

HEALTH NETWORKS AND DISPARITIES

Duke
UNIVERSITY

BASS
CONNECTIONS

DNAC
at the Social Science Research Institute



Primary Investigator: Jim Moody, PhD

Project Manager: Laura Sheble, PhD

Molly Chen, Emily Wu

Medicine tends to be problem-centric, focusing on conditions as separate. Is there a way to improve the comprehensiveness of diagnoses through a holistic analysis: which diagnoses tend to co-occur in patients of similar demographic groups?

AIM: Construct an interactive diagnosis network that allows users to explore patterns between disease categories and demographics as well as narrow down which health conditions tend to co-occur

Parse data into
format needed for
static graph



Create interactive
network interface



Construct ego-
network of closely
related conditions

DATASET:

1,048,576 entries (2007-2011)

Duke hospital records, Durham Cty.

Grouped by demographics:

- Age: 0-90+
- Race: White, Black, Asian, Latino
- Gender: M | F

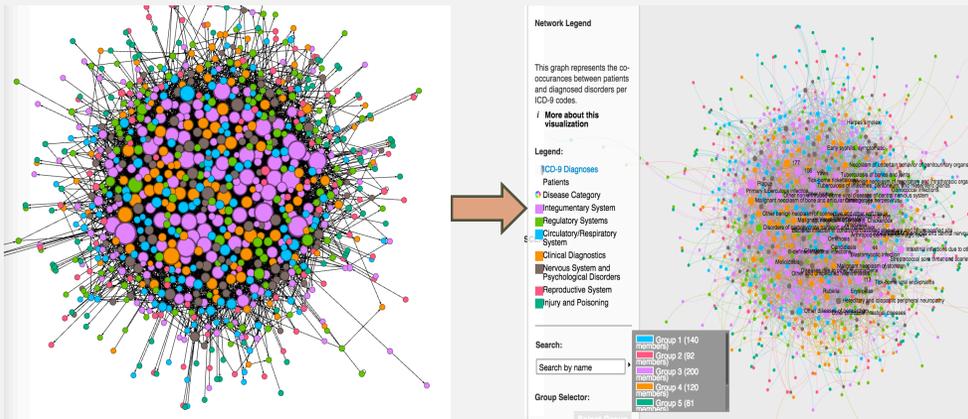
Diagnoses coded using ICD-9 codes

*In order to construct node-edge pairs, all patients kept in dataset were diagnosed with at least 2 conditions

CONSTRUCTING THE NETWORKS

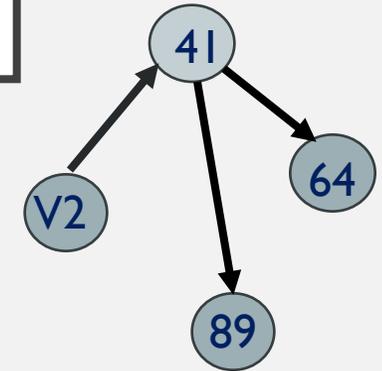
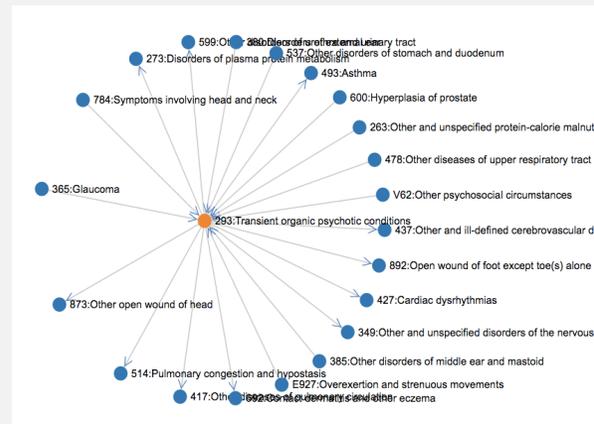
Global Network

- Parse CSV → JSON format, create node (diagnosis) and edge (patient) lists with source-target pairs and indices
- Run data in Gephi to create network with layout, color codes
- Add Sigma JS plugin to make network interactive



Ego Network

- Consist of focal node and neighbors
- Use force-directed D3 layout to map nodes near related disorders
- Uses search algorithms to match user input with corresponding diagnosis entry
- Displays neighboring diagnoses



- Each node represents a diagnosis
- Each edge represents a patient
- *Earlier diagnoses* → *Later diagnoses*

Health Networks and Disparities

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What is this tool, and what can it be used for?

Medicine tends to be problem-centric: a patient presents a particular condition, and the health care provider attempts to solve each problem as it is presented. A more effective approach to healthcare is to holistically examine other medical problems that commonly co-occur in similar patients. A diagnosis network of comorbid health conditions can help not only medical professionals but also patients and the general public to view which health conditions are commonly associated with a disease of interest. The tool also accounts for disparities by race, gender and age, helping identify trends and opportunities to reduce disparities in care.

This is an interactive web-based network tool created by a team at [Duke University](#) under the program [Data+](#), funded by the [Duke Social Science Research Initiative \(SSRI\)](#) and the [Information Initiative at Duke \(IID\)](#). The tool allows users to see which health conditions co-occur.



