Building Data Capacity for Patient Centered Outcomes Research

Nigam Shah
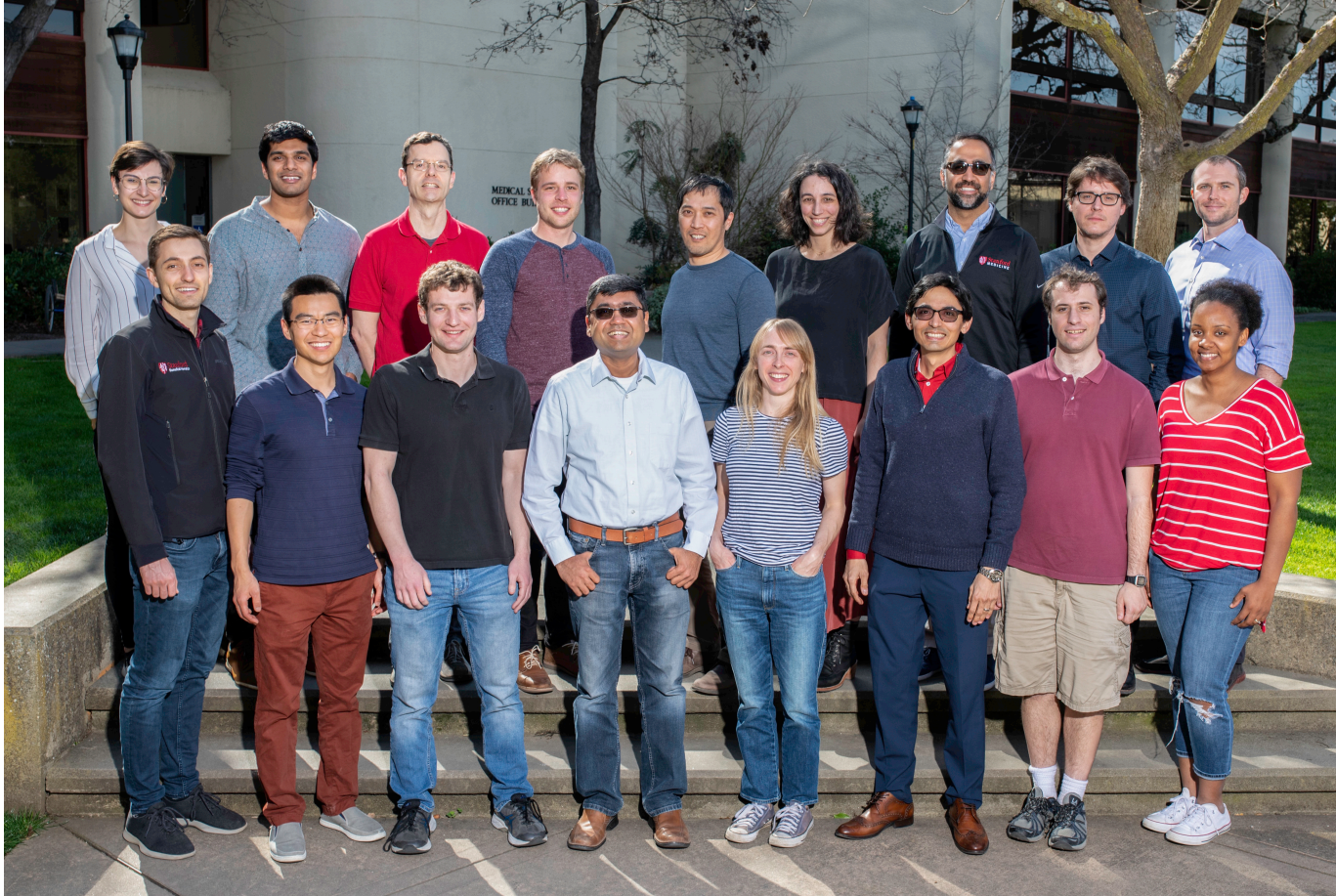