



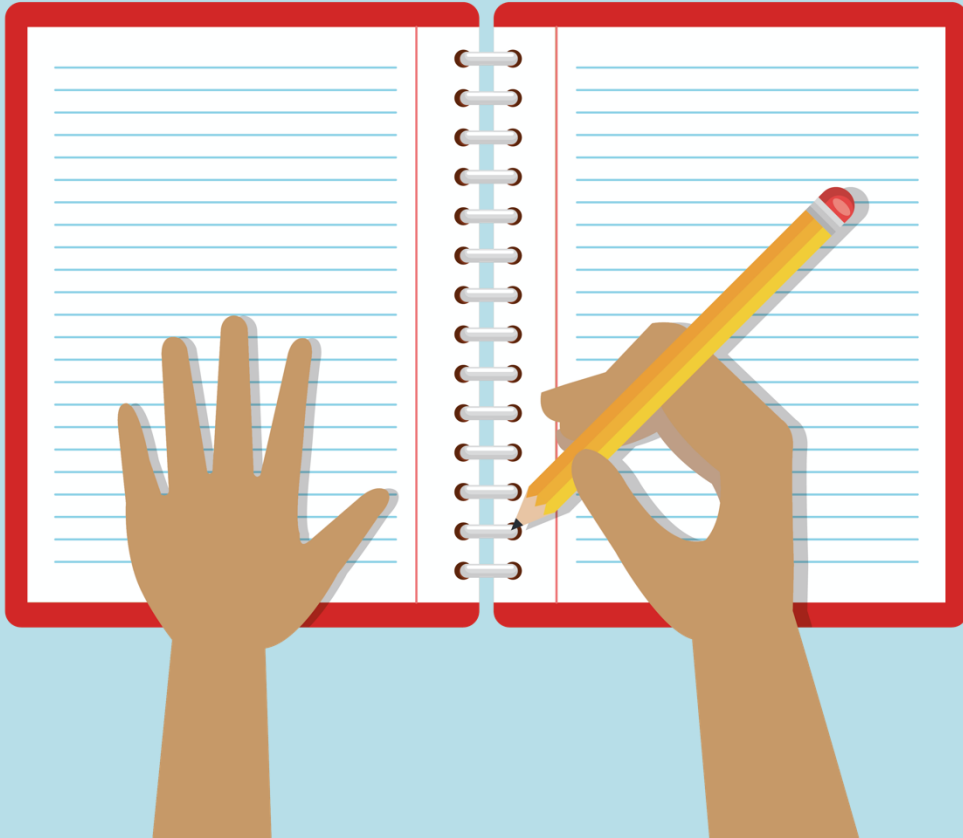
Data Tools for Research

Presentation for UM Psychiatry
October 22, 2024

Twitter/X: @projectEMERSE
Web: project-emerse.org
Email: hanauer@umich.edu
emerse-team@umich.edu

David Hanauer, MD, MS
Dept of Learning Health Sciences
University of Michigan

If you want to take notes or visit links



these slides can be found at:

this link will be
on most slides



em**erse**
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

<http://project-emerse.org/presentations.html>

A hand holding a megaphone is shown on the left side of the image. The megaphone is white with a grey rim and a red interior. Several white and orange triangular shapes radiate from the megaphone, suggesting sound or energy. The background is black with a red diagonal stripe. A large white banner is positioned diagonally across the center, containing the text "I am here to tell you about EMERSE".

