



MIMIC-III

NLP

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AI in Healthcare

What Disease Did I Pick?

I selected disease codes related to 401.0 – Malignant Essential Hypertension. Malignant essential hypertension is a severe and life-threatening form of high blood pressure that develops rapidly and can cause damage to multiple organs.

What About the Text Data?

The objective of this analysis is to extract medical entities using Spacy, SciSpacy, Word2Vec, and t-SNE plots.

Additionally, used MedSpacy to perform a similar analysis.

GitHub and Google Colab Links:

https://colab.research.google.com/github/AnkitaSavaliya/AIH/blob/main/MIMIC-III_NLP.ipynb

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<https://github.com/AnkitaSavaliya/AIH/blob/main/MIMIC-III%20NLP.pptx>



What Disease Did I Pick?

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<https://github.com/AnkitaSavaliya/AIH/blob/main/MIMIC-III%20NLP.pptx>

Data Preparation

```
from google.colab import auth
auth.authenticate_user()
print('Authenticated')

!gcloud projects list

from google.cloud import bigquery

# Construct a BigQuery client object.
client = bigquery.Client(project='clinical-entity-extraction')

"""
ICD codes related to Hypertension:
4010 - Malignant essential hypertension
4011 - Benign essential hypertension
4019 - Unspecified essential hypertension
"""

# Fetch notes only for ICD-9 code 4010(Malignant essential hypertension)
query = """
SELECT SUBJECT_ID, TEXT, CATEGORY
FROM `physionet-data.mimiciii_notes.noteevents`
WHERE SUBJECT_ID IN (
    SELECT d.SUBJECT_ID
    FROM `physionet-data.mimiciii_clinical.diagnoses_icd` d
    WHERE d.ICD9_CODE = '4010' -- Hypertension code
    AND d.SEQ_NUM = 1 -- Assuming 1 indicates primary diagnosis
)
AND CATEGORY LIKE 'Discharge summary';
"""

# Run the query
query_job = client.query(query)

# Print the results
noteevents_df = query_job.to_dataframe()

len(noteevents_df)
```

- Fetched rows from noteevents only for ICD-9 CODE 4010 using the BigQuery client.
- The query returned 162 rows.
- Prepared a DataFrame with the required columns.
- Saved the query result to a CSV/XLSX file to reduce queries to the database.

```
patients_dict = {"SUBJECT_ID":[], "CATEGORY":[], "TEXT":[]};
for i in range(0, len(noteevents_df)):
    patients_dict["SUBJECT_ID"].append(noteevents_df.loc[i, 'SUBJECT_ID'])
    patients_dict["CATEGORY"].append(noteevents_df.loc[i, 'CATEGORY'])
    patients_dict["TEXT"].append(noteevents_df.loc[i, 'TEXT'])
```

```
patients_df = pd.DataFrame(patients_dict)
len(patients_df)
patients_df = patients_df.iloc[2:] # Cleanup
```

```
# Download the patients_df dataframe in .csv and excel format
patients_df.to_csv(r'Patient_Summary.csv', index = False)
patients_df.to_excel("Patient_Summary.xlsx")
```

```
# Copy Processed data to google drive
!cp 'Patient_Summary.csv' '/content/drive/MyDrive/Colab Notebooks/AIH/Patient_Summary.csv'
!cp 'Patient_Summary.xlsx' '/content/drive/MyDrive/Colab Notebooks/AIH/Patient_Summary.xlsx'
```

Common Function to Extract Tokens Using a Given NLP Model (SpaCy/SciSpaCy)

```
import spacy

# Function to clean and extract tokens (removing punctuation and spaces)
def extract_cleaned_text(text, nlp_model):
    doc = nlp_model(str(text)) # Convert to string and process text
    tokens = [token.text for token in doc if not token.is_punct and not token.is_space]
    return " ".join(tokens) # Return cleaned text as a string
```

Process TEXT using SpaCy (Remove punctuation and spaces)

```
import pandas as pd

#Load Patient summary
patients_df_scapy = pd.read_csv("/content/drive/MyDrive/Colab Notebooks/AIH/Patient_Summary.csv")

# Load the spacy model
nlp_spacy = spacy.load('en_core_web_sm')

# Apply token extraction
patients_df_scapy["Processed_Text"] = patients_df_scapy["TEXT"].apply(lambda text: extract_cleaned_text(text, nlp_spacy))
```

Extract Entities Using Spacy

```
doc = nlp_spacy( patients_df_scapy['Processed_Text'][0])
for ent in doc.ents:
    print(ent.text, ent.start_char, ent.end_char, ent.label_)
```

2297 146 150 DATE
Known 257 262 PERSON
22 year old 277 288 DATE
ESRD 321 325 ORG
TTP 350 353 ORG
HOCM 358 362 ORG
HA 381 383 ORG
Awoke 409 414 ORG
this a.m. 415 424 TIME
8/10 430 434 CARDINAL
HA 454 456 ORG
Monday 521 527 DATE
SOB + Diarrhea 650 664 ORG
1 day 667 672 DATE
217/140 691 698 CARDINAL
254/152 715 722 CARDINAL
IV 30 744 749 DATE
1 755 756 CARDINAL
4 766 767 CARDINAL
208 801 804 CARDINAL
50 mg x 843 850 QUANTITY
1 851 852 CARDINAL
193/134 904 911 CARDINAL
CXR 1006 1009 ORG
ROS 1023 1026 ORG
past week 1036 1045 DATE
SOB N V + 1066 1075 ORG
BP 1122 1124 GPE

ESRD 1410 1414 ORG
SLE 1427 1430 ORG
1 1461 1462 CARDINAL
every 3 months 1468 1482 DATE
2 years 1487 1494 DATE
3 1516 1517 CARDINAL
2137 1534 1538 DATE
3 1593 1594 CARDINAL
2137 1599 1603 DATE
1 1640 1641 CARDINAL
Echo 1744 1748 GPE
2137 1752 1756 DATE
2139 1776 1780 DATE
20 1783 1785 CARDINAL
7 1786 1787 CARDINAL
8 1828 1829 CARDINAL
9 1837 1838 CARDINAL
Staph 1848 1853 PERSON
6 1887 1888 CARDINAL
10 1892 1894 CARDINAL
16 year old 1990 2001 DATE
Graduated Name2 NI School 2010 2035 ORG
Denies 2102 2108 WORK_OF_ART
SLE -Grandfather 2150 2166 ORG
DM 2195 2197 GPE
Physical Exam Vitals 2279 2299 ORG

Denies 2102 2108 WORK_OF_ART
SLE -Grandfather 2150 2166 ORG
DM 2195 2197 GPE
Physical Exam Vitals 2279 2299 ORG
98.0 2300 2304 CARDINAL
173/51 2305 2311 CARDINAL
86 2312 2314 CARDINAL
100 2318 2321 CARDINAL
RA HEENT 2322 2330 PERSON
w/ EOMI 2381 2388 ORG
LAD 2434 2437 GPE
Cardiac RRR NL 2453 2467 ORG
S1 2468 2470 PRODUCT
w/ Valsalva 2561 2572 PERSON
Lungs 2580 2585 WORK_OF_ART
Abd 2619 2622 PERSON
HSM 2641 2644 ORG
GU 2668 2670 ORG
2 + DP 2688 2694 DATE
Neuro AOX3 2739 2749 PERSON
Results UA 2811 2821 PERSON
100 2830 2833 CARDINAL
CXR 2873 2876 NORP
EKG NSR nml 2901 2912 ORG
LAE LVH 2943 2950 ORG
V5 2988 2990 CARDINAL
2139 3030 3034 DATE
26 3038 3040 CARDINAL