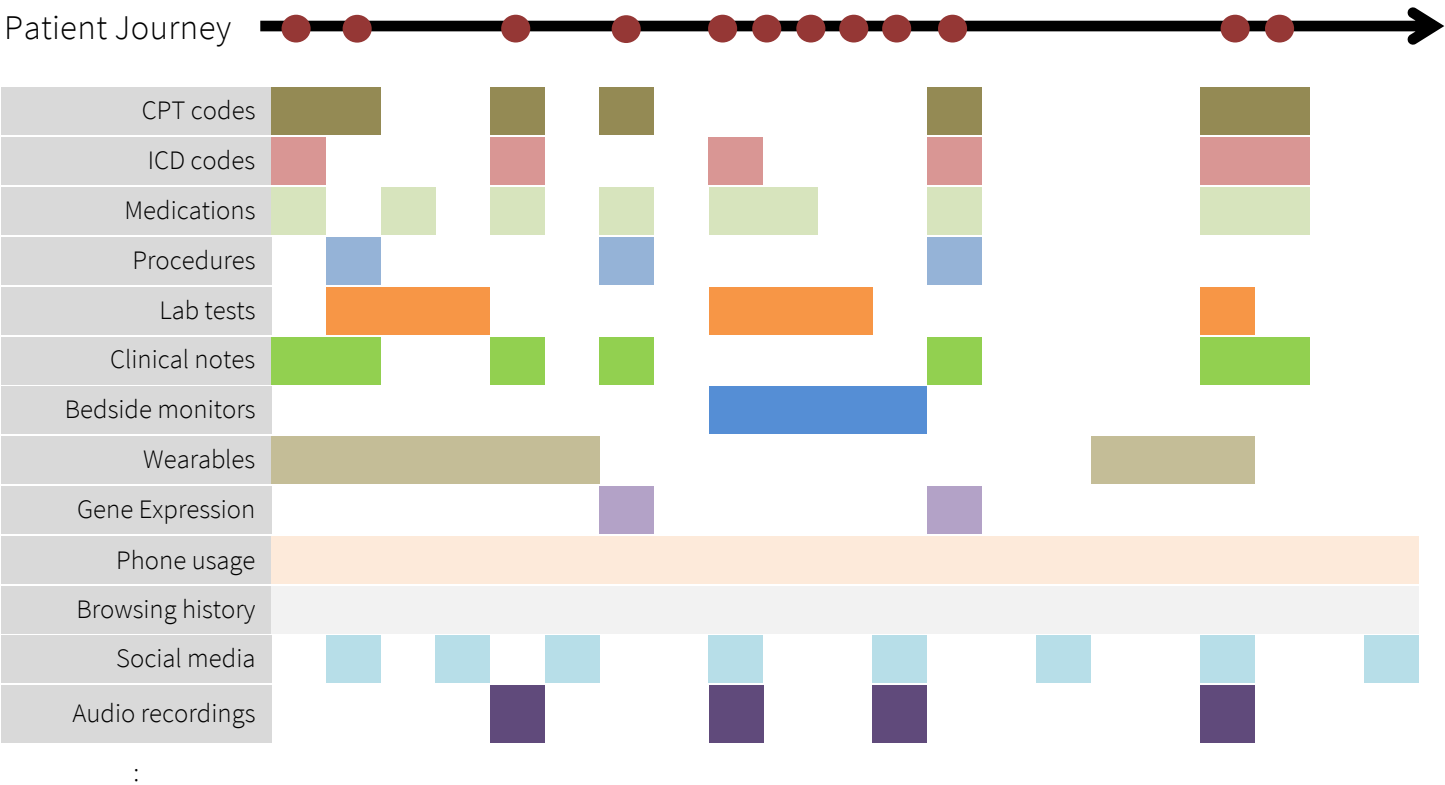
Acknowledgements
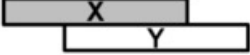
A patient timeline view of data