I am here to tell you
about EMERSE

em@rse
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

<http://project-emerse.org/presentations.html>

2021 study out of UC Irvine: *Design, Implementation, and Usability of the Electronic Medical Record Search Engine (EMERSE) Tool*

<https://escholarship.org/uc/item/44p23878>

“Users unanimously responded that they would recommend the system to others, and...for a tool they found so useful, they believed that **far too few people both within and outside of their network knew about the tool’s existence.**”



Unstructured vs Structured Data

EMERSE is for this...	...not this
<i>Unstructured Data (free-text)</i>	<i>Structured Data</i>
Mrs. Jones is a 56 year old female with a history of HTN, hypercholesterolemia, and T2DM who comes to the clinic today with a 3 day h/o dizziness and severe headache on the left side.	WBC: 5.6 Total cholesterol: 182 Weight: 67.4 AST: 30 ALT: 52

80% of EHR data are in unstructured free-text



} structured data

} unstructured data/free text

The EMERSE solution



- A system “for the people”
- Users search the notes on their own
 - No need to wait in a queue for an analyst or a data scientist
- Easy-to-use for non-technical users
- Unlike with some EHRs, EMERSE can search across all notes and all patients at once
- Continuous refinements for almost 19 years




EMERSE is a useful tool

- It will be one of many you need to build/support your project(s)



What can EMERSE do?

Lots of things!



EMERSE for Cardiac Surgery Research
David Hanauer


Linda Farhat, Clinical Research Coordinator
Department of Cardiac Surgery, Michigan Medicine

01:28

Cardiac Surgery Research

"It allows us to basically target exactly what we need to know."

--Linda Farhat, Clinical Research Coordinator



EMERSE for Quality Analytics
David Hanauer

Andrew Heiler, Clinical Quality Coordinator

01:18

Quality Analytics

"I can't imagine having to do what I do without having EMERSE."

--Andrew Heiler, Quality Analytics Coordinator



EMERSE for Infection Control
David Hanauer

Jayna Berger Heiler, Infection Prevention Coach

01:33

Infection Prevention

"The value of EMERSE is immeasurable."

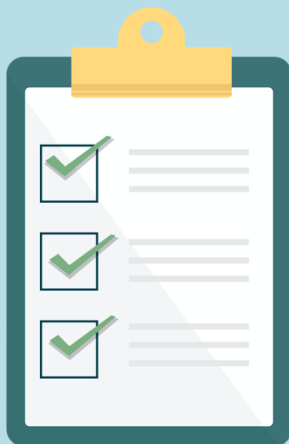
--Jayna Berger Heiler, Infection Prevention Coach

Watch our videos: https://project-emerse.org/use_cases.html

Find cohorts

EMERSE allows you to find cohorts based on things mentioned in the notes

- diseases
- drugs
- symptoms
- anything*



*if it is mentioned

Find cohorts

It's perfect for finding rare things...



...like rare cancers such as
cutaneous leiomyosarcoma

See this talk for more details:

<https://vimeo.com/677482835>

“Using EMERSE to Improve Research
Involving Rare Cancers”



Highlight documents for chart review

Thoracocentesis confirmed the recurrence of mantle cell lymphoma. Disease restaging work-up revealed multicompartiment lymphadenopathy in the neck, mediastinal, retrocrural, retroperitoneal and pelvic regions. Bone marrow was also involved. The patient was treated with a total of six cycles of rituximab, cyclophosphamide, vincristine, doxorubicin and dexamethasone (R-HyperCVAD) completed in January 2007. That treatment led to complete remission that lasted until October 2008, when the disease was found to have recurred in the left pleural space and retroperitoneum without bone marrow involvement.



