Improving Information Gathering Through Natural Language Processing of Patient Signs and Symptoms in the Electronic Health Record

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How is the diagnostic process capturing the patient experience?

Information Integration and Interpretation

- Patient History
- Physical Exam
- Observation
- Diagnostic Tests
- Monitoring Devices
- Referrals and Consultations
- Medical Record / EHR

Definitions

- Medical record (a.k.a. health record, patient chart)
  - A record of a patient's medical information[1]
  - Includes diagnoses, clinical notes, test results, treatments and procedures, social and family history, medications taken

- Electronic health record (EHR)
  - Often considered synonymous with electronic medical record (EMR)
  - A digital version of a patient's paper chart [that] are real-time, patient-centered records that make information available instantly and securely to authorized users.[2]

1. https://www.merriam-webster.com/medical/medical%20record
2. https://www.healthit.gov/faq/what-electronic-health-record-ehr

Most Commonly Used EHR Vendor Systems

Inpatient Market Share[1]

Vendor	% Hospitals
Epic*	36%
Oracle Cerner	25%
Meditech	16%
CPSI	8%
Other	15%

*Virtually all academic medical centers

Outpatient Market Share[2]

Vendor	% Practices
eClinicalWorks	14%
Epic	10%
Athenahealth	8%
NextGen	5%
Other	64%

1. https://www.beckershospitalreview.com/ehrs/ehr-vendor-market-share-in-the-us.html. Accessed July 15, 2024.
2. https://www.definitivehc.com/blog/top-ambulatory-ehr-systems. Accessed July 15, 2024.