Visualize SpaCy Entities Using displaCy

```
from spacy import displacy
displacy.render(nlp_spacy(patients_df_scapy['Processed_Text'][0]), style="ent")
```

Admission Date 2140 1 19 Discharge Date 2140 1 21 Date of Birth 2117 8 7 Sex F Service MEDICINE Allergies Penicillins Attending:[**First Name3 LF 2297 DATE Chief Complaint headache Major Surgical or Invasive Procedure Hemodialysis History of Present Illness Ms. Known PERSON lastname is a 22 year old DATE female with SLE lupus nephritis ESRD ORG on HD malignant HTN h o TTP ORG and HOCM ORG who presents with HA ORG and hypertensive urgency Awoke ORG this a.m. TIME with 8/10 CARDINAL left sided frontal HA ORG was n't sure if it was d t flare of uveitis that had started on Monday DATE or d t HTN Decided to skip HD and come to ED for evaluation No vision changes numbness weakness change in gait chest pain SOB + Diarrhea ORG x 1 day DATE In ED patient was 217/140 CARDINAL but elevated to 254/152 CARDINAL > received labetalol IV 30 DATE mg x 1 CARDINAL and MSO4 4 CARDINAL mg and pressures dropped to SBPs 208 CARDINAL and HA improved Repeat labetalol with 50 mg x QUANTITY 1 CARDINAL and repeated dose of morphine dropped pressures to 193/134 CARDINAL > labetalol gtt started asa given and HA resolved Head CT negative for intracranial bleed and CXR ORG unremarkable ROS ORG cold for past week DATE no fevers chills CP SOB N V + ORG diarrhea Upon arrival to the floor patient's BP GPE was 191/126 CARDINAL labetalol gtt was not started No sxs no HA She states that she is compliant with all her meds and her mother cooks with no salt and she has been adherent to diet Past Medical History 1 Lupus 2134 Diagnosed after she began to have swollen fingers a rash and painful joints 2 CARDINAL ESRD ORG secondary to SLE ORG 2135 Was initially on cytoxin 1 CARDINAL dose every 3 months DATE for 2 years DATE until began dialysis 3 CARDINAL times a week in 2137 DATE T Th Sat Awaiting living donor transplant from mother 3 CARDINAL HTN 2137 DATE Normal BPs run 180's/120's Has had 1 CARDINAL hypertensive crisis that precipitated seizures in the past 4 Uveitis secondary to SLE 4 15 5 HOCM per Echo GPE in 2137 DATE 6 Vaginal bleeding 2139 DATE 9 20 CARDINAL 7 CARDINAL Multiple episodes of dialysis reactions 8 CARDINAL Anemia 9 CARDINAL Coag neg Staph PERSON bacteremia and HD line infection 6 CARDINAL 15 10 CARDINAL H O UE clot was on coumadin but no longer Social History Lives in Location 669 with mother and 16 year old DATE brother Graduated Name2 NI School ORG and then got sick so currently is not working or attending school Denies WORK_OF_ART any T E D. Family History -No history of SLE -Grandfather ORG has HTN -Distant history of DM GPE -No history of clotting disorders -No other history of other autoimmune diseases Physical Exam Vitals ORG 98.0 CARDINAL 173/51 CARDINAL 86 CARDINAL 15 100 CARDINAL RA HEENT PERSON L eye injected w periorbital edema R eye reactive w/ EOMI ORG anicteric sclera MMM OP clear Neck supple no LAD GPE no thyromegaly Cardiac RRR NL ORG S1 PRODUCT and S2 + S4 III VI systolic ejection murmur LUSB radiating to apex and axilla intensifies w/ Valsalva PERSON no rub Lungs WORK_OF_ART CTAB no wheezes rhonchi crackles Abd PERSON soft NTND NABS no HSM ORG no rebound or guarding GU ORG no CVAT Ext warm 2 + DP DATE pulses no C C E L femoral dialysis catheter Neuro AOx3 PERSON CN II XII intact strength sensation grossly intact Pertinent Results UA PERSON mod bld 100 CARDINAL protein present on prior UAs Radiology CXR NORP No acute CP abnormality EKG NSR nml ORG axis nml intervals borderline LAE LVH ORG J point elevation in V2,V3 TWI I aVL V5 CARDINAL V6 No change when compared to prior on 2139 DATE 11 26 CARDINAL CT HEAD No intracranial hemorrhage Brief Hospital Course WORK_OF_ART A P Patient is a 22 year old DATE female with SLE lupus nephritis ESRD ORG on HD who presents with hypertensive urgency Hypertensive urgency Unclear ORG precipitant Possibly secondary to pain from worsening uveitis Compliant PERSON with meds Denies illicit and tox screen negative Patient was started on labetalol drip in ED GPE with good BP response and was subsequently transitioned to PO GPE anti hypertensives in ICU ORG with maintenance of stable SBPs in 150s-170s CARDINAL baseline 170s-190s Per nephrologist's recommendations home lisinopril was increased to 40 mg QUANTITY po bid from 40 mg po QUANTITY qd for better baseline BP ORG control No clinical evidence of end organ damage UA ORG difficult ro interpret in setting of CRF CE's LOC x 1 CARDINAL negative Headache FAC No evidence by CT ORG for intracranial bleed Headaches PERSON were well controlled with morphine sulfate and had resolved by time of discharge Uveitis Followed ORG by outpatient optho specialist Ophtho PERSON not consulted per patient's request ESRD ORG Secondary to lupus nephritis On transplant list Patient PERSON received hemodialysis in house with 500 ml QUANTITY ultrafiltrate without complications At dry weight of 45 kg QUANTITY per patient Began Sevelamer ORG 800 TID ORG with meals Given difficulty in interpreting renin and aldosterone levels in acutely ill patients these were not drawn and will need to be drawn at outpatient follow up Medications on Admission Lisinopril 40 PRODUCT mg PO QD FAC Labetalol 600 CARDINAL PO GPE TID Valsartan 320 CARDINAL mg PO QD Clonidine ORG 0.3 CARDINAL mg transdermal QW Prednisone 40 mg PO QD FAC Atropine 1 Hospital1 Prednisolone Acetate 1 ORG Q1H Moxifloxacin eye drops qid Lorazepam 1 LAW mg PO Q4 FAC 6H PRN Discharge ORG Medications 1 CARDINAL Labetalol 200 mg Tablet Sig Three CARDINAL 3 CARDINAL Tablet PO TID 3 CARDINAL times a day Tablet(s 2 Clonidine 0.3 mg/24 QUANTITY hr Patch Weekly Sig ORG One CARDINAL 1 Patch Weekly Transdermal QTHUR every Thursday 3 DATE Atropine 1 Drops Sig One CARDINAL 1 Drop Ophthalmic Hospital1 2 CARDINAL times a day 4 Lorazepam 1 mg Tablet Sig One CARDINAL 1 Tablet PO Q4 6H every 4 to 6 hours TIME as needed 5 CARDINAL Valsartan 160 CARDINAL mg Tablet ORG Sig Two CARDINAL 2 CARDINAL Tablet PO DAILY Daily ORG 6 CARDINAL Prednisolone Acetate 1 Drops ORG Suspension Sig One CARDINAL 1 CARDINAL Drop Ophthalmic Q1H every hour 7 Lisinopril 40 TIME mg Tablet GPE Sig One CARDINAL 1 Tablet PO twice a day Disp:*60 Tablet(s Refills:*2 PERSON 8 Sevelamer 800 mg Tablet PERSON Sig One CARDINAL 1 Tablet PO TID 3 CARDINAL times a day Disp:*90 Tablet(s Refills:*2 9 Prednisone 20 CARDINAL mg Tablet PERSON Sig Two CARDINAL 2 CARDINAL Tablet PO once a day 10 Blood Pressure Kit Kit Sig PERSON One CARDINAL 1 Kit Miscellaneous once a day Disp:*1 Kit Refills:*0 Discharge PERSON Disposition Home Discharge Diagnosis Hypertensive urgency Discharge Condition Good Discharge Instructions Please take all of your blood pressure medications as prescribed You should adhere to a low salt diet as increased levels of sodium can drive your blood pressure up You are being discharged with a prescription for a home blood pressure monitor which you can use to take daily DATE measurements You should call your primary care physician for Name Initial PRE systolic blood pressures greater than 180 CARDINAL or if you experience headaches nausea vomiting chest pain shortness of breath or any other concerning symptoms Followup Instructions Please WORK_OF_ART resume hemodialysis according to your regular schedule You are scheduled to see Dr. First Name8 PERSON NamePattern2 Last Name NamePattern1 4883 DATE in the Division of Nephrology ORG on Wednesday 2 3 DATE at 9:30 AM TIME Please call Telephone Fax 1 435 if you need to reschedule You are scheduled to follow up with your primary care physician Last Name NamePattern4 First Name4 ORG NamePattern1 Last Name NamePattern1 2423 DATE on Tuesday 1 26 DATE at 3:30 PM TIME Please call Telephone Fax 1 250 CARDINAL if you need to reschedule You have been referred to see Dr. First Name4 NamePattern1 Last Name NamePattern1 2539 DATE in the Division of Hematology ORG for further evaluation of your anemia This appointment is scheduled for 2 9 DATE at 3 p.m. TIME His office is located on the Location un of the Hospital Ward Name ORG 23 CARDINAL Building on the Hospital1 18 Hospital Ward Name FAC 516 CARDINAL Please call Dr.[**Name NI 44536 CARDINAL administrative assistant Doctor First Name 8982 DATE at Telephone Fax 1 32192 ORG if you need to confirm or reschedule