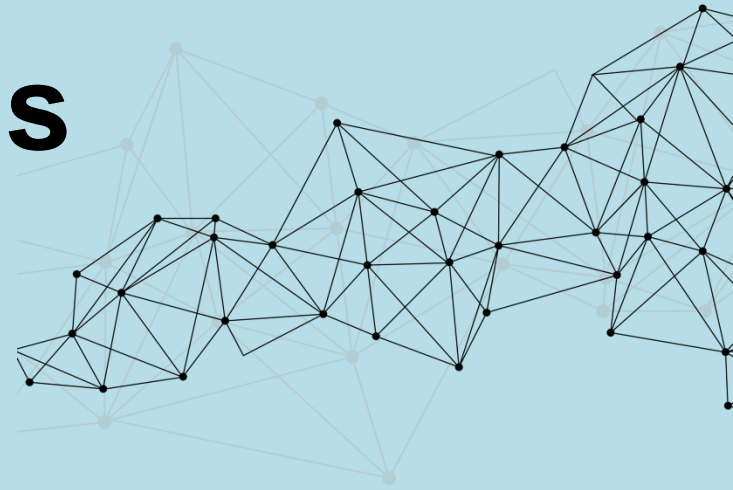
EMERSE is \equiv fast

Query to identify all patients with the following	Reporting DB time (s)	EMERSE time (s)	EMERSE advantage
cavernous hemangioma	14,652	2	7,320x
gray platelet syndrome	14,940	2	7,470x
inferior lingular segment of the left upper lobe	17,784	9	1,980x

...enabling real-time querying



Synonyms



- Used for query expansions
- User-controlled
- Multiple datasets can be included
- EMERSE Synonyms
 - acronyms, abbreviations, professional/consumer terms, misspellings, trade/generic drug names, species, chemo regimens, phrase variations, malapropisms, idioms, neologisms, organizations, companies, & more
 - 2.6 million unique entries

Synonyms for "smoker"



Click individual terms to highlight or de-highlight.

Synonyms (126)

[SORT A TO Z](#)

[HIGHLIGHT ALL](#)

[HIGHLIGHT NONE](#)

- abuse nicotine
- abuses nicotine
- addicted to nicotine
- addicted to tobacco
- addiction to nicotine
- addiction to tobacco
- ash tray
- ash trays
- ashtray
- ashtrays
- chain smoker
- chain smokers
- chain smoking
- chainsmoker
- chainsmokers
- chainsmoking
- cigar
- cigar day
- cigar per day
- cigarette day
- cigarette pack day
- cigarette packs each day
- cigarette packs every day
- cigarette packs per day
- cigarette per day
- cigarette smoke
- cigarette smoker
- cigarette smokers
- cigarette smoking
- cigarettes
- cigarettes day
- cigarettes per day
- cigars
- cigars days
- cigars per day
- continue to smoke
- continued to smoke
- continues to smoke
- continuing to smoke
- current every day smoker
- current everyday smoker
- current smoker
- currently smokes
- dependence on cigarettes
- dependence on nicotine
- dependence on tobacco
- dependent on cigarettes
- dependent on nicotine
- dependent on tobacco
- nicotine
- nicotine abuse
- nicotine abuser
- nicotine abusers
- nicotine addiction
- nicotine addictions
- nicotine dependence
- nicotine dependent
- pack a day
- pack day
- pack each day
- pack history
- pack per day
- pack year
- pack year smoker
- pack years
- pack yr
- pack yrs
- packs
- packs a day
- packs day
- packs each day
- packs of cigarette day
- packs of cigarette each day
- packs of cigarette per day
- packs of cigarettes day
- packs of cigarettes each day
- packs of cigarettes every day
- packs of cigarettes per day
- packs per day
- packs per year
- packyear
- packyears
- packyr
- packyrs
- pipe
- pipes
- pk year
- pk years
- pk yr
- pk yrs

Synonyms for "social determinant of health"



Click individual terms to highlight or de-highlight.

Synonyms (364)

[SORT A TO Z](#)

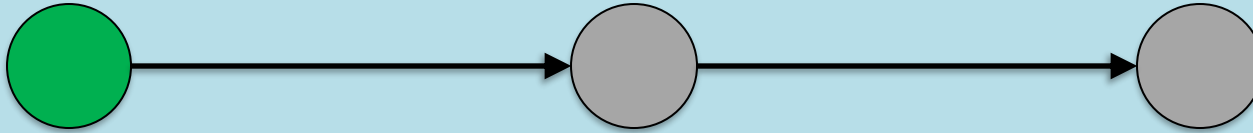
[HIGHLIGHT ALL](#)

[HIGHLIGHT NONE](#)

