


Realizing the promise of real-world data at scale

Using clinical expert trained AI
for a complete view of US Health



May 8, 2023

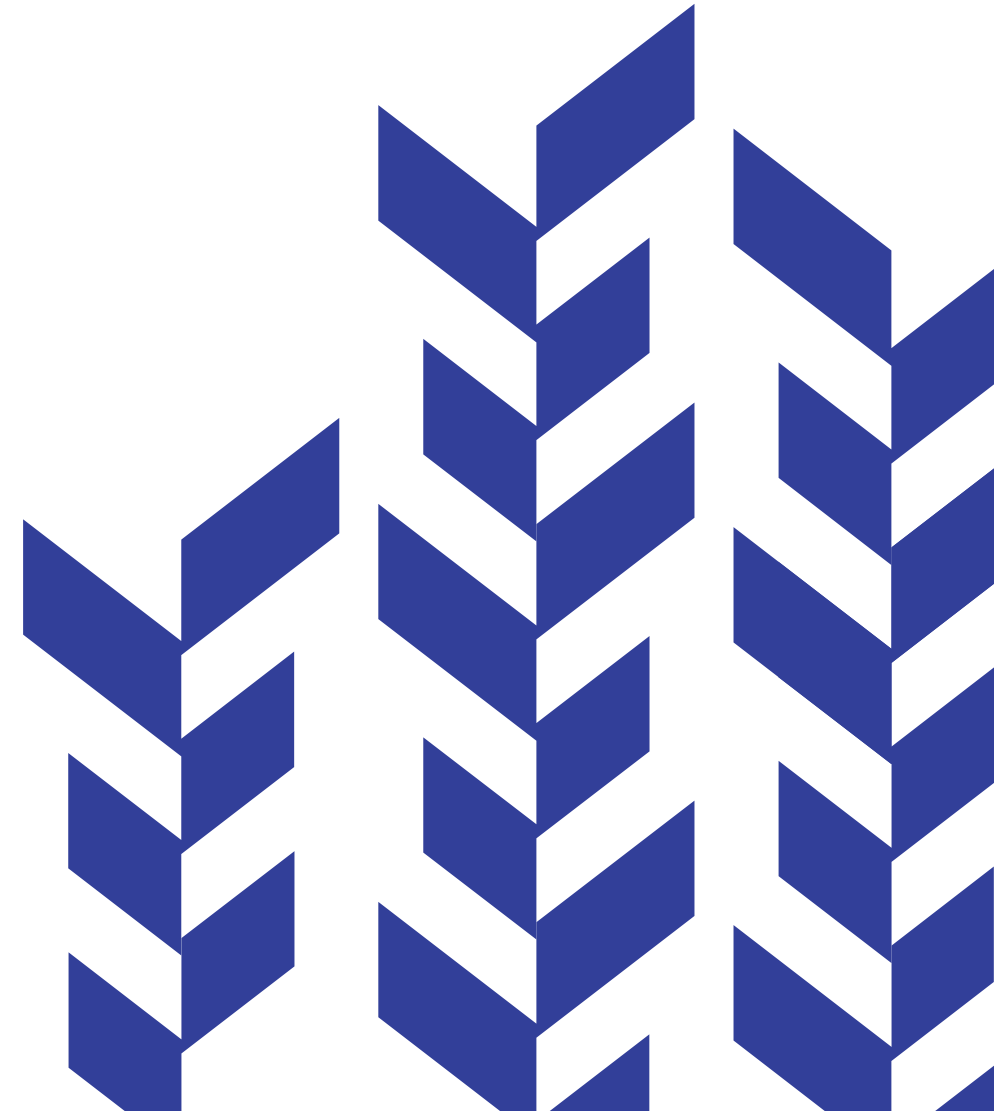




Ryan Ahern, MD MPH
Chief Medical Officer,
Truveta



Eric McCulley
Head of Portfolio Innovation,
US Immunology, UCB



COVID-19 pandemic revealed gaps in the U.S. healthcare system, creating confusion for health systems and patients



Donald J. Trump ✓

54K Tweets

↻ Donald J. Trump Retweeted



Biobiobiobio @biobiobiobior • Jul 25 ▼

● REMINDER - July 25, 2020:
62 studies confirm the effectiveness of hydroxychloroquine. Deafening silence of the Mainstream Medias, unacceptable mediatic lockdown. [#Hydroxychloroquine](#)