Word2Vec and t-SNE Visualization Using SpaCy-Processed Data

```
from gensim.models import Word2Vec

#Build corpus
corpus = build_corpus(patients_df_spacy, nlp_spacy)
```

Minimum word count: 12, Maximum word count: 493, Median word count: 213

```
model_word2vec = Word2Vec(corpus, min_count=50, window=3, vector_size=100)
```

```
def build_corpus(df, model="en_core_web_sm"):
    """
    Extracts named entities from the specified text column in a DataFrame using a spaCy model,
    builds a corpus.

    Parameters:
    - df (pd.DataFrame): DataFrame containing text data.
    - text_column (str): Column name containing processed text.
    - model (str): spaCy model to use (default: "en_core_web_sm").

    Returns:
    - corpus (list of lists): Extracted entities per document.
    """
    nlp = model
    corpus = []

    for _, row in df.iterrows():
        tokens = [ent.text for ent in nlp(row["Processed_Text"]).ents]
        corpus.append(tokens)

    # Calculate word counts
    word_counts = [len(doc) for doc in corpus]

    print(f"Minimum word count: {min(word_counts)}, Maximum word count: {max(word_counts)}, Median word count: {sorted(word_counts)[len(word_counts) // 2]}")

    return corpus
```

- Created common function to build corpus using given model SpaCy/SciSpaCy

```
model_word2vec.wv.similar_by_key("Clonidine"), model_word2vec.wv.similar_by_key("BP")

[(['Patch Weekly', 0.9990012049674988),
 ('QH', 0.9982399940490723),
 ('Lisinopril', 0.9979649782180786),
 ('Patch Weekly Sig', 0.9978789687156677),
 ('Labetalol', 0.9974281787872314),
 ('Hydralazine', 0.9969014525413513),
 ('HCl', 0.9962852597236633),
 ('hours', 0.9962539076805115),
 ('Metoprolol', 0.9959376454353333),
 ('Aspirin', 0.9956783652305603)],
 [(['MICU', 0.9974619150161743),
 ('transferred', 0.9973183870315552),
 ('RA', 0.997249186038971),
 ('Pt', 0.9971693754196167),
 ('baseline', 0.9967537522315979),
 ('flood', 0.9967240691184998),
 ('admitted', 0.9966705441474915),
 ('patient 's', 0.9966193437576294),
 ('EKG', 0.9965095520019531),
 ('hypertension', 0.9962207674980164)]]
```



```
def tsne_plot(model, words, preTrained=False):
    """
    Creates and displays two t-SNE plots:
    1. Simple scatter plot with labels.
    2. Scatter plot with distance-based coloring.

    Parameters:
    - model: The Word2Vec model or pre-trained model.
    - words: List of words to visualize.
    - preTrained: Boolean flag to choose between Word2Vec or pre-trained model.
    """
    labels = []
    tokens = []

    # Apply t-SNE for dimensionality reduction
    tsne_model = TSNE(perplexity=30, early_exaggeration=12, n_components=2, init='pca', max_iter=1000, random_state=23)

    # Prepare tokens and labels
    for word in words:
        if preTrained:
            tokens.append(model[word]) # Pre-trained word vectors
        else:
            tokens.append(model.wv[word]) # Word2Vec model vectors
            labels.append(word)

    tokens = np.array(tokens)
    new_values = tsne_model.fit_transform(tokens)

    x = new_values[:, 0]
    y = new_values[:, 1]

    # First plot: Scatter plot with annotations
    plt.figure(figsize=(10, 8))
    for i in range(len(x)):
        plt.scatter(x[i], y[i])
        plt.annotate(labels[i],
                     xy=(x[i], y[i]),
                     xytext=(5, 2),
                     textcoords='offset points',
                     ha='right',
                     va='bottom')
    plt.title("t-SNE Visualization (Labels)")
    plt.show()

    # Second plot: Scatter plot with distance-based coloring
    plt.figure(figsize=(10, 8))
    distances = np.sqrt(new_values[:, 0]**2 + new_values[:, 1]**2)
    plt.scatter(new_values[:, 0], new_values[:, 1], c=distances, cmap='plasma')
    plt.colorbar(label="Distance from Origin")
    plt.title("t-SNE Visualization with Distance-Based Coloring")
    plt.show()
```

- Define common function for t-SNE plot which creates two plots(with labels and with distance-based coloring)
- Call function using corpus built using Spacy processed text.

```
vocabs = model_word2vec.wv.key_to_index.keys()
new_v = np.array(list(vocabs))
tsne_plot(model_word2vec, new_v)
```