- abused
- academic problem
- adoptive parent
- afford
- affordable medication
- affordable prescription
- alcoholism
- amphetamine abuse
- antisocial
- appears depressed
- appears sad
- appears to be depressed
- appears to be sad
- assisted living facilit
- assisted living facility
- assistive device
- bankruptcy
- banned
- bath bench
- bath not on first floor
- bed and bath are not on the first floor
- boarding house
- burglary
- care giver support
- cared for by a friend
- cared for by a relative
- charity care
- cheaper
- childhood abuse
- chipped paint
- cigarettes
- cluttered
- co pay
- cocaine abuse
- common law partnership
- community support
- computer illiterate
- condominium
- copay
- correctional facility
- court date
- court mandated
- court ordered
- crime victim
- death of family member
- death of friend
- death of partner
- dementia
- detox
- difficult working conditions
- difficulty maintaining employment
- disability income
- disabled partner
- disabled partners
- disabled relative
- disorderly
- divorced
- drug seeking
- drunk
- dysthymia
- dysthymic
- economic problems
- education level
- education problem
- education problems
- elderly parents
- employment difficulties
- employment income insecurity
- employment insecurity
- estranged
- evict
- evicted
- experiencing discrimination
- exposed to violence
- extended care facility
- extended tub bench
- feeling down
- feels down
- felony
- filthy living
- finances
- financial concerns
- financial constraints
- financial difficulties
- financial issues
- financial strain
- financial stress
- financial stressors
- financially
- fixed income
- flooded
- food bank
- food insecure
- food insecurity
- food pantries
- food stamps
- foreclosed
- forgery
- forging
- foster care
- foster family
- fruit and vegetable intake
- gender identity
- general financial insecurity
- grab bars present
- group home
- gunpoint
- hand held shower
- health insurance
- healthcare problem



