From Search to Synthesis: EMERSE, LLMs, and the Future of AI-Augmented Clinical Discovery

Presentation for the Weill Cornell Medical Center

July 15, 2026

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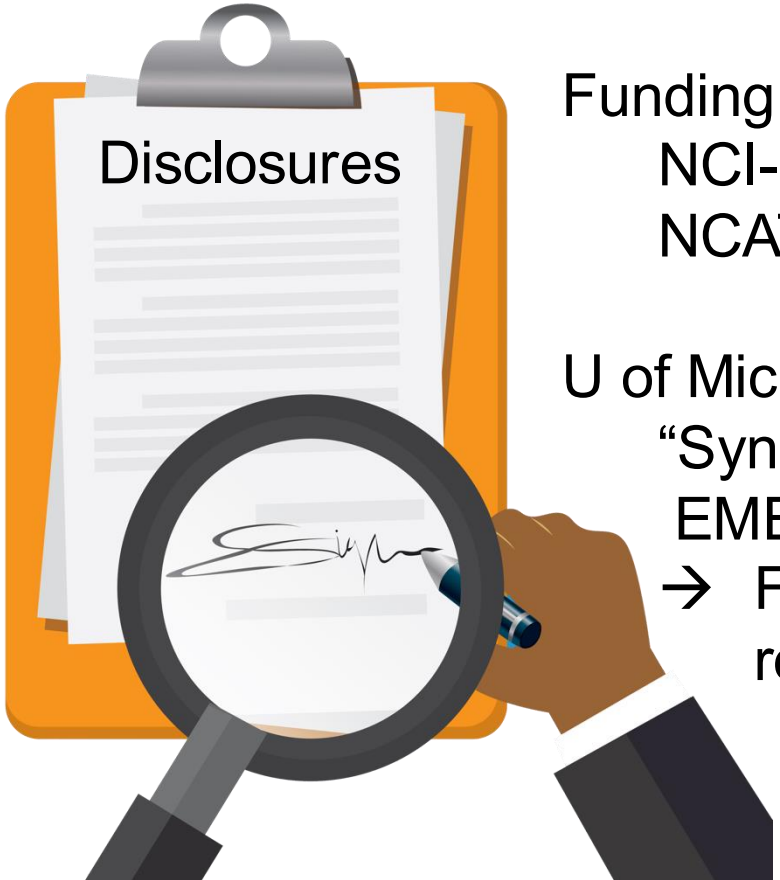
Dept of Learning Health Sciences
University of Michigan

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

Disclosures



Funding: U.S National Institutes of Health
NCI-ITCR: U24CA269315
NCATS-CTSA: UM1TR004404

U of Michigan Royalties/Licensing:
"Synonyms" dataset–optional "plugin" for EMERSE
→ Free for use within EMERSE for research

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ELECTRONIC MEDICAL RECORD SEARCH ENGINE

Unstructured vs Structured Data

EMERSE is for this…	…not this
Unstructured Data (free-text)	*Structured Data*
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

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2007

Accuracy of Administrative Coding for Type 2 Diabetes in Children, Adolescents, and Young Adults

Erinn T. Rhodes, MD, MPH[1,2]
Lori M.B. Laffel MD, MPH[1,2,3]
Tessa V. Gonzalez, AB[1]
David S. Ludwig MD, PhD[1,2]

Statistical analysis
Results are presented as proportions with PPV defined as the proportion with a type 2 diabetes ICD-9-CM code that had a clin-

- Among 432 patients with an ICD-9 code for type 2 diabetes:
  - 251 (58%) had type 1 diabetes
  - 112 (26%) had neither type 1 nor type 2 diabetes
  - 69 (16%) had type 2 diabetes

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https://pubmed.ncbi.nlm.nih.gov/17192348/

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

2025

Misclassification of Myocardial Infarction Subtypes in Administrative Claims

Implications for Clinical Epidemiology and Quality Assessment

Andrea Martinez, MD,[a] Muhammad Etiwy, MD,[b] James L. Januzzi, Jr, MD,[b,c] Cian P. McCarthy, MB, BCh, BAO, SM,[b,c] David Cheng, PhD,[a,d,e] Erika Shults, MS,[b] Sarah K. Gustus, MS, ATC,[b] John Hsu, MD, MBA,[a,d,e] Jason H. Wasfy, MD, MPhil[b,e]

- Among 350 patients with an ICD-10 code for type 1 myocardial infarction (MI):
  - 138 (39%) had type 1 MI
  - 159 (45%) had type 2 MI
  - 35 (10%) had other myocardial injuries

https://pubmed.ncbi.nlm.nih.gov/40701673/

80% of EHR data are in unstructured free-text

structured data

unstructured data/free text

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Free-text is really important

- “The use of EHRs to create disease registers or assess quality of care will be misleading if free text information is not taken into account.”

  https://link.springer.com/article/10.1186/1471-2288-13-105

- “Structured data is best used for first pass filtering of EHR data...prior to a more nuanced second pass using unstructured data”

  https://pmc.ncbi.nlm.nih.gov/articles/PMC4333685/

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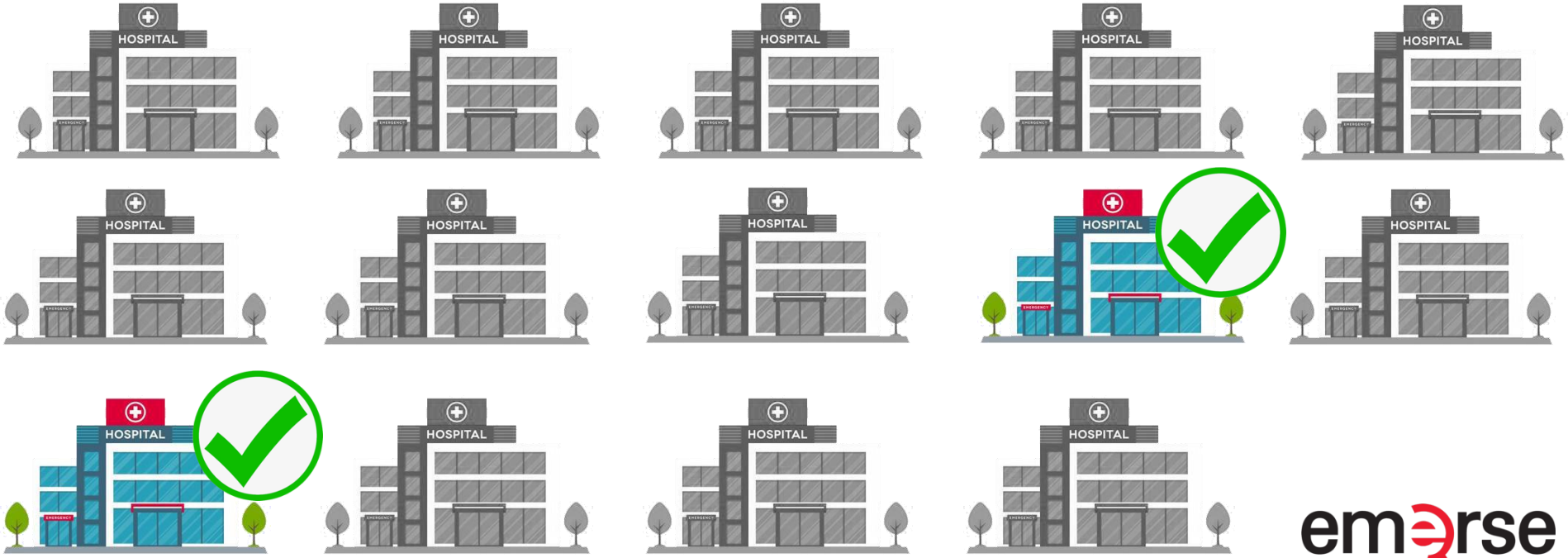
Most medical centers lack tools for free-text



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And options that exist aren’t great

2025 study on EMR usability:

“The same three items (integration into workflow, **finding information**, and usability of alerts) received the highest number of 'poor' ratings among hospital and practice physicians.”

https://www.nature.com/articles/s41746-025-01657-4

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The EMERSE solution

- Software tool designed for searching electronic health record notes
- Users search the notes on their own
  - No need to wait in a queue for an analyst or a data scientist
- Made for non-technical researchers
- Search across all notes and all patients at once
- Continuously updated for **> 20 years**

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

Pathology Reports: Single Report

Username: hanauer

Search Terms: test

Summary

important screening test that is extremely us

Last Updated	Result Test Code
02/08/2006	TDGYN

GYNECOLOGIC SMEAR
ENDOCX/CERVICAL THIN LAYER

T8X320
Specimen adequacy: Satisfactory. An endocervical component is absent (the patient is pregnant).

Examination for neoplastic cells: Negative.

The cervicovaginal Pap smear is a very important screening test that is extremely useful in the detection of cancerous and precancerous conditions of the uterine cervix. However, this test is not perfect and false negative results, in which cancer or a precancerous condition may be missed, represent a known and expected limitation of this test. Quality assurance studies indicate an irreducible false negative fraction of at least 5%. The patient

The EMERSE solution

- Initially made for researchers at University of Michigan Cancer Center
- Adopted by about 20 academic health centers including 

- Open source software
  - Each site installs locally
  - Our EMERSE team provides implementation support

rse
SEARCH ENGINE

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

EMERSE is a useful tool…

…but it will likely be one of several you need to support your project(s)

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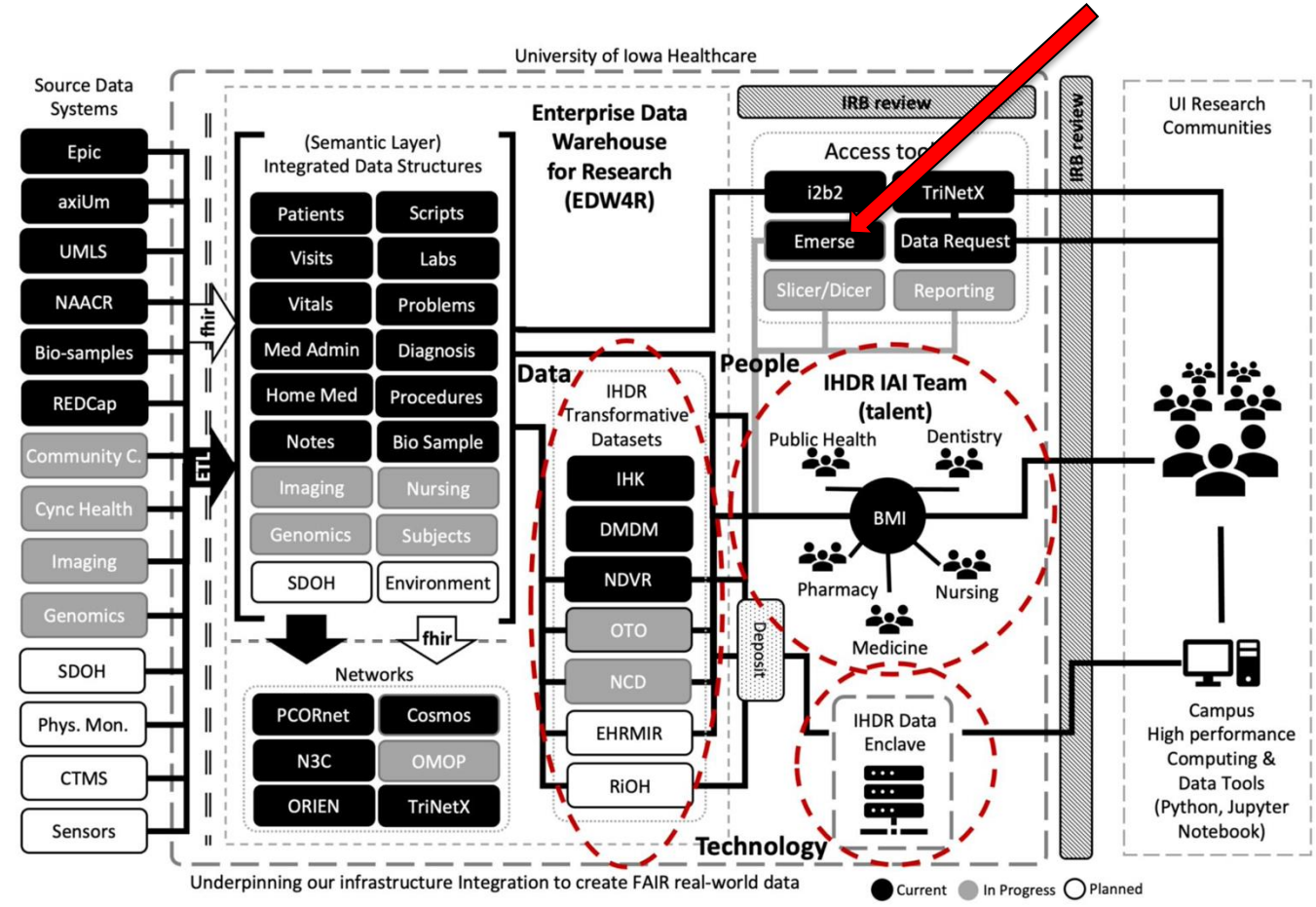
http://project-emerse.org/presentations.html



https://doi.org/10.1093/jamia/ocad236

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

What can EMERSE do?

Lots of things!

Cardiac Surgery Research

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

--Linda Farhat, Clinical Research Coordinator

Quality Analytics

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

--Andrew Heiler, Quality Analytics Coordinator

Infection Prevention

"The value of EMERSE is immeasurable."

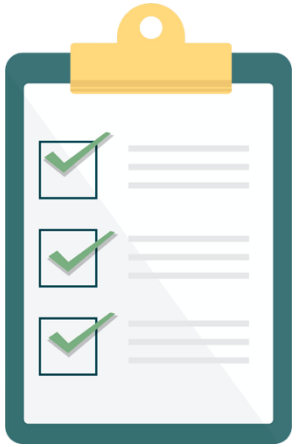
--Jayna Berger Heiler, Infection Prevention Coach

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

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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"

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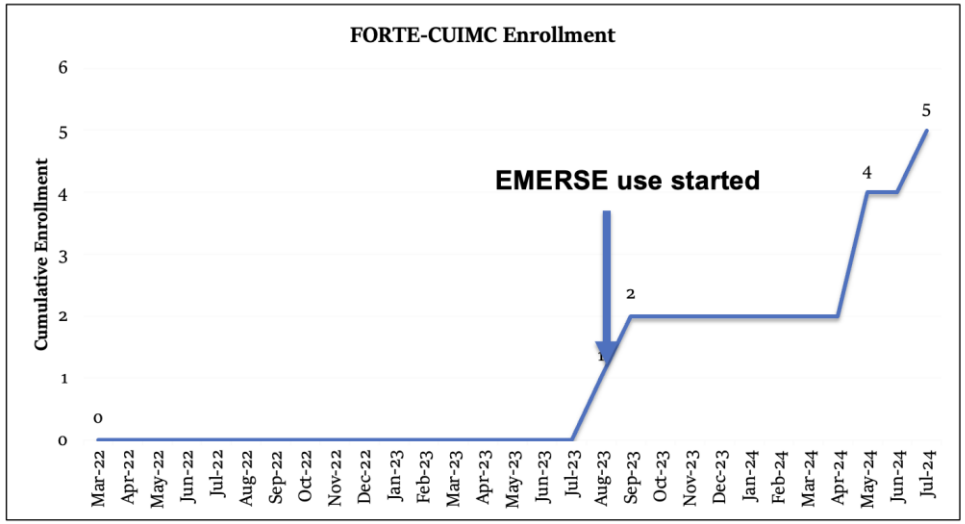
Enroll patients on trials

- **We were able to enroll patients!**

- **Note:**
  While CUMC rolled out the EMERSE workflow for FORTE, we were also simultaneously testing reaching out to EMERSE identified FORTE patients over MyChart to introduce the FORTE study to patients



See this talk for more details:
https://vimeo.com/1084845123/
EMERSE Community Meeting May 2025

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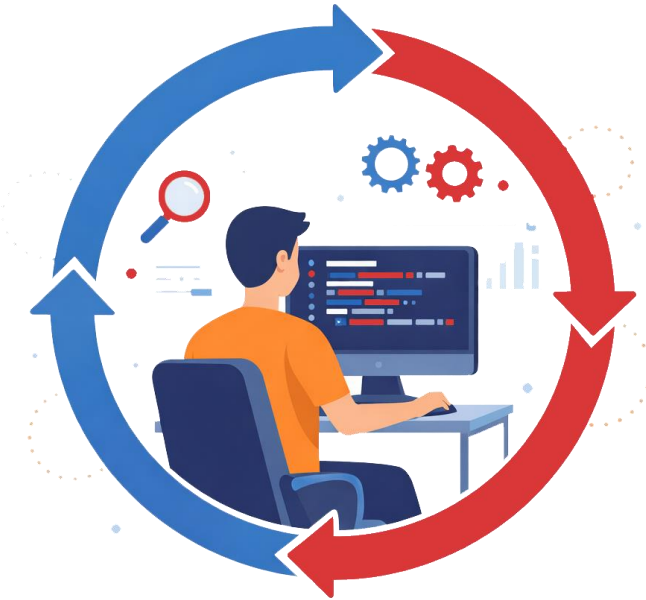
EMERSE keeps the human-in-the-loop



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

Highlight terms in documents for chart review

Thoracocentesis confirmed the recurrence of mantle cell lymphoma. Disease restaging work-up revealed multicompartment 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.

https://jmedicalcasereports.biomedcentral.com/articles/10.1186/1752-1947-4-329

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EMERSE is *fast*

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

…enabling real-time querying

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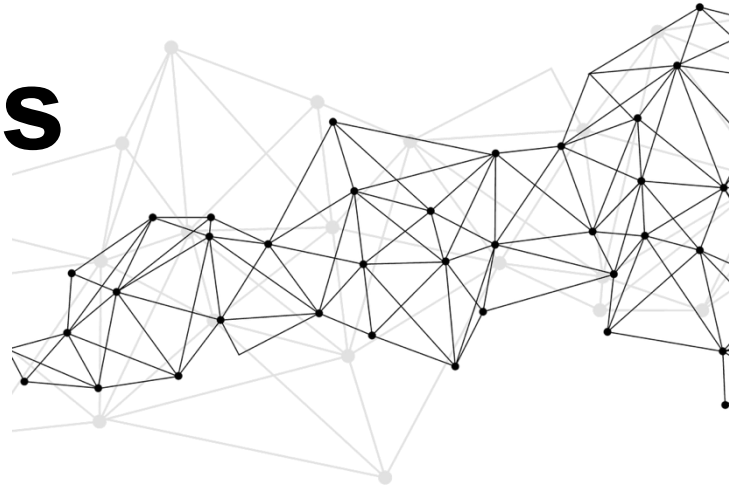
Synonyms



- 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
  - 3 million unique entries

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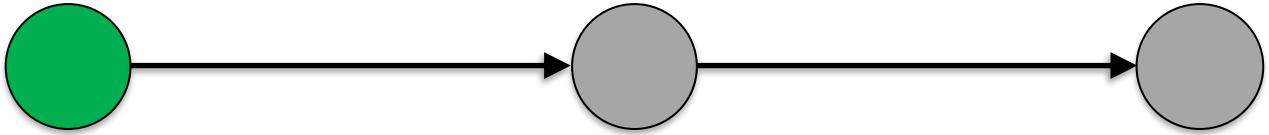
Typical workflow



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

Cohort discovery tools:
i2b2/ENACT, TriNetX, Leaf, etc.