World Health Organization



MEDICAL NEWS TODAY

WHO 'strongly' against hydroxychloroquine use for COVID-19 prevention



Saving Lives with Data

Truveta is the market leader in EHR data and analytics to improve patient care, accelerate R&D, and inform public policy

Truveta Data

The most complete, timely,
and clean health data

Truveta Studio

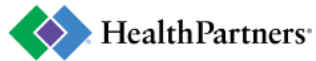
Fast, transparent analytics for
everyone in the organization

Truveta Community

Connecting healthcare and
life sciences

30 health systems committed to Saving Lives with Data

17% of care across all 50 states



Truveta Data: The most complete, timely, and clean health data

➤ **COMPLETE**

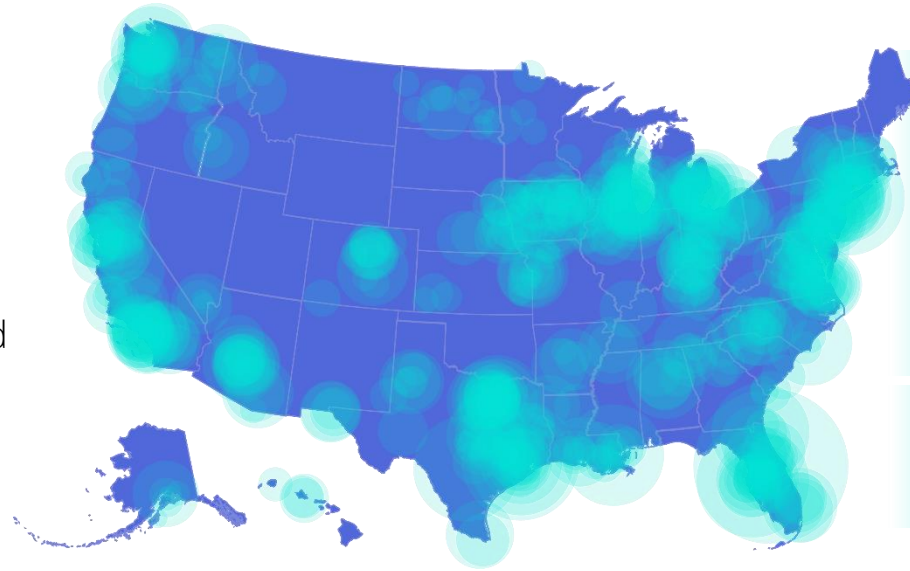
Deep EHR health data providing the most complete clinical context

➤ **TIMELY**

Daily EHR updates across care settings and geographies to find and track patients of interest

➤ **CLEAN**

Accurate and normalized without commercial bias, data held to the highest standards of data quality and provenance



STRUCTURED DATA

Diagnosis (SNOMED, ICD)
Procedure (CPT, HCPCS)
Medication (RXNORM, NDC)
Labs (LOINC, UCUM)
Immunizations (CVX)
Genomic Biomarkers (HGNC)
Implanted/Explanted Device (UDI)
Demographics
Flowsheets
Care setting