Process TEXT using SciSpaCy

```
import pandas as pd
import scispacy
import spacy

#Load Dischar
patients_df_SciSpaCy = pd.read_csv("/content/drive/MyDrive/Colab Notebooks/AIH/Patient_Summary.csv")

nlp_SciSpaCy = spacy.load('en_core_sci_md') # Load the specified NLP model

# Apply token extraction
patients_df_SciSpaCy["Processed_Text"] = patients_df_SciSpaCy["TEXT"].apply(lambda text: extract_cleaned_text(text, nlp_SciSpaCy))

#Copy Processed data to google drive
patients_df_SciSpaCy.to_csv(r'Patient_Summary_SciSpacy.csv', index = False)
!cp 'Patient_Summary_SciSpacy.csv' '/content/drive/MyDrive/Colab Notebooks/AIH/Patient_Summary_SciSpacy.csv'
```



Visualize SciSpaCy Entities Using displaCy

```
from spacy import displacy
displacy.render(nlp_SciSpaCy( patients_df_SciSpaCy['Processed_Text'][0]), style="ent", jupyter=True)
```

Admission ENTITY Date 2140 1 19 Discharge Date ENTITY 2140 1 21 Date of Birth 2117 8 7 Sex F Service MEDICINE Allergies ENTITY Penicillins ENTITY Attending:[**First ENTITY Name3 ENTITY LF 2297 Chief Complaint headache ENTITY Major Surgical ENTITY or Invasive Procedure Hemodialysis ENTITY History of Present Illness

Ms. Known lastname is a 22 year ENTITY old female ENTITY with SLE lupus nephritis ENTITY ESRD ENTITY on HD ENTITY malignant ENTITY HTN h/o TTP ENTITY and HOCM ENTITY who presents with HA ENTITY and hypertensive ENTITY urgency ENTITY Awoke ENTITY this a.m. with 8/10 left sided frontal HA ENTIT

was n't sure if it was d/t flare ENTITY of uveitis ENTITY that had started on Monday ENTITY or d/t HTN ENTITY Decided ENTITY to skip HD ENTITY and come to ED ENTITY for evaluation ENTITY No vision changes numbness weakness ENTITY change in gait chest pain ENTITY SOB ENTITY + Diarrhea ENTITY x 1 day

ENTITY In ED ENTITY patient ENTITY was 217/140 but elevated ENTITY to 254/152 > received labetalol ENTITY IV 30 mg x 1 and MSO4 ENTITY 4 mg and pressures ENTITY dropped to SBPs ENTITY 208 and HA ENTITY improved Repeat labetalol ENTITY with 50 mg x 1 and repeated dose ENTITY of morphine ENTITY

dropped pressures ENTITY to 193/134 > labetalol ENTITY gtt ENTITY started asa given and HA ENTITY resolved Head CT ENTITY negative ENTITY for intracranial bleed ENTITY and CXR ENTITY unremarkable ROS cold ENTITY for past week ENTITY no fevers ENTITY chills CP SOB N/V + ENTITY diarrhea ENTITY

Upon arrival ENTITY to the floor patient's BP ENTITY was 191/126 labetalol ENTITY gtt ENTITY was not started No sxs no HA ENTITY She states ENTITY that she is compliant ENTITY with all her meds ENTITY and her mother ENTITY cooks ENTITY with no salt ENTITY and she has been adherent ENTITY to diet ENTITY

Past Medical History 1 Lupus 2134 Diagnosed ENTITY after she began to have swollen fingers ENTITY a rash ENTITY and painful joints 2 ENTITY ESRD ENTITY secondary ENTITY to SLE ENTITY 2135 Was initially on cytoxan 1 dose ENTITY every 3 months ENTITY for 2 years ENTITY until began dialysis 3 times ENTITY a

week ENTITY in 2137 T Th Sat Awaiting ENTITY living donor transplant from mother 3 HTN ENTITY 2137 Normal ENTITY BPs ENTITY run 180's/120's Has had 1 hypertensive ENTITY crisis ENTITY that precipitated ENTITY seizures ENTITY in the past 4 Uveitis ENTITY secondary to SLE ENTITY 4 15 5 HOCM ENTITY per

Echo ENTITY in 2137 6 Vaginal bleeding ENTITY 2139 9 20 7 Multiple episodes ENTITY of dialysis reactions ENTITY 8 Anemia ENTITY 9 Coag neg Staph bacteremia ENTITY and HD line infection ENTITY 6 15 10 H/O UE ENTITY clot ENTITY was on coumadin ENTITY but no longer Social History Lives ENTITY in Location

ENTITY 669 with mother ENTITY and 16 year ENTITY old brother ENTITY Graduated Name2 NI School ENTITY and then got sick ENTITY so currently is not working ENTITY or attending ENTITY school Denies ENTITY any T/E/D. Family History ENTITY -No history ENTITY of SLE ENTITY -Grandfather has HTN ENTITY -

Distant history ENTITY of DM ENTITY -No history of clotting disorders ENTITY -No other history ENTITY of other autoimmune diseases ENTITY Physical Exam ENTITY Vitals 98.0 173/51 86 15 100 RA ENTITY HEENT ENTITY L eye injected w/periorbital edema R eye reactive w/ EOMI anicteric sclera MMM ENTITY OP ENTITY clear

Neck supple ENTITY no LAD no thyromegaly Cardiac RRR ENTITY NLS1 ENTITY and S2 + S4 III/VI systolic ejection murmur ENTITY LUSB ENTITY radiating to apex ENTITY and axilla ENTITY intensifies ENTITY w/ Valsalva no rub ENTITY Lungs CTAB ENTITY no wheezes rhonchi crackles ENTITY Abd soft NTND NABS

ENTITY no HSM ENTITY no rebound ENTITY or guarding ENTITY GU ENTITY no CVAT ENTITY Ext warm 2 + DP ENTITY pulses ENTITY no C/C/E ENTITY L femoral dialysis catheter ENTITY Neuro A/Ox3 CN II-XII ENTITY intact strength/sensation ENTITY grossly intact ENTITY Pertinent Results ENTITY UA ENTITY

mod bid 100 protein ENTITY present on prior UAs ENTITY Radiology ENTITY CXR ENTITY No acute ENTITY CP ENTITY abnormality EKG ENTITY NSR ENTITY nml ENTITY axis nml intervals borderline LAE ENTITY LVH ENTITY J point elevation in V2,V3 TWI I ENTITY aVL V5 V6 No change ENTITY when compared

ENTITY to prior on 2139 11 26 CT ENTITY HEAD No intracranial hemorrhage ENTITY Brief Hospital Course ENTITY A/P ENTITY Patient ENTITY is a 22 year ENTITY old female ENTITY with SLE lupus nephritis ENTITY ESRD ENTITY on HD ENTITY who presents with hypertensive ENTITY urgency Hypertensive urgency

Unclear precipitant ENTITY Possibly secondary to pain ENTITY from worsening ENTITY uveitis ENTITY Compliant with ENTITY meds Denies ENTITY illicit ENTITY and tox screen ENTITY negative ENTITY Patient ENTITY was started on labetalol ENTITY drip ENTITY in ED ENTITY with good BP ENTITY response