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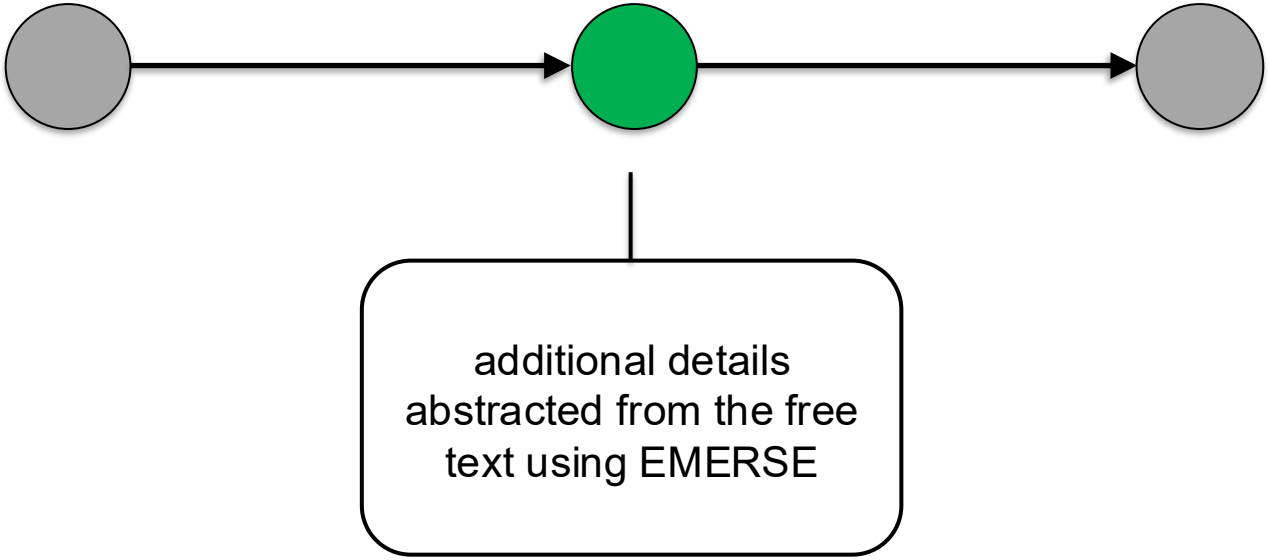
Typical workflow



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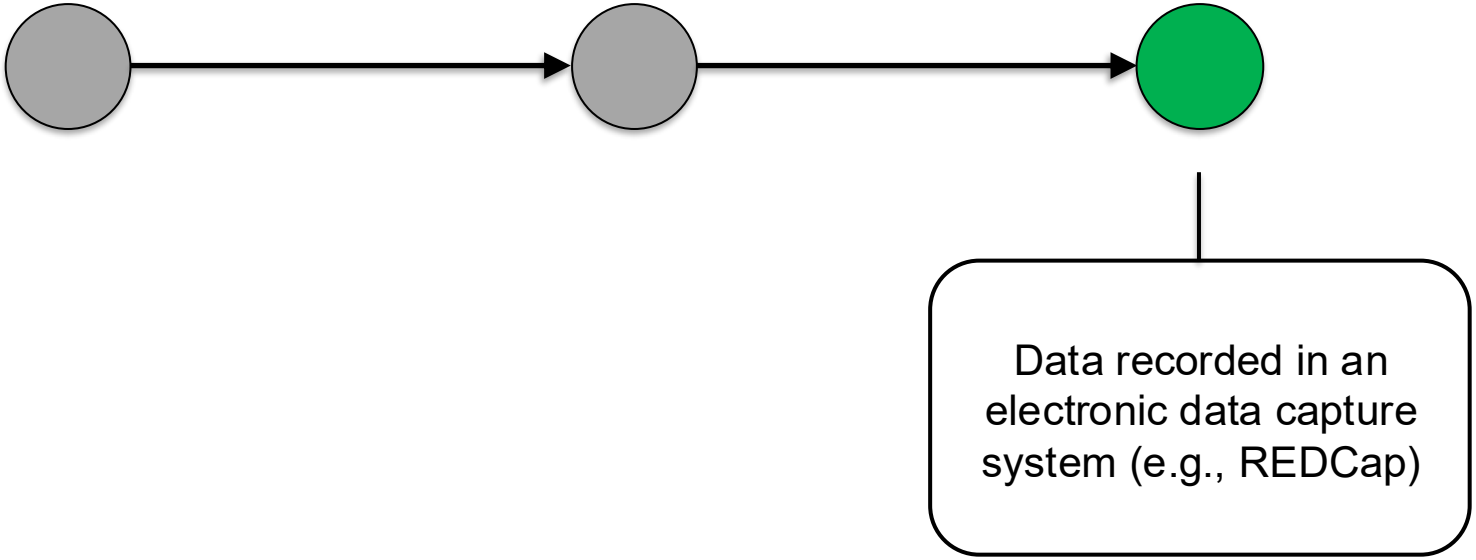
Typical workflow



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Publications using EMERSE

730+

papers and abstracts

Full list at:

http://project-emerse.org/publications.html

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Brief Demo

- no real names
- no PHI
- publicly available
- “notes” are mainly abstracts & case reports

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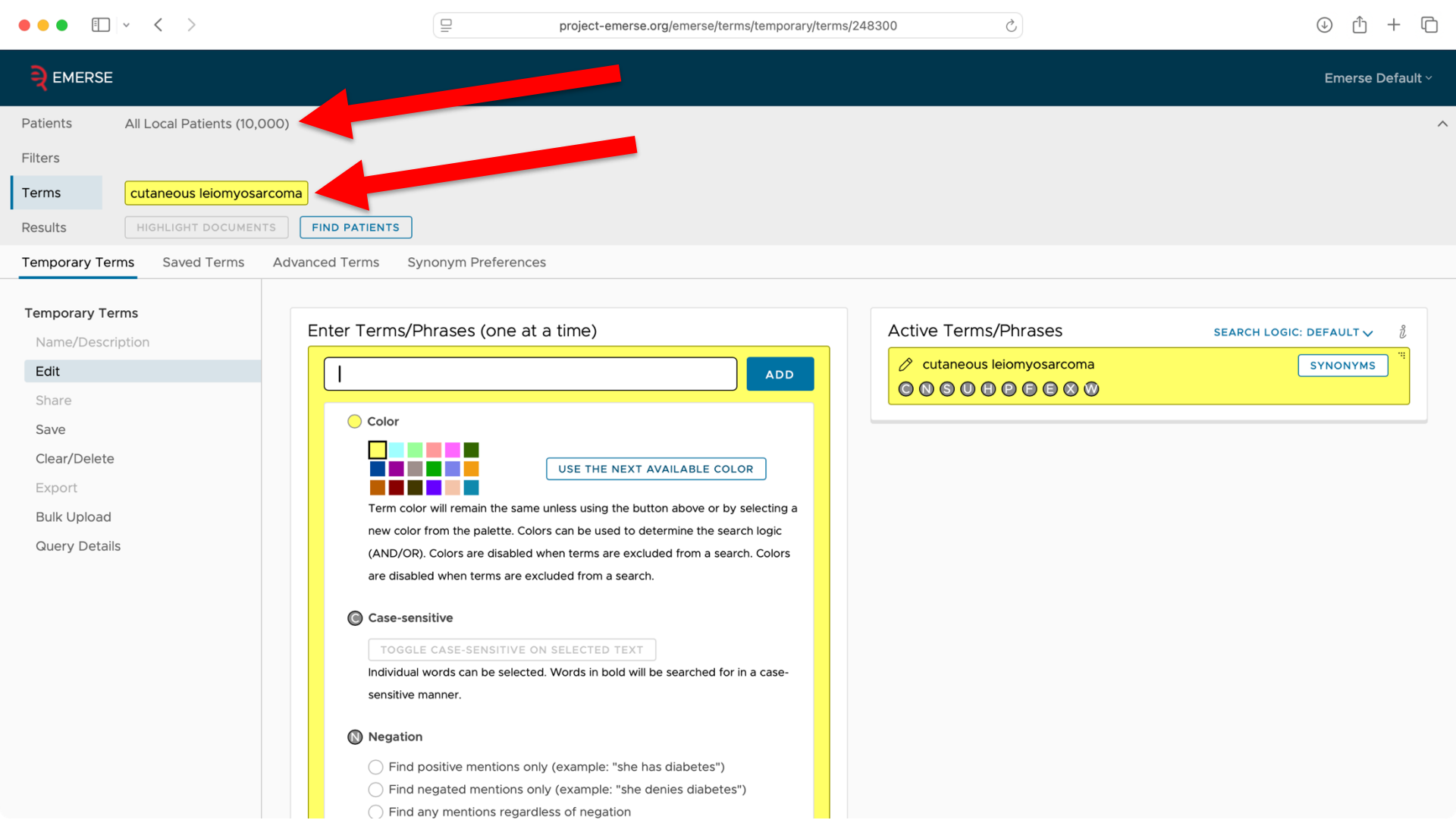
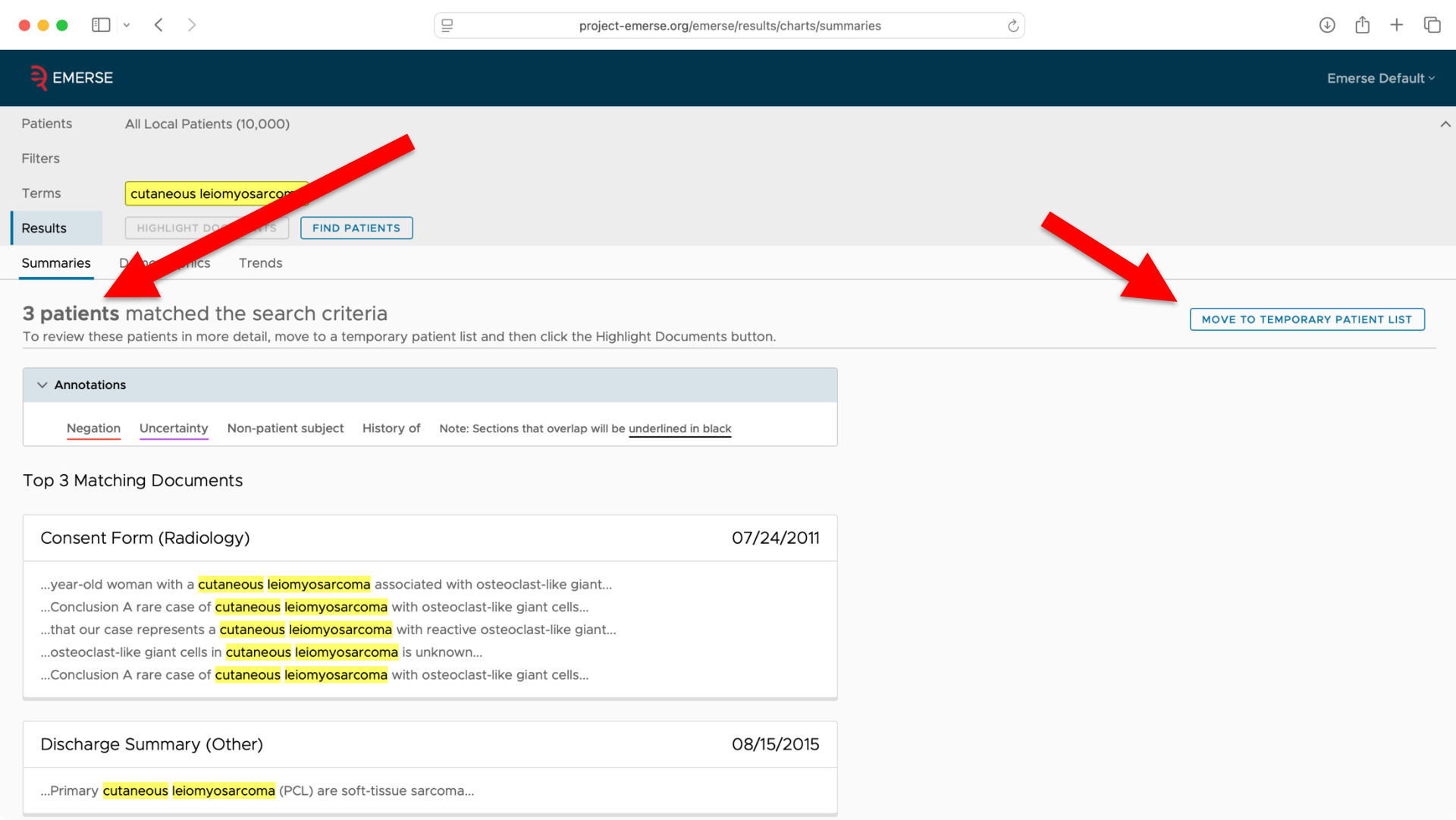
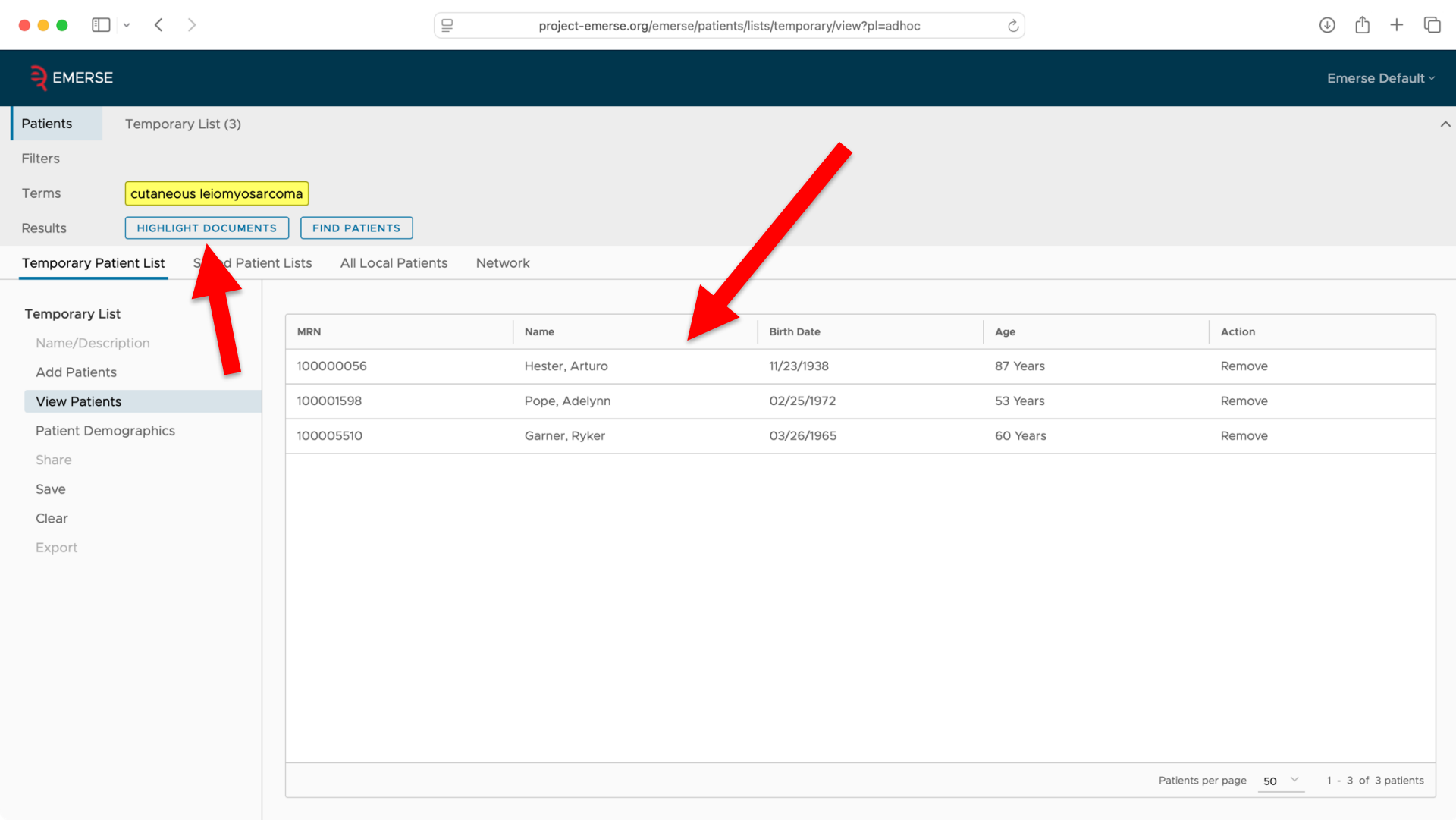
http://project-emerse.org/presentations.html


project-emerse.org/emerse/terms/temporary/terms/248300
EMERSE
Emerse Default
Patients
All Local Patients (10,000)
Filters
Terms
cutaneous leiomyosarcoma
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Temporary Terms
Saved Terms
Advanced Terms
Synonym Preferences
Temporary Terms
Name/Description
Edit
Share
Save
Clear/Delete
Export
Bulk Upload
Query Details
Enter Terms/Phrases (one at a time)
ADD
Color
USE THE NEXT AVAILABLE COLOR
Term color will remain the same unless using the button above or by selecting a new color from the palette. Colors can be used to determine the search logic (AND/OR). Colors are disabled when terms are excluded from a search. Colors are disabled when terms are excluded from a search.
Case-sensitive
TOGGLE CASE-SENSITIVE ON SELECTED TEXT
Individual words can be selected. Words in bold will be searched for in a case-sensitive manner.
Negation
Find positive mentions only (example: "she has diabetes")
Find negated mentions only (example: "she denies diabetes")
Find any mentions regardless of negation
Active Terms/Phrases
SEARCH LOGIC: DEFAULT
cutaneous leiomyosarcoma
SYNONYMS
C N S U H P F E X W


project-emerse.org/emerse/results/charts/summaries
EMERSE
Emerse Default
Patients
All Local Patients (10,000)
Filters
Terms
cutaneous leiomyosarcoma
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Summaries
Trends
3 patients matched the search criteria
To review these patients in more detail, move to a temporary patient list and then click the Highlight Documents button.
MOVE TO TEMPORARY PATIENT LIST
Annotations
Negation
Uncertainty
Non-patient subject
History of
Note: Sections that overlap will be underlined in black
Top 3 Matching Documents
Consent Form (Radiology)
07/24/2011
...year-old woman with a cutaneous leiomyosarcoma associated with osteoclast-like giant...
...Conclusion A rare case of cutaneous leiomyosarcoma with osteoclast-like giant cells...
...that our case represents a cutaneous leiomyosarcoma with reactive osteoclast-like giant...
...osteoclast-like giant cells in cutaneous leiomyosarcoma is unknown...
...Conclusion A rare case of cutaneous leiomyosarcoma with osteoclast-like giant cells...
Discharge Summary (Other)
08/15/2015
...Primary cutaneous leiomyosarcoma (PCL) are soft-tissue sarcoma...


project-emerse.org/emerse/patients/lists/temporary/view?pl=adhoc
EMERSE
Emerse Default
Patients
Temporary List (3)
Filters
Terms
cutaneous leiomyosarcoma
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Temporary Patient List
Saved Patient Lists
All Local Patients
Network
Temporary List
Name/Description
Add Patients
View Patients
Patient Demographics
Share
Save
Clear
Export
MRN
Name
Birth Date
Age
Action
100000056
Hester, Arturo
11/23/1938
87 Years
Remove
100001598
Pope, Adelynn
02/25/1972
53 Years
Remove
100005510
Garner, Ryker
03/26/1965
60 Years
Remove
Patients per page
50
1 - 3 of 3 patients

Patients Temporary List (3)

Filters

Terms cutaneous leiomyosarcoma

Results HIGHLIGHT DOCUMENTS FIND PATIENTS

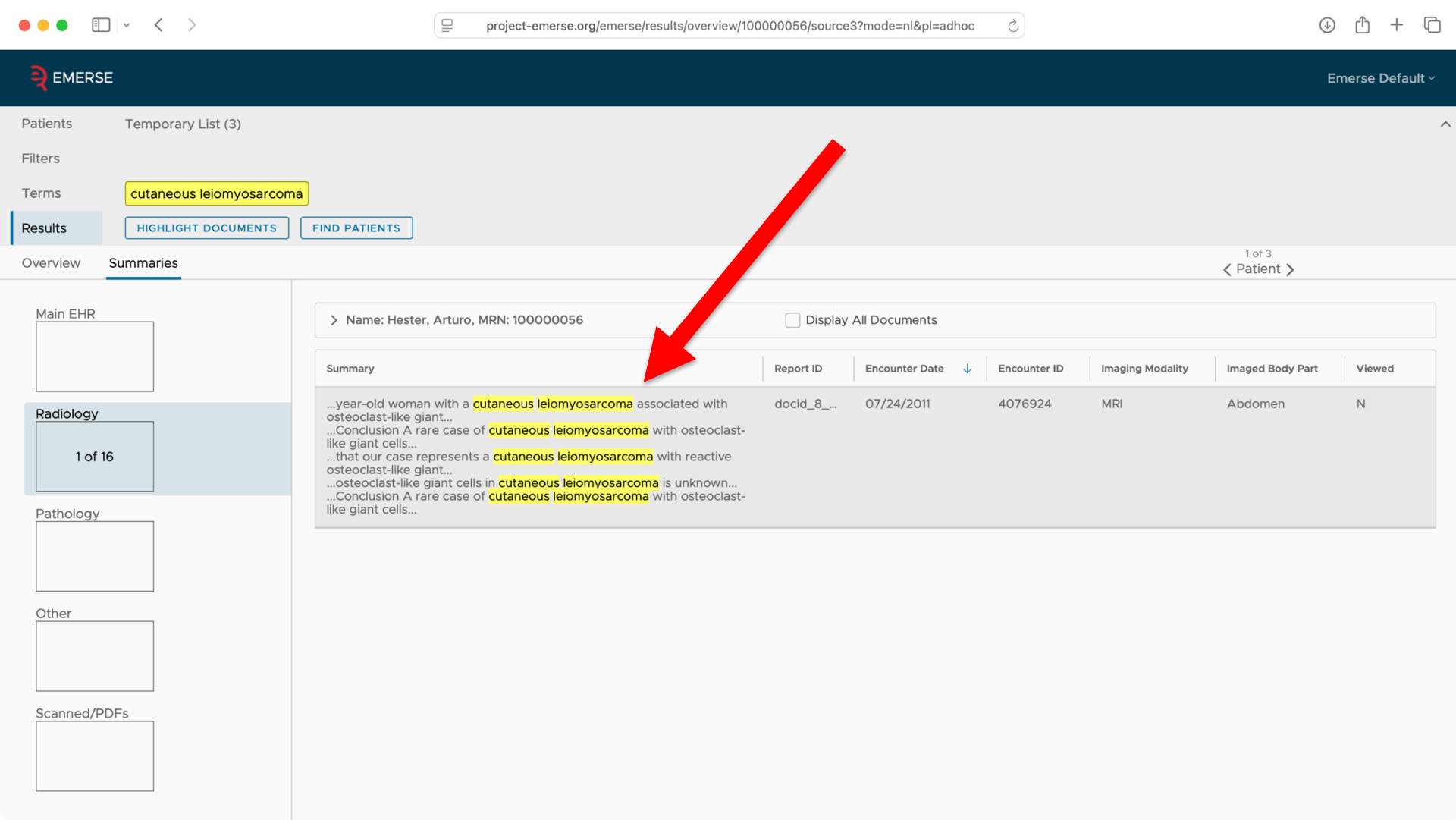
Overview

Sorted by: Insert Order Ascending

Numbers Grayscale Mosaic

MRN	Name	Main EHR	Radiology	Pathology	Other	Scanned/PDFs	Comment	Tag
100000056	Hester, Arturo		1 of 16				0 / 255	
100001598	Pope, Adelynn				1 of 18		0 / 255	
100005510	Garner, Ryker			1 of 17			0 / 255	

Patients per page 50 1 - 3 of 3 patients


project-emerse.org/emerse/results/overview/100000056/source3?mode=nl&pl=adhoc
EMERSE
Emerse Default
Patients
Temporary List (3)
Filters
Terms
cutaneous leiomyosarcoma
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Overview
Summaries
1 of 3
Patient
Main EHR
Radiology
1 of 16
Pathology
Other
Scanned/PDFs
Name: Hester, Arturo, MRN: 100000056
Display All Documents
Summary
Report ID
Encounter Date
Encounter ID
Imaging Modality
Imaged Body Part
Viewed
...year-old woman with a cutaneous leiomyosarcoma associated with osteoclast-like giant...
...Conclusion A rare case of cutaneous leiomyosarcoma with osteoclast-like giant cells...
...that our case represents a cutaneous leiomyosarcoma with reactive osteoclast-like giant...
...osteoclast-like giant cells in cutaneous leiomyosarcoma is unknown...
...Conclusion A rare case of cutaneous leiomyosarcoma with osteoclast-like giant cells...
docid_8_...
07/24/2011
4076924
MRI
Abdomen
N