UNSTRUCTURED DATA

Clinician notes
Imaging reports
Biopsy reports
DICOM images



SOCIAL DRIVERS OF HEALTH

CLAIMS DATA

MORTALITY DATA

PHARMACY DATA





🔥 Kareem Carr 🔥

@kareem_carr

the first time
you work with
real data



Billions of data points normalized daily with unmatched accuracy

> **TRAINED ON UNPRECEDENTED DATA**

Truveta Language Model (TLM)
is trained on 80M+ patient journeys

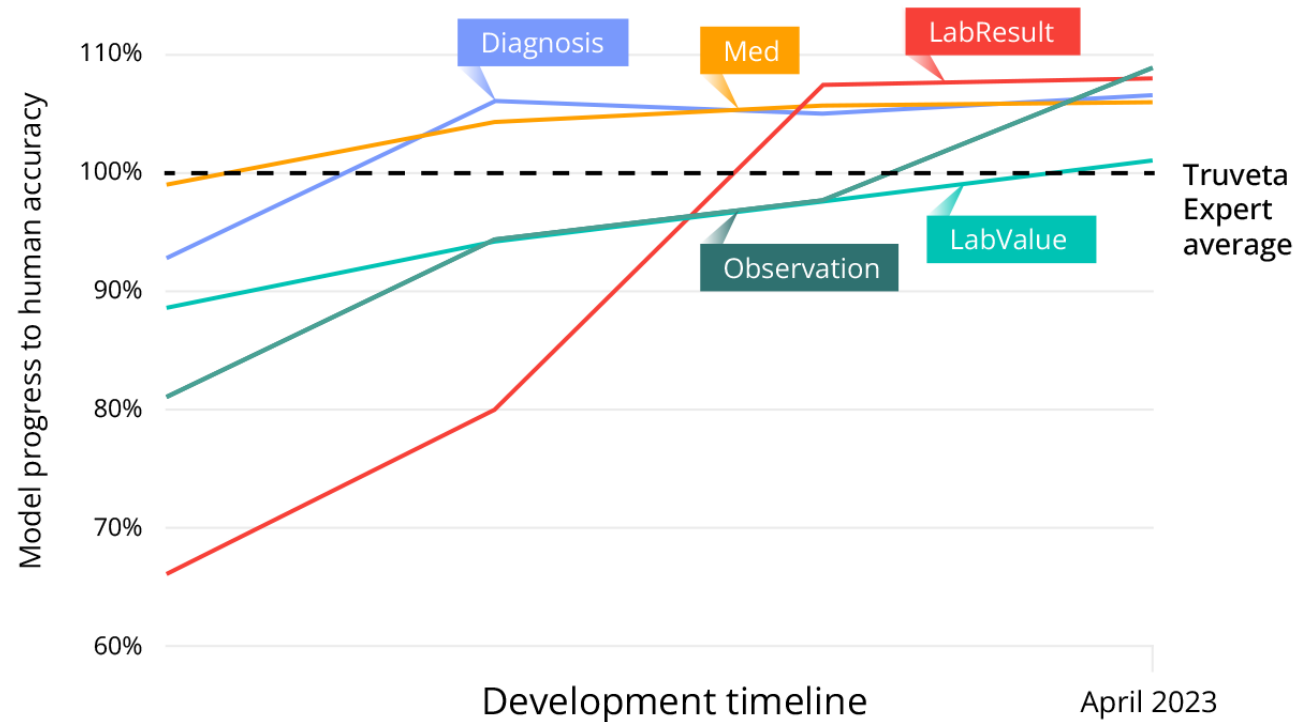
> **CLINICAL EXPERTS IN THE LOOP**

Reviewed and refined for accuracy
by a team of clinical experts

> **GREATER THAN 92% ACCURACY**

Across diagnoses, medications,
clinical observations, lab results, etc.

Normalization vs human expert baseline



Case Study:
Understanding patient
journey in Hidradenitis
Suppurativa



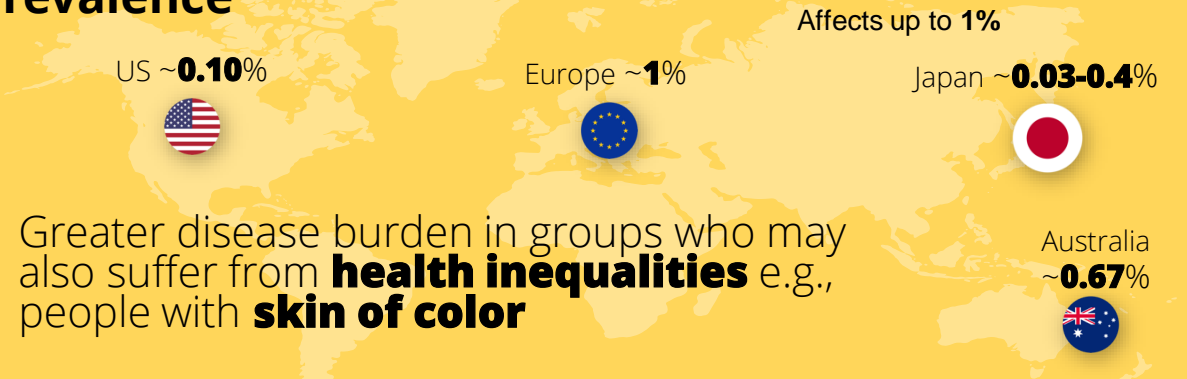
HS is a Debilitating Disease ¹⁻²¹



Hidradenitis Suppurativa (HS) *Hidra-den-eye-tis Sup-RA-tiva*

A **debilitating, chronic, inflammatory skin disease** of the **hair follicle** that presents with **painful, inflamed lesions** in the armpits, genital area, groin, buttocks/anus, and breasts resulting in painful, inflamed lesions, abscesses, tracts, and scarring