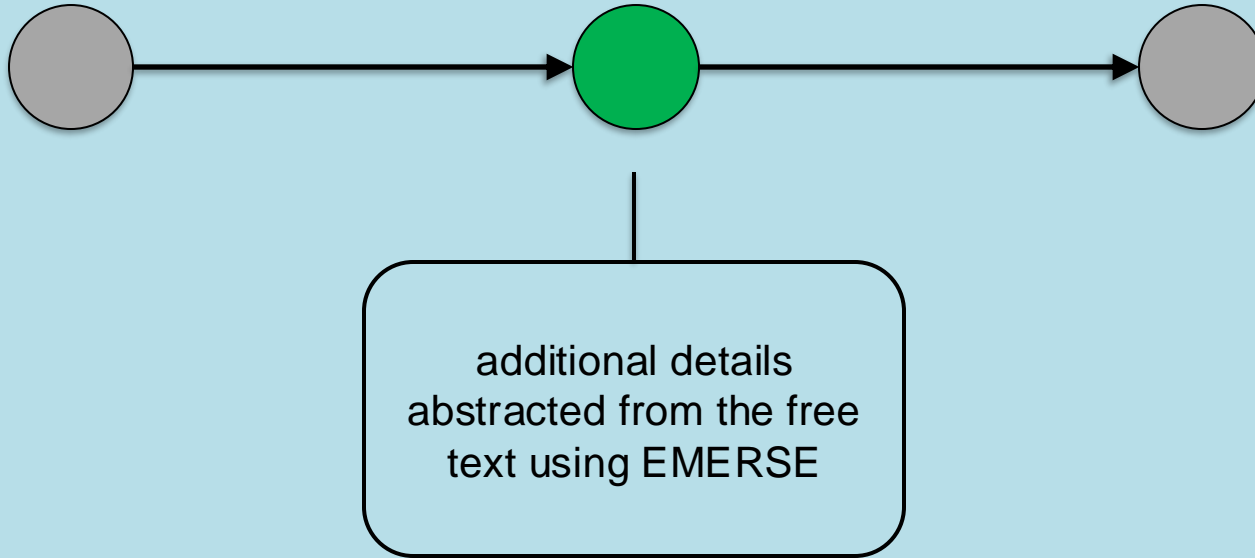
Typical workflow



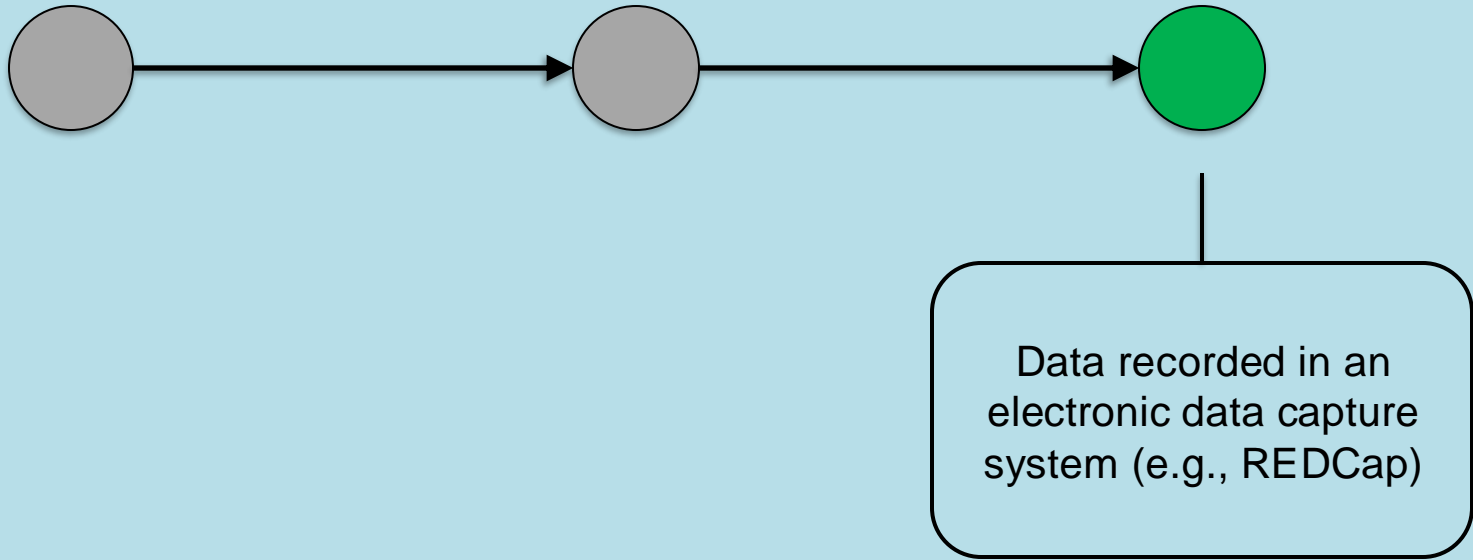
initial cohort identified with a cohort discovery tool using structured data (or via EMERSE 'Find Patients')

Cohort discovery tools:
Data Direct, ENACT

Typical workflow



Typical workflow



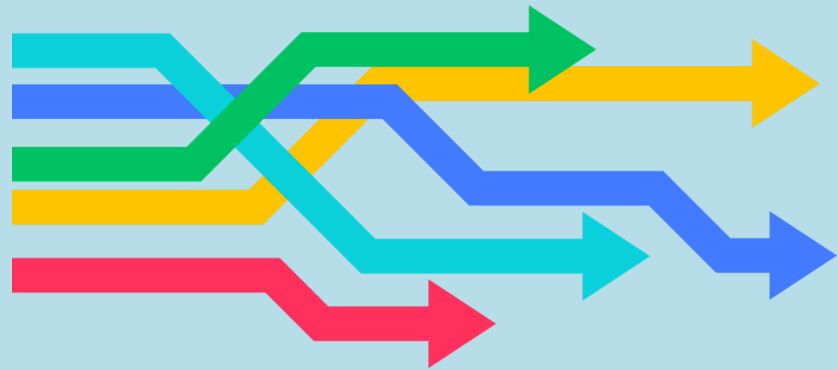
Just released...