Main EHR

Radiology

1 of 16

Pathology

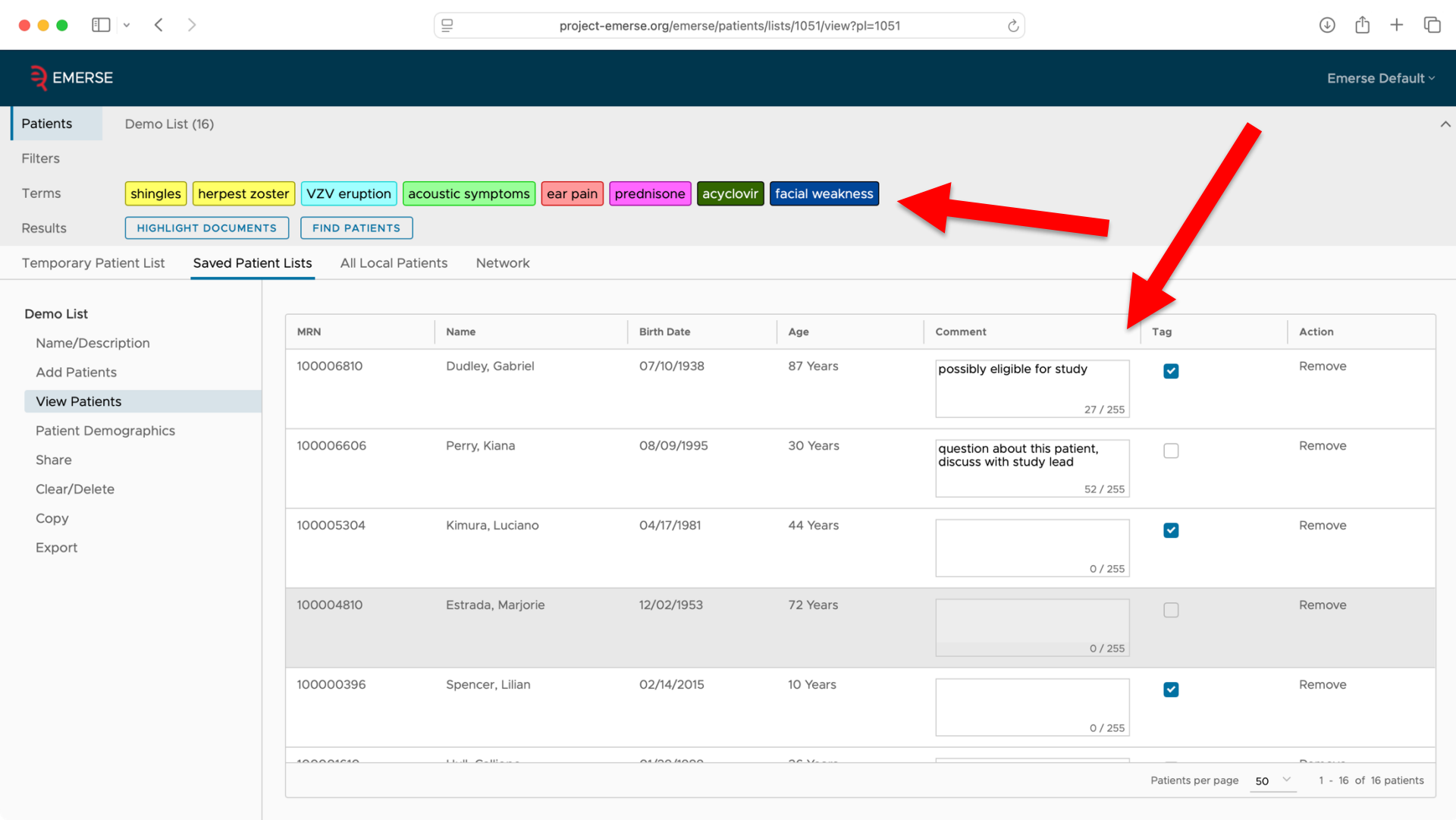
Other

Scanned/PDFs

Name: Hester, Arturo, MRN: 100000056 Display All Documents Stick on Top

- Radiology Report
- Semantic Groups
- Annotations
- Summary

Case Report from the Journal of Medical Case Reports Title: Leiomyosarcoma of the skin with osteoclast-like giant cells: a case report | Journal of Medical Case Reports | Full Text DOI: 10.1186/1752-1947-1-180 Abstract Introduction Osteoclast-like giant cells have been noted in various malignant tumors, such as, carcinomas of pancreas and liver and leiomyosarcomas of non-cutaneous locations, such as, uterus and rectum. We were unable to find any reported case of a leiomyosarcoma of the skin where osteoclast-like giant cells were present in the tumor. Case presentation We report a case of a 59-year-old woman with a cutaneous leiomyosarcoma associated with osteoclast-like giant cells arising from the subcutaneous artery of the leg. The nature of the giant cells is discussed in light of the findings from the immunostaining as well as survey of the literature. Conclusion A rare case of cutaneous leiomyosarcoma with osteoclast-like giant cells is reported. The giant cells in the tumor appear to be reactive histiocytic cells. Open Peer Review reports Introduction Osteoclast-like giant cells have been noted in various malignant tumors, such as, carcinomas of pancreas and liver and leiomyosarcomas of non-cutaneous locations, such as, uterus and rectum. We were unable to find any reported case of leiomyosarcoma of the skin where osteoclast-like giant cells were present in the tumor. We are reporting such a case occurring in the leg of a 59-year-old woman and discussing the nature of the osteoclast-like giant cells in light of the results from the immunostaining as well as the survey of the literature. Case presentation A 59-year-old woman presented with a painless skin nodule on her left leg present for an unknown period of time. The patient's remaining medical history was unremarkable. An excisional biopsy of the leg nodule (Fig. 1) showed an infiltrating spindle cell neoplasm within the subcutaneous tissue, arising from the muscular wall of an artery. The tumor was composed of proliferating, interweaving fascicles of eosinophilic spindle cells with pleomorphic ovoid to cigar-shaped nuclei and occasional paranuclear vacuoles (Fig. 2a). The mitotic activity was brisk, ranging from 1 to more than 5 per 5 high-power fields. A striking finding in the tumor was the presence of scattered osteoclast-like giant cells with dark basophilic cytoplasm and multiple nuclei (Fig. 2b) in between the neoplastic spindle cells. The spindle cells were strongly


project-emerse.org/emerse/patients/lists/1051/view?pl=1051
EMERSE
Emerse Default
Patients
Demo List (16)
Filters
Terms
shingles
herpest zoster
VZV eruption
acoustic symptoms
ear pain
prednisone
acyclovir
facial weakness
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Temporary Patient List
Saved Patient Lists
All Local Patients
Network
Demo List
Name/Description
Add Patients
View Patients
Patient Demographics
Share
Clear/Delete
Copy
Export
MRN
Name
Birth Date
Age
Comment
Tag
Action
100006810
Dudley, Gabriel
07/10/1938
87 Years
possibly eligible for study
27 / 255
Remove
100006606
Perry, Kiana
08/09/1995
30 Years
question about this patient, discuss with study lead
52 / 255
Remove
100005304
Kimura, Luciano
04/17/1981
44 Years
0 / 255
Remove
100004810
Estrada, Marjorie
12/02/1953
72 Years
0 / 255
Remove
100000396
Spencer, Lilian
02/14/2015
10 Years
0 / 255
Remove
Patients per page
50
1 - 16 of 16 patients

Patients Demo List (16)

Filters

Terms shingles | herpest zoster | VZV eruption | acoustic symptoms | ear pain | prednisone | acyclovir | facial weakness

Results HIGHLIGHT DOCUMENTS | FIND PATIENTS

Overview

Sorted by: Insert Order | Ascending

Numbers Grayscale Mosaic

MRN	Name	Main EHR	Radiology	Pathology	Other	Scanned/PDFs	Comment	Tag
100006810	Dudley, Gabriel				1 of 17		possibly eligible for study 27 / 255	☑
100006606	Perry, Kiana			1 of 20			question about this patient, discuss with study lead 52 / 255	☐
100005304	Kimura, Luciano				1 of 16		0 / 255	☑
100004810	Estrada, Marjorie				1 of 17		0 / 255	☐
100000396	Spencer, Lilian							☑

Patients per page 50 | 1 - 16 of 16 patients

Patients Demo List (16)

Filters

Terms shingles | herpest zoster | VZV eruption | acoustic symptoms | ear pain | prednisone | acyclovir | facial weakness

Results HIGHLIGHT DOCUMENTS | FIND PATIENTS

Overview

Sorted by: Insert Order | Ascending

Numbers Grayscale Mosaic

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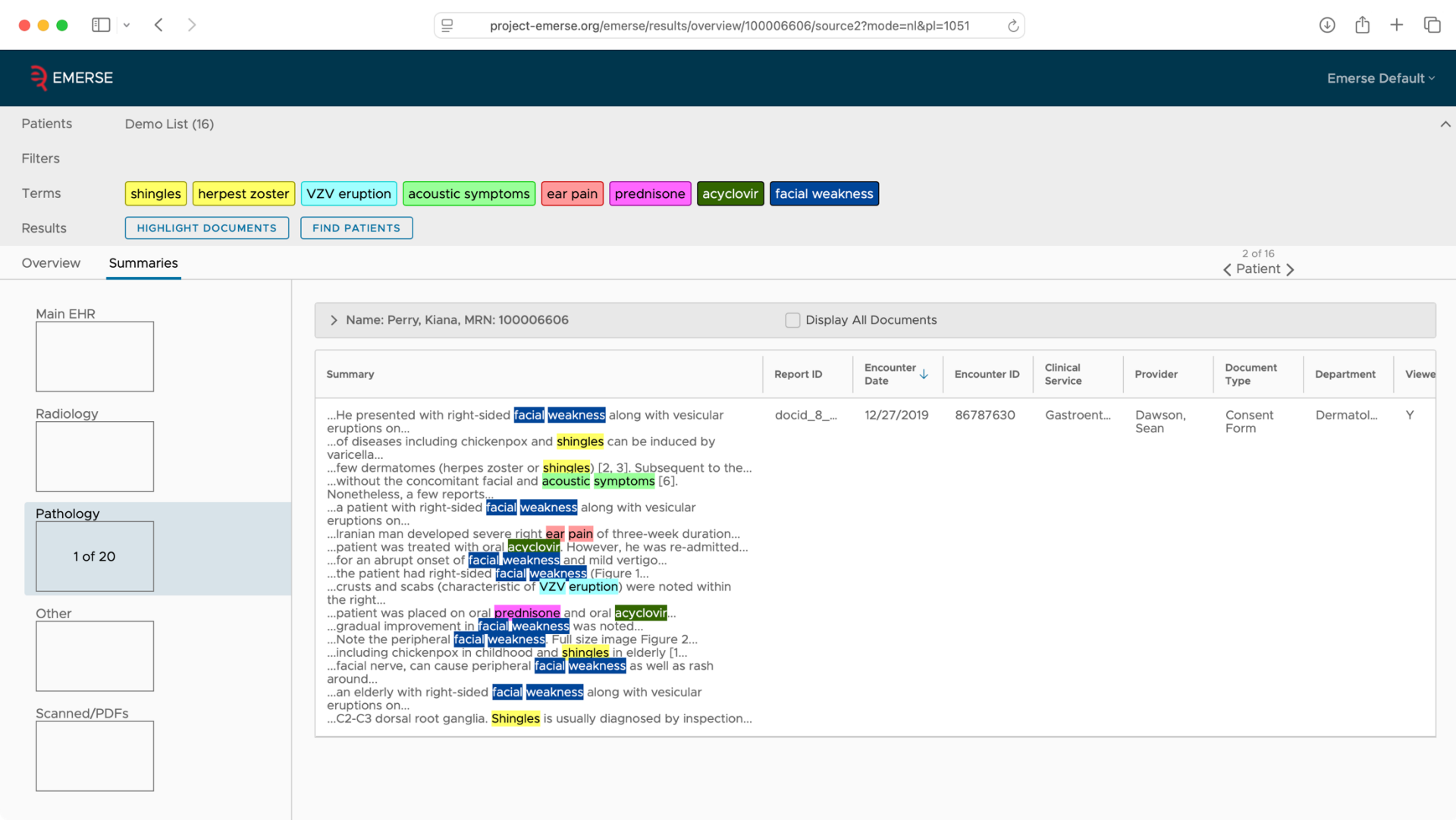
100006606	Perry, Kiana						question about this patient, discuss with study lead 52 / 255	☐
100005304	Kimura, Luciano						0 / 255	☑
100004810	Estrada, Marjorie						0 / 255	☐
100000396	Spencer, Lilian							☑

Patients per page 50 1 - 16 of 16 patients


project-emerse.org/emerse/results/overview/100006606/source2?mode=nl&pl=1051
EMERSE
Emerse Default
Patients
Demo List (16)
Filters
Terms
shingles
herpest zoster
VZV eruption
acoustic symptoms
ear pain
prednisone
acyclovir
facial weakness
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Overview
Summaries
2 of 16
Patient
Main EHR
Radiology
Pathology
1 of 20
Other
Scanned/PDFs
Name: Perry, Kiana, MRN: 100006606
Display All Documents
Summary
Report ID
Encounter Date
Encounter ID
Clinical Service
Provider
Document Type
Department
Viewe
...He presented with right-sided facial weakness along with vesicular eruptions on...
...of diseases including chickenpox and shingles can be induced by varicella...
...few dermatomes (herpes zoster or shingles) [2, 3]. Subsequent to the...
...without the concomitant facial and acoustic symptoms [6]. Nonetheless, a few reports...
...a patient with right-sided facial weakness along with vesicular eruptions on...
...Iranian man developed severe right ear pain of three-week duration...
...patient was treated with oral acyclovir. However, he was re-admitted...
...for an abrupt onset of facial weakness and mild vertigo...
...the patient had right-sided facial weakness (Figure 1...
...crusts and scabs (characteristic of VZV eruption) were noted within the right...
...patient was placed on oral prednisone and oral acyclovir...
...gradual improvement in facial weakness was noted...
...Note the peripheral facial weakness. Full size image Figure 2...
...including chickenpox in childhood and shingles in elderly [1...
...facial nerve, can cause peripheral facial weakness as well as rash around...
...an elderly with right-sided facial weakness along with vesicular eruptions on...
...C2-C3 dorsal root ganglia. Shingles is usually diagnosed by inspection...
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Dawson, Sean
Consent Form
Dermatol...
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Main EHR

Radiology

Pathology

1 of 20

Other

Scanned/PDFs

IX and X) by varicella-zoster virus and its subsequent activation may result in the characteristic eruptions of herpes zoster cephalicus. Coexistence of facial palsy and involvement of upper cervical dermatomes by varicella-zoster virus is quite rare. Case presentation Here, we report a 71-year-old Iranian man with involvement of multiple sensory ganglia (geniculate ganglion and upper dorsal root ganglia) by varicella-zoster virus. He presented with right-sided facial weakness along with vesicular eruptions on the right side of his neck, and second and third cervical dermatomes. Conclusion The present case is an example of herpes zoster cephalicus with cervical nerve involvement. Although resembling Ramsay Hunt syndrome with presence of facial nerve paralysis and accompanying vesicles, involvement of cervical dermatomes is not a feature of the classic Ramsay Hunt syndrome. Introduction A wide spectrum of diseases including chickenpox and shingles can be induced by varicella-zoster virus (VZV) [1]. After the primary infection (chickenpox), the virus remains dormant in cranial nerves (e.g. geniculate ganglion of facial nerve) and dorsal root ganglia and then becomes reactivated decades later [1, 2]. The reactivated VZV reaches the skin through axons usually causing pain and vesicular eruption restricted to a few dermatomes (herpes zoster or shingles) [2, 3]. Subsequent to the involvement of sensory branches of facial nerve by VZV, the contiguous motor branches might become inflamed, resulting in facial palsy [4]. First noted by Ramsay Hunt in early nineteenths, simultaneous involvements of multiple cranial nerve ganglia (geniculate ganglion and peripheral ganglia of cranial nerves VIII, IX and X) by VZV and its subsequent activation may result in the characteristic eruptions of herpes zoster cephalicus [5, 6]. Later in 1915, Sharpe classified herpes zoster cephalicus into five categories based on the inflammation of the geniculate, auditory, glossopharyngeal or vagal ganglia with or without the concomitant facial and acoustic symptoms [6]. Nonetheless, a few reports of the coexistence of facial palsy and involvement of upper cervical dermatomes by VZV can be read in the literature. Hereby, we report a patient with right-sided facial weakness along with vesicular eruptions on the right side of his neck and C2-C3 cervical dermatomes, indicating the involvement of multiple sensory ganglia (geniculate ganglion and upper dorsal root ganglia) by VZV. Case presentation A 71-year-old Iranian man developed severe right ear pain of three-week duration. He then developed a painful, vesicular eruption on the right side of his neck. With a presumptive diagnosis of herpes zoster reactivation, the patient was treated with oral acyclovir. However, he was re-admitted for an abrupt onset of facial weakness and mild vertigo. On examination, the patient had right-sided facial weakness (Figure 1). In addition, vesicular eruptions with adherent crusts and scabs (characteristic of VZV eruption) were noted within the right external auditory canal, over the mastoid, around the pinna, and C2-C3 cervical dermatomes (involvement of VII cranial nerve and C2-3 spinal nerves) (Figure 2). He had no associated immunocompromising condition including immunosuppressant drug use, leukemia, etc. A diagnosis of VZV reactivation from multiple ganglia was made based on the patient's characteristic presentation. The serum anti-VZV IgM antibody (ELISA) and VZV DNA (polymerase chain reaction) were negative. A computed tomography scan of the head was unremarkable. Further investigation revealed an increased white cell count (of 21600/?L) and a first hour erythrocyte sedimentation rate of 72 mm. The patient was placed on oral prednisone and oral acyclovir. A gradual improvement in facial weakness was noted. The herpetic vesicles on the head and neck were completely crusted. He was discharged with a favorable clinical condition. Figure 1 Right facial nerve palsy. Note the peripheral facial

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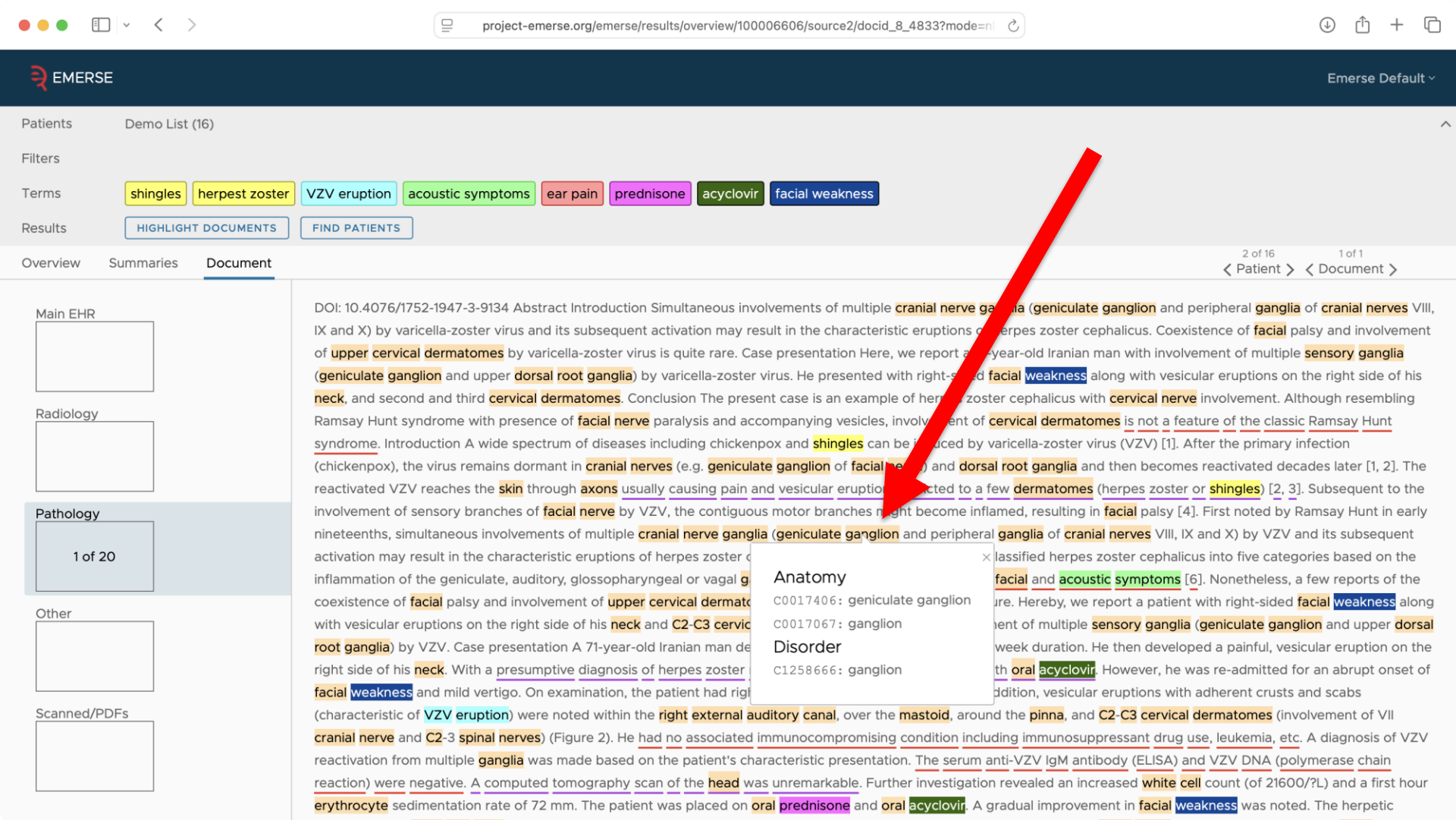
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EMERSE
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Patients
Demo List (16)
Filters
Terms
shingles
herpest zoster
VZV eruption
acoustic symptoms
ear pain
prednisone
acyclovir
facial weakness
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Overview
Summaries
Document
2 of 16
Patient
1 of 1
Document
Main EHR
Radiology
Pathology
1 of 20
Other
Scanned/PDFs
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Anatomy
C0017406: geniculate ganglion
C0017067: ganglion
Disorder
C1258666: ganglion

Patients Demo List (16)

Filters

Terms shingles | herpest zoster | VZV eruption | acoustic symptoms | ear pain | prednisone | acyclovir | facial weakness