Prevalence



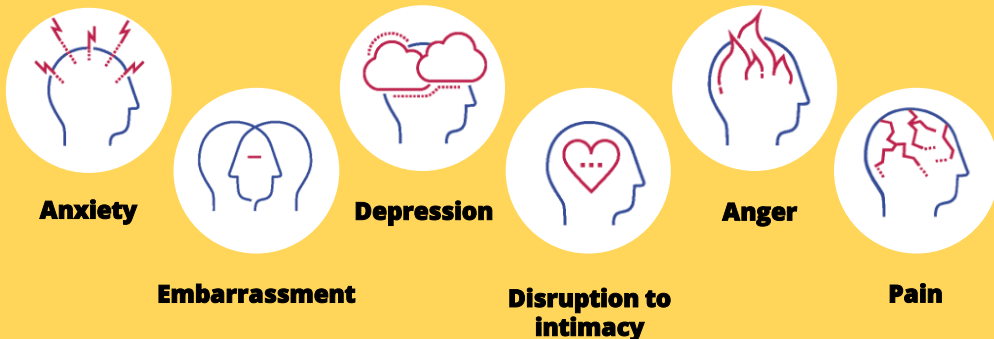
Delay in Diagnosis

Not Understood
Significant delays in diagnosis averaging

7 yrs

Resulting in **intense pain, progressive scarring,** and **psychological damage**²