Patient Journey

CPT codes		
ICD codes		
Medications		
Procedures		
Lab tests		
Clinical notes		
Bedside monitors		
Wearables		
Gene Expression		
Phone usage		
Browsing history		
Social media		
Audio recordings		

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Perform interval algebra

Patients with a history of myocardial infarction who have pneumonia.

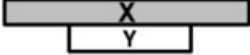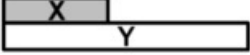Patient with T2DM who are uncontrolled with metformin.

Allen Statements		Pictoral Example
Relations	Inverse Relations	
X *before* Y	Y *after* X	X ▨ Y
X *equals* Y	Y *equals* X	X / Y
X *meets* Y	Y *met by* X	X / Y
X *overlaps* Y	Y *overlapped by* X	X / Y
X *contains* Y	Y *during* X	X / Y
X *starts* Y	Y *started by* X	X / Y
X *finishes* Y	Y *finished by* X	X / Y

Mate et al, A Method for the Graphical Modeling of Relative Temporal Constraints (Preprint)
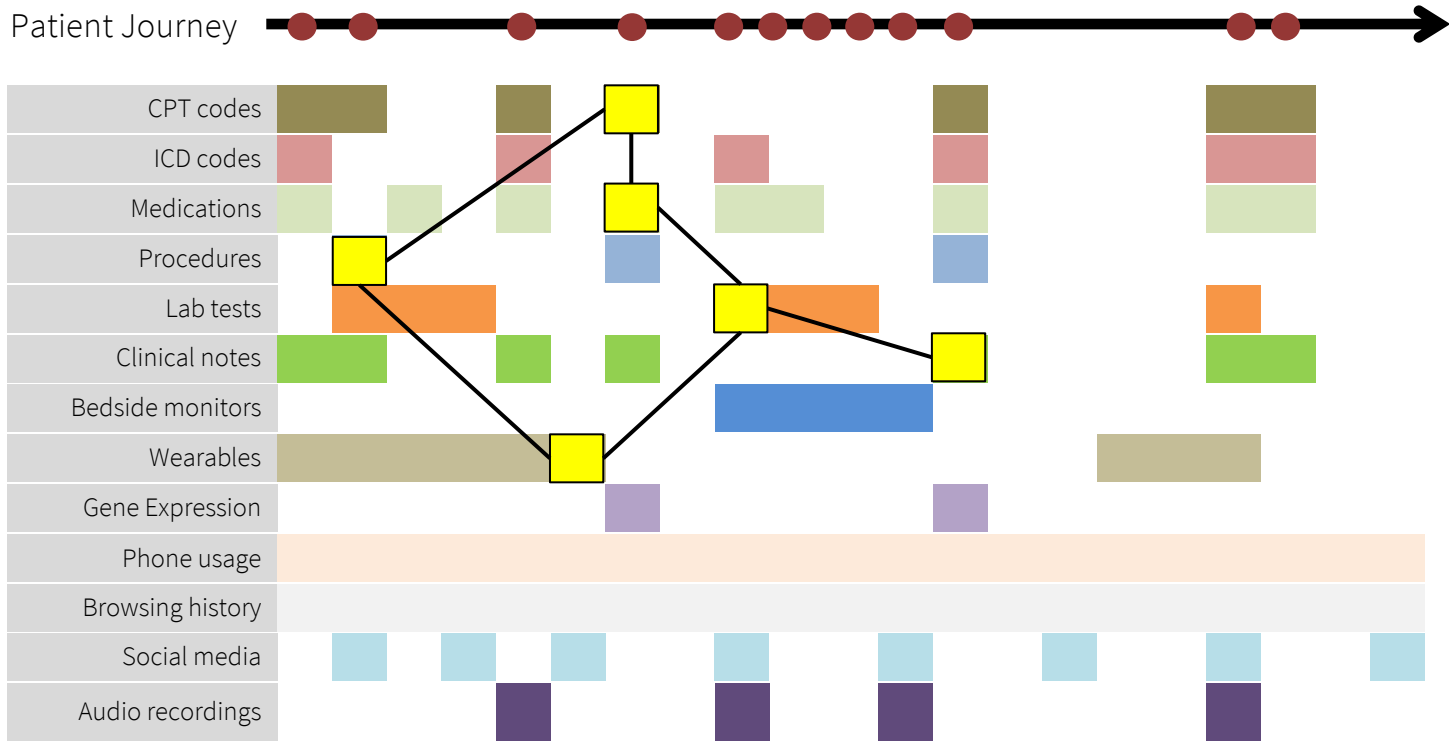
Navigate knowledge graphs

Patients with disorders of glucose metabolism.

