increase value, although recent AI advances present new opportunities for use of unstructured (text) data

Common RWD sources used in Research

Source: Swift B, Jain L, White C, Chandrasekaran V, Bhandari A, Hughes DA, et al. Innovation at the intersection of clinical trials and real-world data science to advance patient care. Clin Transl Sci. 2018;11(5):450–60.

Research Considerations

Benefits

- Sources often contain a large patient population and longitudinal data
- Can accelerate discoveries by streamlining data collection
- Especially useful for “pragmatic trials” focused on decision-making

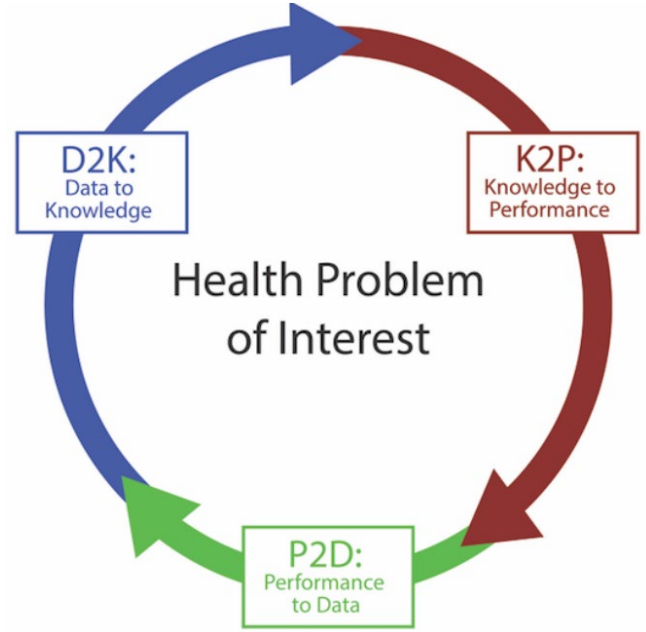
Challenges

- Data of interest may not be collected as real-world data
- Data quality concerns, including missing data
- Generalizability concerns

Source: Rogers JR, Lee J, Zhou Z, Cheung YK, Hripcsak G, Weng C. Contemporary use of real-world data for clinical trial conduct in the United States: a scoping review. J Am Med Inform Assoc. 2021 Jan 15;28(1):144-154.

"Health systems become **learning systems** when they can, routinely and continuously, study and improve themselves."

Charles P. Friedman



Source: https://www.uab.edu/medicine/coere/images/Envisioning_a_Learning_Health_System_Charles_P._Friedman.pdf

Exemplary use of RWD to detect RN strain during a work shift

An exploratory study of underutilized data streams

Operational sources of RWD

Clinician-generated

Communication Devices

Med & Supply Dispensing

Electronic Health Records

Locator Badge & other wearables

Patient-generated

Personal Emergency Response System

Smart Pill Organizers

Nurse Call, Bed data
Smart hospital rooms

Personal health records

Detecting RN strain using operational real-world data

RNs identified activity changes that occur during periods of strain (as ideas for computable signals)

Transformed real-world data into shift-level features e.g., # minutes spent on a communication device

Utilized machine learning to create an algorithm that can signal RN strain as early as 8 hrs into a 12-hr shift

Exported data from communication, nurse call, med dispensing, and time & attendance systems

Outcome labeling of each work shift for presence/ absence of unplanned overtime (proxy for RN strain)

Source: Womack DM, Hribar MR, Steege LM, Vuckovic NH, Eldredge DH, Gorman PN. Registered Nurse Strain Detection Using Ambient Data: An Exploratory Study of Underutilized Operational Data Streams in the Hospital Workplace. Appl Clin Inform. 2020 Aug;11(4):598-605.

Shift-level features that contain information re: RN strain*

- Sum of communication device minutes
- Skewness of medication count across RNs
- % medications delivered via syringe
- Sum of medications dispensed in shift hours 1-3
- Sum of nurse call minutes (patient wait time)
- % of patients present on previous day (pt continuity)
- Mean # med dispenses per patient

*Features with high importance in one or more machine learning models
Unplanned RN overtime – used as a proxy indicator of RN strain

Shift-level features that were not discriminative of strain*

cross-assignment med dispensing (a helping behavior)

Sum of medication dispenses across all patients

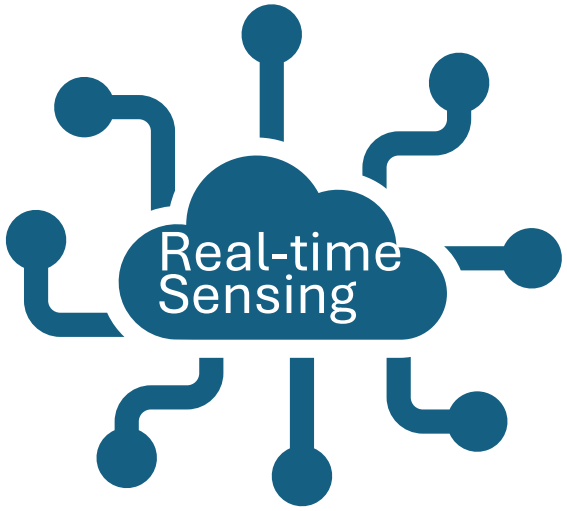
Aggregate years of RN experience

% RNs who worked the previous calendar day (RN continuity)