Results HIGHLIGHT DOCUMENTS | FIND PATIENTS

Main EHR

Radiology

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1 of 20

Other

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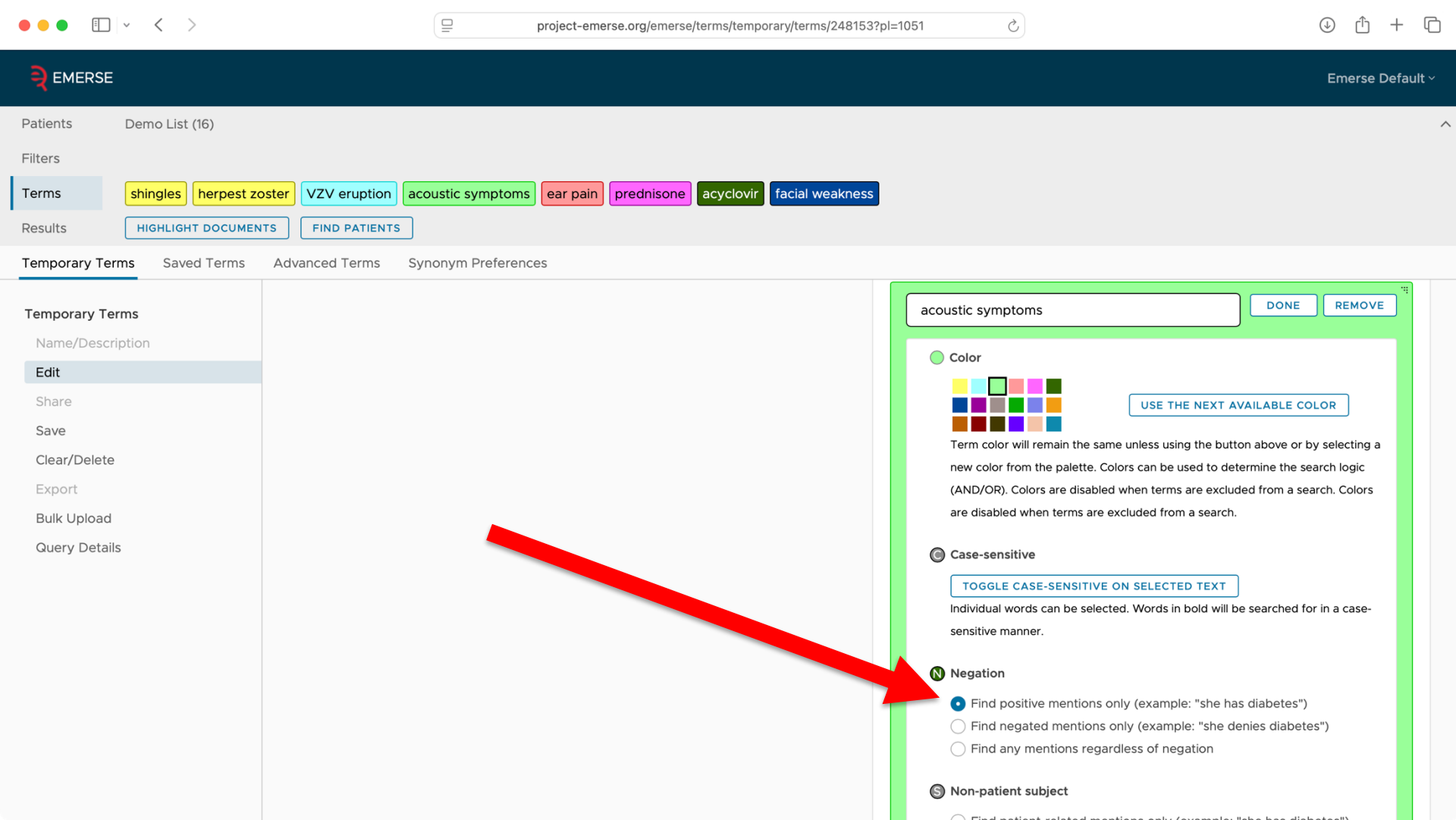
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Emerse Default
Patients
Demo List (16)
Filters
Terms
shingles
herpest zoster
VZV eruption
acoustic symptoms
ear pain
prednisone
acyclovir
facial weakness
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Temporary Terms
Saved Terms
Advanced Terms
Synonym Preferences
Temporary Terms
Name/Description
Edit
Share
Save
Clear/Delete
Export
Bulk Upload
Query Details
acoustic symptoms
DONE
REMOVE
Color
USE THE NEXT AVAILABLE COLOR
Term color will remain the same unless using the button above or by selecting a new color from the palette. Colors can be used to determine the search logic (AND/OR). Colors are disabled when terms are excluded from a search. Colors are disabled when terms are excluded from a search.
Case-sensitive
TOGGLE CASE-SENSITIVE ON SELECTED TEXT
Individual words can be selected. Words in bold will be searched for in a case-sensitive manner.
Negation
Find positive mentions only (example: "she has diabetes")
Find negated mentions only (example: "she denies diabetes")
Find any mentions regardless of negation
Non-patient subject

Main EHR

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Pathology

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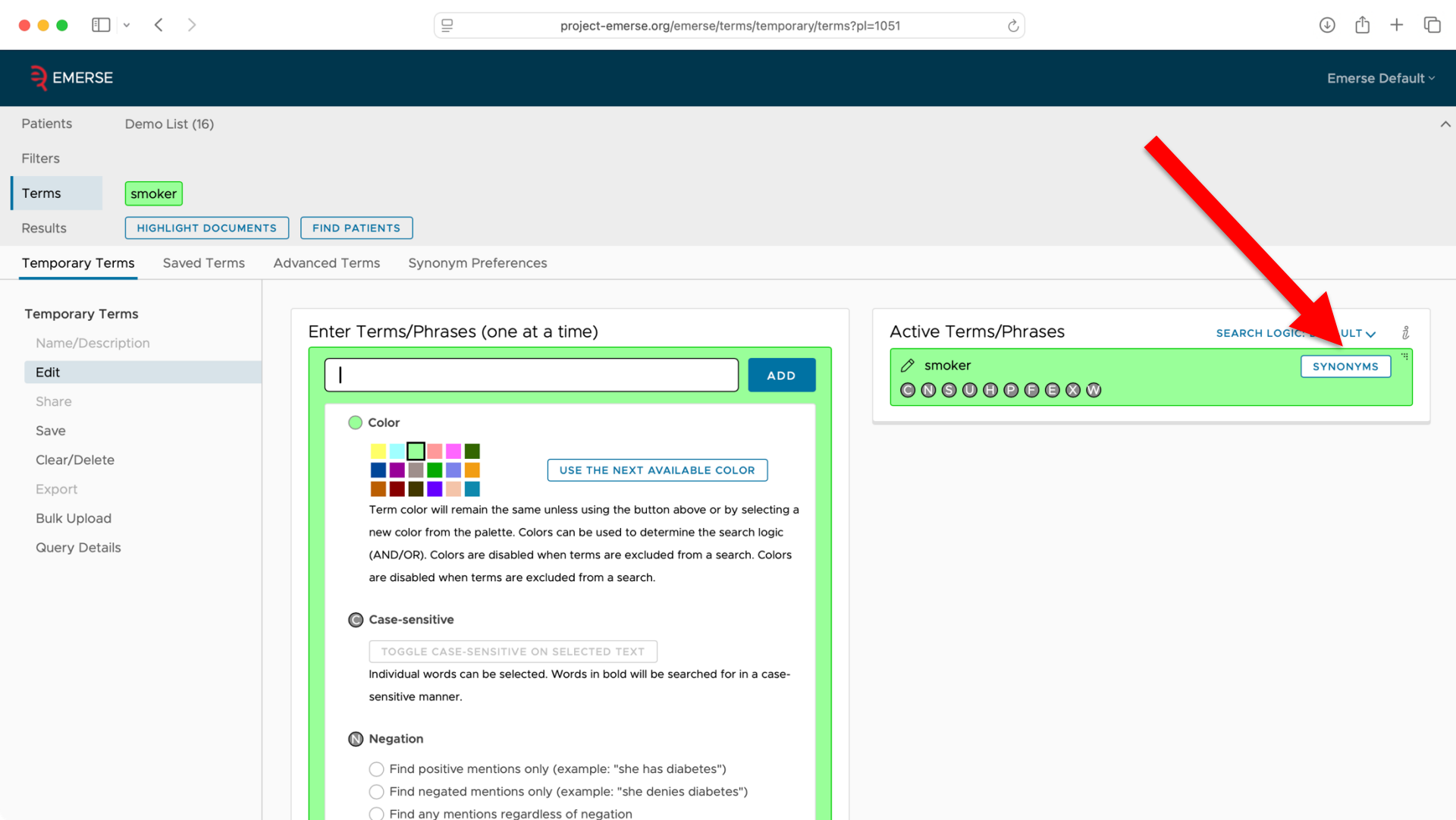
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Patients
Demo List (16)
Filters
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smoker
Results
HIGHLIGHT DOCUMENTS
FIND PATIENTS
Temporary Terms
Saved Terms
Advanced Terms
Synonym Preferences
Temporary Terms
Name/Description
Edit
Share
Save
Clear/Delete
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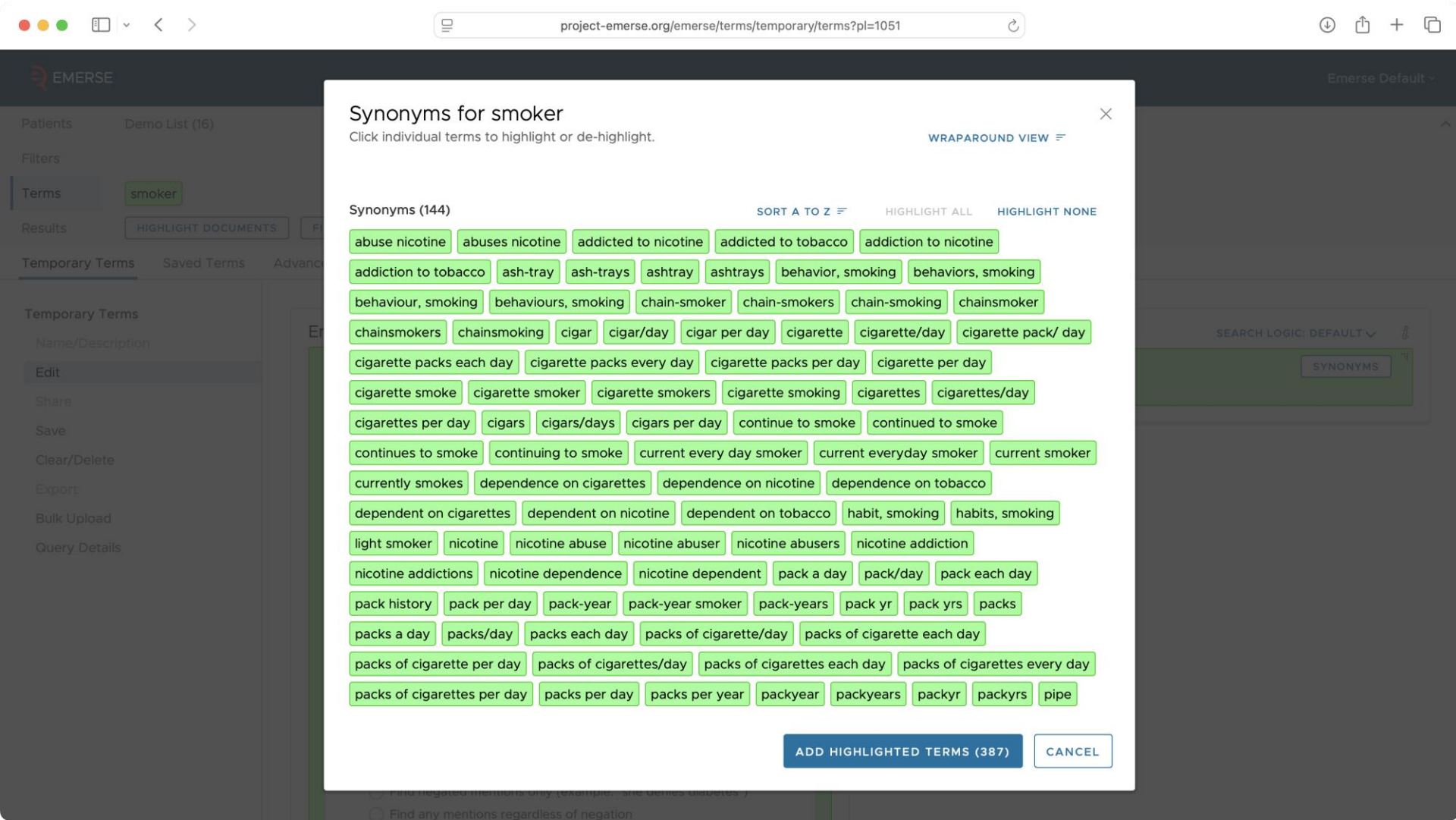
Find any mentions regardless of negation
Active Terms/Phrases
SEARCH LOGIC
smoker
SYNONYMS
C N S U H P F E X W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Temporary Terms
Saved Terms
Temporary Terms
Name/Description
Edit
Share
Save
Clear/Delete
Export
Bulk Upload
Query Details
SEARCH LOGIC: DEFAULT
SYNONYMS
Synonyms for smoker
Click individual terms to highlight or de-highlight.
WRAPAROUND VIEW
Synonyms (144)
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
behavior, smoking
behaviors, smoking
behaviour, smoking
behaviours, smoking
chain-smoker
chain-smokers
chain-smoking
chainsmoker
chainsmokers
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cigar/day
cigar per day
cigarette
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
habit, smoking
habits, smoking
light smoker
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
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packs/day
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packs of cigarettes per day
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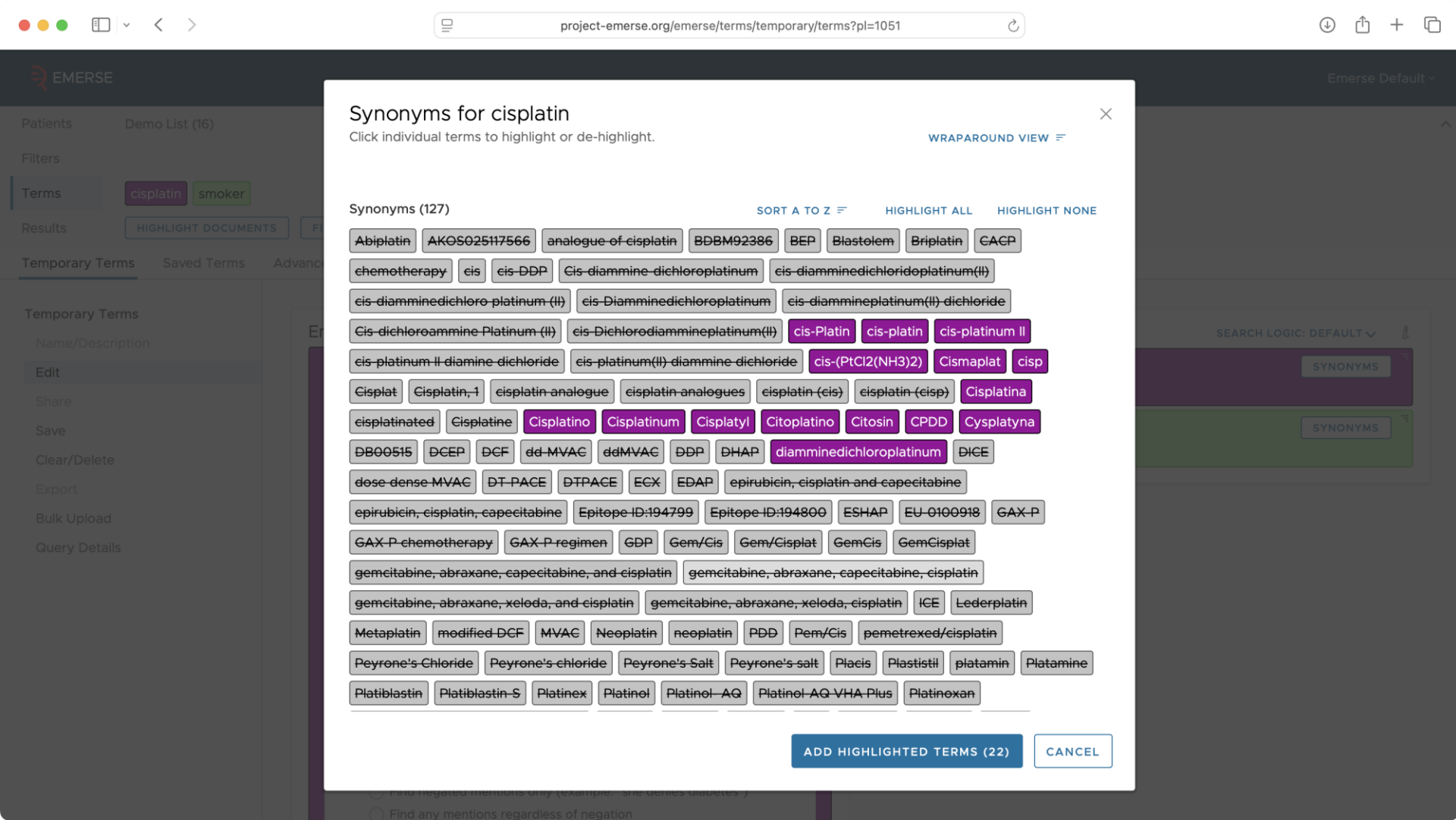
pipe
ADD HIGHLIGHTED TERMS (387)
CANCEL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cisplatin
smoker
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Bulk Upload
Query Details
SEARCH LOGIC: DEFAULT
SYNONYMS
SYNONYMS
Synonyms for cisplatin
Click individual terms to highlight or de-highlight.
WRAPAROUND VIEW
Synonyms (127)
SORT A TO Z
HIGHLIGHT ALL
HIGHLIGHT NONE
Abiplatin
AKOS025117566
analogue of cisplatin
BDBM92386
BEP
Blastolem
Briplatin
CACP
chemotherapy
cis
cis-DDP
Cis-diammine-dichloroplatinum
cis-diamminedichloridoplatinum(II)
cis-diamminedichloro-platinum (II)
cis-Diamminedichloroplatinum
cis-diammineplatinum(II) dichloride
Cis-dichloroammine Platinum (II)
cis-Dichlorodiammineplatinum(II)
cis-Platin
cis-platin
cis-platinum II
cis-platinum II diamine dichloride
cis-platinum(II) diammine dichloride
cis-(PtCl2(NH3)2)
Cismaplat
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Cisplat
Cisplatin,1
cisplatin analogue
cisplatin analogues
cisplatin (cis)
cisplatin (cisp)
Cisplatina
cisplatinated
Cisplatine
Cisplatino
Cisplatinum
Cisplatyl
Citoplatino
Citosin
CPDD
Cysplatyna
DB00515
DCEP
DCF
dd-MVAC
ddMVAC
DDP
DHAP
diamminedichloroplatinum
DICE
dose dense MVAC
DT-PACE
DTPACE
ECX
EDAP
epirubicin, cisplatin and capecitabine
epirubicin, cisplatin, capecitabine
Epitope ID:194799
Epitope ID:194800
ESHAP
EU-0100918
GAX-P
GAX-P chemotherapy
GAX-P regimen
GDP
Gem/Cis
Gem/Cisplat
GemCis
GemCisplat
gemcitabine, abraxane, capecitabine, and cisplatin
gemcitabine, abraxane, capecitabine, cisplatin
gemcitabine, abraxane, xeloda, and cisplatin
gemcitabine, abraxane, xeloda, cisplatin
ICE
Lederplatin
Metaplatin
modified DCF
MVAC
Neoplatin
neoplatin
PDD
Pem/Cis
pemetrexed/cisplatin
Peyrone's Chloride
Peyrone's chloride
Peyrone's Salt
Peyrone's salt
Placis
Plastistil
platamin
Platamine
Platiblastin
Platiblastin-S
Platinex
Platinol
Platinol-AQ
Platinol-AQ VHA Plus
Platinoxan
ADD HIGHLIGHTED TERMS (22)
CANCEL

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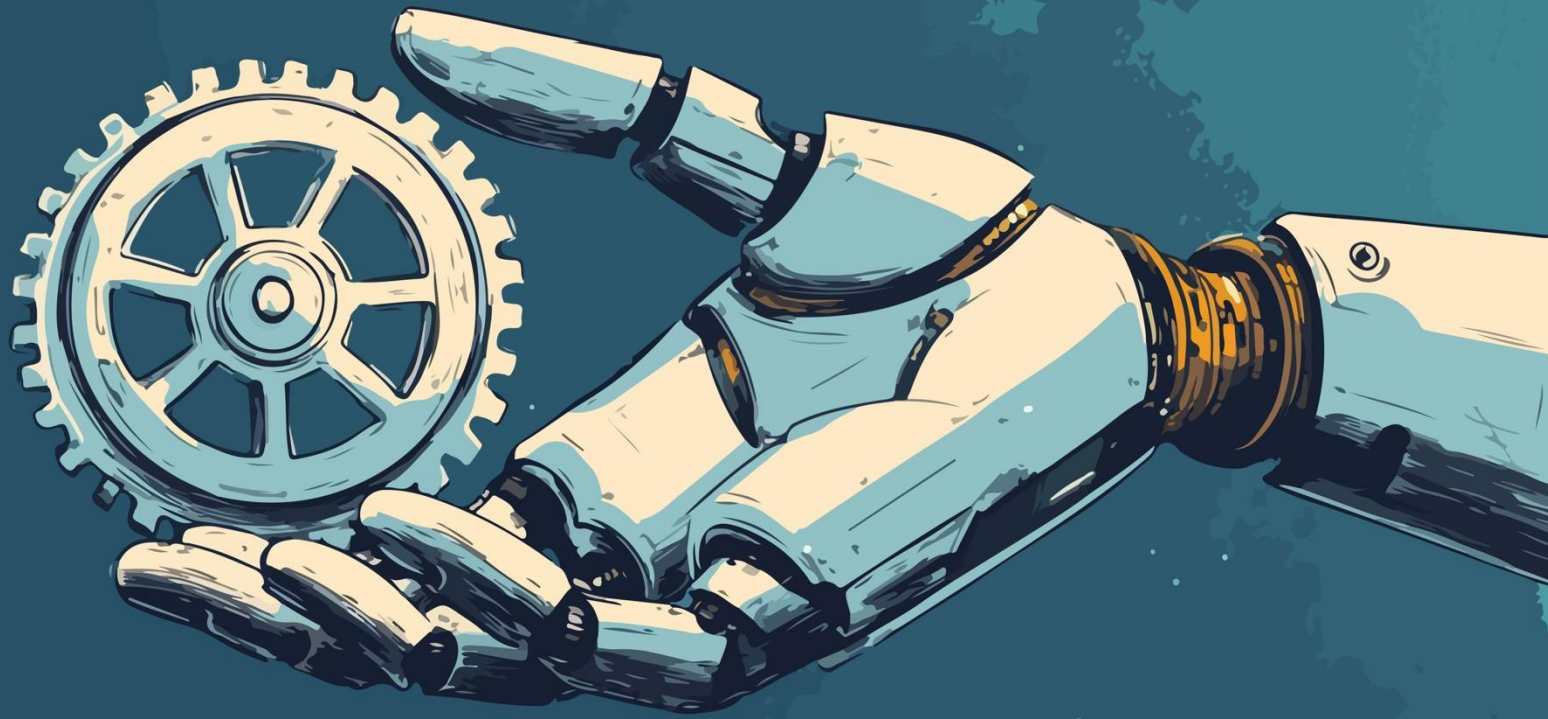

How do we ensure its future?

emerse
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

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

LLMs are changing how we work with text…do we even need search anymore?