ENTITY and was subsequently transitioned to PO ENTITY anti-hypertensives ENTITY in ICU ENTITY with maintenance ENTITY of stable ENTITY SBPs ENTITY in 150s-170s baseline ENTITY 170s-190s Per nephrologist's ENTITY recommendations ENTITY home lisinopril ENTITY was increased ENTITY to 40 mg po bid

ENTITY from 40 mg po qd ENTITY for better baseline ENTITY BP ENTITY control No clinical evidence ENTITY of end organ damage ENTITY UA ENTITY difficult to interpret in setting of CRF CE's ENTITY x 1 negative ENTITY Headache ENTITY No evidence ENTITY by CT ENTITY for intracranial bleed ENTITY

Headaches ENTITY were well controlled with morphine sulfate ENTITY and had resolved by time of discharge Uveitis ENTITY Followed by outpatient ENTITY optho specialist Optho not consulted per patient's ENTITY request ESRD ENTITY Secondary ENTITY to lupus nephritis ENTITY On transplant list ENTITY Patient ENTITY

received hemodialysis ENTITY in house ENTITY with 500 ml ultrafiltrate ENTITY without complications ENTITY At dry weight ENTITY of 45 kg per patient ENTITY Began Sevalamer ENTITY 800 TID ENTITY with meals ENTITY Given difficulty ENTITY in interpreting ENTITY renin ENTITY and aldosterone ENTITY levels

ENTITY in acutely ill ENTITY patients ENTITY these were not drawn and will need to be drawn at outpatient ENTITY follow up ENTITY Medications ENTITY on Admission Lisinopril ENTITY 40 mg PO ENTITY QD ENTITY Labetalol ENTITY 600 PO ENTITY TID ENTITY Valsartan ENTITY 320 mg PO ENTITY QD ENTITY

Clonidine ENTITY 0.3 mg transdermal QW ENTITY Prednisone ENTITY 40 mg PO ENTITY QD ENTITY Atropine 1 Hospital/1 ENTITY Prednisolone ENTITY Acetate 1 ENTITY Q1H ENTITY Moxifloxacin ENTITY eye drops ENTITY qid ENTITY Lorazepam 1 ENTITY mg PO ENTITY Q4 6H PRN Discharge Medications 1

Labetalol ENTITY 200 mg Tablet ENTITY Sig Three 3 Tablet ENTITY PO ENTITY TID ENTITY 3 times a day ENTITY Tablet(s ENTITY 2 Clonidine ENTITY 0.3 mg/24 hr Patch Weekly Sig ENTITY One 1 Patch Weekly ENTITY Transdermal QTHUR ENTITY every Thursday 3 Atropine 1 Drops ENTITY Sig One 1 Drop Ophthalmic

Hospital 1 2 times a day ENTITY 4 Lorazepam 1 ENTITY mg Tablet ENTITY Sig One 1 Tablet ENTITY PO Q4 6H ENTITY every 4 to 6 hours ENTITY as needed 5 Valsartan ENTITY 160 mg Tablet ENTITY Sig Two 2 Tablet ENTITY PO ENTITY DAILY Daily ENTITY 6 Prednisolone ENTITY Acetate 1 Drops Suspension Sig

ENTITY One 1 Drop Ophthalmic ENTITY Q1H ENTITY every hour 7 Lisinopril ENTITY 40 mg Tablet ENTITY Sig One 1 Tablet ENTITY PO ENTITY twice a day ENTITY Disp:*60 Tablet(s ENTITY Refills:*2 ENTITY 8 Sevalamer ENTITY 800 mg Tablet ENTITY Sig One 1 Tablet ENTITY PO ENTITY TID ENTITY 3 times a

day ENTITY Disp:*90 ENTITY Tablet(s ENTITY Refills:*2 ENTITY 9 Prednisone ENTITY 20 mg Tablet ENTITY Sig Two 2 Tablet ENTITY PO ENTITY once a day ENTITY 10 Blood Pressure Kit Kit Sig One 1 Kit ENTITY Miscellaneous once a day ENTITY Disp:*1 Kit Refills:*0 Discharge ENTITY Disposition Home Discharge

ENTITY Diagnosis ENTITY Hypertensive urgency Discharge Condition Good Discharge Instructions ENTITY Please take all of your blood pressure medications ENTITY as prescribed ENTITY You should adhere to a low-salt diet ENTITY as increased ENTITY levels ENTITY of sodium ENTITY can drive your blood pressure ENTITY up

You are being discharged with ENTITY a prescription ENTITY for a home blood pressure monitor ENTITY which you can use to take daily measurements ENTITY You should call your primary care physician ENTITY for Name Initial PRE ENTITY systolic ENTITY blood pressures ENTITY greater than 180 or if you experience headaches

ENTITY nausea vomiting chest ENTITY pain shortness of breath ENTITY or any other concerning symptoms ENTITY Followup Instructions Please ENTITY resume hemodialysis ENTITY according to your regular schedule ENTITY You are scheduled to see Dr. First Name8 NamePattern2 Last Name NamePattern1 4883 in the Division of

Nephrology ENTITY on Wednesday 2 3 at 9:30 AM Please call Telephone/Fax 1 435 if you need to reschedule ENTITY You are scheduled to follow-up ENTITY with your primary care physician ENTITY Last Name NamePattern4 First Name4 NamePattern1 ENTITY Last Name NamePattern1 ENTITY 2423 on Tuesday 1 26 at 3:30 PM ENTITY

Please call Telephone/Fax 1 250 if you need to reschedule ENTITY You have been referred to see Dr. First Name4 NamePattern1 Last Name NamePattern1 ENTITY 2539 in the Division of Hematology ENTITY for further evaluation ENTITY of your anemia ENTITY This appointment ENTITY is scheduled for 2 9 at 3 p.m. His office is located on the

Location ENTITY un of the Hospital Ward ENTITY Name 23 Building on the Hospital 18 Hospital Ward ENTITY Name 516 Please call Dr.[**Name NI ENTITY 44536 administrative assistant Doctor First ENTITY Name 8982 at Telephone/Fax 1 32192 ENTITY if you need to confirm ENTITY or reschedule ENTITY

Word2Vec and t-SNE Visualization Using SciSpaCy-Processed Data

```
from gensim.models import Word2Vec
```

```
corpus = build_corpus(patients_df_SciSpaCy, nlp_SciSpaCy)
```

Minimum word count: 11, Maximum word count: 1152, Median word count: 474

```
model_word2vec = Word2Vec(corpus, min_count=50, window=3, vector_size=100)
```

```
model_word2vec.wv.similar_by_key("Clonidine"), model_word2vec.wv.similar_by_key("BP")
```

```
([('Patch Weekly', 0.9987740516662598),  
 ('Labetalol', 0.9983558058738708),  
 ('Patch Weekly Sig', 0.9981586933135986),  
 ('Q8H', 0.9978556036949158),  
 ('Lisinopril', 0.9977641701698303),  
 ('HCl', 0.997312605381012),  
 ('Aspirin', 0.9972076416015625),  
 ('Patch', 0.9967060089111328),  
 ('Q6H', 0.9966330528259277),  
 ('Atorvastatin', 0.996251106262207)],  
 [('arrival', 0.9982121586799622),  
 ('ED', 0.998018741607666),  
 ('RA', 0.9977825880050659),  
 ('negative', 0.9974157810211182),  
 ('hypertension', 0.9971168637275696),  
 ('Pt', 0.9968937039375305),  
 ('transferred', 0.9968693256378174),  
 ('RR', 0.9962092638015747),  
 ('Brief Hospital Course', 0.9961373805999756),  
 ('years', 0.9957362413406372)])
```

