

# Reimagining EMERSE in the Age of Large Language Models

Presentation for the Pan Pacific Symposium on Stem Cells and Cancer Research

May 2026



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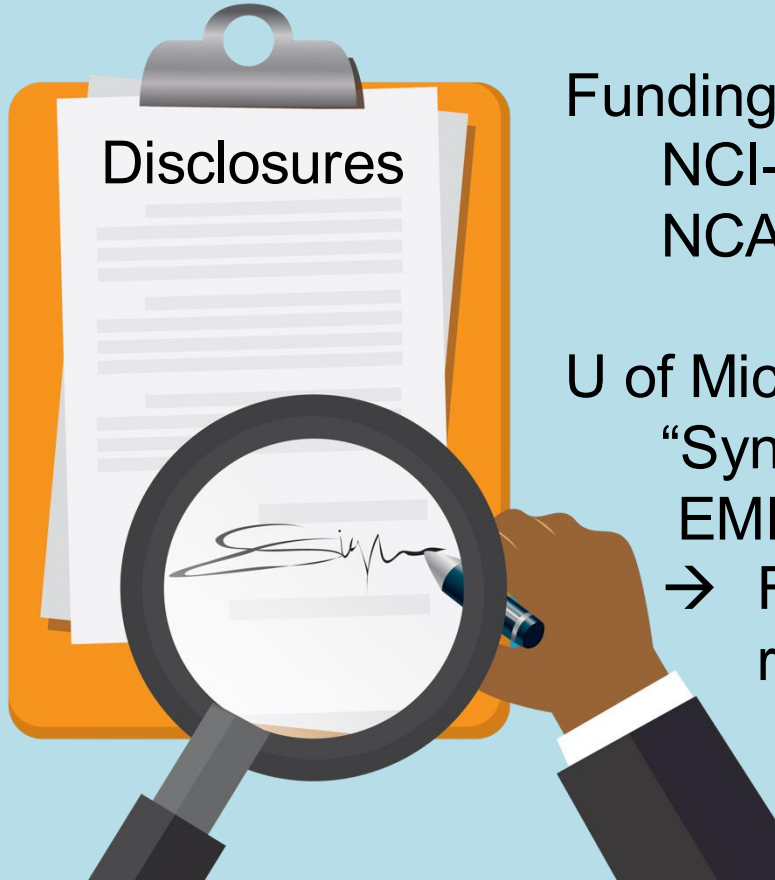
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Dept of Learning Health Sciences  
University of Michigan

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

# Disclosures

Funding: U.S National Institutes of Health  
NCI-ITCR: U24CA269315  
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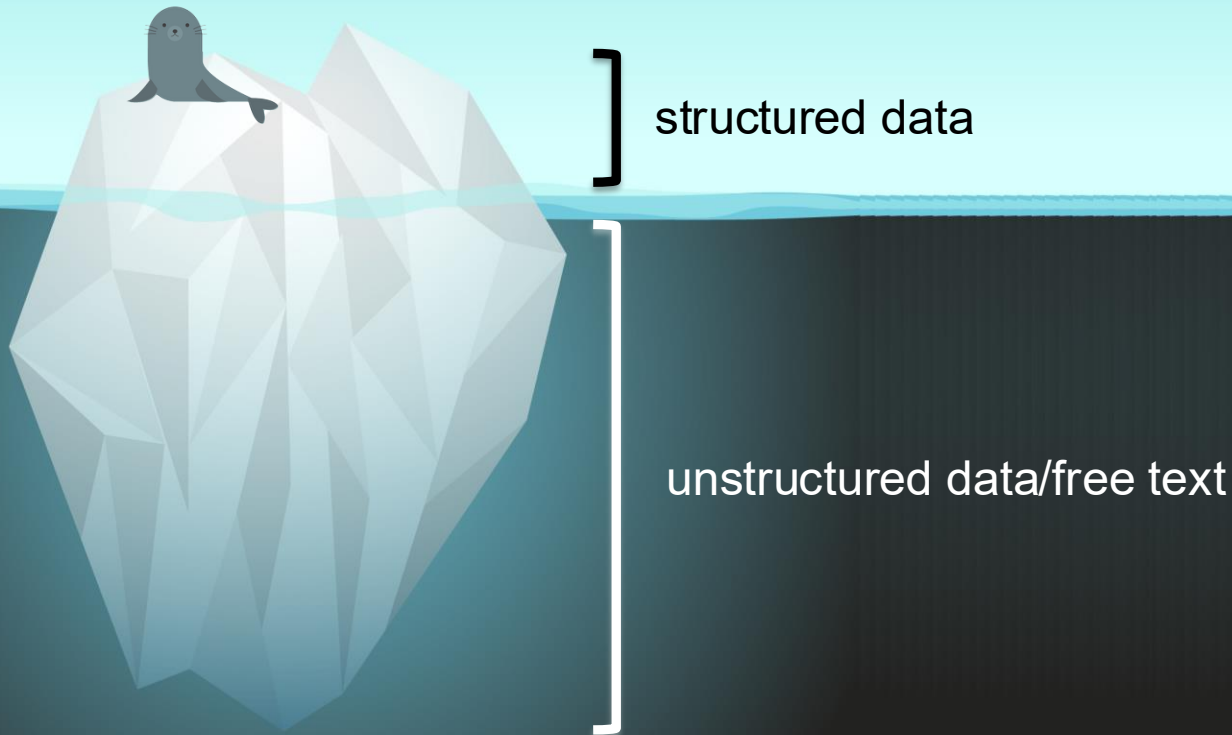
U of Michigan Royalties/Licensing:  
“Synonyms” dataset—optional “plugin” for  
EMERSE  
→ Free for use within EMERSE for  
research