Perspective

Search still matters: information retrieval in the era of generative AI

William Hersh, MD*

https://pmc.ncbi.nlm.nih.gov/articles/PMC11339511/pdf/ocae014.pdf
2024

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ELECTRONIC MEDICAL RECORD SEARCH ENGINE

Current EMERSE efforts

- Leverage the platform we have already built
  - security model (roles, privileges, auditing)
  - rapid retrieval of clinical notes
  - simple user interface for researchers
- Extend the capabilities with LLMs in various areas of the application

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ELECTRONIC MEDICAL RECORD SEARCH ENGINE

LLM agnostic

- We are not building our own LLM
- EMERSE should be flexible to connect to any LLM using APIs

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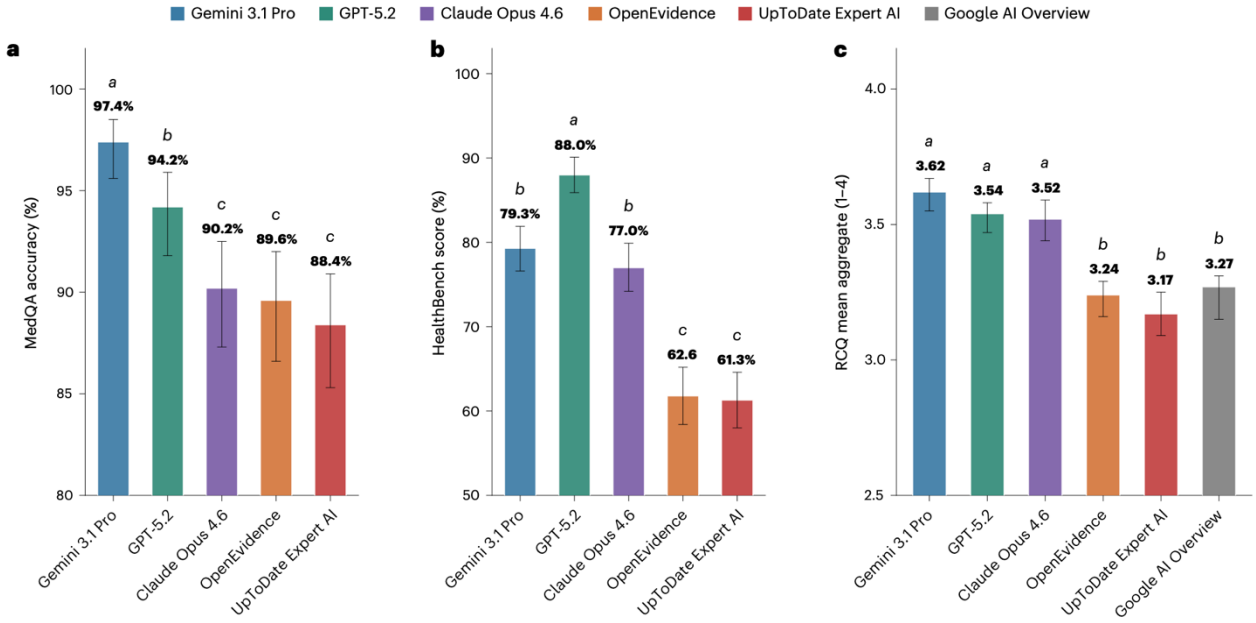
nature medicine

Brief Communication

https://doi.org/10.1038/s41591-026-04431-5

General-purpose large language models outperform specialized clinical AI tools on medical benchmarks



Initial thoughts: This should be easy

- LLMs are good at reading text
- Clinical notes are text
- Typical LLM paradigm:
  - paste note → ask question → get answer

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The reality: it's not so easy

- Patients have many notes over time
- Users ask multiple follow-up questions
- Clinical context matters
- Answers must be grounded in source documentation

- Need to track costs
- Need to control costs

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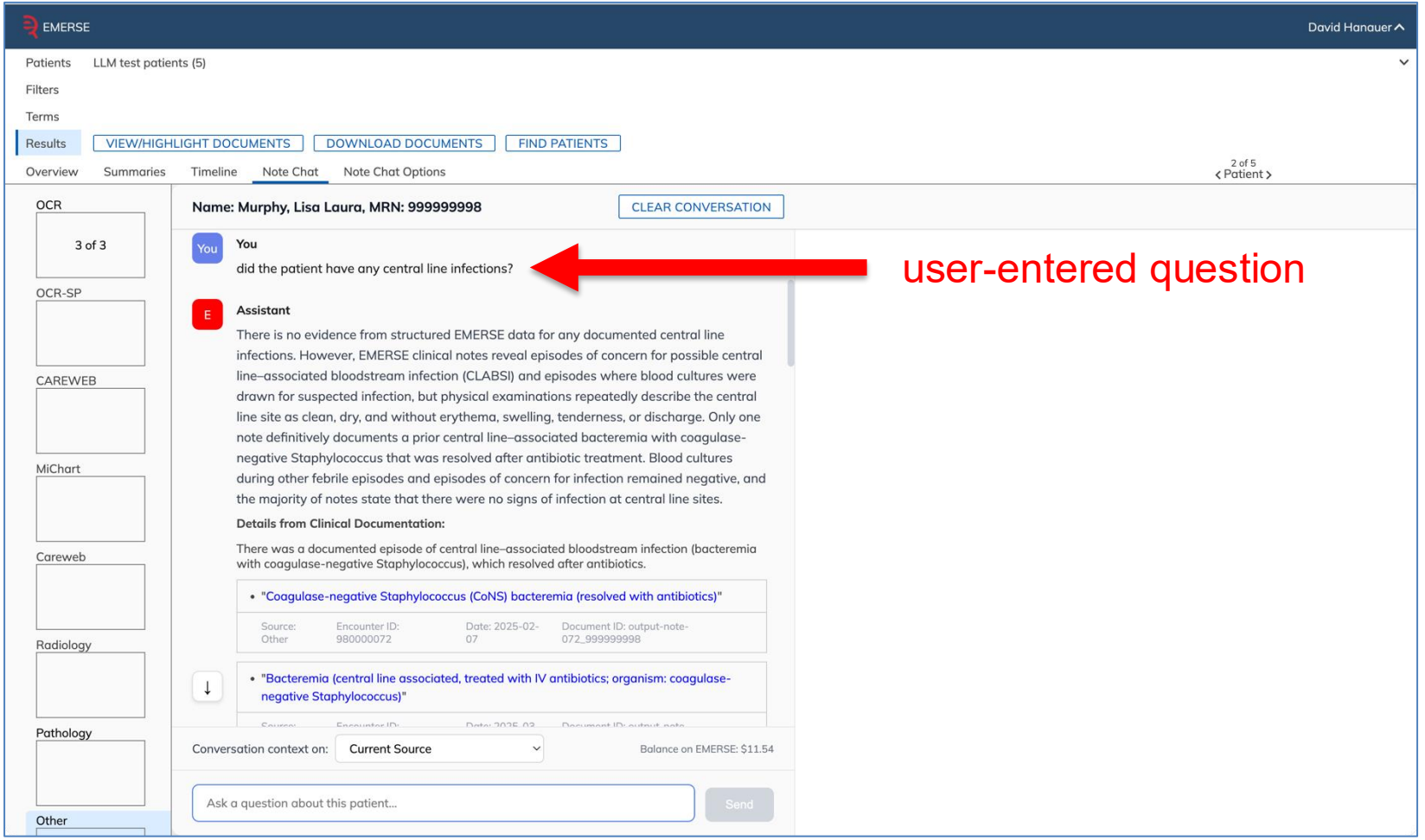
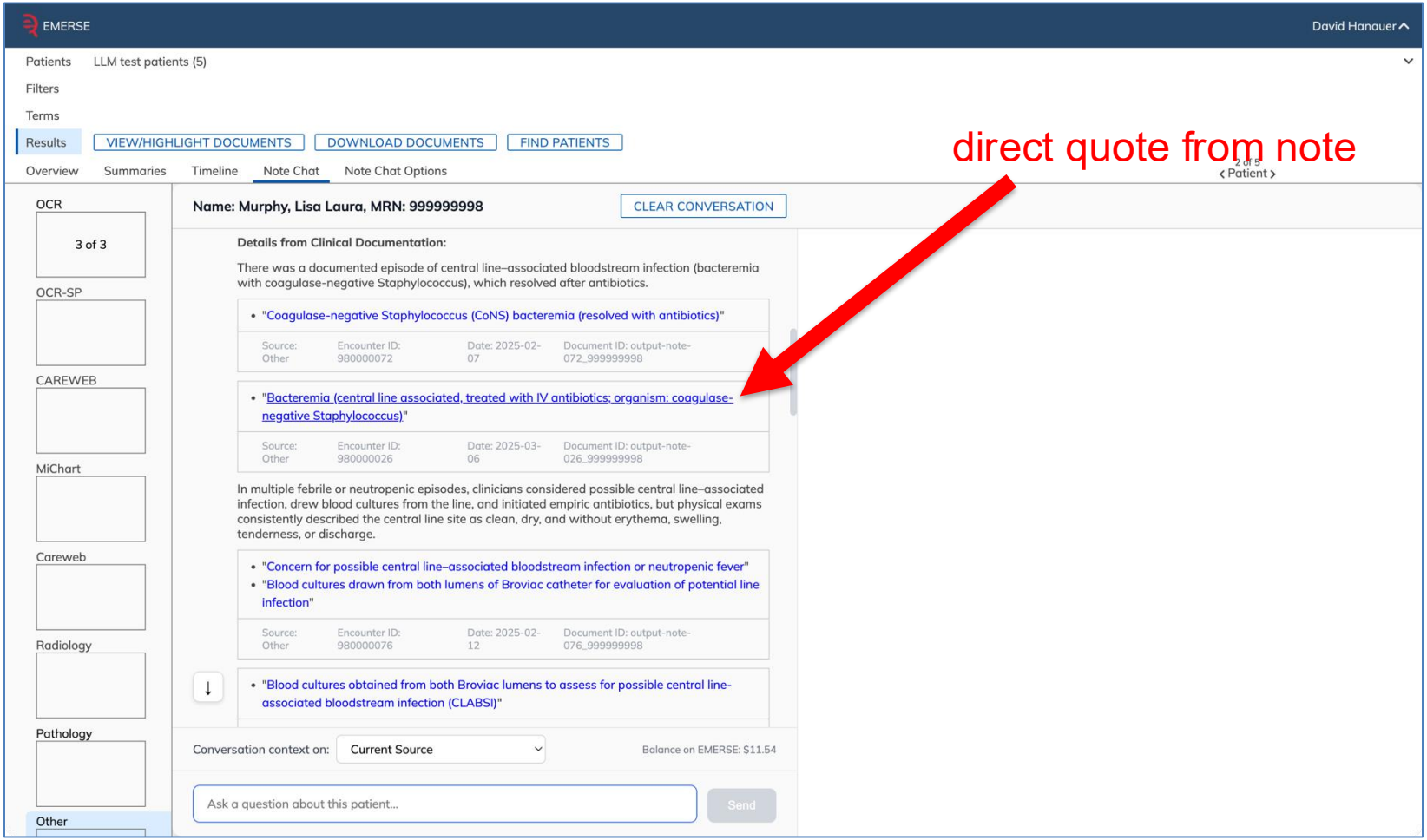
Note Chat


