Visualizing Clinical Data of Patients at the Child and Adolescent Psychiatric Emergency Unit

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Background

- Child and Adolescent Psychiatry Unit (CAPE) only short-stay psychiatric ward in the province for 17 year old or younger patients
- Common presentation: suicidality, depression, psychosis
- Ongoing large multi-disciplinary project to collect data on patients and use for suicide prediction

Motivation/Who

We posses a manually created database covering around 333 patients

Would like to visualize their data!

Vis would allow exploration to learn about out patients

Little previous work looking at this!

Users: hospital managers, psychiatrists, researchers

Motivation/Who

Example Questions:

- Do our patients follow expected patterns of illness e.g. more depression in the fall, mania in the spring?

- Is medication use consistent with evidence-based guidelines?

- Do psychotic disorders increase with age?

Motivation/Who

Important consideration:

- Current physician workflows incorporate very little technology, and very little vis

- Doctors are very scared of complicated Vis!

- Our Vis must be very simple, at least initially

Actions/Why

- **Consume**
  - Discover- definitely!
  - Present – maybe?
  - Enjoy – no!
- **Produce**
  - Probably not yet, maybe in the future?
- **Search**
  - Explore/browse more than others, but likely all search tasks.
- **Query**
  - Summarize, compare important

Actions/Why

- Filtering is a key features
- Users will likely not want to view all data at once
- Different users may have widely different use cases

Data/What

Items = patients = 333

Attributes (Categorical, Ordinal, Quantitative)

- Diverse dataset!
- For this project, decided to focus on most important
- Privacy considerations also limited data selection

Data/What

Quantitative/Ordinal Attributes

• Age

• School grade

• Month of admission

Binary Attributes

• Prior admission?

• Transferred from a different hospital?

• Psychiatrist follow up?

• Brought in by police/parents/etc

Data/What

Categorical Attributes

History:
- Psychiatric and other diagnoses
- Medications
- Substance use (alcohol, cocaine...)
- Ethnicity

Data is hierarchical! E.g.

Data/What

- Diagnosis
  - Psychotic Disorders
    - Schizophrenia
    - Brief Psychotic Episode
  - Depressive Disorders
    - Major Depressive Disorder
    - Persistent Depressive Disorder
- Medications
  - Antidepressants
    - Fluoxetine
    - Sertraline
  - Antipsychotics
  - Sedatives
  - Stimulants

Data also is also repeated for different time periods….

Data/What

- Diagnosis
  - Diagnoses at admission
  - Diagnoses at discharge
- Medications
  - Medications in last 12 months
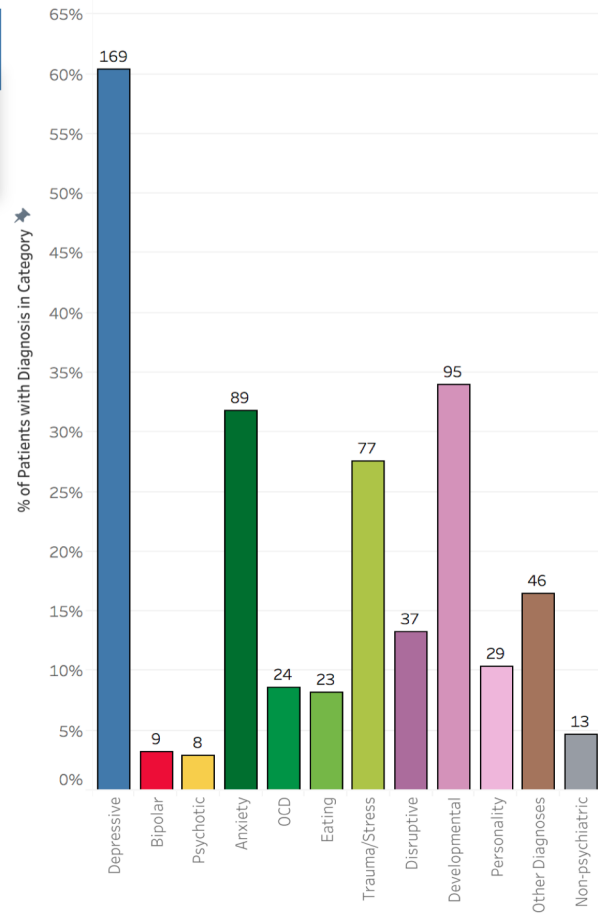 - Medications on admission
  - Medications on discharge
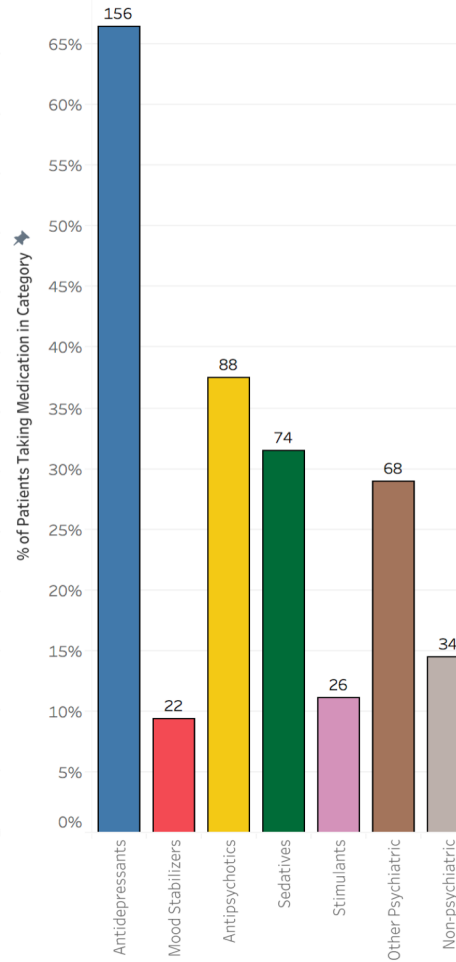
Lets go through Demo

Scalability

- Attributes
  - Using the drop down menu, additional views could be added
  - Nesting could allow more
  - Likely could fit as many as one could realistically want in clinical data
  - Different levels of diagnosis/medication hierarchy could be used

Scalability

- Items
  - We do not show individual patients
  - Vis could show data based on as many patients as desired
  - Computationally would need optimization, expect could support as many as could feasibly want

- **Vis could likely handle clinically relevant number of attributes/items**

Lessons Learned

- PF-20: premature design commitment: consideration space too small/ PF-22 non-rapid prototyping
  - Too much time before first vis'ing
  - Once vis'd, design choices were much more obvious
  - Iteration much better than implementing all at once
  - Tamara told us so ☺
  - Due to changing tools, wanting to perfect design

Lessons Learned

Scope:

- Next time, start with very, very small range of data to vis
- And then build from there!

Tool choice:

- Tableau allowed some quick and pretty vis
- Should have done more pre-processing with Python (pivots uuughhh)
- Tough for group projects due to version control, etc

Future Work

- Extending the current vis
  - More attributes
  - More filtering/persistent filtering
  - Allowing an explicit compare function
- Automation
  - Eventually goal is to use data from an NLP pipeline being developed
  - Would take clinical documents as input, output this vis
  - Would need extensive work on automatically categorizing, cleaning, etc.

Questions?

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