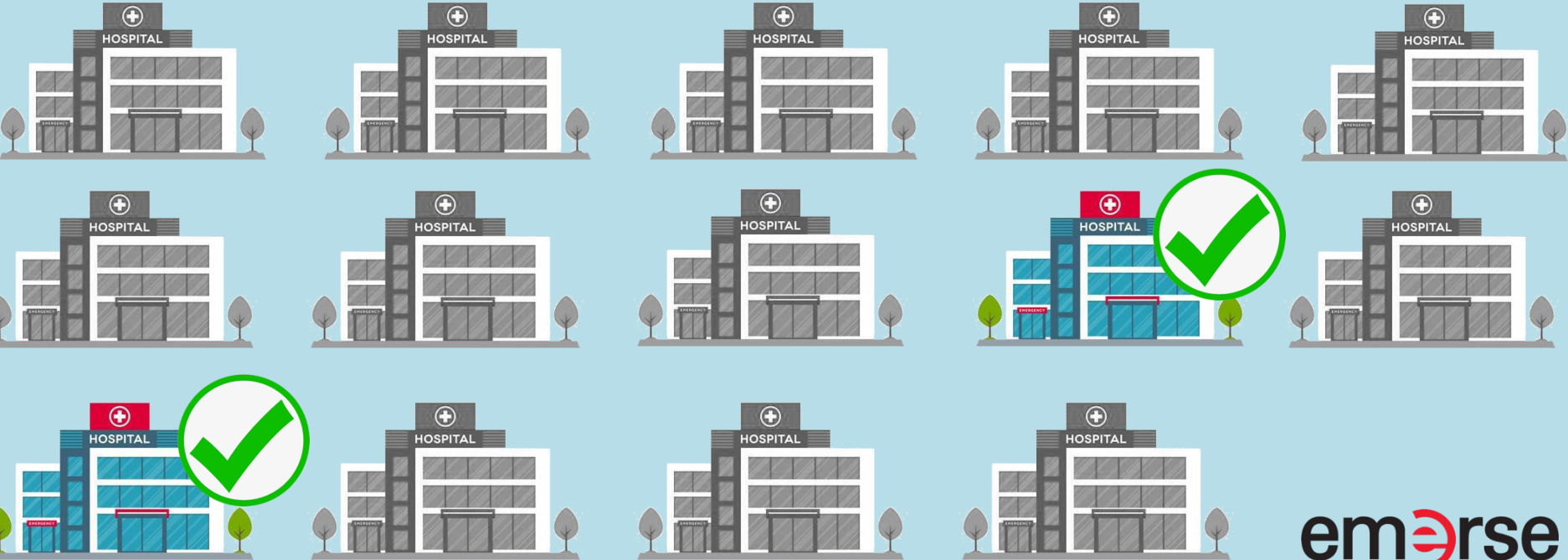
# Unstructured vs Structured Data

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



# Most medical centers lack tools for free-text



# And many options that exist aren't great



2024 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>

# 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 users
- Search across all notes and all patients at once
- Continuous refinements for > 20 years



# The EMERSE solution

- Created initially for researchers at University of Michigan Cancer Center
- Adopted by about 20 other academic health centers
- Open source software
  - Each site installs locally
  - Our EMERSE team provides implementation support



# EMERSE is a very useful tool


- but it will likely be one of several you need to 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."

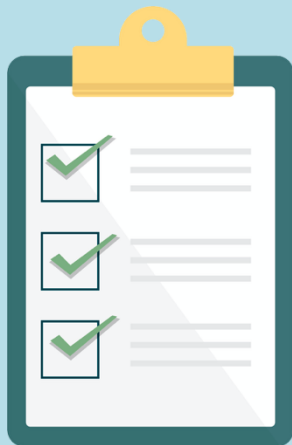
--Jayna Berger Heiler, Infection Prevention Coach

Watch our videos: [https://project-emerse.org/use\\_cases.html](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>

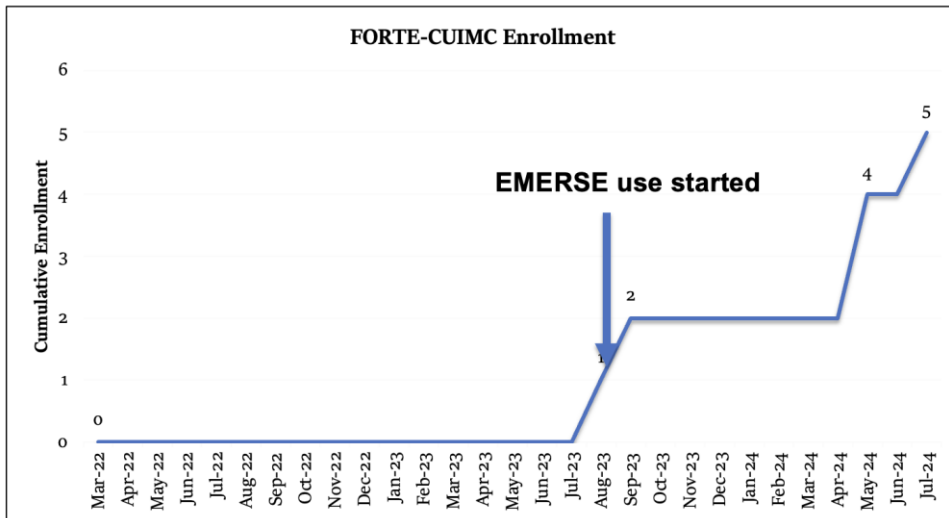
“Using EMERSE to Improve Research  
Involving Rare Cancers”



# 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

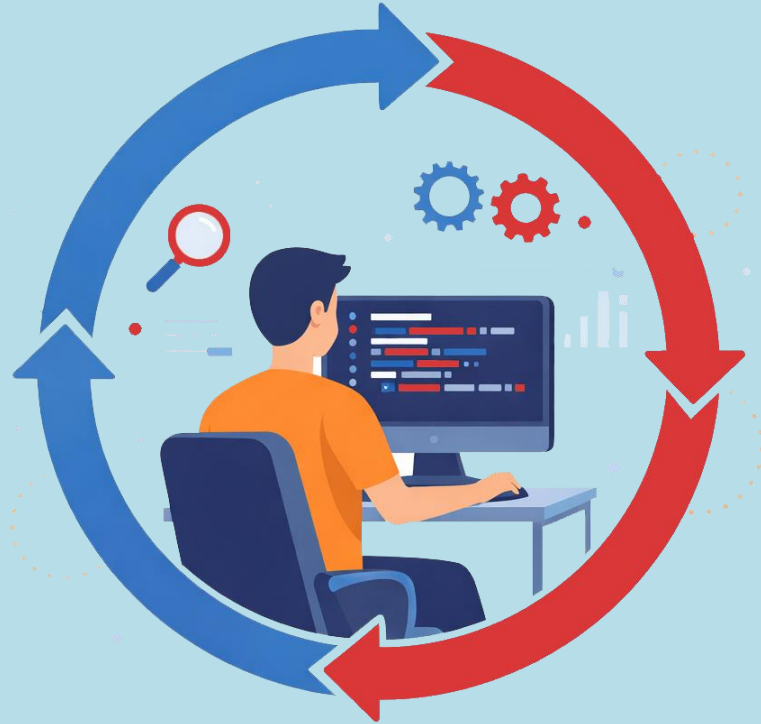


See this talk for more details:

<https://vimeo.com/1084845123/>

EMERSE Community Meeting May 2025

# We keep the human-in-the-loop



# 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.



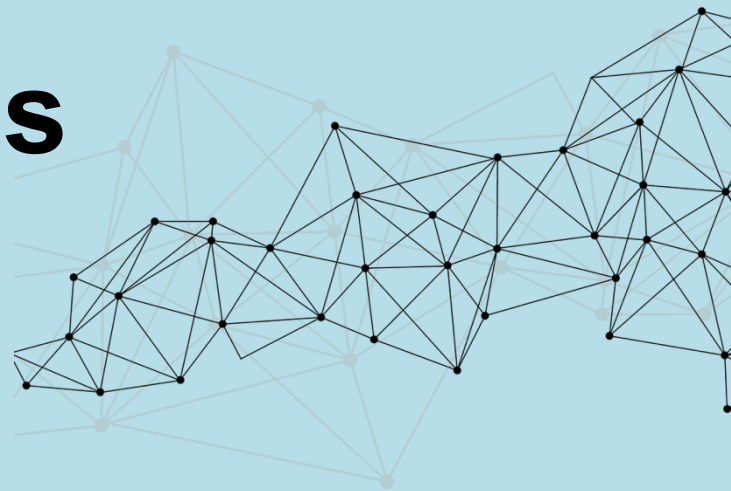
# EMERSE is $\equiv$ fast

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

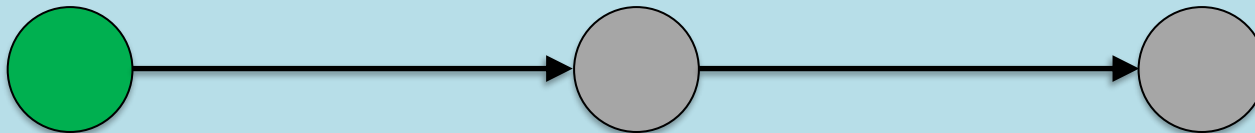


# Synonyms



- 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
  - 3 million unique entries

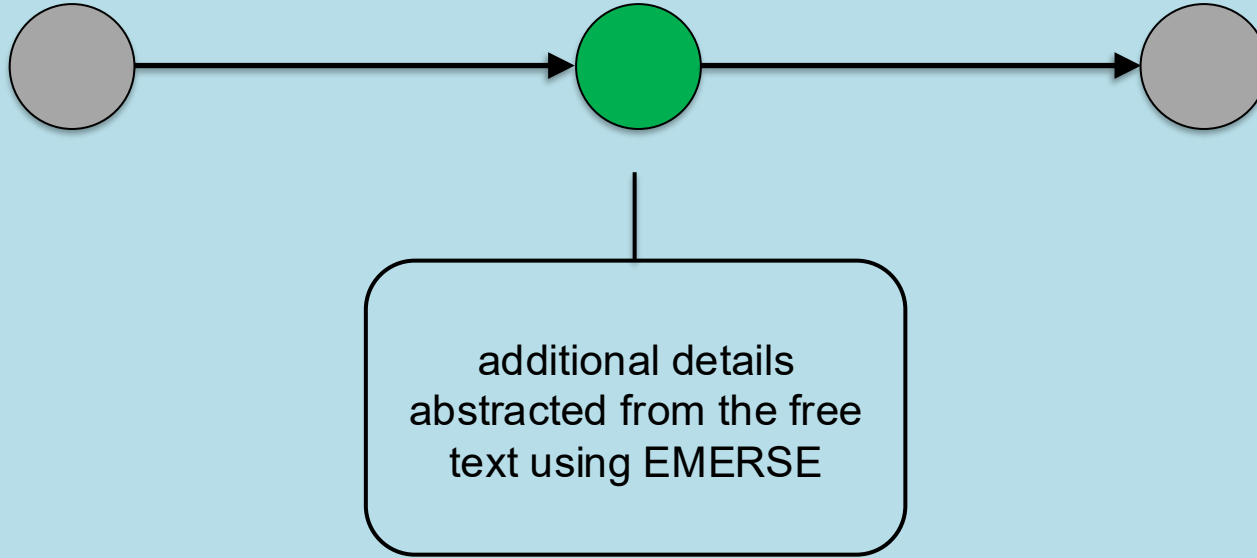
# Typical workflow



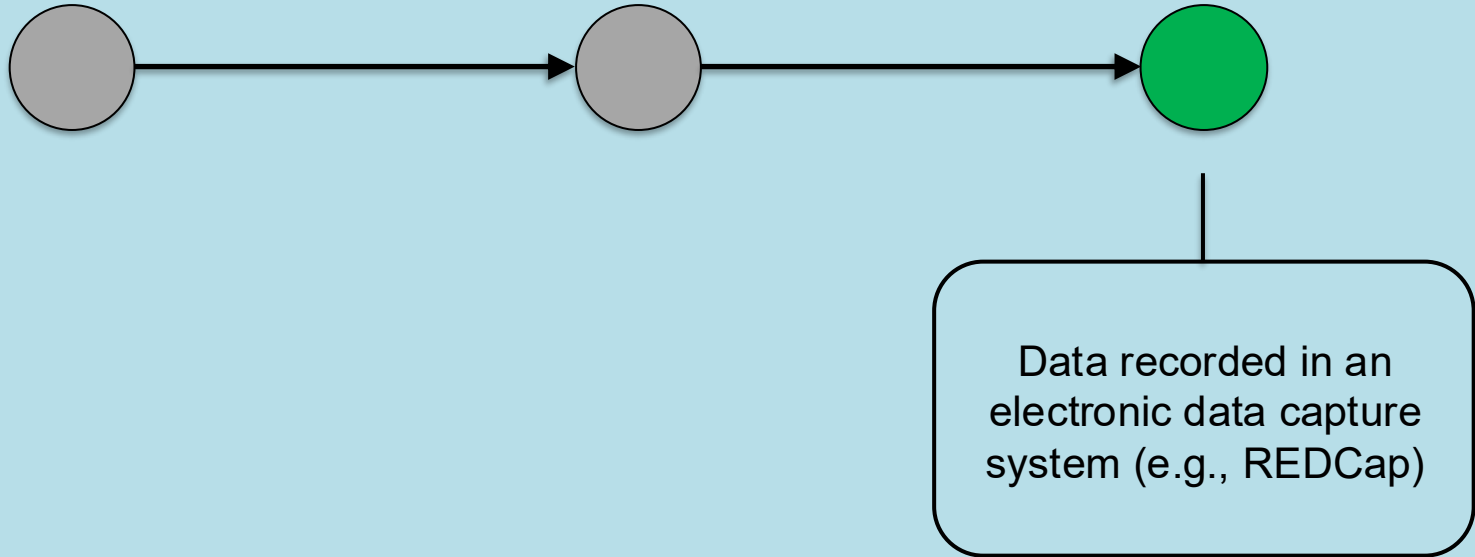
initial cohort identified  
with a cohort discovery  
tool using structured  
data (or via EMERSE  
'Find Patients')