EMERSE
David Hanauer
Patients
LLM test patients (5)
Filters
Terms
Results
VIEW/HIGHLIGHT DOCUMENTS
DOWNLOAD DOCUMENTS
FIND PATIENTS
Overview
Summaries
Timeline
Note Chat
Note Chat Options
2 of 5
Patient
OCR
3 of 3
OCR-SP
CAREWEB
MiChart
Careweb
Radiology
Pathology
Other
Name: Murphy, Lisa Laura, MRN: 999999998
CLEAR CONVERSATION
You
You
did the patient have any central line infections?
user-entered question
E
Assistant
There is no evidence from structured EMERSE data for any documented central line infections. However, EMERSE clinical notes reveal episodes of concern for possible central line–associated bloodstream infection (CLABSI) and episodes where blood cultures were drawn for suspected infection, but physical examinations repeatedly describe the central line site as clean, dry, and without erythema, swelling, tenderness, or discharge. Only one note definitively documents a prior central line–associated bacteremia with coagulase-negative Staphylococcus that was resolved after antibiotic treatment. Blood cultures during other febrile episodes and episodes of concern for infection remained negative, and the majority of notes state that there were no signs of infection at central line sites.
Details from Clinical Documentation:
There was a documented episode of central line–associated bloodstream infection (bacteremia with coagulase-negative Staphylococcus), which resolved after antibiotics.
"Coagulase-negative Staphylococcus (CoNS) bacteremia (resolved with antibiotics)"
Source: Other
Encounter ID: 980000072
Date: 2025-02-07
Document ID: output-note-072_999999998
"Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)"
Conversation context on:
Current Source
Balance on EMERSE: $11.54
Ask a question about this patient...
Send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Summaries
Timeline
Note Chat
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2 of 5
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direct quote from note
OCR
3 of 3
OCR-SP
CAREWEB
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Radiology
Pathology
Other
Name: Murphy, Lisa Laura, MRN: 999999998
CLEAR CONVERSATION
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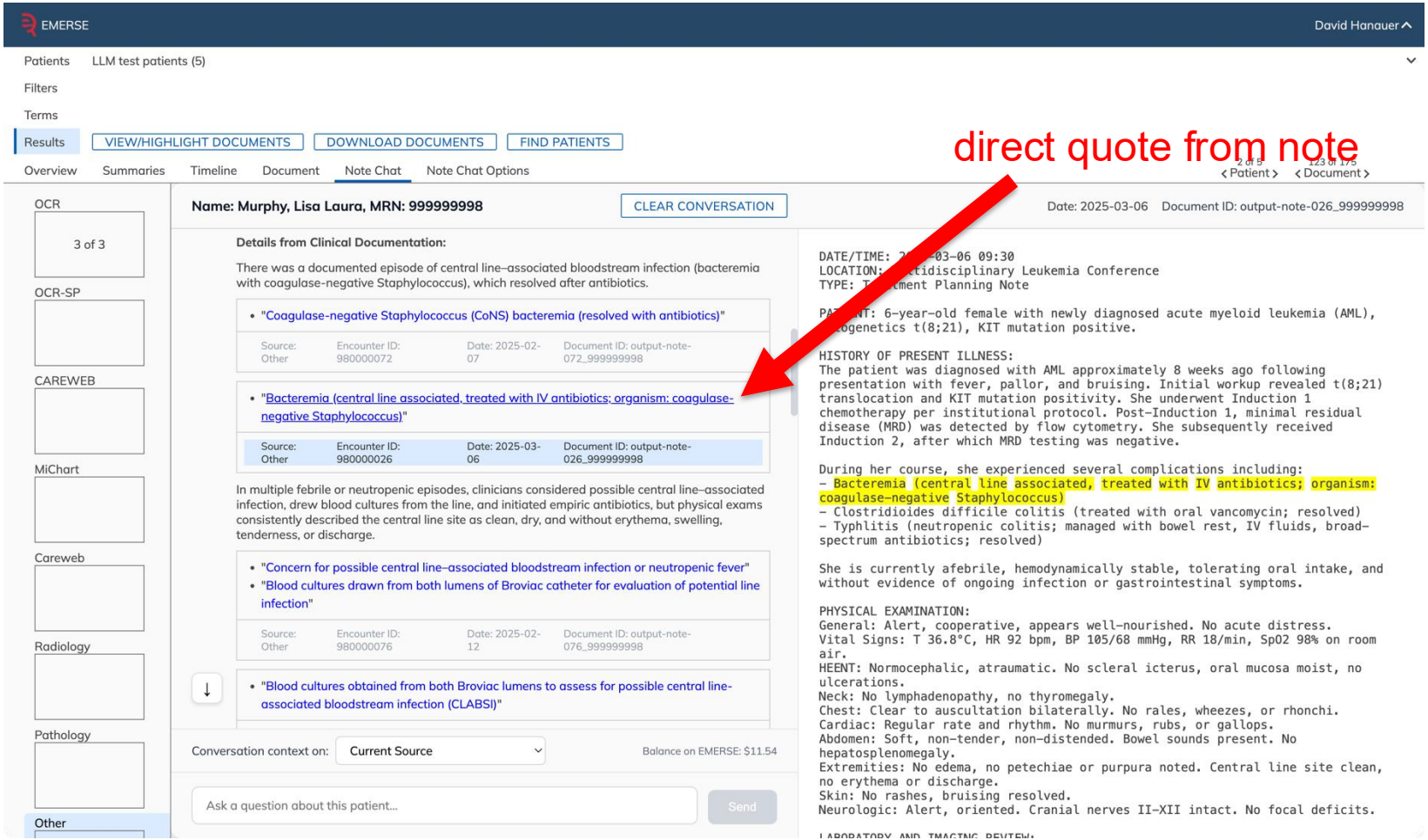
"Coagulase-negative Staphylococcus (CoNS) bacteremia (resolved with antibiotics)"
Source: Other
Encounter ID: 980000072
Date: 2025-02-07
Document ID: output-note-072_999999998
"Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)"
Source: Other
Encounter ID: 980000026
Date: 2025-03-06
Document ID: output-note-026_999999998
In multiple febrile or neutropenic episodes, clinicians considered possible central line–associated infection, drew blood cultures from the line, and initiated empiric antibiotics, but physical exams consistently described the central line site as clean, dry, and without erythema, swelling, tenderness, or discharge.
"Concern for possible central line–associated bloodstream infection or neutropenic fever"
"Blood cultures drawn from both lumens of Broviac catheter for evaluation of potential line infection"
Source: Other
Encounter ID: 980000076
Date: 2025-02-12
Document ID: output-note-076_999999998
"Blood cultures obtained from both Broviac lumens to assess for possible central line-associated bloodstream infection (CLABSI)"
Conversation context on:
Current Source
Balance on EMERSE: $11.54
Ask a question about this patient...
Send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Timeline
Document
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Name: Murphy, Lisa Laura, MRN: 999999998
CLEAR CONVERSATION
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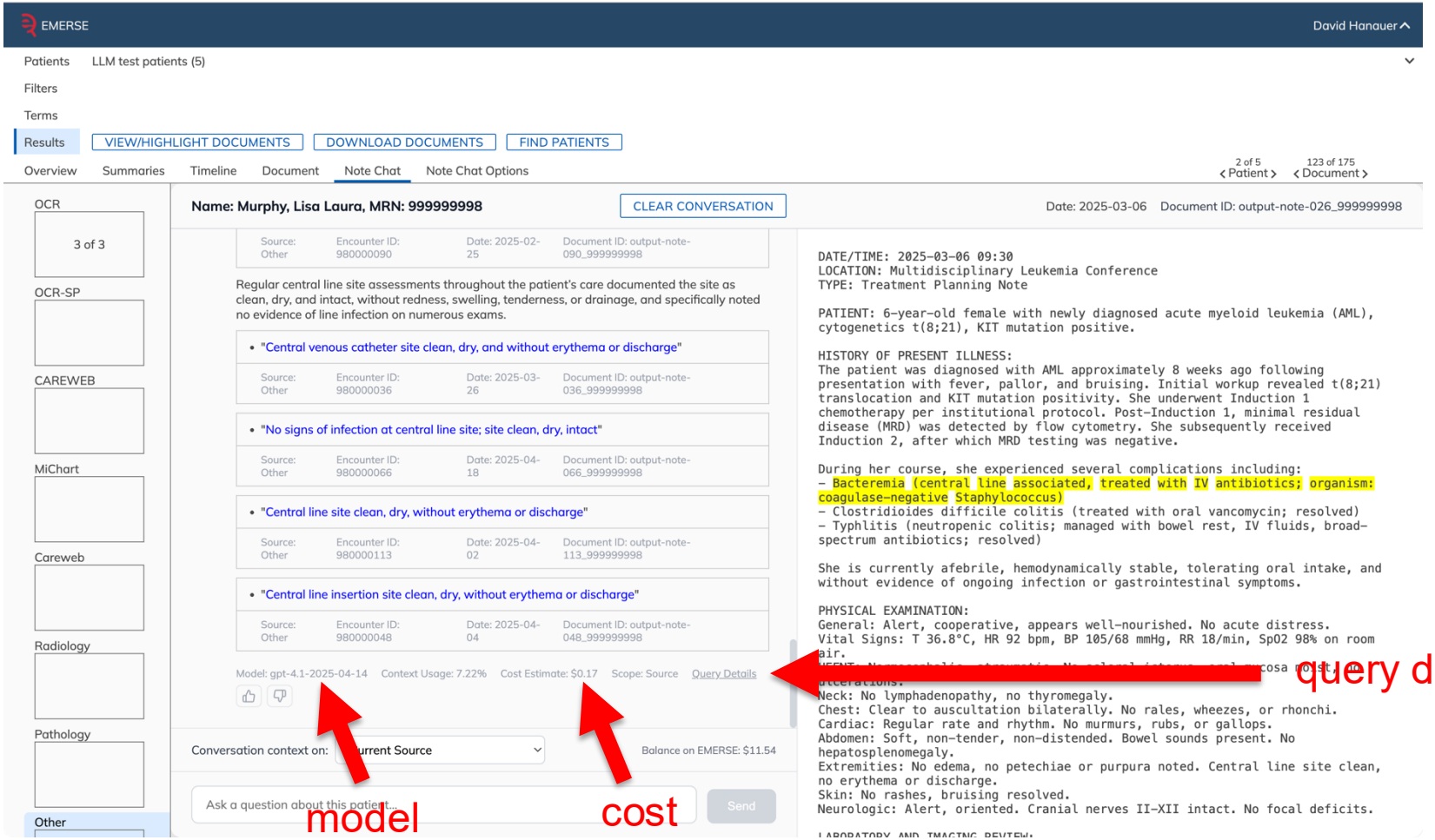
"Blood cultures obtained from both Broviac lumens to assess for possible central line-associated bloodstream infection (CLABSI)"
Conversation context on:
Current Source
Balance on EMERSE: $11.54
Ask a question about this patient...
Send
DATE/TIME: 2 03-06 09:30
LOCATION: tidisciplinary Leukemia Conference
TYPE: T ment Planning Note
PA NT: 6-year-old female with newly diagnosed acute myeloid leukemia (AML), ogenetics t(8;21), KIT mutation positive.
HISTORY OF PRESENT ILLNESS:
The patient was diagnosed with AML approximately 8 weeks ago following presentation with fever, pallor, and bruising. Initial workup revealed t(8;21) translocation and KIT mutation positivity. She underwent Induction 1 chemotherapy per institutional protocol. Post-Induction 1, minimal residual disease (MRD) was detected by flow cytometry. She subsequently received Induction 2, after which MRD testing was negative.
During her course, she experienced several complications including:
- Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)
- Clostridioides difficile colitis (treated with oral vancomycin; resolved)
- Typhlitis (neutropenic colitis; managed with bowel rest, IV fluids, broad-spectrum antibiotics; resolved)
She is currently afebrile, hemodynamically stable, tolerating oral intake, and without evidence of ongoing infection or gastrointestinal symptoms.
PHYSICAL EXAMINATION:
General: Alert, cooperative, appears well-nourished. No acute distress.
Vital Signs: T 36.8°C, HR 92 bpm, BP 105/68 mmHg, RR 18/min, SpO2 98% on room air.
HEENT: Normocephalic, atraumatic. No scleral icterus, oral mucosa moist, no ulcerations.
Neck: No lymphadenopathy, no thyromegaly.
Chest: Clear to auscultation bilaterally. No rales, wheezes, or rhonchi.
Cardiac: Regular rate and rhythm. No murmurs, rubs, or gallops.
Abdomen: Soft, non-tender, non-distended. Bowel sounds present. No hepatosplenomegaly.
Extremities: No edema, no petechiae or purpura noted. Central line site clean, no erythema or discharge.
Skin: No rashes, bruising resolved.
Neurologic: Alert, oriented. Cranial nerves II–XII intact. No focal deficits.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David Hanauer
Patients
LLM test patients (5)
Filters
Terms
Results
VIEW/HIGHLIGHT DOCUMENTS
DOWNLOAD DOCUMENTS
FIND PATIENTS
Overview
Summaries
Timeline
Document
Note Chat
Note Chat Options
2 of 5 Patient
123 of 175 Document
OCR
3 of 3
OCR-SP
CAREWEB
MiChart
Careweb
Radiology
Pathology
Other
Name: Murphy, Lisa Laura, MRN: 999999998
CLEAR CONVERSATION
Date: 2025-03-06 Document ID: output-note-026_999999998
Source: Other
Encounter ID: 980000090
Date: 2025-02-25
Document ID: output-note-090_999999998
Regular central line site assessments throughout the patient's care documented the site as clean, dry, and intact, without redness, swelling, tenderness, or drainage, and specifically noted no evidence of line infection on numerous exams.
"Central venous catheter site clean, dry, and without erythema or discharge"
Source: Other
Encounter ID: 980000036
Date: 2025-03-26
Document ID: output-note-036_999999998
"No signs of infection at central line site; site clean, dry, intact"
Source: Other
Encounter ID: 980000066
Date: 2025-04-18
Document ID: output-note-066_999999998
"Central line site clean, dry, without erythema or discharge"
Source: Other
Encounter ID: 980000113
Date: 2025-04-02
Document ID: output-note-113_999999998
"Central line insertion site clean, dry, without erythema or discharge"
Source: Other
Encounter ID: 980000048
Date: 2025-04-04
Document ID: output-note-048_999999998
Model: gpt-4.1-2025-04-14
Context Usage: 7.22%
Cost Estimate: $0.17
Scope: Source
Query Details
Conversation context on:
urrent Source
Balance on EMERSE: $11.54
Ask a question about this patient...
Send
model
cost
query details
DATE/TIME: 2025-03-06 09:30
LOCATION: Multidisciplinary Leukemia Conference
TYPE: Treatment Planning Note
PATIENT: 6-year-old female with newly diagnosed acute myeloid leukemia (AML), cytogenetics t(8;21), KIT mutation positive.
HISTORY OF PRESENT ILLNESS:
The patient was diagnosed with AML approximately 8 weeks ago following presentation with fever, pallor, and bruising. Initial workup revealed t(8;21) translocation and KIT mutation positivity. She underwent Induction 1 chemotherapy per institutional protocol. Post-Induction 1, minimal residual disease (MRD) was detected by flow cytometry. She subsequently received Induction 2, after which MRD testing was negative.
During her course, she experienced several complications including:
- Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)
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She is currently afebrile, hemodynamically stable, tolerating oral intake, and without evidence of ongoing infection or gastrointestinal symptoms.
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General: Alert, cooperative, appears well-nourished. No acute distress.
Vital Signs: T 36.8°C, HR 92 bpm, BP 105/68 mmHg, RR 18/min, SpO2 98% on room air.
Neck: No lymphadenopathy, no thyromegaly.
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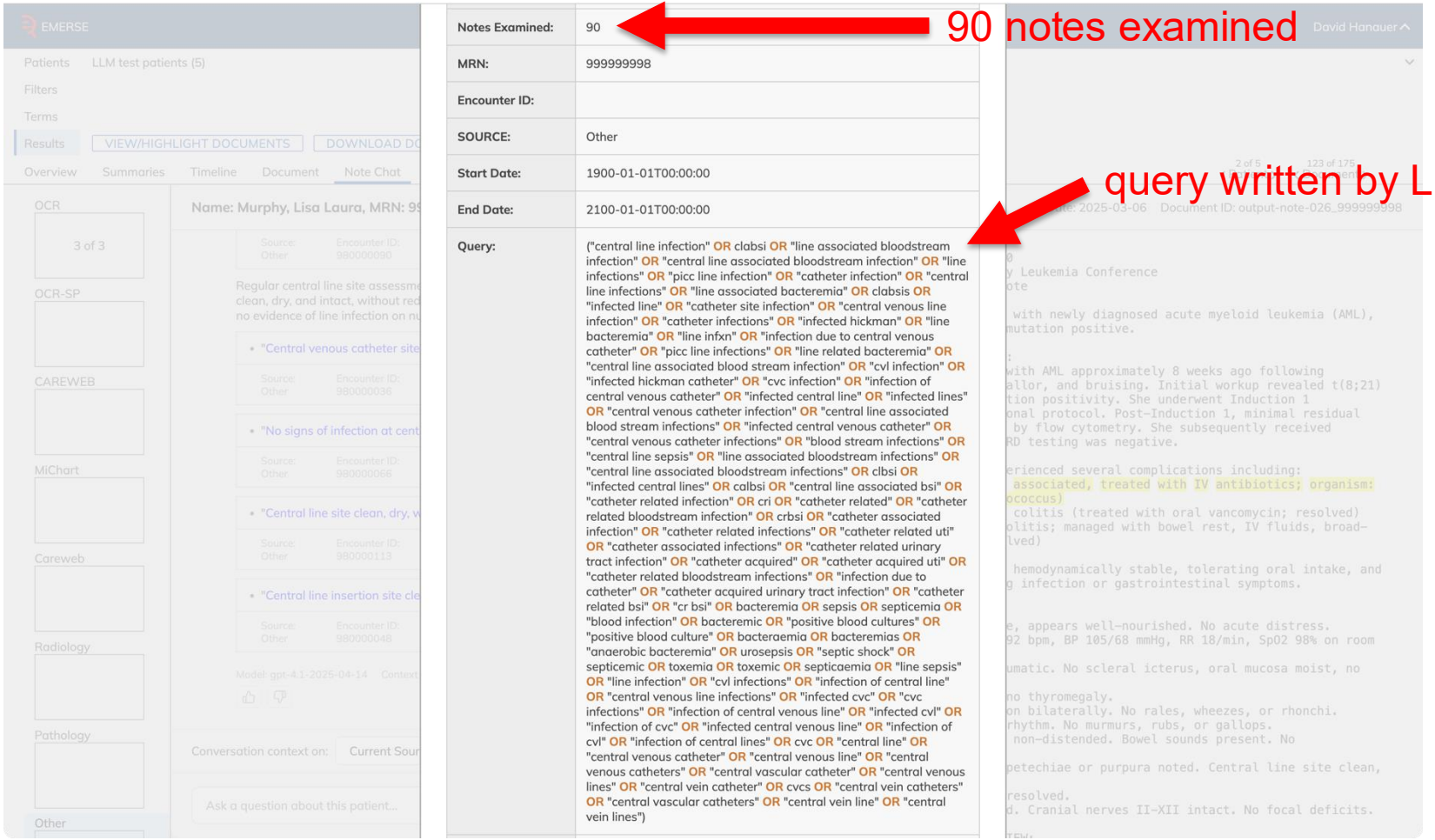
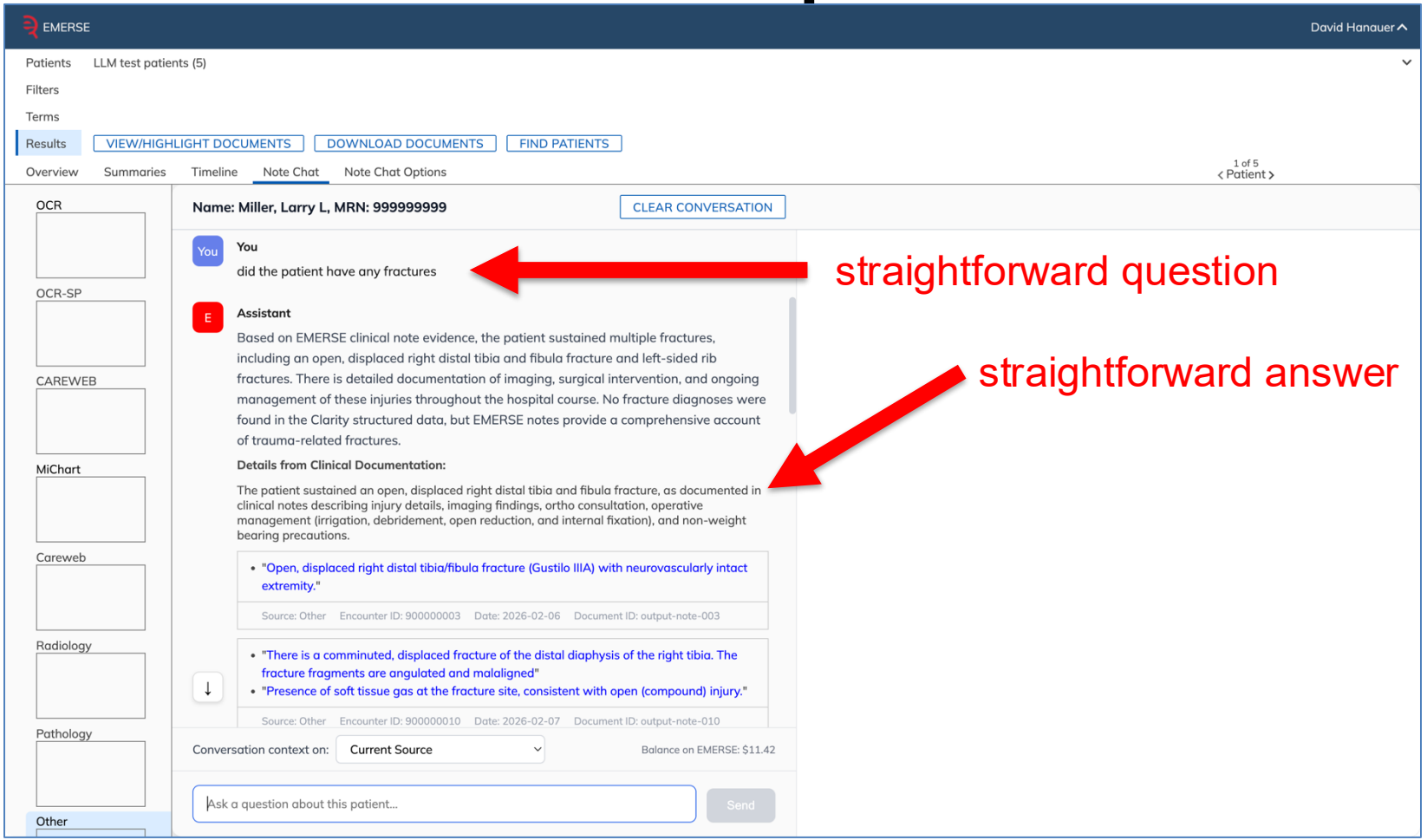
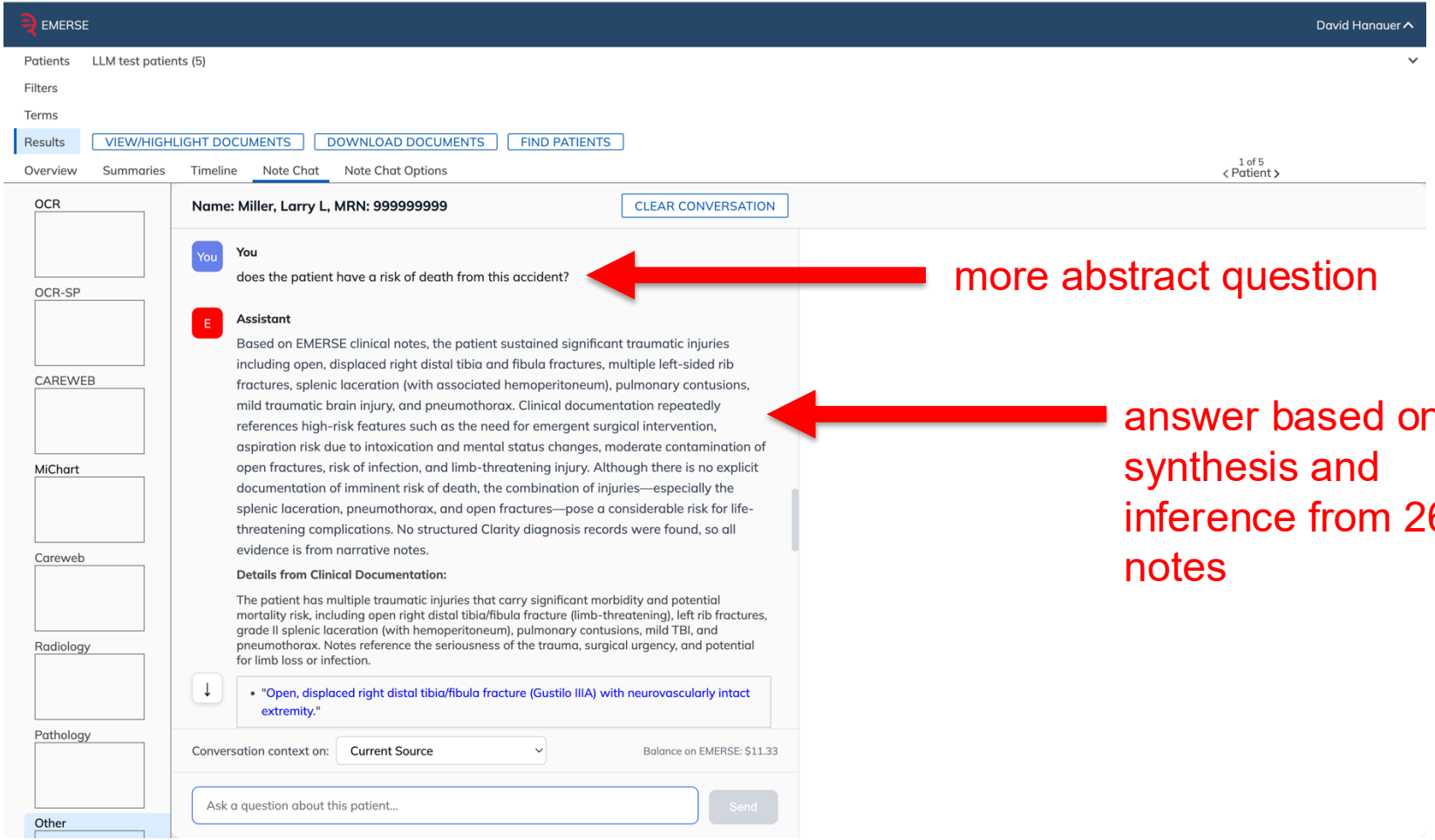
Extremities: No edema, no petechiae or purpura noted. Central line site clean, no erythema or discharge.
Skin: No rashes, bruising resolved.
Neurologic: Alert, oriented. Cranial nerves II-XII intact. No focal deficits.

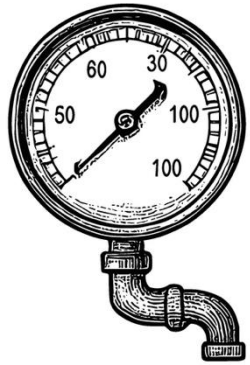

90 notes examined
query written by LLM
Notes Examined: 90
MRN: 999999998
Encounter ID:
SOURCE: Other
Start Date: 1900-01-01T00:00:00
End Date: 2100-01-01T00:00:00
Query: ("central line infection" OR clabsi OR "line associated bloodstream infection" OR "central line associated bloodstream infection" OR "line infections" OR "picc line infection" OR "catheter infection" OR "central line infections" OR "line associated bacteremia" OR clabsis OR "infected line" OR "catheter site infection" OR "central venous line infection" OR "catheter infections" OR "infected hickman" OR "line bacteremia" OR "line infxn" OR "infection due to central venous catheter" OR "picc line infections" OR "line related bacteremia" OR "central line associated blood stream infection" OR "cvl infection" OR "infected hickman catheter" OR "cvc infection" OR "infection of central venous catheter" OR "infected central line" OR "infected lines" OR "central venous catheter infection" OR "central line associated blood stream infections" OR "infected central venous catheter" OR "central venous catheter infections" OR "blood stream infections" OR "central line sepsis" OR "line associated bloodstream infections" OR "central line associated bloodstream infections" OR clbsi OR "infected central lines" OR calbsi OR "central line associated bsi" OR "catheter related infection" OR cri OR "catheter related" OR "catheter related bloodstream infection" OR crbsi OR "catheter associated infection" OR "catheter related infections" OR "catheter related uti" OR "catheter associated infections" OR "catheter related urinary tract infection" OR "catheter acquired" OR "catheter acquired uti" OR "catheter related bloodstream infections" OR "infection due to catheter" OR "catheter acquired urinary tract infection" OR "catheter related bsi" OR "cr bsi" OR bacteremia OR sepsis OR septicemia OR "blood infection" OR bacteremic OR "positive blood cultures" OR "positive blood culture" OR bacteraemia OR bacteremias OR "anaerobic bacteremia" OR urosepsis OR "septic shock" OR septicemic OR toxemia OR toxemic OR septicaemia OR "line sepsis" OR "line infection" OR "cvl infections" OR "infection of central line" OR "central venous line infections" OR "infected cvc" OR "cvc infections" OR "infection of central venous line" OR "infected cvl" OR "infection of cvc" OR "infected central venous line" OR "infection of cvl" OR "infection of central lines" OR cvc OR "central line" OR "central venous catheter" OR "central venous line" OR "central venous catheters" OR "central vascular catheter" OR "central venous lines" OR "central vein catheter" OR cvcs OR "central vein catheters" OR "central vascular catheters" OR "central vein line" OR "central vein lines")

One more patient

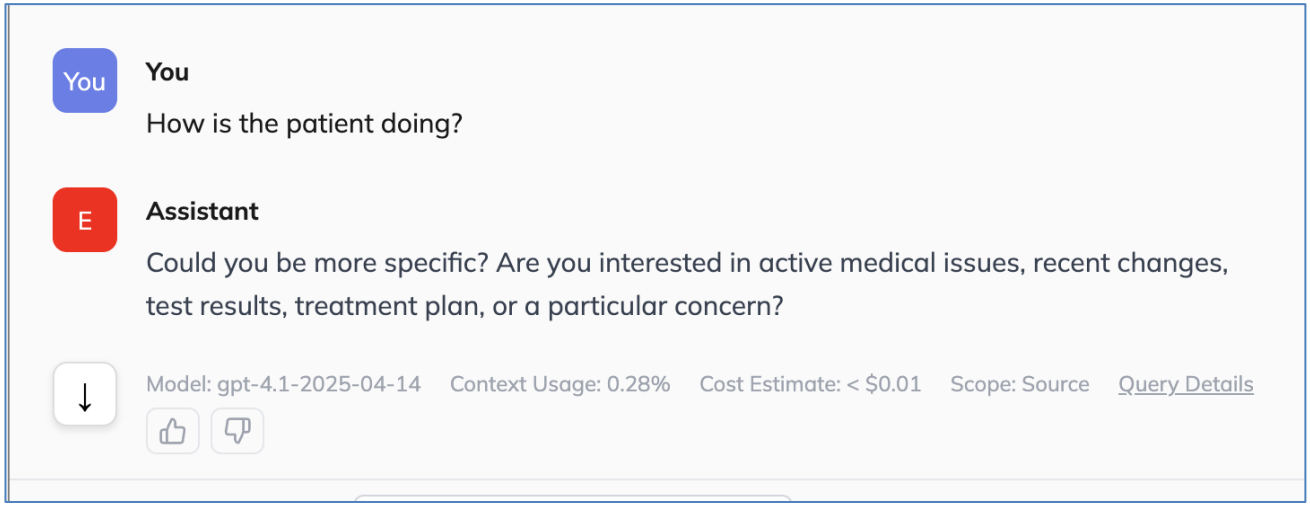



EMERSE
David Hanauer
Patients
LLM test patients (5)
Filters
Terms
Results
VIEW/HIGHLIGHT DOCUMENTS
DOWNLOAD DOCUMENTS
FIND PATIENTS
Overview
Summaries
Timeline
Note Chat
Note Chat Options
1 of 5
Patient
OCR
OCR-SP
CAREWEB
MiChart
Careweb
Radiology
Pathology
Other
Name: Miller, Larry L, MRN: 999999999
CLEAR CONVERSATION
You
You
does the patient have a risk of death from this accident?
E
Assistant
Based on EMERSE clinical notes, the patient sustained significant traumatic injuries including open, displaced right distal tibia and fibula fractures, multiple left-sided rib fractures, splenic laceration (with associated hemoperitoneum), pulmonary contusions, mild traumatic brain injury, and pneumothorax. Clinical documentation repeatedly references high-risk features such as the need for emergent surgical intervention, aspiration risk due to intoxication and mental status changes, moderate contamination of open fractures, risk of infection, and limb-threatening injury. Although there is no explicit documentation of imminent risk of death, the combination of injuries—especially the splenic laceration, pneumothorax, and open fractures—pose a considerable risk for life-threatening complications. No structured Clarity diagnosis records were found, so all evidence is from narrative notes.
Details from Clinical Documentation:
The patient has multiple traumatic injuries that carry significant morbidity and potential mortality risk, including open right distal tibia/fibula fracture (limb-threatening), left rib fractures, grade II splenic laceration (with hemoperitoneum), pulmonary contusions, mild TBI, and pneumothorax. Notes reference the seriousness of the trauma, surgical urgency, and potential for limb loss or infection.
"Open, displaced right distal tibia/fibula fracture (Gustilo IIIA) with neurovascularly intact extremity."
Conversation context on:
Current Source
Balance on EMERSE: $11.33
Ask a question about this patient...
Send
more abstract question
answer based on synthesis and inference from 26 notes

How does it all work?