Severe impact on QoL and ability to work



Demographics

3x

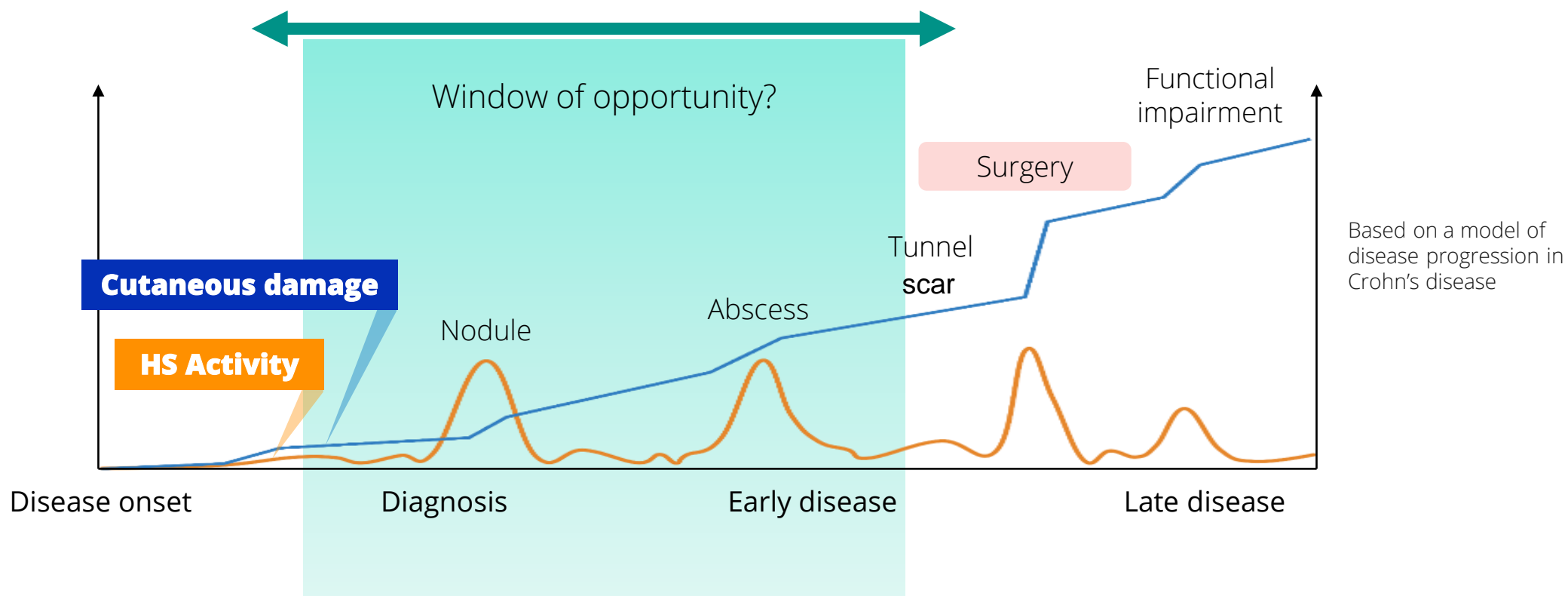
more common in **women** than men

Most frequently occurs **after puberty**, in people in their **20s** and **30s**

African Americans have **~3x higher prevalence** than White individuals

Understanding the patient journey using Truveta

The “**window of opportunity**” refers to the period during which **efforts to control inflammatory activity** may be **most effective**



Adapted from Martorell et al. *Actas Dermosifiliogr.* 2016;107(Suppl 2):32–42.

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Study Overview

POPULATIONS

Population - HS for L...

Population Editor

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Data Dictionary

Population - HS for ISPOR

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Edit Codeset

hs_codes = codeset("ICD10CM", SelfAndDescendants, "L73.2Hidradenitis suppurativa) +

Edit Codeset

codeset("SNOMED CT", Self, "59393003Hidradenitis suppurativa)

hs_dx = filter(Patient.ConditionSet a) {

a.CodeConceptId in (hs_codes, any)

}

population hs_dx

Save

Generate Snapshot

POPULATION ESTIMATE

111K

0.16 seconds

Sex

Female

76.4%

Male

23.2%

Masked

0.2%

No Information

0.2%

Race / Ethnicity

White

54.4%

Black Or African American

31.2%

Other Race

6.3%

Unknown

Truveta Confidential

12

4.6%

TRUVETA

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Study Overview

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11

hs_codes = codeset("ICD10CM", SelfAndDescendants, "L73.2Hidradenitis suppurativa) +