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

# Typical workflow



# Typical workflow



# Publications using EMERSE

745

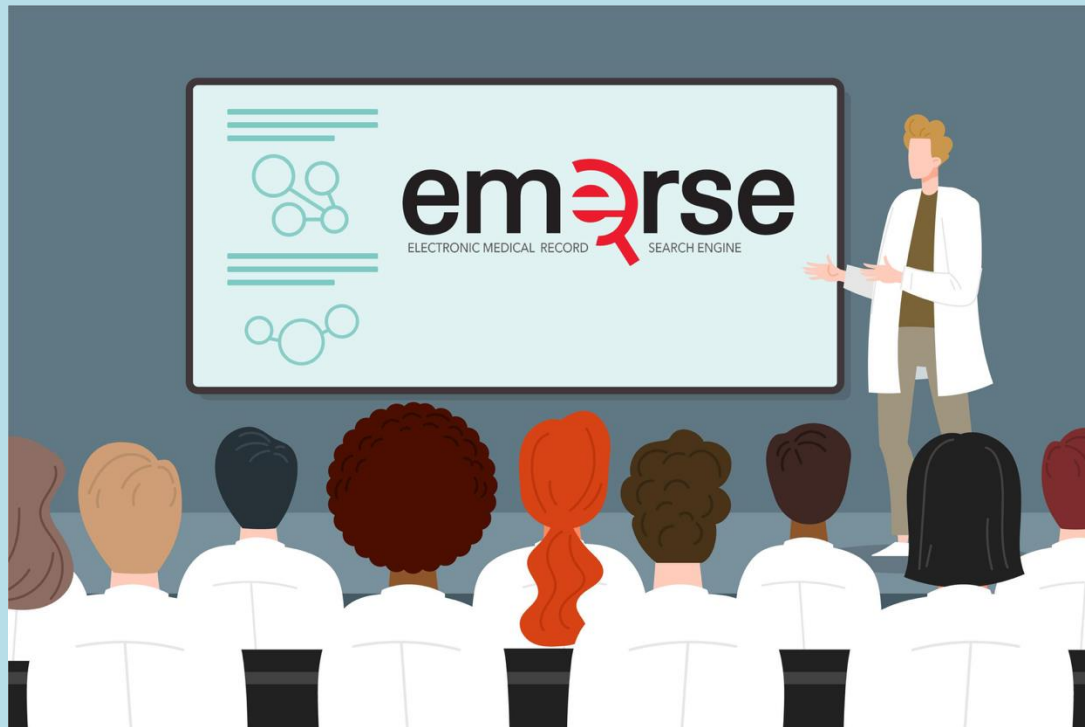
papers and abstracts



Full list at:

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

# Demo



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

Patients All Local Patients (10,000)

Filters

Terms **cutaneous leiomyosarcoma**

Results

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)



#### 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

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

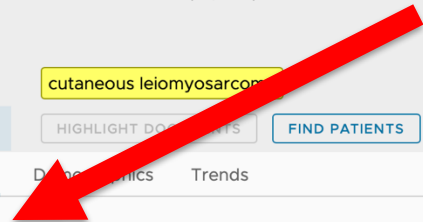
Patients All Local Patients (10,000)

Filters

Terms cutaneous leiomyosarcoma

Results HIGHLIGHT DOCUMENTS FIND PATIENTS

Summaries Documents Trends



### 3 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](#)
[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
<p>...year-old woman with a <b>cutaneous leiomyosarcoma</b> associated with osteoclast-like giant...</p> <p>...Conclusion A rare case of <b>cutaneous leiomyosarcoma</b> with osteoclast-like giant cells...</p> <p>...that our case represents a <b>cutaneous leiomyosarcoma</b> with reactive osteoclast-like giant...</p> <p>...osteoclast-like giant cells in <b>cutaneous leiomyosarcoma</b> is unknown...</p> <p>...Conclusion A rare case of <b>cutaneous leiomyosarcoma</b> with osteoclast-like giant cells...</p>	

Discharge Summary (Other)	08/15/2015
<p>...Primary <b>cutaneous leiomyosarcoma</b> (PCL) are soft-tissue sarcoma...</p>	

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**

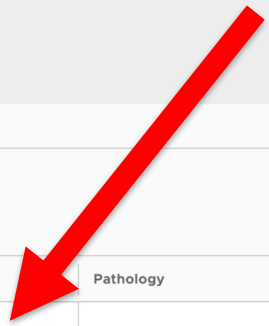
Results **HIGHLIGHT DOCUMENTS** **FIND PATIENTS**

Overview

Sorted by: **Insert Order** **Ascending**

Numbers Grayscale Mosaic

MRN	Name	Main EHR	Radiology	Pathology	Other	Scanned/PDFs	Comment	Tag
100000056	<a href="#">Hester, Arturo</a>		1 of 16				<input type="text" value="0 / 255"/>	<input type="checkbox"/>
100001598	<a href="#">Pope, Adelynn</a>				1 of 18		<input type="text" value="0 / 255"/>	<input type="checkbox"/>
100005510	<a href="#">Garner, Ryker</a>			1 of 17			<input type="text" value="0 / 255"/>	<input type="checkbox"/>