1. User asks a question
2. LLM evaluates question for specificity
    - If too vague, it will ask for more details



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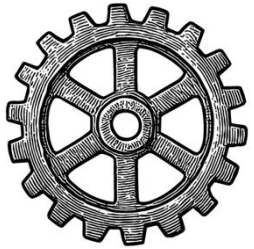
How does it all work?



3. LLM decides if reporting database (e.g., Epic Clarity) should be queried for any known details about the patient
    - demographics, diagnoses, medications, etc.
    - usually not enough to answer the question, but used to help the LLM focus on the right details.
4. LLM writes an initial free text search query (no RAG/embeddings), using the structured data as a guide, if available

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How does it all work?

5. LLM will then use available Synonyms to expand the query with additional terms
6. LLM evaluates the expanded query to remove terms likely to be vague, which could lead to excess false positives/noise
   - e.g., ‘ca’ could be cancer, calcium, catheter-associated, etc

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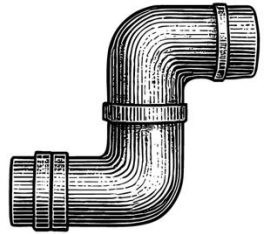
How does it all work?



7. LLM queries EMERSE notes (stored in Solr) to retrieve up to 800 notes (controlled by user preferences)
8. Snippets from each note are extracted with 1,000 characters on each end of the search terms

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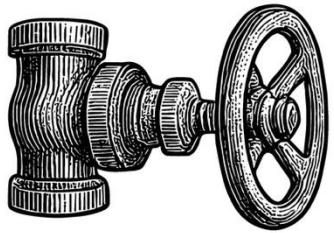
How does it all work?



9. Snippets, along with note metadata, are sent back to the LLM for synthesis and answering the question
   - LLM is instructed to extract exact quotes from notes as supporting evidence
10. Results are returned in a structured (JSON) format and presented to the user in a consistent manner

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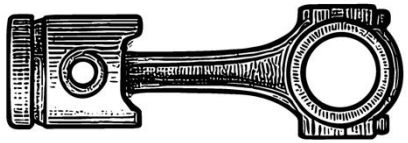
How does it all work?



11. User can click on supporting quotes to review the text in the original note
    - The quoted text is highlighted with deterministic highlighter
    - If text cannot be highlighted deterministically, the LLM may have paraphrased, so text and note is sent to LLM to try to highlight
    - If text still cannot be highlighted it could represent a hallucination and user is warned

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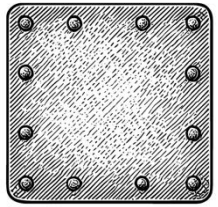
Additional details



- Workflow engine ties distinct LLM calls together
- Conversational memory is maintained, but only within a patient, and only per-conversation
- To encourage reproducibility a temperature of 0 is initially used
  - If LLM returns invalid JSON, and it cannot be repaired, the system will retry at higher temperatures to obtain a valid response

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Additional details

- System maintains detailed accounting of input/output tokens, with estimated costs available for each answer and as a running ledger per user

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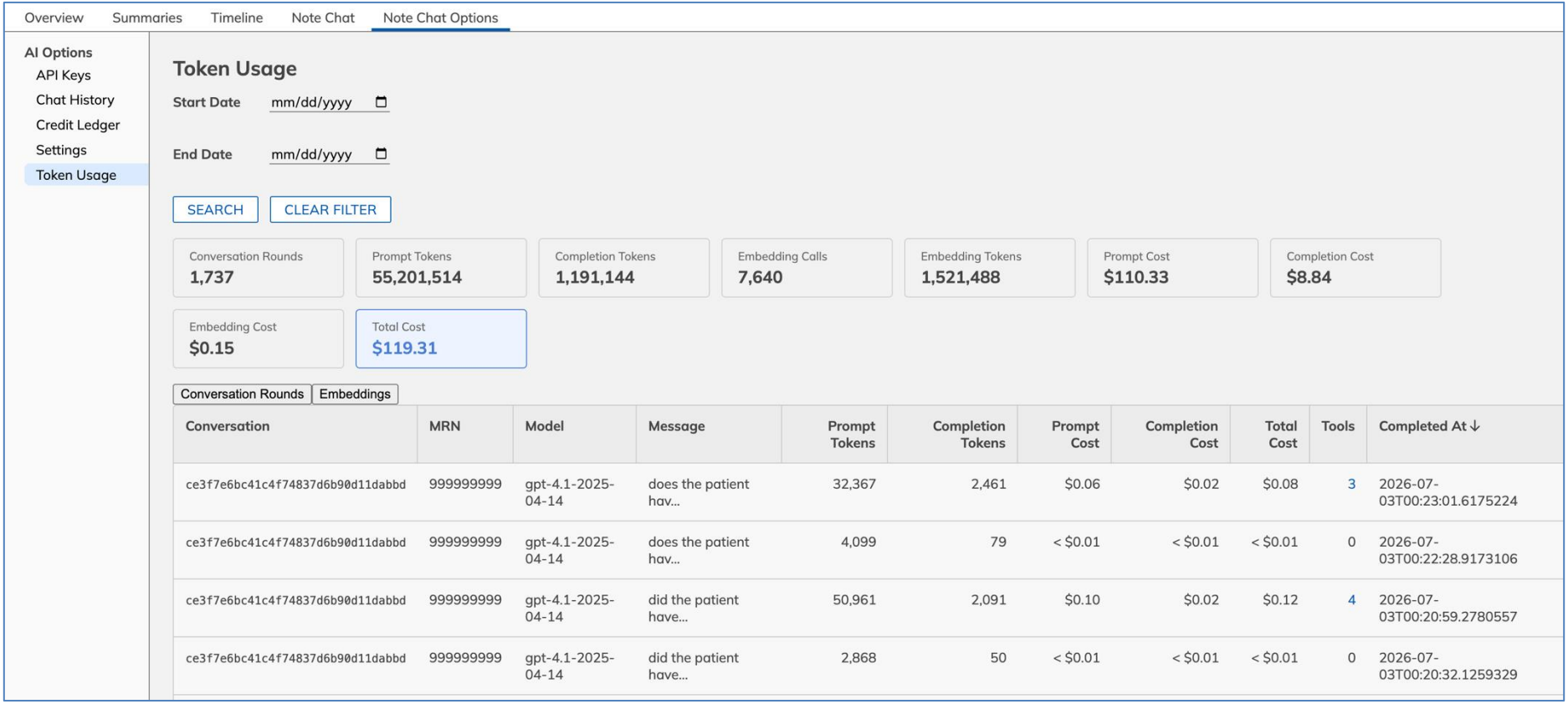

Overview
Summaries
Timeline
Note Chat
Note Chat Options
AI Options
API Keys
Chat History
Credit Ledger
Settings
Token Usage
Token Usage
Start Date
mm/dd/yyyy
End Date
mm/dd/yyyy
SEARCH
CLEAR FILTER
Conversation Rounds
1,737
Prompt Tokens
55,201,514
Completion Tokens
1,191,144
Embedding Calls
7,640
Embedding Tokens
1,521,488
Prompt Cost
$110.33
Completion Cost
$8.84
Embedding Cost
$0.15
Total Cost
$119.31
Conversation Rounds
Embeddings
Conversation
MRN
Model
Message
Prompt Tokens
Completion Tokens
Prompt Cost
Completion Cost
Total Cost
Tools
Completed At ↓
ce3f7e6bc41c4f74837d6b90d11dabbd
999999999
gpt-4.1-2025-04-14
does the patient hav...
32,367
2,461
$0.06
$0.02
$0.08
3
2026-07-03T00:23:01.6175224
ce3f7e6bc41c4f74837d6b90d11dabbd
999999999
gpt-4.1-2025-04-14
does the patient hav...
4,099
79
< $0.01
< $0.01
< $0.01
0
2026-07-03T00:22:28.9173106
ce3f7e6bc41c4f74837d6b90d11dabbd
999999999
gpt-4.1-2025-04-14
did the patient have...
50,961
2,091
$0.10
$0.02
$0.12
4
2026-07-03T00:20:59.2780557
ce3f7e6bc41c4f74837d6b90d11dabbd
999999999
gpt-4.1-2025-04-14
did the patient have...
2,868
50
< $0.01
< $0.01
< $0.01
0
2026-07-03T00:20:32.1259329

Overview | Summaries | Timeline | Note Chat | Note Chat Options

AI Options

- API Keys
- Chat History
- Credit Ledger
- Settings
- Token Usage

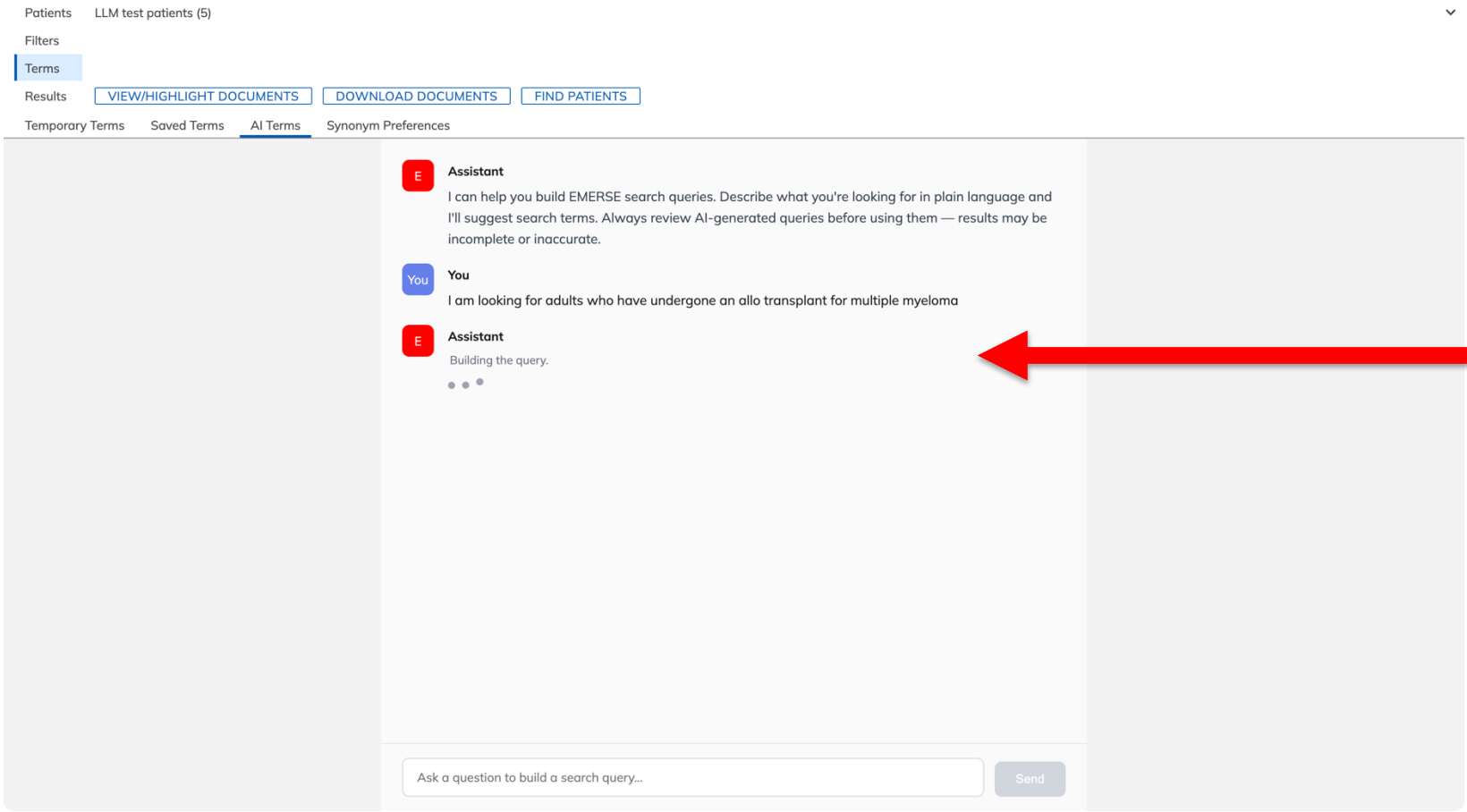
Account: EMERSE (EMERSE)

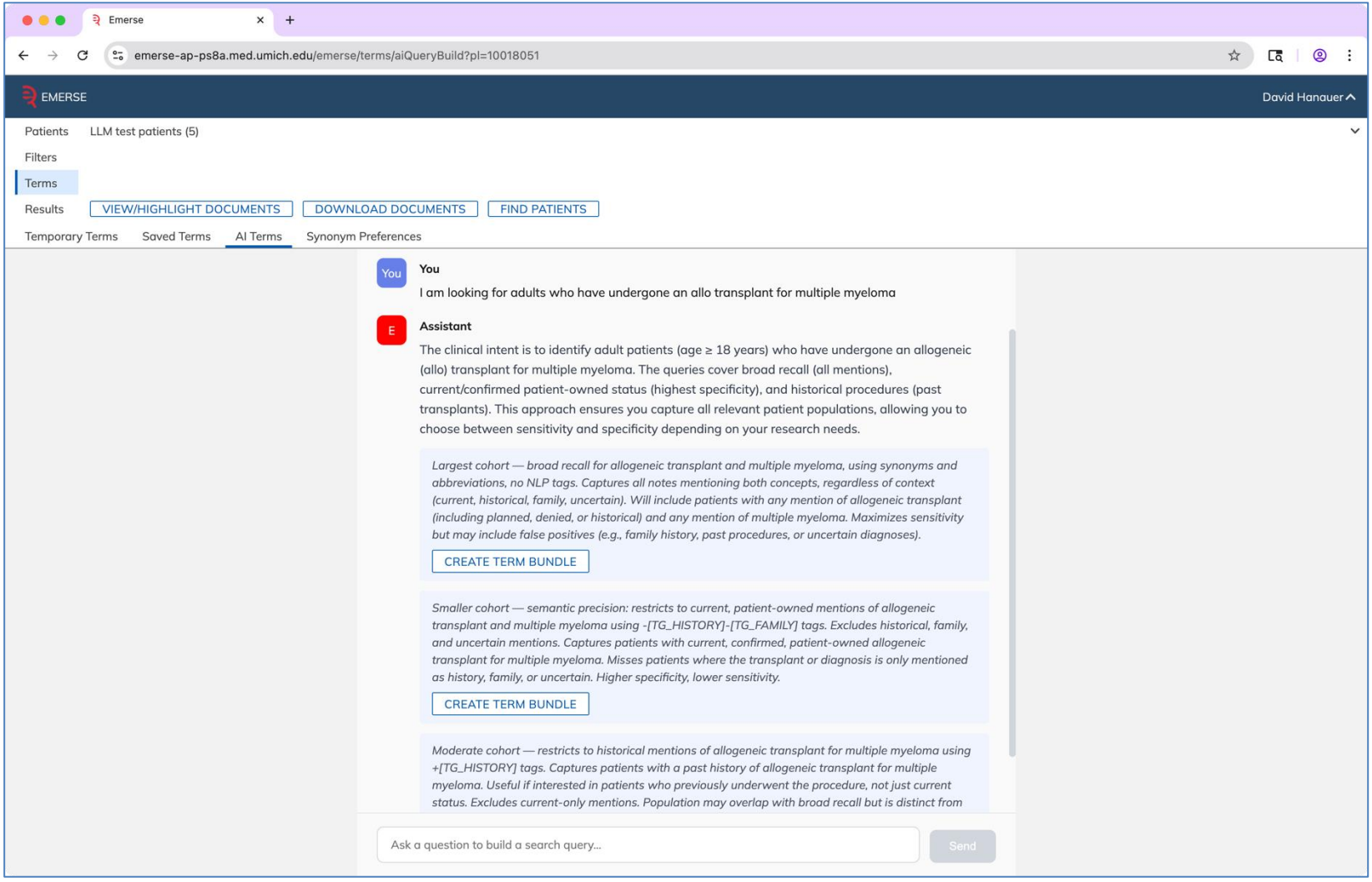
Current Balance
$11.33

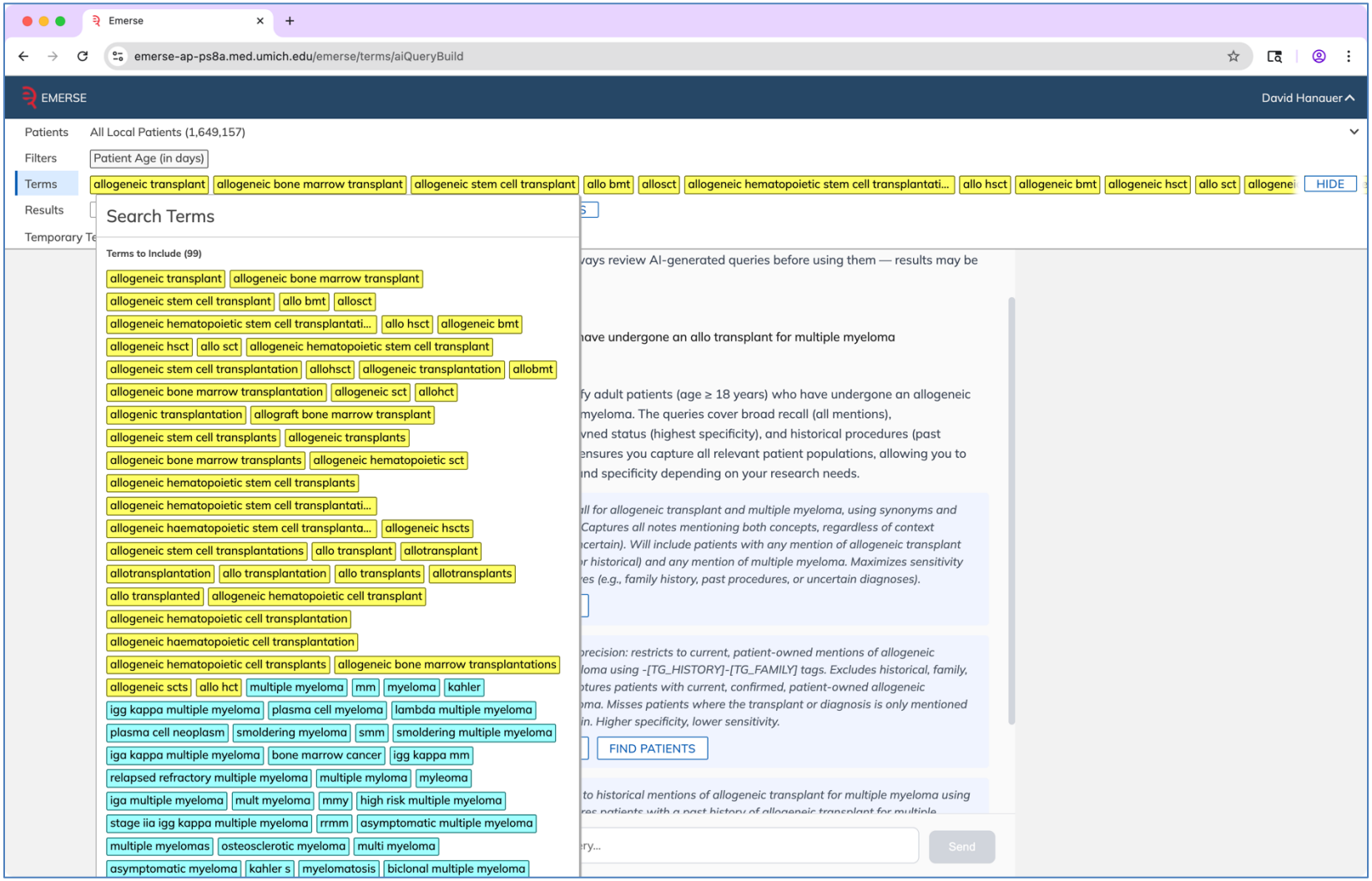
From mm/dd/yyyy To mm/dd/yyyy CLEAR

Date ↓	Type	Amount	Remaining Balance	Reference ID	Created By	Note
2026-07-03 00:23	Chat	-$0.09	$11.33	15835	SYSTEM	
2026-07-03 00:20	Chat	-$0.13	$11.42	15833	SYSTEM	
2026-07-03 00:07	Chat	-$0.17	$11.54	15830	SYSTEM	
2026-07-02 12:33	Chat	-$0.09	$11.72	15744	SYSTEM	
2026-07-02 12:31	Chat	-$0.13	$11.81	15739	SYSTEM	
2026-07-02 10:04	Chat	-$0.01	$11.93	15726	SYSTEM	
2026-07-02 09:37	Chat	-$0.16	$11.95	15712	SYSTEM	
2026-07-02 09:34	Chat	-$0.16	$12.10	15707	SYSTEM	
2026-07-01 19:53	Chat	-$0.01	$12.26	15705	SYSTEM	
2026-07-01 19:53	Chat	-$0.30	$12.27	15704	SYSTEM	
2026-06-24 22:08	Chat	-$0.01	$12.57	15257	SYSTEM	

Query Generation




Emerse
emerse-ap-ps8a.med.umich.edu/emerse/terms/aiQueryBuild?pl=10018051
EMERSE
David Hanauer
Patients
LLM test patients (5)
Filters
Terms
Results
VIEW/HIGHLIGHT DOCUMENTS
DOWNLOAD DOCUMENTS
FIND PATIENTS
Temporary Terms
Saved Terms
AI Terms
Synonym Preferences
You
You
I am looking for adults who have undergone an allo transplant for multiple myeloma
E
Assistant
The clinical intent is to identify adult patients (age ≥ 18 years) who have undergone an allogeneic (allo) transplant for multiple myeloma. The queries cover broad recall (all mentions), current/confirmed patient-owned status (highest specificity), and historical procedures (past transplants). This approach ensures you capture all relevant patient populations, allowing you to choose between sensitivity and specificity depending on your research needs.
Largest cohort — broad recall for allogeneic transplant and multiple myeloma, using synonyms and abbreviations, no NLP tags. Captures all notes mentioning both concepts, regardless of context (current, historical, family, uncertain). Will include patients with any mention of allogeneic transplant (including planned, denied, or historical) and any mention of multiple myeloma. Maximizes sensitivity but may include false positives (e.g., family history, past procedures, or uncertain diagnoses).
CREATE TERM BUNDLE
Smaller cohort — semantic precision: restricts to current, patient-owned mentions of allogeneic transplant and multiple myeloma using -[TG_HISTORY]-[TG_FAMILY] tags. Excludes historical, family, and uncertain mentions. Captures patients with current, confirmed, patient-owned allogeneic transplant for multiple myeloma. Misses patients where the transplant or diagnosis is only mentioned as history, family, or uncertain. Higher specificity, lower sensitivity.
CREATE TERM BUNDLE
Moderate cohort — restricts to historical mentions of allogeneic transplant for multiple myeloma using +[TG_HISTORY] tags. Captures patients with a past history of allogeneic transplant for multiple myeloma. Useful if interested in patients who previously underwent the procedure, not just current status. Excludes current-only mentions. Population may overlap with broad recall but is distinct from
Ask a question to build a search query...
Send