- Build corpus using SciSpaCy
- Plot t-SNE

```
vocabs = model_word2vec.wv.key_to_index.keys()  
new_v = np.array(list(vocabs))  
tsne_plot(model_word2vec, new_v)
```


en_ner_bc5cdr_md Visualization Using SciSpaCy-Processed Data

```
import en_ner_bc5cdr_md
import spacy
from spacy import displacy
nlp_bc5cdr = en_ner_bc5cdr_md.load()
displacy.render(nlp_bc5cdr(patients_df_SciSpaCy['Processed_Text'][0]), style="ent", jupyter=True)
```

- en_ner_bc5cdr_md is a Named Entity Recognition (NER) model from SciSpaCy that specializes in identifying **diseases** and **chemicals** in text

Admission Date 2140 1 19 Discharge Date 2140 1 21 Date of Birth 2117 8 DISEASE 7 Sex F Service MEDICINE Allergies DISEASE Penicillins CHEMICAL Attending:[**First Name3 CHEMICAL LF 2297 Chief Complaint headache DISEASE Major Surgical or Invasive Procedure Hemodialysis History of Present Illness Ms. Known lastname is a 22 year old female with SLE lupus nephritis ESRD DISEASE on HD malignant HTN DISEASE h/o TTP DISEASE and HOCM DISEASE who presents with HA and hypertensive DISEASE urgency Awoke this a.m. with 8/10 left sided frontal HA was n't sure if it was d/t flare of uveitis DISEASE that had started on Monday or d/t HTN Decided to skip HD DISEASE and come to ED for evaluation No vision changes numbness weakness DISEASE change in gait chest pain DISEASE SOB + Diarrhea DISEASE x 1 day In ED patient was 217/140 but elevated to 254/152 > received labetalol CHEMICAL IV 30 mg x 1 and MSO4 CHEMICAL 4 mg and pressures dropped to SBPs 208 and HA improved Repeat labetalol CHEMICAL with 50 mg x 1 and repeated dose of morphine CHEMICAL dropped pressures to 193/134 > labetalol CHEMICAL gtt started asa given and HA resolved Head CT negative for intracranial bleed DISEASE and CXR unremarkable ROS cold for past week no fevers chills CP SOB NV CHEMICAL + diarrhea DISEASE Upon arrival to the floor patient's BP was 191/126 labetalol CHEMICAL gtt was not started No sx's no HA She states that she is compliant with all her meds and her mother cooks with no salt CHEMICAL and she has been adherent to diet Past Medical History 1 Lupus 2134 Diagnosed after she began to have swollen fingers a rash DISEASE and painful joints DISEASE 2 ESRD DISEASE secondary to SLE 2135 Was initially on cytoxan CHEMICAL 1 dose every 3 months for 2 years until began dialysis 3 times a week in 2137 T Th Sat Awaiting living donor transplant from mother 3 HTN 2137 Normal BPs run 180's/120's Has had 1 hypertensive DISEASE crisis that precipitated seizures DISEASE in the past 4 Uveitis DISEASE secondary to SLE 4 15 5 HOCM DISEASE per Echo in 2137 6 Vaginal bleeding DISEASE 2139 9 20 7 Multiple episodes of dialysis reactions 8 Anemia DISEASE 9 Coag neg Staph bacteremia DISEASE and HD DISEASE line infection DISEASE 6 15 10 H/O UE clot was on coumadin CHEMICAL but no longer Social History Lives in Location 669 with mother and 16 year old brother Graduated Name2 NI School and then got sick so currently is not working or attending school Denies any T/E/D. Family History -No history of SLE -Grandfather has HTN -Distant history of DM CHEMICAL -No history of clotting disorders DISEASE -No other history of other autoimmune diseases DISEASE Physical Exam Vitals 98.0 173/51 86 15 100 RA HEENT L eye injected w/periorbital edema R eye reactive w/ DISEASE EOMI anicteric sclera MMM OP clear Neck CHEMICAL supple no LAD no thyromegaly DISEASE Cardiac RRR NL S1 and S2 + S4 III/VI systolic ejection murmur LUSB radiating to apex and axilla intensifies w/ Valsalva no rub Lungs CTAB CHEMICAL no wheezes rhonchi DISEASE crackles Abd soft NTND NABS no HSM no rebound or guarding GU CHEMICAL no CVAT Ext warm 2 + DP pulses no C/C/E L femoral dialysis catheter Neuro AOx3 CN II-XII intact strength/sensation grossly intact Pertinent Results UA CHEMICAL mod bld 100 protein present on prior UAS CHEMICAL Radiology CXR No acute CP abnormality CHEMICAL EKG NSR DISEASE nml axis nml intervals borderline LAE LVH J point elevation in V2,V3 TWI I aVL V5 V6 No change when compared to prior on 2139 11 26 CT HEAD No intracranial hemorrhage DISEASE Brief Hospital Course A/P Patient is a 22 year old female with SLE lupus nephritis ESRD DISEASE on HD DISEASE who presents with hypertensive DISEASE urgency Hypertensive DISEASE urgency Unclear precipitant Possibly secondary to pain DISEASE from worsening uveitis DISEASE Compliant with meds Denies illicit and tox screen negative Patient was started on labetalol CHEMICAL drip in ED with good BP response and was subsequently transitioned to PO anti-hypertensives in ICU with maintenance of stable SBPs in 150s-170s baseline 170s-190s Per nephrologist's recommendations home lisinopril CHEMICAL was increased to 40 mg po bid from 40 mg po qd for better baseline BP control No clinical evidence of end organ damage UA DISEASE difficult to interpret in setting of CRF DISEASE CE's x 1 negative Headache DISEASE No evidence by CT for intracranial bleed DISEASE Headaches DISEASE were well controlled with morphine CHEMICAL sulfate and had resolved by time of discharge Uveitis DISEASE Followed by outpatient optho specialist Optho CHEMICAL not consulted per patient's request ESRD DISEASE Secondary to lupus nephritis DISEASE On transplant list Patient received hemodialysis in house with 500 ml ultrafiltrate without complications At dry weight of 45 kg per patient Began Sevelamer 800 TID with meals Given difficulty in interpreting renin and aldosterone CHEMICAL levels in acutely ill patients these were not drawn and will need to be drawn at outpatient follow up Medications on Admission Lisinopril CHEMICAL 40 mg PO QD Labetalol CHEMICAL 600 PO TID Valsartan CHEMICAL 320 mg PO QD Clonidine CHEMICAL 0.3 mg transdermal QW Prednisone CHEMICAL 40 mg PO QD Atropine CHEMICAL 1 Hospital1 Prednisolone Acetate CHEMICAL 1 Q1H Moxifloxacin CHEMICAL eye drops qid Lorazepam CHEMICAL 1 mg PO Q4 6H PRN Discharge Medications 1 Labetalol CHEMICAL 200 mg Tablet Sig Three 3 Tablet PO TID 3 times a day Tablet(s CHEMICAL 2 Clonidine CHEMICAL 0.3 mg/24 hr Patch Weekly Sig One 1 Patch Weekly Transdermal QTHUR every Thursday 3 Atropine CHEMICAL 1 Drops CHEMICAL Sig One 1 Drop Ophthalmic Hospital1 2 times a day 4 Lorazepam CHEMICAL 1 mg Tablet Sig One 1 Tablet PO Q4 6H every 4 to 6 hours as needed 5 Valsartan CHEMICAL 160 mg Tablet Sig Two 2 Tablet PO DAILY Daily 6 Prednisolone Acetate CHEMICAL 1 Drops CHEMICAL Suspension Sig One 1 Drop Ophthalmic Q1H every hour 7 Lisinopril CHEMICAL 40 mg Tablet Sig One 1 Tablet PO twice a day Disp:*60 Tablet(s Refills:*2 CHEMICAL 8 Sevelamer CHEMICAL 800 mg Tablet Sig One 1 Tablet PO TID 3 times a day Disp:*90 Tablet(s Refills:*2 CHEMICAL 9 Prednisone CHEMICAL 20 mg Tablet Sig Two 2 Tablet PO once a day 10 Blood Pressure Kit Kit Sig One 1 Kit Miscellaneous once a day Disp:*1 CHEMICAL Kit Refills:*0 Discharge Disposition Home Discharge Diagnosis Hypertensive DISEASE urgency Discharge Condition Good Discharge Instructions Please take all of your blood pressure medications as prescribed You should adhere to a low-salt diet as increased levels of sodium CHEMICAL can drive your blood pressure up You are being discharged with a prescription for a home blood pressure monitor which you can use to take daily measurements You should call your primary care physician for Name Initial PRE systolic blood pressures greater than 180 or if you experience headaches nausea vomiting chest pain shortness of breath DISEASE or any other concerning symptoms Followup Instructions Please resume hemodialysis according to your regular schedule You are scheduled to see Dr. First Name8 NamePattern2 Last Name NamePattern1 CHEMICAL 4883 in the Division of Nephrology on Wednesday 2 3 at 9:30 AM Please call Telephone/Fax 1 435 if you need to reschedule You are scheduled to follow-up with your primary care physician Last Name NamePattern4 First Name4 NamePattern1 CHEMICAL Last Name NamePattern1 CHEMICAL 2423 on Tuesday 1 26 at 3:30 PM Please call Telephone/Fax 1 250 if you need to reschedule You have been referred to see Dr. First Name4 NamePattern1 CHEMICAL Last Name NamePattern1 CHEMICAL 2539 in the Division of Hematology for further evaluation of your anemia DISEASE This appointment is scheduled for 2 9 at 3 p.m. His office is located on the Location un of the Hospital Ward Name 23 Building on the Hospital1 18 Hospital Ward Name 516 Please call Dr.[**Name NI 44536 administrative assistant Doctor First Name 8982 at Telephone/Fax 1 32192 if you need to confirm or reschedule