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



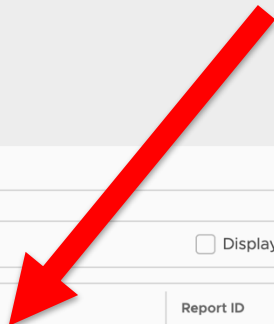
Other



Scanned/PDFs



> Name: Hester, Arturo, MRN: 100000056  Display All Documents



Summary	Report ID	Encounter Date ↓	Encounter ID	Imaging Modality	Imaged Body Part	Viewed
<p>...year-old woman with a <b>cutaneous leiomyosarcoma</b> associated with osteoclast-like giant...</p> <p>...Conclusion A rare case of <b>cutaneous leiomyosarcoma</b> with osteoclast-like giant cells...</p> <p>...that our case represents a <b>cutaneous leiomyosarcoma</b> with reactive osteoclast-like giant...</p> <p>...osteoclast-like giant cells in <b>cutaneous leiomyosarcoma</b> is unknown...</p> <p>...Conclusion A rare case of <b>cutaneous leiomyosarcoma</b> with osteoclast-like giant cells...</p>	docid_8_...	07/24/2011	4076924	MRI	Abdomen	N



Patients Temporary List (3)

Filters

Terms cutaneous leiomyosarcoma

Results HIGHLIGHT DOCUMENTS FIND PATIENTS

Overview Summaries Document

1 of 3 1 of 1 < Patient < Document >

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



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	<input checked="" type="checkbox"/>	Remove
100006606	Perry, Kiana	08/09/1995	30 Years	question about this patient, discuss with study lead 52 / 255	<input type="checkbox"/>	Remove
100005304	Kimura, Luciano	04/17/1981	44 Years	 0 / 255	<input checked="" type="checkbox"/>	Remove
100004810	Estrada, Marjorie	12/02/1953	72 Years	 0 / 255	<input type="checkbox"/>	Remove
100000396	Spencer, Lillian	02/14/2015	10 Years	 0 / 255	<input checked="" type="checkbox"/>	Remove

Patients per page 50 1 - 16 of 16 patients



Patients Demo List (16)

Filters

Terms: shingles, herpes 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	<input checked="" type="checkbox"/>
100006606	Perry, Kiana			1 of 20			question about this patient, discuss with study lead 52 / 255	<input type="checkbox"/>
100005304	Kimura, Luciano				1 of 16			<input checked="" type="checkbox"/>
100004810	Estrada, Marjorie				1 of 17			<input type="checkbox"/>
100000396	Spencer, Lilian							<input checked="" type="checkbox"/>

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 1 2 3

MRN	Name	Main EHR	Radiology	Pathology	Other	Scanned/PDFs	Comment	Tag
100006810	Dudley, Gabriel						possibly eligible for study 27 / 255	<input checked="" type="checkbox"/>
100006606	Perry, Kiana						question about this patient, discuss with study lead 52 / 255	<input type="checkbox"/>
100005304	Kimura, Luciano						 0 / 255	<input checked="" type="checkbox"/>
100004810	Estrada, Marjorie						 0 / 255	<input type="checkbox"/>
100000396	Spencer, Lilian							<input checked="" type="checkbox"/>

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	View
<p>...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...</p>	docid_8_...	12/27/2019	86787630	Gastroent...	Dawson, Sean	Consent Form	Dermatol...	Y

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

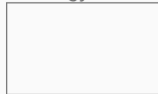
1 of 1

&lt; Patient &gt; &lt; Document &gt;

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 nineteenth, 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

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 1 of 1 < Patient > < Document >

Main EHR



Radiology



Pathology

1 of 20

Other



Scanned/PDFs



DOI: 10.4076/1752-1947-3-9134 Abstract Introduction Simultaneous involvements of multiple cranial nerve ganglia (geniculate ganglion and peripheral ganglia of cranial nerves VIII, 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 nineteenth, 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



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

Main EHR

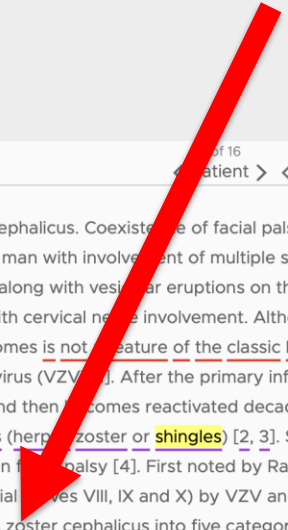
Radiology

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). 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 nineteenth, 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



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

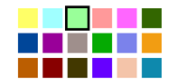
Export

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

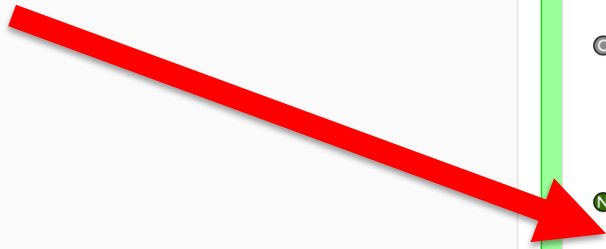
Individual words can be selected. Words in bold will be searched for in a case-sensitive manner.

#### 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

Find patient related mentions only (example: "she has diabetes")



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

Main EHR



Radiology



Pathology

1 of 20

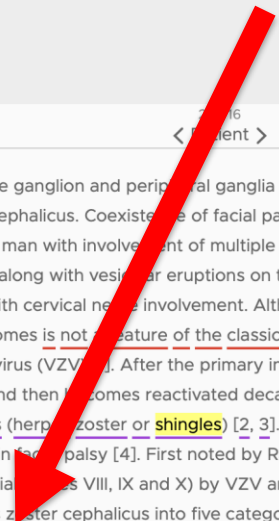
Other



Scanned/PDFs



DOI: 10.4076/1752-1947-3-9134 Abstract Introduction Simultaneous involvements of multiple cranial nerve ganglia (geniculate ganglion and peripheral ganglia of cranial nerves VIII, 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). 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 nineteenth century, 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



Patients Demo List (16)

Filters

Terms **smoker**

Results [HIGHLIGHT DOCUMENTS](#) [FIND PATIENTS](#)

**Temporary Terms** [Saved Terms](#) [Advanced Terms](#) [Synonym Preferences](#)

### Temporary Terms

Name/Description

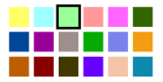
**Edit**

- Share
- Save
- Clear/Delete
- Export
- Bulk Upload
- Query Details

### Enter Terms/Phrases (one at a time)



#### 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.

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[TOGGLE CASE-SENSITIVE ON SELECTED TEXT](#)

Individual words can be selected. Words in bold will be searched for in a case-sensitive manner.