Emerse
emerse-ap-ps8a.med.umich.edu/emerse/terms/aiQueryBuild
EMERSE
David Hanauer
Patients
All Local Patients (1,649,157)
Filters
Patient Age (in days)
Terms
allogeneic transplant
allogeneic bone marrow transplant
allogeneic stem cell transplant
allo bmt
allosct
allogeneic hematopoietic stem cell transplantati...
allo hsct
allogeneic bmt
allogeneic hsct
allo sct
allogenei
HIDE
Results
Temporary Te
Search Terms
Terms to Include (99)
allogeneic transplant
allogeneic bone marrow transplant
allogeneic stem cell transplant
allo bmt
allosct
allogeneic hematopoietic stem cell transplantati...
allo hsct
allogeneic bmt
allogeneic hsct
allo sct
allogeneic hematopoietic stem cell transplant
allogeneic stem cell transplantation
allohsct
allogeneic transplantation
allobmt
allogeneic bone marrow transplantation
allogeneic sct
allohct
allogenic transplantation
allograft bone marrow transplant
allogeneic stem cell transplants
allogeneic transplants
allogeneic bone marrow transplants
allogeneic hematopoietic sct
allogeneic hematopoietic stem cell transplants
allogeneic hematopoietic stem cell transplantati...
allogeneic haematopoietic stem cell transplanta...
allogeneic hscts
allogeneic stem cell transplantations
allo transplant
allotransplant
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allo transplantation
allo transplants
allotransplants
allo transplanted
allogeneic hematopoietic cell transplant
allogeneic hematopoietic cell transplantation
allogeneic haematopoietic cell transplantation
allogeneic hematopoietic cell transplants
allogeneic bone marrow transplantations
allogeneic scts
allo hct
multiple myeloma
mm
myeloma
kahler
igg kappa multiple myeloma
plasma cell myeloma
lambda multiple myeloma
plasma cell neoplasm
smoldering myeloma
smm
smoldering multiple myeloma
iga kappa multiple myeloma
bone marrow cancer
igg kappa mm
relapsed refractory multiple myeloma
multiple myloma
myleoma
iga multiple myeloma
mult myeloma
mmy
high risk multiple myeloma
stage iia igg kappa multiple myeloma
rrmm
asymptomatic multiple myeloma
multiple myelomas
osteosclerotic myeloma
multi myeloma
asymptomatic myeloma
kahler s
myelomatosis
biclonal multiple myeloma
ways review AI-generated queries before using them — results may be
have undergone an allo transplant for multiple myeloma
fy adult patients (age ≥ 18 years) who have undergone an allogeneic
myeloma. The queries cover broad recall (all mentions),
vned status (highest specificity), and historical procedures (past
ensures you capture all relevant patient populations, allowing you to
nd specificity depending on your research needs.
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Captures all notes mentioning both concepts, regardless of context
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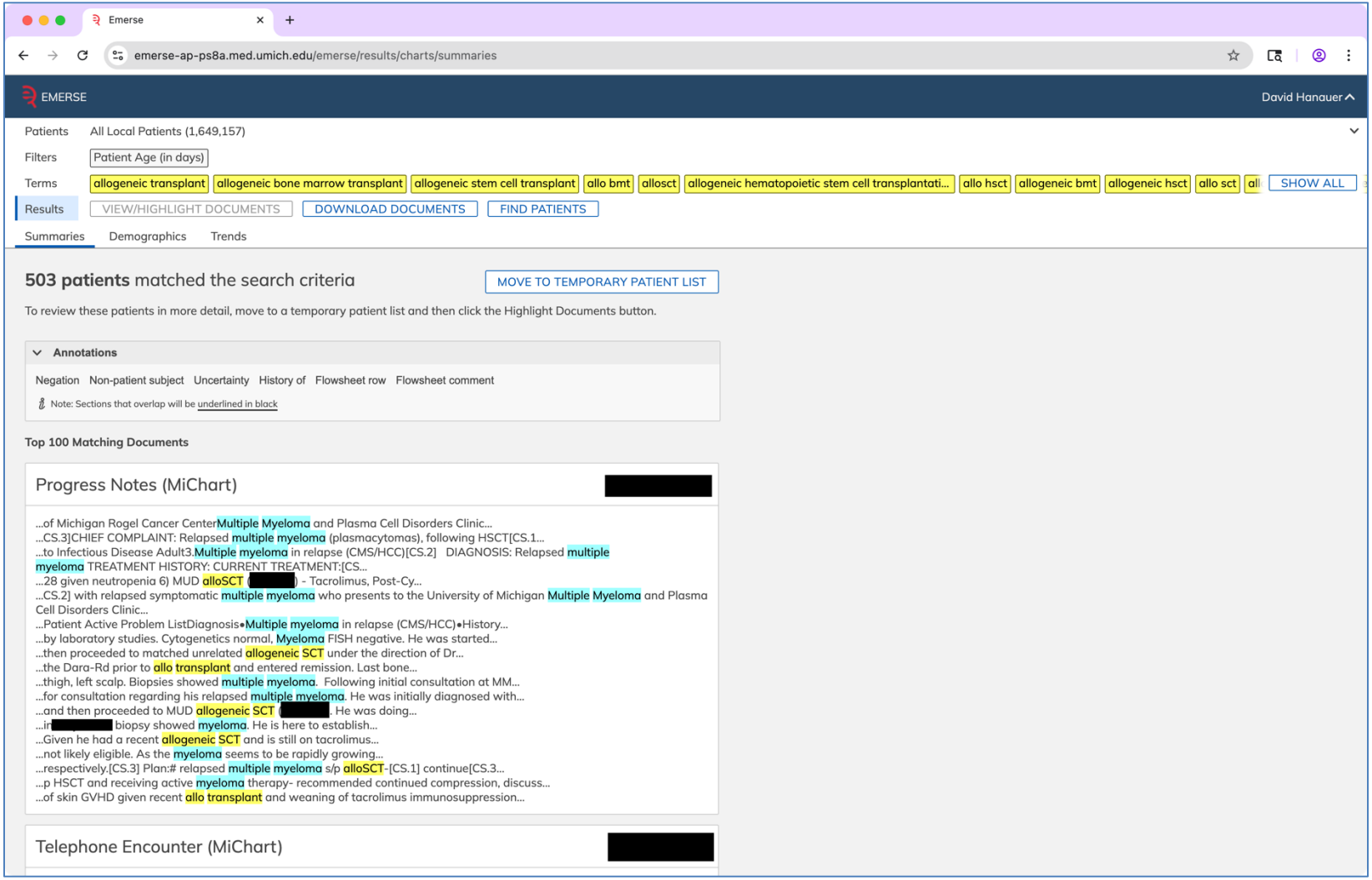
recision: restricts to current, patient-owned mentions of allogeneic
loma using -[TG_HISTORY]-[TG_FAMILY] tags. Excludes historical, family,
tures patients with current, confirmed, patient-owned allogeneic
oma. Misses patients where the transplant or diagnosis is only mentioned
in. Higher specificity, lower sensitivity.
FIND PATIENTS
to historical mentions of allogeneic transplant for multiple myeloma using
ery...
Send


Emerse
emerse-ap-ps8a.med.umich.edu/emerse/results/charts/summaries
EMERSE
David Hanauer
Patients
All Local Patients (1,649,157)
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allogeneic hsct
allo sct
SHOW ALL
Results
VIEW/HIGHLIGHT DOCUMENTS
DOWNLOAD DOCUMENTS
FIND PATIENTS
Summaries
Demographics
Trends
503 patients matched the search criteria
MOVE TO TEMPORARY PATIENT LIST
To review these patients in more detail, move to a temporary patient list and then click the Highlight Documents button.
Annotations
Negation
Non-patient subject
Uncertainty
History of
Flowsheet row
Flowsheet comment
Note: Sections that overlap will be underlined in black
Top 100 Matching Documents
Progress Notes (MiChart)
[redacted]
...of Michigan Rogel Cancer CenterMultiple Myeloma and Plasma Cell Disorders Clinic...
...CS.3]CHIEF COMPLAINT: Relapsed multiple myeloma (plasmacytomas), following HSCT[CS.1...
...to Infectious Disease Adult3.Multiple myeloma in relapse (CMS/HCC)[CS.2] DIAGNOSIS: Relapsed multiple myeloma TREATMENT HISTORY: CURRENT TREATMENT:[CS...
...28 given neutropenia 6) MUD alloSCT ([redacted]) - Tacrolimus, Post-Cy...
...CS.2] with relapsed symptomatic multiple myeloma who presents to the University of Michigan Multiple Myeloma and Plasma Cell Disorders Clinic...
...Patient Active Problem ListDiagnosis•Multiple myeloma in relapse (CMS/HCC)•History...
...by laboratory studies. Cytogenetics normal. Myeloma FISH negative. He was started...
...then proceeded to matched unrelated allogeneic SCT under the direction of Dr...
...the Dara-Rd prior to allo transplant and entered remission. Last bone...
...thigh, left scalp. Biopsies showed multiple myeloma. Following initial consultation at MM...
...for consultation regarding his relapsed multiple myeloma. He was initially diagnosed with...
...and then proceeded to MUD allogeneic SCT ([redacted]. He was doing...
...ir[redacted] biopsy showed myeloma. He is here to establish...
...Given he had a recent allogeneic SCT and is still on tacrolimus...
...not likely eligible. As the myeloma seems to be rapidly growing...
...respectively.[CS.3] Plan:# relapsed multiple myeloma s/p alloSCT-[CS.1] continue[CS.3...
...p HSCT and receiving active myeloma therapy- recommended continued compression, discuss...
...of skin GVHD given recent allo transplant and weaning of tacrolimus immunosuppression...
Telephone Encounter (MiChart)
[redacted]

Initial Experiences

- LLMs are powerful but multiple challenges remain
  - Cost
  - Speed
  - Completeness
  - Accuracy
    - Invalid JSON
    - Paraphrasing instead of direct quotes
  - Hallucinations – rare

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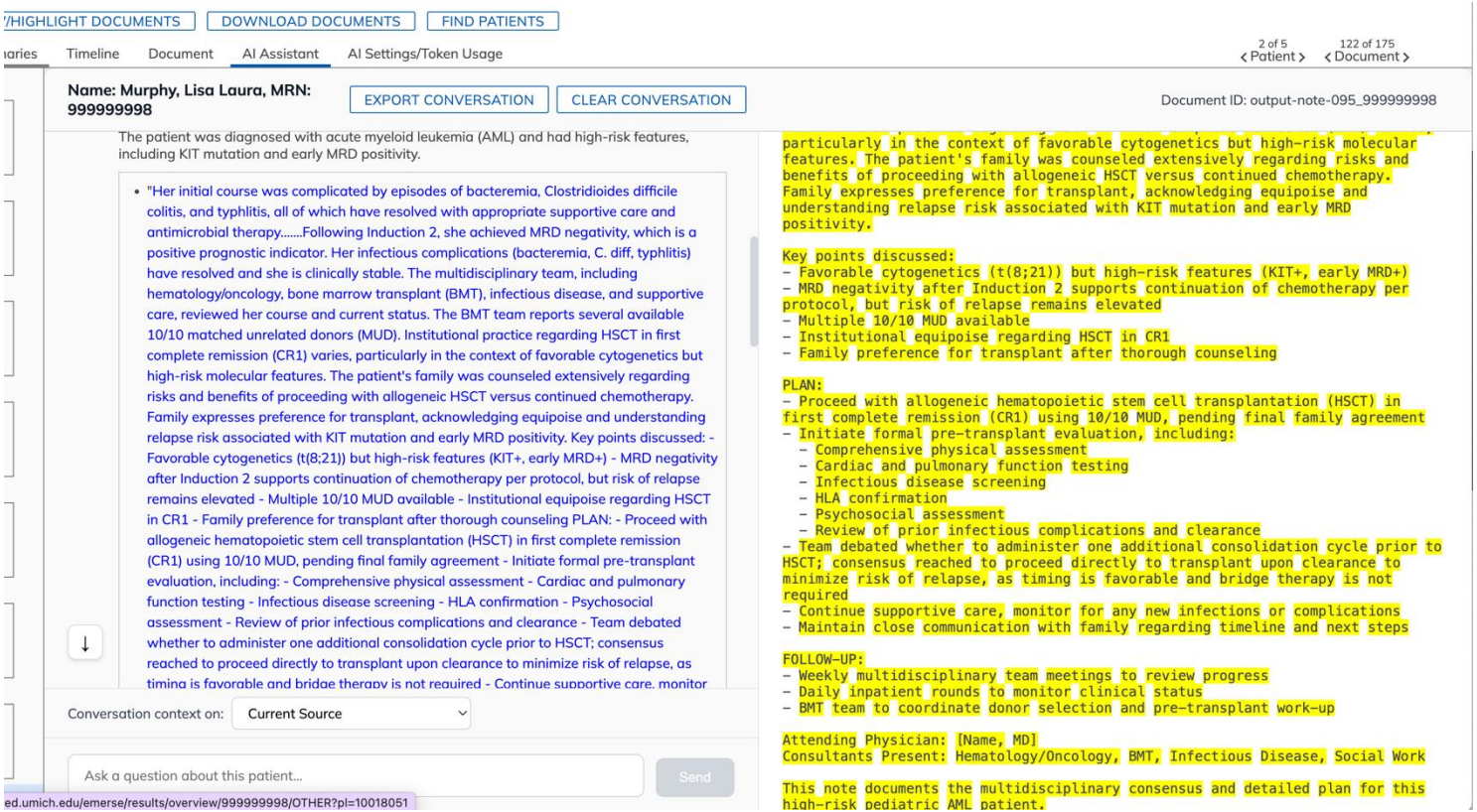
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

Quoting too much text



Invalid JSON

question: why did the patient get a transplant?


```
[
  {
    "answer": "Treatment for acute myeloid leukemia (AML)
via an allogeneic hematopoietic stem cell/bone marrow
transplant.",
    "quote": "status post allogeneic hematopoietic stem cell
transplantation for AML"
  },
  {
    "answer": "The transplant indication was AML (acute
myeloid leukemia).",
    "quote": "Day +220 post-allogeneic BMT for AML",
  }
]
```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Context window limitations

- 1 million token limit for context window
- A quick check of our EHR identifies:
  - Patient with 9377 notes, 4.6 million tokens
  - Patient with 8675 notes, 7.5 million tokens
- Need to sample, no guarantee it can be “complete”

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LLM work remains in progress

- We are excited and optimistic about what will be possible
- Users are eager to test the upcoming capabilities

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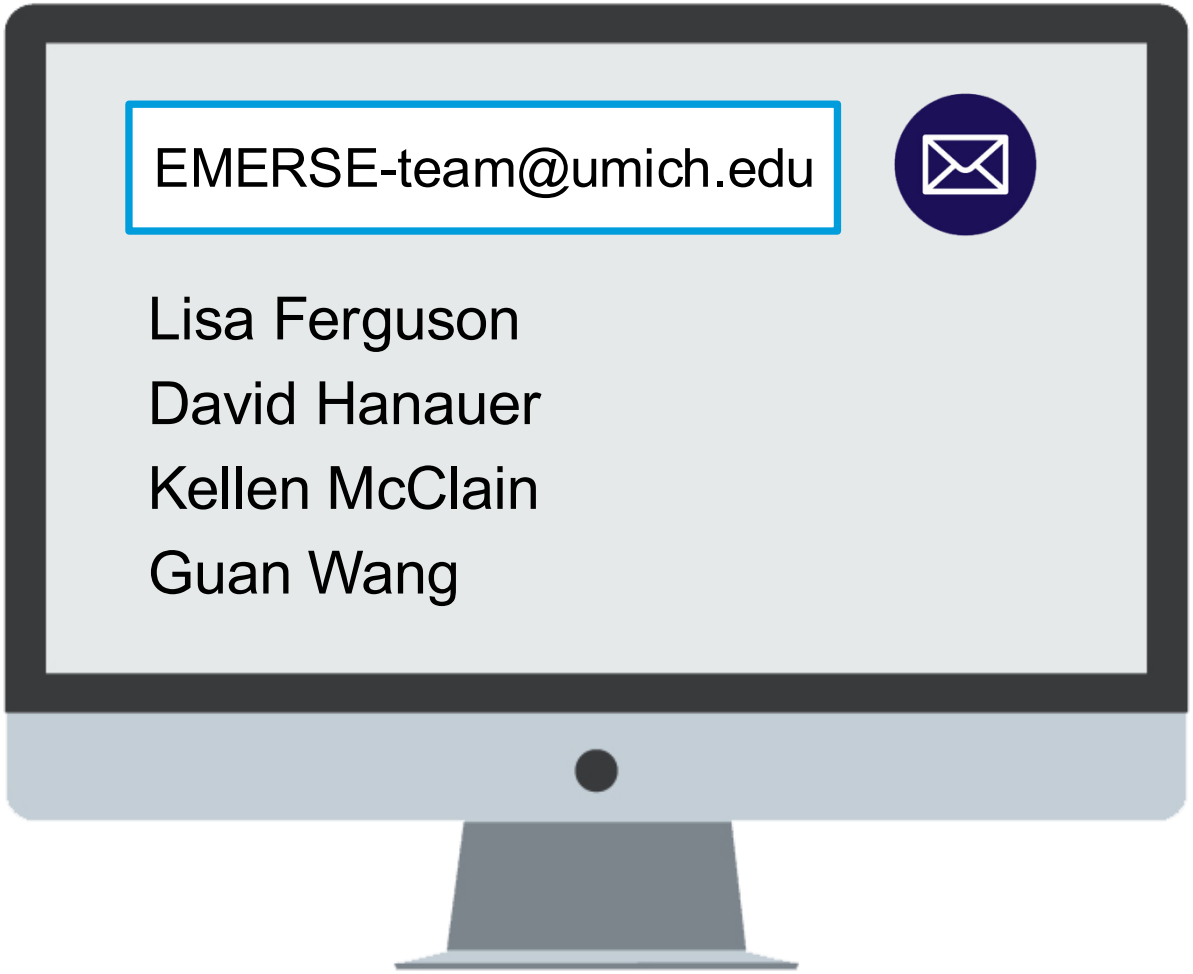
http://project-emerse.org/presentations.html



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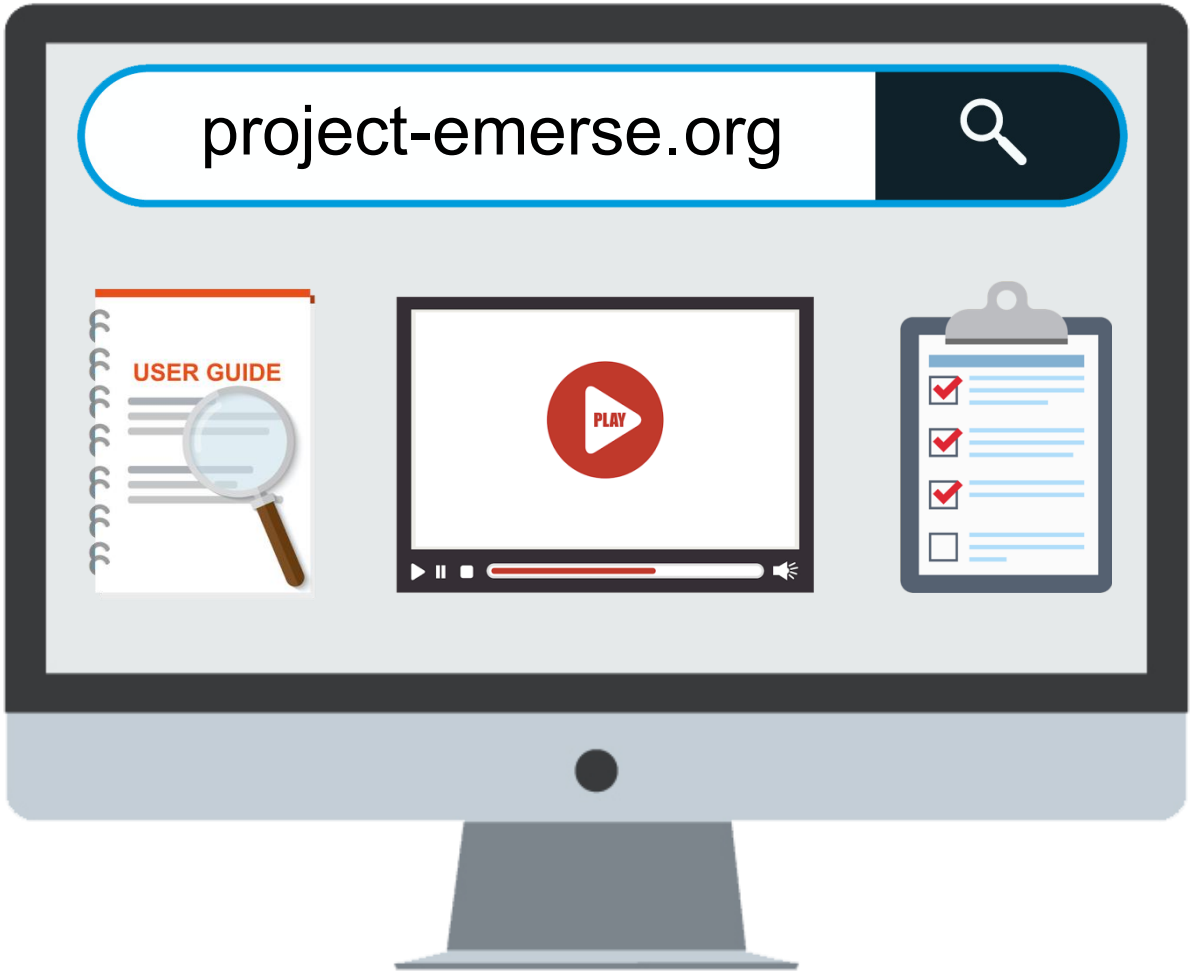
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

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

THANK YOU!



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