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Truveta Confidential

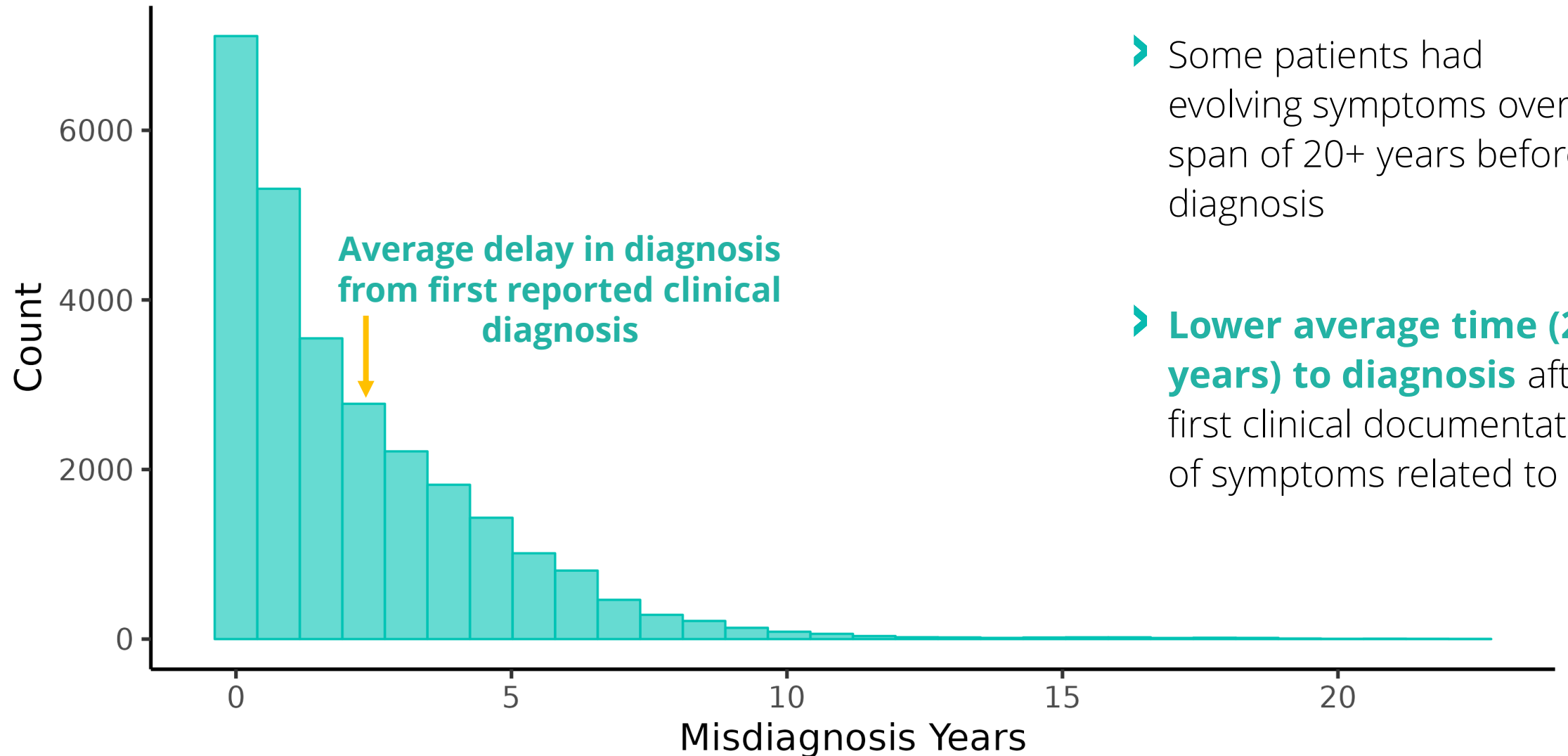
13

4.6%

Truveta Library

Data Dictionary

We can analyze the patient journey using Truveta Studio...



- Some patients had evolving symptoms over a span of 20+ years before diagnosis
- **Lower average time (2.2 years) to diagnosis** after first clinical documentation of symptoms related to HS

... and understand the clinical consequences of delay

- HS diagnosed population broken down into three categories based on delays in diagnosis
- Patients with long delays **nearly twice as likely to have a diagnosis for depression or generalized anxiety disorder**
- Patients with long delays **have surgical procedures more often as treatment** before diagnosed with HS

	Short N = 6,908	Moderate N = 13,709	Long N = 6,871
Depression Diagnosis	1,929 (28%)	5,001 (36%)	3,244 (47%)
Generalized Anxiety Disorder Diagnosis	1,939 (28%)	5,118 (37%)	3,260 (47%)
Substance Abuse Diagnosis	1,426 (21%)	3,787 (28%)	2,554 (37%)

	Short N = 6,908	Moderate N = 13,709	Long N = 6,871
Surgery for Abscess, Cyst, Boil before HS Diagnosis	604 (8.7%)	1,305 (9.6%)	855 (12%)

Truveta Data includes critical information from clinician notes

Primary Physician [Name:Practitioner]

Reason For Visit [Name:Patient] presents to the office for follow up.