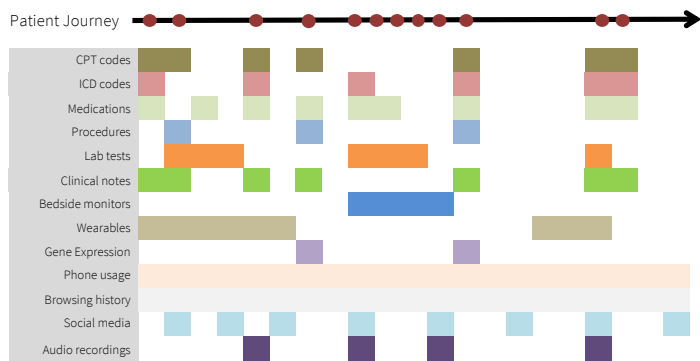Patient with treated with "beta blockers".
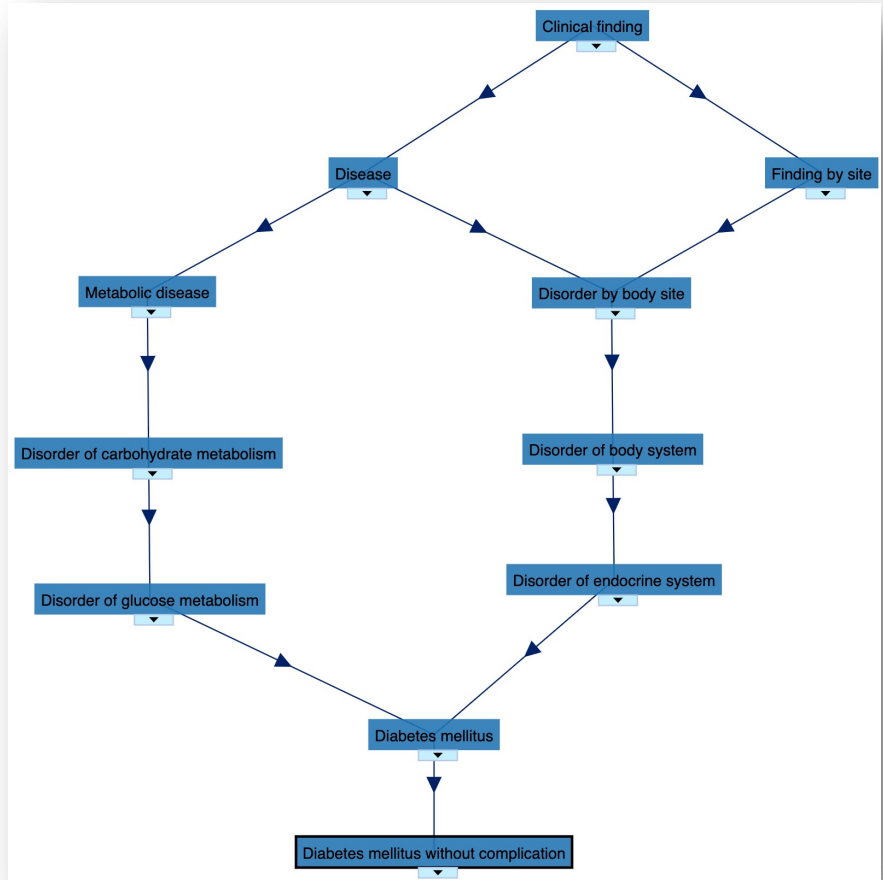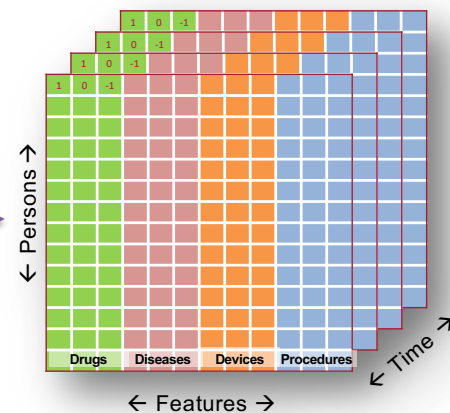
State phenotype definitions

Technology for timelines to data frames in real time

265 patients showing 50 - 100 range

ACE: the Advanced Cohort Engine for searching longitudinal patient records 🔓

Alison Callahan ✉, Vladimir Polony, José D Posada, Juan M Banda, Saurabh Gombar, Nigam H Shah   Author Notes

minutes 🔍➖➕   11

⟳ QUERY   ✕ CLEAR   ⬇ EVENTS   ⬇ PATIENTS

```
1  //patients with cryptogenic stroke, where we don't have an
      obvious reason for the stroke
2  var stroke = INTERSECT(OR(ICD9=434, ICD9=436), NOT(OR(ICD9=393,
      ICD9=394, ICD9=397.1, ICD9=398, ICD9=246, ICD9=424.9, ICD9
      =V43, ICD9=433.1, ICD9=431, ICD9=434.11, ICD9=434.01)), AGE
      (40 YEARS, 90 YEARS), VISIT TYPE="inpatient visit", NOT(TEXT
      ="heart valve prosthesis"), NOT(TEXT="disease of mitral
      valve"), NOT(TEXT="rheumatic heart disease"))
```

HIGHLIGHTS

▸ $AFIB
▸ $STROKE
▸ SEQUENCE($STROKE*, $AFIB) + (-5 ...

Closing thoughts

- We need to adopt the construct of a patient time (rather than tables, and data models)

- We need to upgrade the computational infrastructure to speed up "time to analysis ready data frame"

- We need a stronger focus on systems and software beyond "methods development"