VULNERABLE PATIENTS, AI, AND THE LAW OF NEUROSURGERY FOR PSYCHIATRIC DISORDERS

Jennifer Chandler
Bertram Loeb Research Chair
Faculty of Law
University of Ottawa

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A long history of technological change

- Early functional/psychiatric neurosurgery and electrical neuromodulation
  - At least 8000 years of trepanation.
  - At least 2000 years of electricity in medicine – electric rays and eels.

- Continuous technological evolution
  - 1930s – Lobotomy and ECT

- Next wave – AI in brain stimulation
  - The need for a new understanding of vulnerability
Evolution of DBS technology

- “Open loop” (conventional)
  - Always “on”
- “Closed loop” (responsive, adaptive, bi-directional)
  - Initially developed for epilepsy
  - Detects onset of symptoms
  - Delivers stimulation as needed
  - Well-suited to episodic, fluctuating symptoms
- Now what?
The future of adaptive DBS? “Intelligent adaptive DBS”

- Co-evolution of technology and applications.
  - Dramatic expansion in target conditions
- New signals
  - Peripheral biomarkers
  - Chemical biomarkers
  - Wearable devices
  - Environmental cues
  - Geolocation - GPS
- AI techniques
  - Machine learning for better symptom prediction models across wide range of states
  - “Reinforcement learning”
Existing laws – typical topics covered

- Restrictions on eligibility
  - Ban for everyone
  - Ban for specific populations
    - Minors
    - Incapable patients
    - Involuntary psychiatric patients
    - Prisoners
  - Additional oversight requirements
    - For everyone
    - For specific vulnerable populations
- Record-keeping and reporting requirements
Protecting vulnerable patients - eligibility restrictions

• An example from Ontario:
  • “s.49(1) Psychosurgery shall not be administered...to a person who is incapable of giving or refusing consent on his or her own behalf...” (*Mental Health Act* RSO 1990, c M.7)
  • In other words – no surrogate consent allowed.

• The central ethico-legal dilemma:
  • Protecting by foreclosing access.
  • “An example where a surrogate decision-maker may intervene could be a person with extremely low IQ with extreme autoaggression. There are known cases who perform laparotomy on themselves or pull out one eye and the second eye is in danger. If no other therapy would help, one may think of a neurosurgical procedure that decreases the likelihood of extreme autoaggression.”

Vulnerability and “intelligent” adaptive DBS

- Consent and the “shifting self”
  - Shifting attitudes to treatment-induced personality and behaviour changes.
    - 62-year old Dutch man preferred psychiatric hospitalization to immobility with Parkinson’s.

- Who should decide for the capable, but altered, patient?
  - An example
    - 33-year old German man who experienced euphoria as a result of DBS for OCD.
Vulnerability and “intelligent” adaptive DBS

• Ulysses agreement justified to protect the vulnerable self?
  • Ulysses agreement or contract – An agreement that binds the future capable person.
  • Agreement to discontinue treatment at specified intervals to allow for re-assessment of treatment effects by “original” person.
QUESTIONS AND COMMENTS

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