Underpinnings of Adult ADHD: Prevalence, Comorbidities, Diagnosis and Treatment

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Disclosures: Sara K. Binder, MD, FRCPC
- Janssen – Speaker honoraria, Ad Board
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Objectives
Adult ADHD:
- Prevalence
- Impact
- Symptom Identification
- Diagnostic clinical tools
- Common comorbidities – DDx
- First-line treatments

How might ADHD impact my practice?

Impact of Untreated and Under-Treated ADHD

Health Care System
50% in bike accidents
33% in ER visits
2-4 x more motor vehicle crashes

School & Occupation
46% Expelled
35% Drop Out
Lower Occupational Status

ADHD Patient

Employer
- Absentism
- Productivity

Family
3x Parental Divorce or Separation
2-4 x Sibling Fights

Society
Substance Use Disorders (SUD)
2 X Risk
Earlier Onset
Less Likely to Quit SUD in Adulthood

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How might ADHD impact my practice?

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**ADHD Sufferers in Canada in 2011**

(Statistics Canada)

<table>
<thead>
<tr>
<th></th>
<th>ADHD in children, teens (age 5–19)</th>
<th>ADHD in adults (age 20–64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Population (estimates)</td>
<td>5,931,717</td>
<td>21,550,449</td>
</tr>
<tr>
<td>Prevalence [%]</td>
<td>6%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Patients with ADHD</td>
<td>355,903</td>
<td>948,219</td>
</tr>
<tr>
<td>% Diagnosed &amp; Treated</td>
<td>33%</td>
<td>7%</td>
</tr>
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<td>117,448</td>
<td>66,375</td>
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How many adults are left untreated? 881,844

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**Regions of the Brain Involved in Executive Functioning**

7. Wolf et al. *Hum Brain Mapp*.

**Monoamines Communicate**

**Monoamines Related to Clinical Effects**

- 5-HT
- DA
- NE

**Vigilance**
- Energy
- Motivation
- Cognition

**Arousal**
- Sleep
- Mood
- Sex
- Appetite
- Aggression

**Impulsivity**
- Reward
- Movement

- **SNRI, NRI Increases Extracellular DA & NE in PFC**
- **SSRI Decrease Extracellular DA & NE in PFC**

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**Understanding the Neurobiology of ADHD**

- **Prefrontal Cortex**
  - Judgment, analysis
  - Problem solving
  - Critical and forward thinking

- **Cingulate Gyrus**
  - Sustaining & shifting attention
  - Flow of thoughts
  - Collaborate/adapt

- **Cerebellum**
  - Cognitive dysfunction
  - Reading difficulties
  - Poor concentration
  - Flow/sequence of activity

- **Caudate Nucleus**
  - Emotions

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**Lifecycle of ADHD**

1. Hyperactive as child
2. Drop out of school
3. Accidents
4. Alcohol/Substance Abuse
5. Parent Relationship Issues
6. Job performance
7. ADHD Sufferers in Canada in 2011 (Statistics Canada)

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- Total Population (estimates) 21,550,449
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IDENTIFICATION

Symptom Buckets
COMBINATION of symptoms = MAJORITY of patients (50-75%)

INATTENTIVE

HYPERACTIVE

IMPULSIVE

Inattentive type increases with age while hyperactive type decreases

Prevalence of ADHD Presentations

ADHD - Inattention Symptoms

Childhood
- Difficulty sustaining attention for homework, chores
- Loses things
- Appears to be not listening
- Trouble with follow through
- Daydreams

Adulthood
- Difficulty sustaining attention in meetings, at work and for household responsibilities
- Disorganized, poor time management
- Inefficient, slow to complete work
- Procrastinate
- Trouble with follow through – don’t do what they promised
- Complaint of poor memory, forgetful

ADHD - Hyperactive Symptoms

Childhood
- Can’t sit in seat, squirming, fidgeting, always on the go
- Can’t work or play quietly, runs, climbs excessively
- Intrudes and interrupts others
- Talks excessively
- Restless
- Impatient