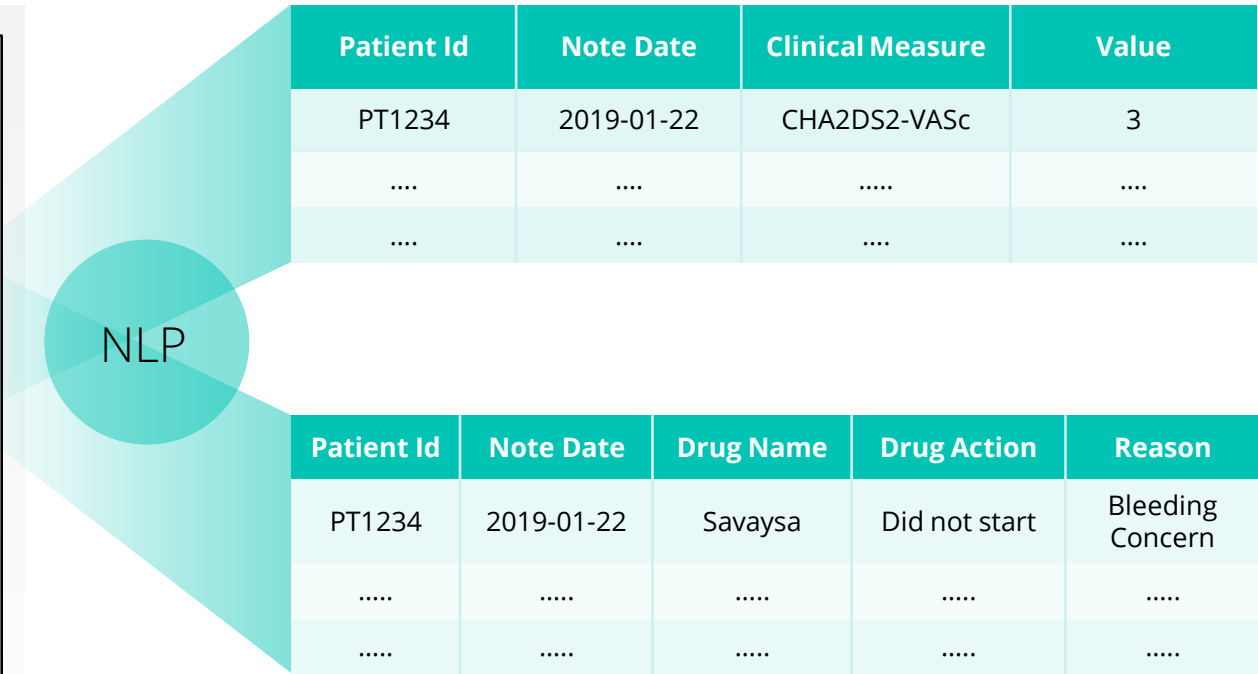
HPI [Name:Patient] is a [Age]-year-old [Gender] atrial fibrillation we returned today for followup. Patient stated that [Gender] leg swelling has improved since started on furosemide. However, patient **did not start** **Savaysa** due to **concern of potential bleeding.**

Assessment Atrial fibrillation (I48.91): Persistent atrial fibrillation with **CHA2DS2-VASc score of 3** (about 3.2% annual ischemic stroke rate): current guideline supports use of anticoagulant monotherapy which lowers the risk of thromboembolism (clotting stroke or systemic emboli) significantly compared to placebo, or aspirin or other combination of anti-platelet therapy that utilize aspirin. Anticoagulant options including, warfarin, Pradaxa, Xarelto, Eliquis, or Savaysa discussed. Last Impression: [Date] | Oral anticoagulants (blood thinner) for stroke risk reduction, including warfarin, vs. Pradaxa, Xarelto, Eliquis, and Savaysa discussed. Potential risks associated with blood thinner usage including - minor/major or fatal bleeding discussed. All questions answered, patient declined and opted to continue daily baby aspirin with food. Patient understood and accept risks.

- Clinical Measure

Drug Name
- Drug Action

Reason



HS Patient Journey: Note 1 – Repeated Outpatient Visit in January

[Name: Patient] is a [Age] y.o. [Gender]

CHIEF COMPLAINT: Patient presents with Abscess

ASSESSMENT AND PLAN: ICD-10-CM ICD-9-CM 1. Abscess of groin, right
L02.214 and 682.2

Ambulatory referral to Dermatology

Ambulatory referral to General Surgery

Recurrent abscess of right inguinal region, this is the 3rd occurrence. Previously drained by general surgery. Will have patient apply warm compresses over weekend and procured an appointment with general surgery on Monday for I&D. Due to multiple reoccurrences, some suspicion for hidradenitis suppurativa. Will refer to dermatology for discussion.

SUBJECTIVE: HPI: Patient presents with recurrent right groin abscess. It has been present for 3 days and is getting more painful. This morning [Gender] noticed it had started to drain. Has had this twice before, been drained by general surgery. No other history of abscesses. [Gender] has taken warm showers but not put warm packs or anything else on it.

- A patient has third occurrence of an abscess.
- Previous abscesses were drained in general surgery.
- HS is suspected and patient is referred to dermatology (and more surgery).