Incorporation of NLP features

- negation
- uncertainty
- subject (patient vs other)
- named entity recognition/mapping to ontologies



Future Work

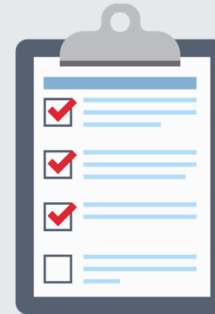
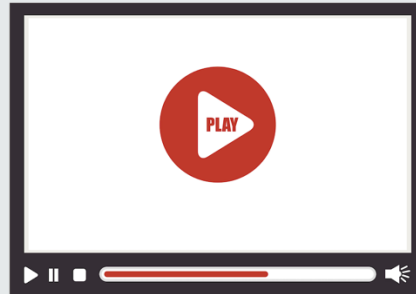


Data extraction from templated notes

Integration with ChatGPT or similar tools

& more...

project-emerse.org



Interested in EMERSE?



Contact us to schedule a time with your team for:

- Discussions about usage strategies
- Training
- Live demonstrations

Getting access (for research)

Apply through the Data Office on the Self Service Tools Page:

<https://medresearch.umich.edu/office-research/about-office-research/our-units/data-office-clinical-translational-research/self-serve-data-tools>

EMERSE-team@umich.edu



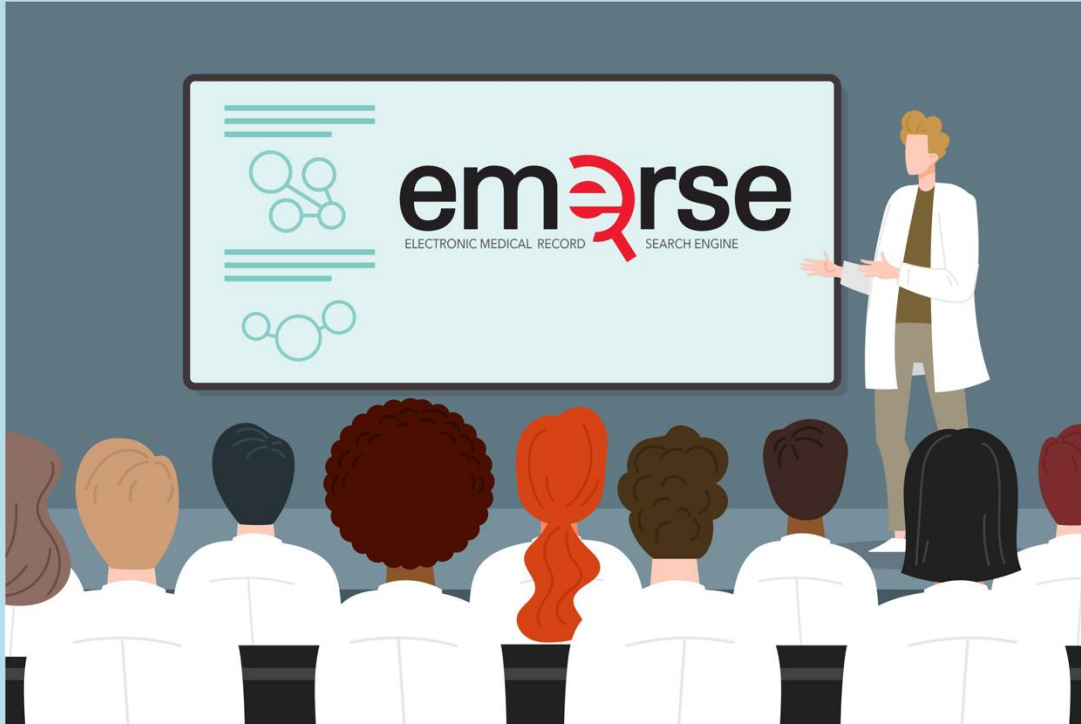
Lisa Ferguson

David Hanauer

Kellen McClain

Guan Wang

Live Demo



- No real names
- No PHI
- Publicly available
- Abstracts & case reports