MedSpacy Visualization Using SciSpaCy-Processed Data

```
import medspacy
from spacy import displacy
from medspacy.ner import TargetRule
from medspacy.visualization import visualize_ent

# Load MedspaCy NLP pipeline
nlp_medspacy = medspacy.load()

# Add rules for target concept extraction
target_matcher = nlp_medspacy.get_pipe("medspacy_target_matcher")
# Define custom rules for better entity detection
target_rules = [
    TargetRule("hyperlipidemia", "DISEASE"),
    TargetRule("O2", "CHEMICAL"),
    TargetRule("FiO2", "CHEMICAL"),
    TargetRule("hypertension", "DISEASE"),
    TargetRule("hypertensive urgency", "DISEASE"),
    TargetRule("obesity", "CONDITION"),
    TargetRule("cardiac", "DISEASE"),
    TargetRule("SLE", "DISEASE"),
    TargetRule("lupus nephritis", "DISEASE"),
    TargetRule("ESRD", "DISEASE"),
    TargetRule("dialysis", "TREATMENT"),
    TargetRule("hemodialysis", "TREATMENT"),
    TargetRule("SBP", "MEASUREMENT"),
    TargetRule("HR", "MEASUREMENT"),
    TargetRule("TPN", "TREATMENT"),
    TargetRule("Prednisone", "MEDICATION"),
    TargetRule("Lisinopril", "MEDICATION"),
    TargetRule("Labetalol", "MEDICATION"),
    TargetRule("Clonidine", "MEDICATION")]
```

- MedSpaCy is a library designed for processing clinical and biomedical text.
- In this code, MedSpaCy is being enhanced by adding custom target rules to better detect specific medical entities such as diseases, treatments, symptoms, and medications in clinical notes.

```
    TargetRule("Valsartan", "MEDICATION"),
    TargetRule("Sevelamer", "MEDICATION"),
    TargetRule("Atropine", "MEDICATION"),
    TargetRule("Morphine sulfate", "MEDICATION"),
    TargetRule("Diarrhea", "SYMPTOM"),
    TargetRule("Headache", "SYMPTOM"),
    TargetRule("nausea", "SYMPTOM"),
    TargetRule("vomiting", "SYMPTOM"),
    TargetRule("shortness of breath", "SYMPTOM"),
    TargetRule("fever", "SYMPTOM"),
    TargetRule("chills", "SYMPTOM")
]

target_matcher.add(target_rules)

# Process the shift note
doc = nlp_medspacy(patients_df_SciSpaCy['Processed_Text'][0])

# visualize
visualize_ent(doc)
```