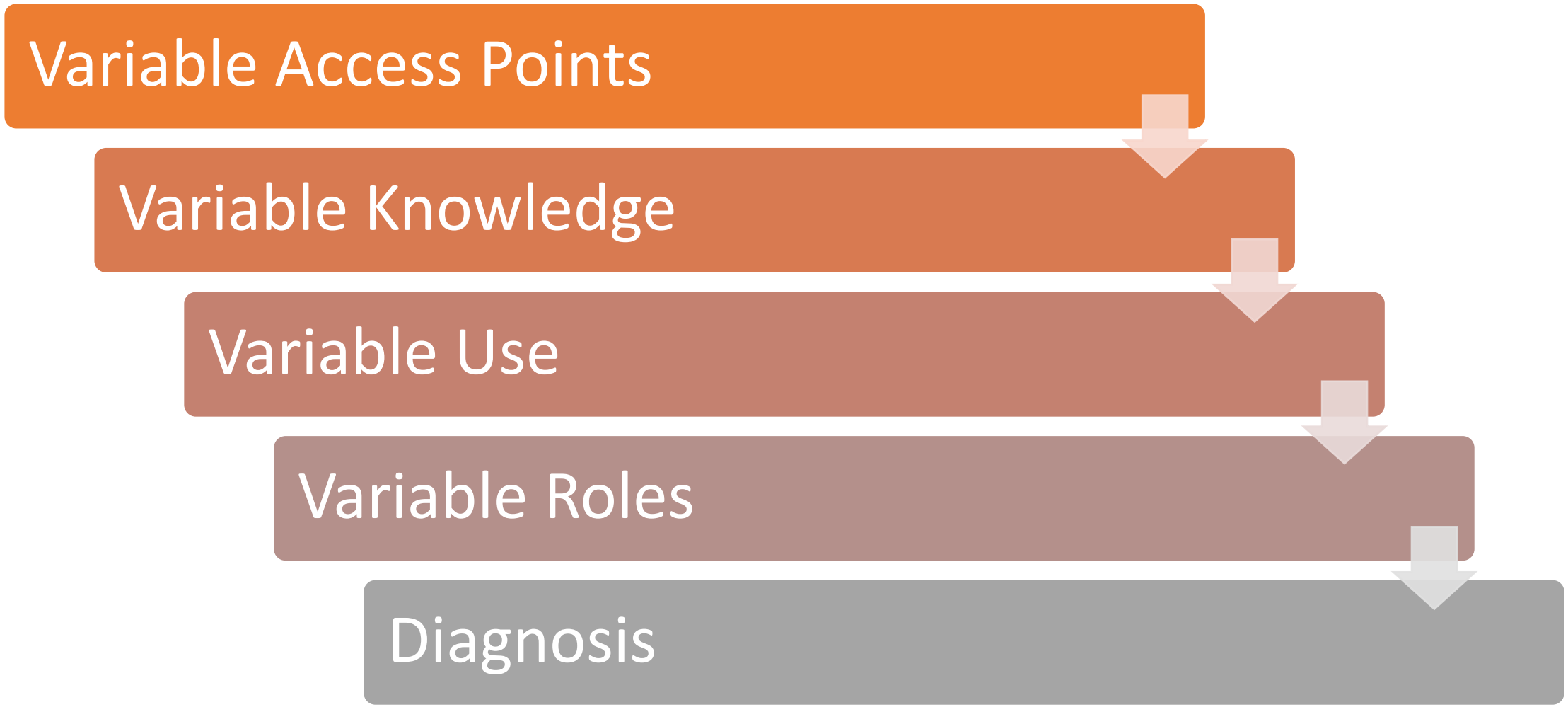
EHR – Primary Purposes

BILLING

QUALITY REPORTING AND REGULATORY COMPLIANCE

CLINICIAN DOCUMENTATION

Variability in Information Flow



Extracting Signs and Symptoms - State of the Art

EHR

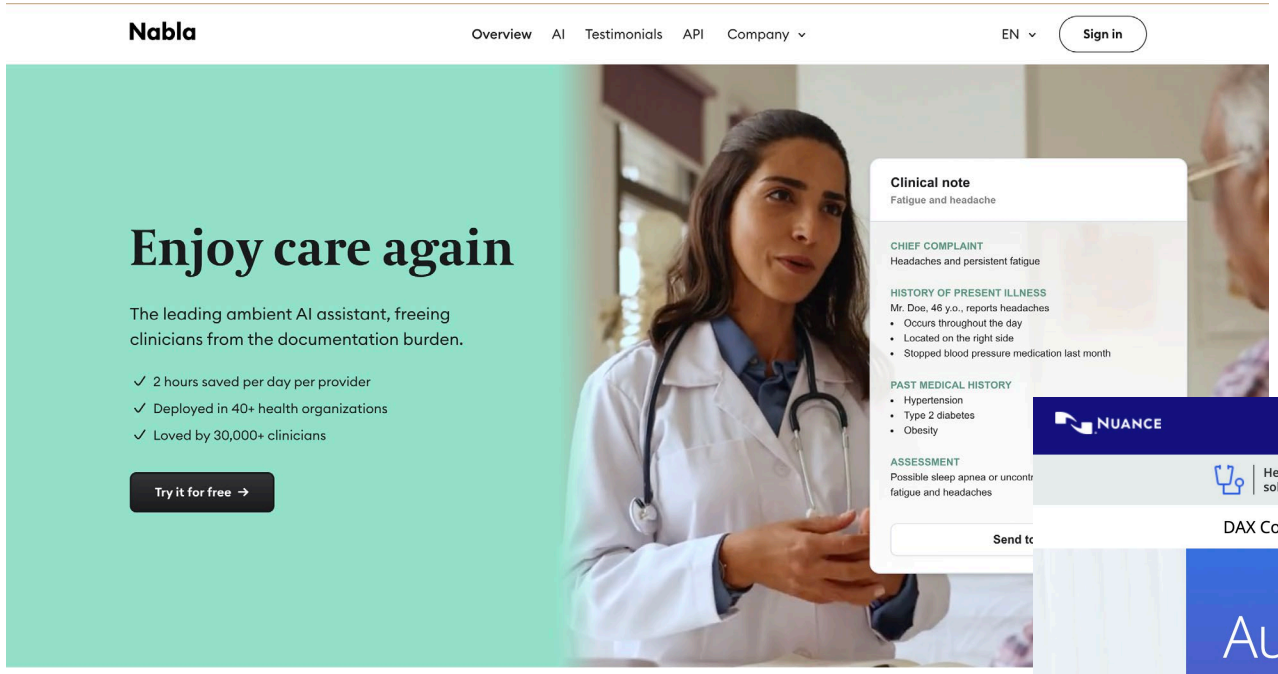
Copilot

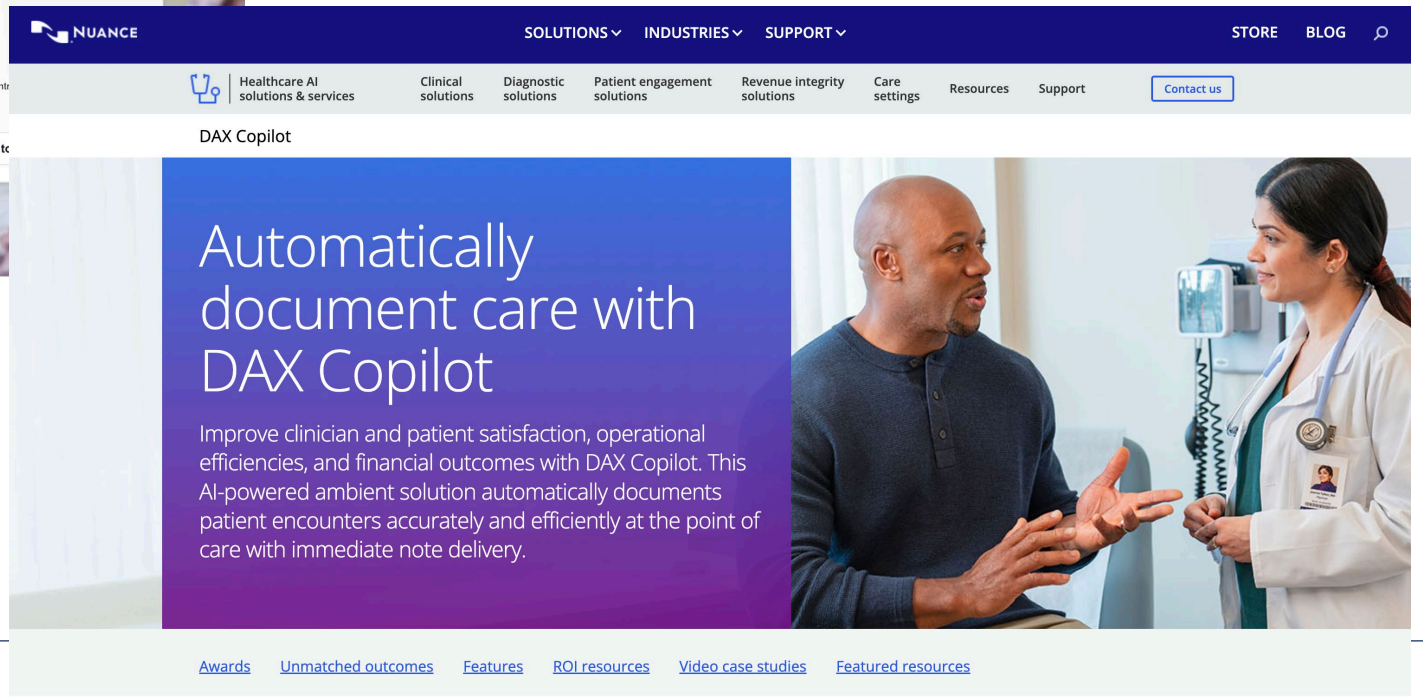
Your everyday AI companion

Multi-Modal Learning - State of the Art

- Natural Language Processing (NLP)
  - Human voice/writing → Computer language
- LLM models
  - Summarization of multiple streams of information
    - Scans
    - Labs
    - Note content
    - Vital sign in flowsheets
    - Image reports
  - Ambient voice recording

Ambient voice





Natural Language Processing (NLP)- State of the Art

- Things to consider
  - Variability of resources
  - Ethical issues
  - Algorithmic bias
  - Issues of validity and reliability

How is the diagnostic process capturing the patient experience?

Its not!

Thank you

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