Count of communication events w/ predefined groups e.g., lift team

*Features with high importance in one or more machine learning models
Unplanned RN overtime – used as a proxy indicator of RN strain

Future Operationalization



Signs of RN strain, work system pressure

Heatmap of RN strain across Units

Flexible resources to assist w/ bursts

Benefits

- Early reallocation to avoid recovery period after a “runaway train”
- Provide insights into root causes and future factors for staffing
- Increase satisfaction, reduce burnout

Implementation status as of 2026

Multi-System Integration Challenge

- Data from multiple systems had to be manually integrated
- An EHR-based prototype was developed, but this was unable to harness non-EHR data streams due to lack of integration
- EHRs have limited ability for real-time analytics harnessing both EHR & non-EHR data

Future optimism

- EHRs are expanding their vendor integration programs, which is laying a foundation for multi-source, real-time data analytics
- Increasing awareness that maintaining human-sustainable workloads is part of a larger, necessary solution to RN retention

Utilizing RNs to enhance Personal Emergency Response (PERS)

An in-home PERS pilot study

Pilot Program: PERS + RN assessment

AI-generated summary using RWD

PERS Response Center calls are recorded

A transcription engine converts recorded voice to text

AI tools, including Natural Language Processing and a Large Language Model summarize call events

AI-generated PERS call summary:

- Answers key questions
- Provides case managers a more complete picture of situations in the home

AI-summary of PERS calls

Workflow Steps	Example AI-generated Output
Situation	The subscriber reported constipation for the last 48 hours
Subscriber tone	Urgent but controlled
Nurse Eligible	Yes
Nurse Utilization	The operator contacted the nurse line and successfully connected the nurse to the caller for further guidance.
Nurse Recommendation	The nurse recommended contacting the primary care provider or going to the emergency department if the enema did not resolve the issue.
Summary	The situation was correctly classified as nurse eligible, the nurse provided guidance, subscriber will contact PCP if problem persists.

Future uses of real-world data

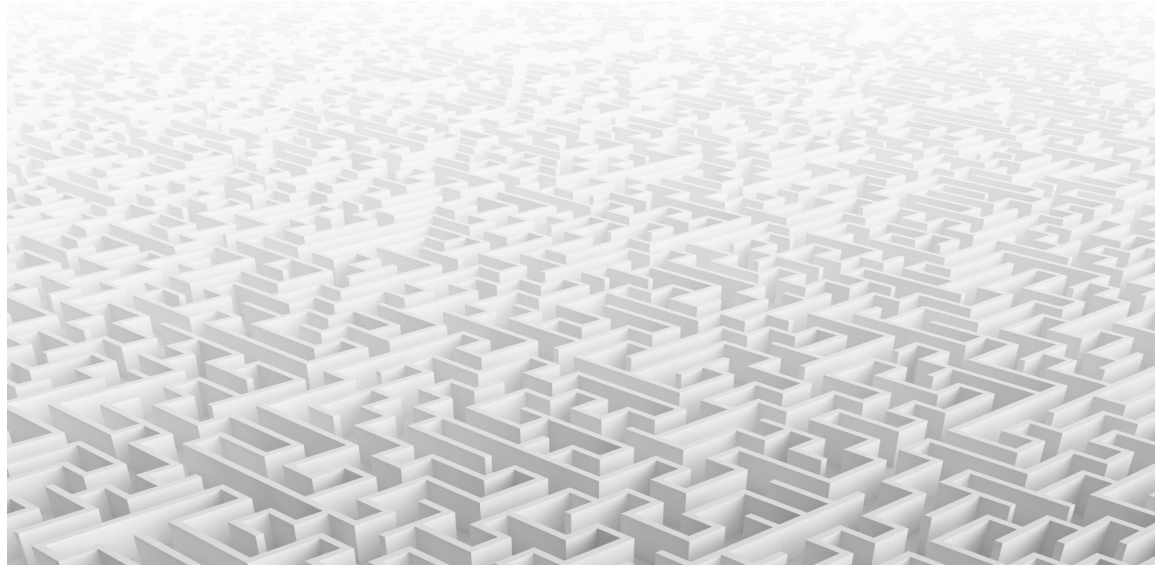
Proactive monitoring of chronic and age-related conditions via new FDA-approved devices for the home e.g., fall detection devices, ankle edema sensors, contactless vital sign monitoring

Integration of patient-generated data into clinical systems, processes and workflows e.g. activity tracking, wearables, food logs

Learning from aggregate real-world data to inform clinical practice, public health and national policy

Nurses' clinical expertise is needed to harness real-world data for good.
You have valuable skills and knowledge to contribute to this endeavor!

Questions & Discussion



Thank you

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