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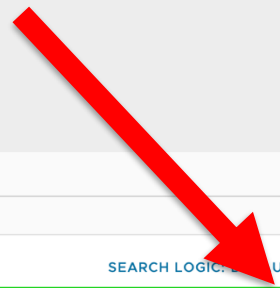
- Find positive mentions only (example: "she has diabetes")
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- Find any mentions regardless of negation

### Active Terms/Phrases

[SEARCH LOGIC](#) [RESULT](#)

**smoker**

C N S U H P F E X W



Patients Demo List (16)

Filters

Terms **smoker**Results **HIGHLIGHT DOCUMENTS**

Temporary Terms Saved Terms Advanced

Temporary Terms

Name/Description

Edit

Share

Save

Clear/Delete

Export

Bulk Upload

Query Details

## 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  
 addition to tobacco ash-tray ash-trays ashtray ashtrays behavior, smoking behaviors, smoking  
 behaviour, smoking behaviours, smoking chain-smoker chain-smokers chain-smoking chainsmoker  
 chainsmokers chainsmoking cigar 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 additions 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

ADD HIGHLIGHTED TERMS (387)

CANCEL

## 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-dichloroamine-Platinum(II) cis-Dichlorodiammineplatinum(II) cis-Platin cis-platin cis-platinum II  
 cis-platinum-II-diamine-dichloride cis-platinum(II)-diammine-dichloride cis-(PtCl<sub>2</sub>(NH<sub>3</sub>)<sub>2</sub>) Cismaplat cisp  
 Cisplat Cisplatin-1 cisplatin-analogue cisplatin-analogues cisplatin-(cis) cisplatin-(cisp) Cisplatina  
 eisplatinated Gisplatine 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 Platinexan

ADD HIGHLIGHTED TERMS (22)

CANCEL

**EMERSE has served the community  
for 20+ years—how do we ensure its  
future?**



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

**Yes!**



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

**em****erse**  
ELECTRONIC MEDICAL RECORD SEARCH ENGINE

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

# Our plans

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

# Chat with the notes

Patients LLM test patients (5) ▼

Filters

Terms

Results [VIEW/HIGHLIGHT DOCUMENTS](#) [DOWNLOAD DOCUMENTS](#) [FIND PATIENTS](#)

Overview Summaries Timeline **AI Assistant** AI Settings/Token Usage 2 of 5 < Patient >

**OCR**  
3 of 3

**OCR-SP**

**CAREWEB**

**MiChart**


**Careweb**

**Radiology**

**Pathology**

**Other**

**Name: Murphy, Lisa Laura, MRN: 999999998** [EXPORT CONVERSATION](#) [CLEAR CONVERSATION](#)

**You**  
did the patient have any central line infections? 

**E Assistant**  
There is evidence from EMERSE clinical notes that the patient experienced at least one episode of central line-associated bloodstream infection (CLABSI) or central line infection, specifically with coagulase-negative Staphylococcus, which was treated and resolved. Multiple notes document concern for possible CLABSI during episodes of fever and neutropenia, with blood cultures drawn and empiric antibiotics started, but most cultures were negative and no ongoing line infection was identified during subsequent admissions. The patient had ongoing central line care and monitoring, and at times vancomycin was added or discontinued based on clinical suspicion and culture results. Overall, the only confirmed central line infection was a prior episode of coagulase-negative Staphylococcus bacteremia, which resolved with antibiotics; no recurrent or persistent line infections were documented during the reviewed period.

**Details from Clinical Documentation:**  
The patient had a prior episode of central line-associated bloodstream infection (CLABSI) with coagulase-negative Staphylococcus, which was treated and resolved.

- "Coagulase-negative Staphylococcus (CoNS) bacteremia during last admission, treated and resolved"

Source: Other CSN: 980000003 Date: 2025-02-07 Document ID: output-note-003\_999999998

Conversation context on: [All Documents For This Patient](#) ▼

Ask a question about this patient... [Send](#)

OCR 3 of 3

OCR-SP

CAREWEB

MiChart

Careweb

Radiology

Pathology

Other

Name: **Murphy, Lisa Laura, MRN: 999999998** [EXPORT CONVERSATION](#) [CLEAR CONVERSATION](#)

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The patient had a prior episode of central line-associated bloodstream infection (CLABSI) with coagulase-negative Staphylococcus, which was treated and resolved.

- "Coagulase-negative Staphylococcus (CoNS) bacteremia during last admission, treated and resolved"

Source: Other CSN: 980000003 Date: 2025-02-07 Document ID: output-note-003\_999999998

- "Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)"

Source: Other CSN: 980000026 Date: 2025-03-06 Document ID: output-note-026\_999999998

During multiple admissions, there was clinical concern for possible central line infection (CLABSI) during episodes of fever and neutropenia, with blood cultures drawn and empiric antibiotics started, but cultures were negative and no ongoing line infection was identified.

- "Blood cultures obtained from both Broviac lumens to assess for possible central line-associated bloodstream infection (CLABSI)."

Source: Other CSN: 980000007 Date: 2025-02-12 Document ID: output-note-007\_999999998

- "Concern for possible central line-associated bloodstream infection or neutropenic fever given underlying diagnosis."

- "Blood cultures drawn from both lumens of Broviac catheter for evaluation of potential line infection."

Source: Other CSN: 980000076 Date: 2025-02-12 Document ID: output-note-076\_999999998

Conversation context on: [All Documents For This Patient](#)

Ask a question about this patient... [Send](#)



EMERSE interface showing patient information for Lisa Laura Murphy, MRN: 999999998. The interface includes a navigation bar with 'EMERSE' and 'David Hanauer', a patient list, filters, and terms. The main content area displays 'Details from Clinical Documentation' for a central line-associated bloodstream infection (CLABSI) with coagulase-negative Staphylococcus. A red arrow points to a highlighted snippet: "Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)". The interface also shows a 'Conversation context on: This Document' dropdown and a 'Send' button for asking questions about the patient.

Patients: LLM test patients (5)  
Filters  
Terms  
Results VIEW/HIGHLIGHT DOCUMENTS DOWNLOAD DOCUMENTS FIND PATIENTS  
Overview Summaries Timeline Document AI Assistant AI Settings/Token Usage 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** EXPORT CONVERSATION CLEAR CONVERSATION

Document ID: output-note-026.999999998

**Details from Clinical Documentation:**

The patient had a prior episode of central line-associated bloodstream infection (CLABSI) with coagulase-negative Staphylococcus, which was treated and resolved.