Date 2140 1 19 Discharge Date 2140 1 21 Date of Birth 2117 8 7 Sex F Service MEDICINE Allergies Penicillins Attending:[**First Name3 LF 2297 Chief Complaint **headache SYMPTOM** Major Surgical or Invasive Procedure **Hemodialysis TREATMENT** History of Present Illness Ms. Known lastname is with **SLE DISEASE** **lupus nephritis DISEASE** **ESRD DISEASE** on HD malignant HTN h/o TTP and HOCM who presents with HA and **hypertensive urgency DISEASE** Awoke this a.m. with 8/10 left sided frontal HA was n't sure **if HYPOTHETICAL** it was d/t flare of uveitis that had started on Mc fed to skip HD and come to ED for evaluation **No NEGATED_EXISTENCE** vision changes numbness weakness change in gait chest pain SOB + **Diarrhea SYMPTOM** x 1 day In ED patient was 217/140 but elevated to 254/152 > received labetalol IV 30 mg x 1 and MSO4 4 mg and pressures dropped to : proved Repeat labetalol with 50 mg x 1 and repeated dose of morphine dropped pressures to 193/134 > labetalol gtt started asa given and HA resolved Head CT negative for intracranial bleed and CXR unremarkable ROS cold for past week **no NEGATED_EXISTENCE** fevers **chills SYMPTOM** CP SOB t **SYMPTOM** Upon arrival to the floor patient 's BP was 191/126 labetalol gtt was not started No sxs no HA She states that she is compliant with all her meds and her **mother FAMILY** cooks **with no NEGATED_EXISTENCE** salt and she has been adherent to diet **Past Medical History HISTORICAL** 1 Lu l after she began to have swollen fingers a rash and painful joints 2 **ESRD DISEASE** secodary to **SLE DISEASE** 2135 Was initially on cytoxin 1 dose every 3 months for 2 years until began **dialysis TREATMENT** 3 times a week in 2137 T Th Sat Awaiting living donor transplant from mother 3 HTN 21 30's/120 's Has had 1 hypertensive crisis that precipitated seizures in the past 4 Uveitis secondary to **SLE DISEASE** 4 15 5 HOCM per Echo in 2137 6 Vaginal bleeding 2139 9 20 7 Multple episodes of **dialysis TREATMENT** reactions 8 Anemia 9 Coag neg Staph bacteremia and HD line infection 6 15 1 n coumadin but no longer Social History Lives in Location 669 with mother and 16 year old brother Graduated Name2 NI School and then got sick so currently is not working or attending school **Denies NEGATED_EXISTENCE** any T/E/D. **Family FAMILY** History -No **history HISTORICAL** of **SLE DIS** ar has HTN -Distant history of DM -No history of clotting disorders -No other **history HISTORICAL** of other autoimmune diseases Physical Exam Vitals 98.0 173/51 86 15 100 RA HEENT L eye injected w/periorbital edema R eye reactive w/ EOMI anicteric sclera MMM OP clear Neck supple no LAD **no EXISTENCE** thyromegaly **Cardiac DISEASE** RRR NL S1 and S2 + S4 III/VI systolic ejection murmur LUSB radiating to apex and axilla intensifies w/ Valsalva no rub Lungs CTAB no wheezes rhonchi crackles Abd soft NTND NABS no HSM no rebound or guarding GU no CVAT Ext warm 2 + DP pulses **EXISTENCE** C/C/E L femoral **dialysis TREATMENT** catheter Neuro AOX3 CN II-XII intact strength/sensation grossly intact Pertinent Results UA mod bld 100 protein present on prior UAs Radiology CXR No acute CP abnormality EKG NSR nml axis nml intervals borderline LAE LVH J point elevation in V2, i No change when compared to prior on 2139 11 26 CT HEAD **No NEGATED_EXISTENCE** intracranial hemorrhage Brief Hospital Course A/P Patient is a 22 year old female with **SLE DISEASE** **lupus nephritis DISEASE** **ESRD DISEASE** on HD who presents with **hypertensive urgency DISEASE** **hypertensive urgency DISEASE** Unclear precipitant Possibly secondary to pain from worsening uveitis Compliant with meds **Denies NEGATED_EXISTENCE** illicit and tox screen negative Patient was started on labetalol drip in ED with good BP response and was subsequently transitioned to PO anti-hypertensive enance of stable SBPs in 150s-170s baseline 170s-190s Per nephrologist 's recommendations home **lisinopril MEDICATION** was increased to 40 mg po bid from 40 mg po qd for better baseline BP control **No NEGATED_EXISTENCE** clinical evidence of end organ damage UA difficult **ro POSSIBLE_EXIS** i setting of CRF CE 's x 1 negative **Headache SYMPTOM** **No evidence NEGATED_EXISTENCE** by CT for intracranial bleed Headaches were well controlled with **morphine sulfate MEDICATION** and had resolved by time of discharge Uveitis Followed by outpatient optho specialist Optho **not NEGATE** per patient 's request **ESRD DISEASE** Secondary to **lupus nephritis DISEASE** On transplant list Patient received **hemodialysis TREATMENT** in house with 500 ml ultrafiltrate without complications At dry weight of 45 kg per patient Began Sevalamer 800 TID with meals Given difficulty in interpreting e levels in acutely ill patients these were **not NEGATED_EXISTENCE** drawn and will need to be drawn at outpatient follow up Medications on Admission **Lisinopril MEDICATION** 40 mg PO QD **Labetalol MEDICATION** 600 PO TID **Valsartan MEDICATION** 320 mg PO QD **Clonidine MEDICATION** 0.0 al QW **Prednisone MEDICATION** 40 mg PO QD **Atropine MEDICATION** 1 Hospital1 Prednisolone Acetate 1 Q1H Moxifloxacin eye drops qid Lorazepam 1 mg PO Q4 6H PRN Discharge Medications 1 **Labetalol MEDICATION** 200 mg Tablet Sig Three 3 Tablet PO TID 3 times a day Tablet(s 2 **Clonid** **ON** 0.3 mg/24 **hr MEASUREMENT** Patch Weekly Sig One 1 Patch Weekly Transdermal QTHUR every Thursday 3 **Atropine MEDICATION** 1 Drops Sig One 1 Drop Ophthalmic Hospital1 2 times a day 4 Lorazepam 1 mg Tablet Sig One 1 Tablet PO Q4 6H every 4 to 6 hours **as needed HYPOTHETICAL** **1 MEDICATION** 160 mg Tablet Sig Two 2 Tablet PO DAILY Daily 6 Prednisolone Acetate 1 Drops Suspension Sig One 1 Drop Ophthalmic Q1H every hour 7 **Lisinopril MEDICATION** 40 mg Tablet Sig One 1 Tablet PO twice a day Disp:*60 Tablet(s Refills:*2 8 **Sevalamer MEDICATION** 800 mg Tablet Sig times a day Disp:*90 Tablet(s Refills:*2 9 **Prednisone MEDICATION** 20 mg Tablet Sig Two 2 Tablet PO once a day 10 Blood Pressure Kit Kit Sig One 1 Kit Miscellaneous once a day Disp:*1 Kit Refills:*0 Discharge Disposition Home Discharge Diagnosis **Hypertensive urgency DISEASE** Discharge Cond Instructions Please take all of your blood pressure medications as prescribed You should adhere to a low-salt diet as increased levels of sodium can drive your blood pressure up You are being discharged with a prescription for a home blood pressure monitor which you can use to take daily measurements) rimary care physician for Name Initial PRE systolic blood pressures greater than 180 or **if HYPOTHETICAL** you experience headaches **nausea SYMPTOM** **vomiting SYMPTOM** chest pain **shortness of breath SYMPTOM** or **any other NEGATED_EXISTENCE** concerning symptoms Followup Instru **hemodialysis TREATMENT** according to your regular schedule You are scheduled to see Dr. First Name8 NamePattern2 Last Name NamePattern1 4883 in the Division of Nephrology on Wednesday 2 3 at 9:30 AM Please call Telephone/Fax 1 435 if you need to reschedule You are scheduled to follow-up wi re physician Last Name NamePattern4 First Name4 NamePattern1 Last Name NamePattern1 2423 on Tuesday 1 26 at 3:30 PM Please call Telephone/Fax 1 250 if you need to reschedule You have been referred to see Dr. First Name4 NamePattern1 Last Name NamePattern1 2539 in the Division of Hema iluation of your anemia This appointment is scheduled for 2 9 at 3 p.m. His office is located on the Location un of the Hospital Ward Name 23 Building on the Hospital1 18 Hospital Ward Name 516 Please call Dr.[**Name NI 44536 administrative assistant Doctor First Name 8982 at Telephone/Fax 1 32192 if : reschedule