Adulthood
- Can’t sit through meetings (checking email, scribbling notes)
- Toe tapping, leg bouncing, chew nails, click pens
- Drives fast, likes active jobs
- Always on the go
- Inner restlessness

ADHD – Impulsive Symptoms

Childhood
- Can’t wait turn, blurts out answers
- Intrudes and interrupts others
- Quits school, gets into trouble with law
- Rushes into things
- Takes risks
- Accident prone
- Impatient/Interrupts

Adulthood
- Doesn’t think about consequences
- Makes impulsive comments (“too mental filter”)?
- Browses/interrupts
- Risk taking – spending, spending, substances, sex
- Relationship and mental difficulties
- Frequent job/career changes
- Impatient (hates waiting in lines)
Case 1: Marie
- 36y/o, married mother of 2 boys – 7y & 4y
- 6 months pregnant
- Works full time in healthcare, masters level education
- Binge Eating D/O from early childhood
- First Depressive episode in late teens
- Manic Episode with psychotic features at 20y/o in the context of moving away from home to work in high stress job, sleep deprivation, few supports
- Hospitalized, diagnosed with Bipolar I and treated with Lithium

Past Psychiatric History
- For the next few years intermittently compliant with Li
- Manic-like symptoms in the fall and depressive symptoms in the winter, no further hospitalizations
- Initiated individual therapy and Eating D/O treatment
- D/C Lithium after first child, stable for last 7 years

Current Symptoms
- Struggles at work due to disorganization, procrastination, behind on paperwork
- Difficulty maintaining household chores, kids schedules, groceries, bills etc
- Binge eating to cope with intense emotions
- Relationship struggles with spouse related to parenting and household management
- Mild depressive Sxs related to situation
- No current manic symptoms

Anxiety screen:
- Constant worries about feeling inadequate, not fitting in, work performance, not keeping up
- Future worries about children, one of whom has ASD and ADHD
- Long history of fearing judgment and criticism, avoidance of crowds and social gatherings
- No OCD, PTSD or Panic D/O

Substance Use:
- Minimal Etoh pre-pregnancy, no drugs
- 4 cups of coffee/day pre-pregnancy, currently 2 cups/day

ADHD Screening
- Childhood:
  - Lifelong problems with organization and time management
  - Never able to read a full book, only abstracts
  - Trouble attending to details, “Big Ideas Person”
  - Always in trouble with parents due to disorganization
  - Never performed as well academically as her IQ would suggest
  - “faked her way through school”
  - Put in huge efforts with limited results
  - Always procrastinated
  - Shy and a “daydreamer” at school

ADHD Screening
- Adulthood:
  - Failed some courses in university, academic probation
  - Not reaching her potential at work
  - Behind on paperwork
  - Easily overwhelmed by household tasks/chores
  - Has needed to over-control her environment to cope
  - Always loses keys, phone, wallet, glasses
  - Often late or forgets appointments
Marie

Medical History:
- No serious head injury or LOC, no seizure history
- Hypothyroid while on Li and briefly treated with Synthroid
- Normal BP, no cardiac history

Family Psychiatric History
- Father: ADHD, ASD, OCD
- Mother: significant mood dysregulation, ? BPD
- Sister: severe anxiety
- Son: ASD, ADHD

Differential Diagnosis
- ADHD, Inattentive presentation
- Social Anxiety D/O
- Binge Eating D/O
- R/O Generalized Anxiety D/O
- Historical Dx of Bipolar I

What next?...
- ADHD screening
  - ASRS
  - Barkley Childhood and Current Self/Other Symptom Scales
  - Weiss Functional Impairment Rating Scale
- Collateral from Spouse/Parents
  - Mood log to R/O Bipolar D/O