- **"Coagulase-negative Staphylococcus (CoNS) bacteremia during last admission, treated and resolved"**  
Source: Other CSN: 980000003 Date: 2025-02-07 Document ID: output-note-003.999999998
- **"Bacteremia (central line associated, treated with IV antibiotics; organism: coagulase-negative Staphylococcus)"**  
Source: Other CSN: 980000026 Date: 2025-03-06 Document ID: output-note-026.999999998

During multiple admissions, there was clinical concern for possible central line infection (CLABSI) during episodes of fever and neutropenia, with blood cultures drawn and empiric antibiotics started, but cultures were negative and no ongoing line infection was identified.

- **"Blood cultures obtained from both Broviac lumens to assess for possible central line-associated bloodstream infection (CLABSI)."**  
Source: Other CSN: 980000007 Date: 2025-02-12 Document ID: output-note-007.999999998
- **"Concern for possible central line-associated bloodstream infection or neutropenic fever given underlying diagnosis."**
- **"Blood cultures drawn from both lumens of Broviac catheter for evaluation of potential line infection."**  
Source: Other CSN: 980000076 Date: 2025-02-12 Document ID: output-note-076.999999998

Conversation context on: This Document

Ask a question about this patient... Send

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)**
  - 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.

Patients LLM test patients (5)

Filters

Terms

Results [VIEW/HIGHLIGHT DOCUMENTS](#) [DOWNLOAD DOCUMENTS](#) [FIND PATIENTS](#)

Overview Summaries Timeline Document **AI Assistant** AI Settings/Token Usage 2 of 5 < Patient > 123 of 175 < Document >

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OCR-SP

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Careweb

Radiology

Pathology

Other

Name: **Murphy, Lisa Laura, MRN: 999999998** [EXPORT CONVERSATION](#) [CLEAR CONVERSATION](#)

Document ID: output-note-026.999999998

- erythema or tenderness), plan to discontinue vancomycin tomorrow."
 

Source: Other CSN: 980000124 Date: 2025-04-08 Document ID: output-note-124.999999998
- Blood cultures were frequently obtained to evaluate for possible line infection during febrile episodes, but most results were negative for bacteremia or fungemia.
  - "CLINICAL INDICATION FOR BLOOD CULTURE: - Fever, chills, and concern for sepsis in the setting of recent hospitalization"
  - "No microbial growth detected at 24 hours of incubation - Preliminary report: Negative for bacteremia/fungemia at this time"

Source: Other CSN: 980000079 Date: 2025-02-13 Document ID: output-note-079.999999998
- "Blood cultures ordered for evaluation of fever and possible bacteremia in the setting of recent onset chills, leukocytosis, and hypotension. Patient is currently being evaluated for sepsis."
  - "At 24 hours of incubation, there is no evidence of microbial growth in any of the submitted blood culture bottles."

Source: Other CSN: 980000010 Date: 2025-02-13 Document ID: output-note-010.999999998
- "No evidence of line infection or skin breakdown. Blood cultures remain negative at 48 hours."
 

Source: Other CSN: 980000051 Date: 2025-04-06 Document ID: output-note-051.999999998

Model: gpt-4.1-2025-04-14 Context Usage: 5.70% Cost Estimate: \$0.13 [Query Details](#)

Conversation context on: **This Document**

Ask a question about this patient... [Send](#)

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)  
 - Clostridioides difficile colitis (treated with oral vancomycin; resolved)  
 - Typhilitis (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.  
 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.



EMERSE

Patients LLM test patients (5)

Filters

Terms

Results VIEW/HIGHLIGHT DOCUMENTS DOWNLOAD

Overview Summaries Timeline Document AI Assistant

OCR 3 of 3

OCR-SP

CAREWEB

MiChart

Careweb

Radiology

Pathology

Other

Name: Murphy, Lisa Laura, MRN: 999999998

- erythema or tenderness), pla
- Blood cultures were frequently episodes, but most results were r
- "CLINICAL INDICATION FOR setting of recent hospitalizat
- "No microbial growth detecte bacteremia/fungemia at this
- "Blood cultures ordered for e recent onset chills, leukocyto sepsis."
- "At 24 hours of incubation, th submitted blood culture bottl
- "No evidence of line infection hours."

Conversation context on: This Document

Ask a question about this patient...

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 "blood stream infection" OR "central line infections" OR "line associated bacteremia" OR "blood stream infections" OR clabsis OR "infected line" OR "catheter site infection" OR "central venous line infection" OR "catheter infections" 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 "cvc infection" OR "infection of central venous catheter" OR "infected central line" OR "central venous catheter infection" OR "central line associated blood stream infections" OR "infected central venous catheter" OR "central venous catheter infections" OR "line associated bloodstream infections" OR "cvl infections" OR "central line associated bloodstream infections" OR "picc line infxn" OR "infection due to central line" OR "infection of central line" OR "central venous line infections" OR "central line sepsis" OR "cla bsi" OR clabs OR "catheter site infections" OR clbsi OR "infected central lines" OR calbsi OR "central line associated bsi" OR "catheter related bloodstream infection" OR cri OR crbsi OR "catheter related infection" OR "catheter related infections" OR "catheter related bsi" OR "catheter related bloodstream infections" OR "cr bsi" OR "line sepsis" OR "line infection" OR "multiple line sepsis" OR "line sepses" OR "multiple line sepses" 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 "bloodstream infection" OR bsi OR "bloodstream infections" OR bsis OR crs OR "catheter related" OR cabsi OR "catheter associated bloodstream infection" OR "catheter associated infection" OR "catheter related bacteremia" OR "infected catheter" OR "catheter sepsis" OR "line associated blood stream infection" OR "cath infection" OR "catheter related sepsis" OR "line associated blood stream infections" OR "port infection" OR "infected port" OR "infected lines" OR "line infxns" OR "line tunnel infection" OR "central line infxn" OR "infxn line" OR "central line infxns" OR "picc line infxns" OR sepsis OR bacteremia OR septic OR "septic shock" OR rosepsis OR "severe sepsis" OR "positive blood cultures" OR "positive blood culture" OR septicemia OR "blood infection" OR bacteremic OR "bacteremia sepsis" OR toxemia OR "sepsis bacteremia" OR "fungal sepsis" OR "gbs sepsis" OR "overwhelming sepsis" OR "blood poisoning" OR "postoperative sepsis" OR "post op sepsis" OR "culture positive sepsis" OR "group b streptococcus sepsis" OR bacteremia OR "postop sepsis" OR septicemic OR toxemic OR toxicemia OR septicemia OR bacteriemia OR bacteremias OR bacteremia OR bactermia OR septsis OR "anaerobic bacteremia" OR bateremia OR bactermic OR bacterema)
Filters:	

David Hanauer

2 of 5 123 of 175

< Patient < Document >

Document ID: output-note-026\_999999998

Leukemia Conference

note

with newly diagnosed acute myeloid leukemia (AML), mutation positive.

with AML approximately 8 weeks ago following fallor, and bruising. Initial workup revealed t(8;21) tion positivity. She underwent Induction 1 onal protocol. Post-Induction 1, minimal residual by flow cytometry. She subsequently received RD testing was negative.