Flare-ups = 3

Misdiagnosis Count = 3

Surgical Procedure Count = 2

Estimated cost = \$7,230

Note 2 – First Dermatology Visit in February

[Location:Hospital] New Patient

[Name:Patient] is a [Age] y.o. [Gender] who presents to the clinic today.

CHIEF COMPLAINT: Abscess (In groin area.)

REFERRED BY: No ref. provider found.

ASSESSMENT AND PLAN:

1. Vulvar cysts doxycycline (VIBRAMYCIN) 100 mg capsule
2. HS is on the differential in regard to the labial inflammatory nodules x 2 and when flaring, and if so I suspect [Gender] is between Hurley stage I & II, but this is difficult to assess today.

On examination today [Name: Practitioner] is around three weeks post op from I&D with general surgery (two total). I do think that [Name: Patient] would benefit from doxycycline for a three-month trial for its anti-inflammatory properties. I do not think it is appropriate to start [Gender] on spironolactone or consider Humira as [Gender] is not presenting with active disease today. [Gender] is to follow up in three months and alert me of any changes in between including new lesions. We did discuss [Gender] risk factors for HS including obesity and tobacco use and I encouraged [Gender] to consider smoking cessation and an exercise regimen.

- Patient has had surgery to treat previous abscess
- New provider suspects HS but is unable to assess
- Provider won't prescribe approved biologic for HS
- Patient will wait 3-months for follow-up

Flare-ups: 3

Misdiagnosis Count = 4

Surgical Procedure Count = 3

Estimated cost = \$11,070

Note 3 – Dermatology Follow-up in May

[Location:Hospital] Return Patient

CHIEF COMPLAINT: Follow-up

Assessment and Plan: 1. Vulvar cysts doxycyup toycline (VIBRAMYCIN) 100 mg capsule

1. Much improved with the doxycycline with only one flare since [Gender] initial visit. [Gender] reports that [Gender] compliance with the medication was not great, but that [Gender] was taking at least one tablet daily. I recommend that [Gender] stay on the one tablet daily the next six months and work toward smoking cessation and weight loss as I feel that this may significantly decrease [Gender] flares. Refills provided today.

- Patient had a flare-up since previous visit
- Had difficulty taking daily medication
- Dermatologist provides refills to antibiotic for 6 month

Flare-ups: 4

Misdiagnosis Count = 5

Surgical Procedure Count = 3

Estimated Cost = \$11,520

Note 4 – HS Diagnosis in November

[Location:Hospital] PROGRESS NOTE

[Name: Patient] is a [Age] y.o. [Gender] who's PCP is [Name: Practitioner], MD and [Gender] presents today with abscess of right groin area. reopened about 3 mo. ago.

ASSESSMENT AND PLAN:

IMPRESSION: ICD-10-CM ICD-9-CM

1. Hidradenitis suppurativa L73.2 705.83
2. Tobacco use disorder F17.200 305.1

RECOMMENDATIONS: Because this area has recurred several times, hidradenitis is a fitting diagnosis, especially with history of tracking previously and level of tenderness. [Gender] is also a smoker which is a strong factor. Discussed instructions and answered all questions. Do not scrub/rub the area (this is an inflammatory skin issue and can worsen with trauma). Wash daily or twice daily with hibiclens or chlorhexadine. – gave to patient. Do not shave area with razor. Clipper is preferred. Be careful not to scratch the skin over the inflamed area. Use cleocin topical twice daily while inflamed.

- Patient has had another flare-up 3 months prior to correct diagnosis
- Patient is prescribed antibiotics as daily treatments and during active inflammation

Flare-ups: 5

Misdiagnosis Count = 5

Surgical Procedure Count = 3

Estimated Cost = \$11,970

Informing critical decisions across the therapy lifecycle

Clinical Trial Design	Clinical Trial Enrollment	Comparative Effectiveness	Safety Monitoring	Label Expansion
<i>Establish trial protocols with a focus on health equity</i>	<i>Find eligible patients for clinical trials with direct health system connections</i>	<i>Assess treatment outcomes in complex clinical populations</i>	<i>Monitor post-market safety and adverse events</i>	<i>Understand how therapies are used in routine clinical care to generate evidence for label expansion</i>

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Q&A



Thank you

Contact us info@truveta.com

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