Using Big Data to to Predict Risk of Aggression in Autistic ED Patients at CAMH

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Agenda

- **Background**
  - Introduction to predictive care
    - Role of machine learning (ML)
  - Introduction to autism and psych care
- **The Present Study**
  - Rationale
  - Methods
  - Demographic results

Background

Predictive Care & ML

- Using artificial intelligence developments to enhance outcome prediction in medicine
  - Big Data + Small Data
  - E.g., predicting suicide, aggression, or readmission
- **Could it perpetuate inequities?**
  - ML models may be biased due to biased datasets
  - **What do we do?**

Sikstrom et al., 2022
Sikstrom et al., 2023

Violence Prediction at CAMH

- Structured risk assessments (e.g., DASA)
  - Patients rated on behavioural antecedents such as irritability, sensitivity to perceived provocation, and impulsivity
- Process
  - Nurses enter narrative details about patients throughout the day
  - The next morning, another nurse rates pt using the DASA based on the notes
  - Higher scores -> higher likelihood of aggression?

Sikstrom et al., 2023

DYNAMIC APPRAISAL OF SITUATIONAL AGGRESSION: INPATIENT VERSION

The following ratings are based on your knowledge and observations of the patient during the **PREVIOUS 24 HOURS**. Well known patients are scored a 1 for an increase in the behaviour described, the patient's usual behaviour while being non-violent is scored as 0.	Mon (circle one)	Tue (circle one)	Wed (circle one)	Thu (circle one)	Fri (circle one)	Sat (circle one)	Sun (circle one)
Irritability – the patient is easily annoyed or angered. The patient is unable to tolerate the presence of others	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Impulsivity – the patient displays behavioural and effective instability (i.e. dramatic fluctuations in mood, or general demeanour, inability to remain composed and directed)	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Unwillingness to follow directions – the patient tends to become angry or aggressive when they are asked to adhere to treatment or to the ward's routine.	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Sensitivity to perceived provocation – the patient tends to see other people's actions as deliberate and harmful: they may misinterpret other people's behaviour or respond with anger in a disproportionate manner to the extent of provocation	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Easily angered when requests are denied – the patient tends to be intolerant, or is easily angered when they make a request that is denied or when they are asked to wait	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Negative attitudes – the patient displays entrenched antisocial and negative attitudes and beliefs which may relate to violence and aggression	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Verbal threats – the patient displayed a verbal outburst, which is more than just aq raised voice, and where there is a definite intent to intimidate or threaten another person	0 1	0 1	0 1	0 1	0 1	0 1	0 1
Total							

Introduction to Autism

- **Neurodevelopmental condition**
  - Differences in social interaction and communication
  - Repetitive behaviours and intense interests
- **Autistic people may:**
  - Struggle with verbal and nonverbal communication
  - Have a hard time reading social cues
  - Have intense circumscribed interests
  - Often experience mental health conditions

American Psychiatric Association, 2013

Autism & Psychiatric Care

- Equity-deserving group - more likely to:
  - Have psychiatric conditions
  - Visit psychiatric EDs
  - Get restrained/sedated in EDs
    - False positive predictions?
    - Traumatic for the patient

Lunsky et al., 2015
Lunsky et al., 2017

Challenges

- Social communication
  - Differences in communicating emotions and distress
  - Double empathy theory?
- Sensory sensitivities
  - The ED is LOUD
  - Bright lights & how busy it is
- Gender?
- Contribute to actual or perceived risk of violence?

American Psychiatric Association, 2013
Milton, 2012
Nicholas et al., 2016

Stigma is a huge factor!

The Present Study

Methods: Part 1 (Quantitative)

- Aim: examine factors that contribute to violence in autistic patients in the CAMH ED
- Electronic Health Record (EHR) data from 10,236 unique patients across 17,703 visits from 2016 to 2022
  - Demographics
  - Primary diagnoses
  - DASA ratings
  - Wait times/time of day/number of other patients?

Demographics

- 148 unique patients with primary diagnoses starting with "auti" or "asp"
  - Gender: 74% male, 22% female, 4% other
  - Age: mean = 28.14, SD = 11.38, range = 17-80
- 270 encounters:
  - Legal status: 62% NA, 16% Form 1, 16% voluntary, 4% involuntary
  - Source: 60% police, 34% self, 6% other

Methods: Part 2 (Qualitative)

- 3-5 focus groups with former ED patients who are autistic
- Online and in-person option
- Semi-structured interviews
- Capturing their ED experience
- Ideas for improving ED accessibility

Autistic Patients' Experiences in the CAMH Emergency Department: Focus Group Guide

1. What were some instances during your ED visit when you felt well taken care of? Please describe.
2. What were some instances during your ED visit when you did not feel well taken care of? Please describe.
3. What were your expectations from your ED visit? Were they met?
4. Have your sensory processing differences impacted your ED experience? If so, how?
5. Have your social communication differences impacted your ED experience? If so, how?
6. What would be helpful for ED staff to know to provide better care for autistic patients?

Next Steps

- Continue exploring the dataset
  - Calculate wait times and access DASA scores
- Feature engineering
  - Focus on factors that predict DASA scores and instances of aggression -- false positives?
- Wait for ethics review for the qualitative part

Limitations

- Primary/secondary dx
- Language impairment + intellectual disability
- Only patients who are admitted receive DASA scores
- Reasons for attending the ED?

Questions?