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hemodynamically stable, tolerating oral intake, and g infection or gastrointestinal symptoms.

e, appears well-nourished. No acute distress. 92 bpm, BP 105/68 mmHg, RR 18/min, SpO2 98% on room umatic. No scleral icterus, oral mucosa moist, no no thyromegaly. on bilaterally. No rales, wheezes, or rhonchi. rhythm. No murmurs, rubs, or gallops. non-distended. Bowel sounds present. No petechiae or purpura noted. Central line site clean, resolved. d. Cranial nerves II-XII intact. No focal deficits.

# Query Generation

Patients LLM test patients (5) ▼

Filters

Terms

Results [VIEW/HIGHLIGHT DOCUMENTS](#) [DOWNLOAD DOCUMENTS](#) [FIND PATIENTS](#)


Temporary Terms Saved Terms AI Terms Synonym Preferences

**E Assistant**  
I can help you build EMERSE search queries. Describe what you're looking for in plain language and I'll suggest search terms. Always review AI-generated queries before using them — results may be incomplete or inaccurate.

**You**  
I am looking for adults who have undergone an allo transplant for multiple myeloma

**E Assistant**  
Building the query.  
...

Ask a question to build a search query... [Send](#)



Emerse x +

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  $\geq 18$  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](#)

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** **allosct** **allogeneic transplantation** **allobmt**
- allogeneic bone marrow transplantation** **allogeneic sct** **allohct**
- allogeneic 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** **alotransplant**
- alotransplantation** **allo transplantation** **allo transplants** **alotransplants**
- 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 myeloma** **myleoma**
- iga multiple myeloma** **mult myeloma** **mmy** **high risk multiple myeloma**
- stage iia igg kappa multiple myeloma** **rmm** **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

ly adult patients (age ≥ 18 years) who have undergone an allogeneic myeloma. The queries cover broad recall (all mentions),

all for allogeneic transplant and multiple myeloma, using synonyms and Captures all notes mentioning both concepts, regardless of context

precision: restricts to current, patient-owned mentions of allogeneic loma using -[TG\_HISTORY]-[TG\_FAMILY] tags. Excludes historical, family,

to historical mentions of allogeneic transplant for multiple myeloma using

ry...

Emerse x +

emerse-ap-ps8a.med.umich.edu/emerse/results/charts/summaries

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** **all** [SHOW ALL](#)

Results

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)

...of Michigan Rogel Cancer Center **Multiple 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...

...if [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)

# Initial Experiences

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

# Quoting too much text

/HIGHLIGHT DOCUMENTS    DOWNLOAD DOCUMENTS    FIND PATIENTS

aries    Timeline    Document    AI Assistant    AI Settings/Token Usage    2 of 5 < Patient >    122 of 175 < Document >

Name: **Murphy, Lisa Laura, MRN: 999999998**    EXPORT CONVERSATION    CLEAR CONVERSATION    Document ID: output-note-095\_999999998

The patient was diagnosed with acute myeloid leukemia (AML) and had high-risk features, including KIT mutation and early MRD positivity.

- "Her initial course was complicated by episodes of bacteremia, Clostridioides difficile colitis, and typhlitis, all of which have resolved with appropriate supportive care and antimicrobial therapy.....Following Induction 2, she achieved MRD negativity, which is a positive prognostic indicator. Her infectious complications (bacteremia, C. diff, typhlitis) have resolved and she is clinically stable. The multidisciplinary team, including hematology/oncology, bone marrow transplant (BMT), infectious disease, and supportive care, reviewed her course and current status. The BMT team reports several available 10/10 matched unrelated donors (MUD). Institutional practice regarding HSCT in first complete remission (CR1) varies, particularly in the context of favorable cytogenetics but high-risk molecular features. The patient's family was counseled extensively regarding risks and benefits of proceeding with allogeneic HSCT versus continued chemotherapy. Family expresses preference for transplant, acknowledging equipoise and understanding relapse risk associated with KIT mutation and early MRD positivity. Key points discussed: - Favorable cytogenetics (t(8;21)) but high-risk features (KIT+, early MRD+) - MRD negativity after Induction 2 supports continuation of chemotherapy per protocol, but risk of relapse remains elevated - Multiple 10/10 MUD available - Institutional equipoise regarding HSCT in CR1 - Family preference for transplant after thorough counseling

**PLAN:**

- Proceed with allogeneic hematopoietic stem cell transplantation (HSCT) in first complete remission (CR1) using 10/10 MUD, pending final family agreement
- Initiate formal pre-transplant evaluation, including:
  - Comprehensive physical assessment
  - Cardiac and pulmonary function testing
  - Infectious disease screening
  - HLA confirmation
  - Psychosocial assessment
  - Review of prior infectious complications and clearance
- Team debated whether to administer one additional consolidation cycle prior to HSCT; consensus reached to proceed directly to transplant upon clearance to minimize risk of relapse, as timing is favorable and bridge therapy is not required
- Continue supportive care, monitor for any new infections or complications
- Maintain close communication with family regarding timeline and next steps

**FOLLOW-UP:**

- Weekly multidisciplinary team meetings to review progress
- Daily inpatient rounds to monitor clinical status
- BMT team to coordinate donor selection and pre-transplant work-up

Attending Physician: [Name, MD]  
Consultants Present: Hematology/Oncology, BMT, Infectious Disease, Social Work

This note documents the multidisciplinary consensus and detailed plan for this high-risk pediatric AML patient.

Conversation context on: **Current Source**

Ask a question about this patient...    Send

ed.umich.edu/emerse/results/overview/999999998/OTHER?p=10018051

# 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",
  }
]
```



# 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 can be “complete”

# LLM work remains in progress

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



EMERSE-team@umich.edu



Lisa Ferguson  
David Hanauer  
Kellen McClain  
Guan Wang

**THANK  
YOU!**