When to Screen?
Patients presenting with:
- Major Mood and Anxiety D/O (including poor response to treatment)
- Drug abuse or drug dependence
- Family history or children with ADHD
- Poor school performance as a child and/or university (not reaching potential)
- Frequent job changes or moving often
- Frequent driving infractions
- Higher number of accidents than average population
- Forgetfulness (late or missed appointments, trouble with adherence to medications)
- Lack of follow-through on therapeutic “homework”

Screening Tools
- ADHD Self-Report Scale (ASRS v1.1)
- Barkley Childhood and Current Symptom Scales
- Wender Utah Rating Scale
- Delta Education Screener
- Jerome Driving Scale
- Weiss Functional Impairment Scale
6. How often do you feel overly active and compelled to do things, like you are driven by a motor?

4. When you have a task that requires a lot of thought, how often do you avoid or delay getting started?

2. How often do you have difficulty getting things in order when you have to work on a project, or when you have appointments or obligations?

1. How often do you have trouble wrapping up the final details of a project, or when you have to remember appointments or deadlines?

18. How often do you interrupt others when they are busy?

17. How often do you have difficulty waiting your turn in situations when turn taking is required?

15. How often do you find yourself talking too much when you are in social situations?

14. How often do you have difficulty unwinding and relaxing when you have time to yourself?

12. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?

11. How often are you distracted by activity or noise around you?

10. How often do you misplace or have difficulty finding things at home or at work?

9. How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?

8. How often do you have difficulty keeping your attention when you are doing something that requires a lot of thought?

7. How often do you make careless mistakes when you have to work on a task to which you are highly committed?

Inner Feeling of Driven by a Motor

Avoid Tasks Requiring ++ Thinking

1. Inattention: Never

2. Inattention: Rarely

3. Inattention: Sometimes

4. Inattention: Often

5. Inattention: Very Often

6. Hyperactivity – Impulsivity: Never

7. Hyperactivity – Impulsivity: Rarely

8. Hyperactivity – Impulsivity: Sometimes

9. Hyperactivity – Impulsivity: Often

10. Hyperactivity – Impulsivity: Very Often

ASRS Screener v1.1

1. Inattention

2. Hyperactivity – Impulsivity

Significant items in red (*p<0.05); Likely to have ADHD with ≥ 4 significant items

HOW TO CONFIRM DIAGNOSIS

Attention Deficit Hyperactivity Disorder – DSM 5

- Diagnostic criteria (American Psychiatric Association Diagnostic and Statistical Manual (DSM-5))
  - > 5 of 9 symptoms of inattention X > 6 mos.
  - or
  - > 5 of 9 symptoms of hyperactivity-impulsivity X > 6 mos.
- Onset prior to age 12 years
- Impairment in more than one setting (e.g., both school and home)
- Social, academic, or occupational impairment
- Symptoms not accounted for by another mental disorder such as a psychotic disorder, mood disorder, anxiety disorder, etc.
- Presentations:
  - Inattentive
  - Hyperactive-Impulsive
  - Combined (most common)

WHAT ARE COMMON COMORBIDITIES?

CANMAT Guidelines 2012 and Comorbidities

- Mood disorders and ADHD frequently co-exist in same families with both disorders, the tendency for comorbidity also is inherited
- Clinicians should routinely assess patients with Bipolar Disorder and MDD for comorbid ADHD and distinguish ADHD from syndromal and subsyndromal mood symptoms

Depression

- Episodic
- Anhedonia
- Consistent low mood (2 weeks)
- Poor Concentration
- Weight loss/gain
- Worthlessness
- Low energy
- Psychosis (rarely)
- Suicidality
- Insomnia – initial, mid, term. Usually occurs in late 20’s

Bipolar Mood Disorder

- Childhood onset
- Affective Instability (with rapid recovering)
- Selective Enthusiasm
- Demoralized during life transitions
- Talkativeness
- Concentration (chronically poor unless really interested)
- Initial Insomnia(73%), restless sleep(80%) or sleep/wake reversal
- Onset during childhood

Presentation of Depression and ADHD

Poor concentration, attention and memory, sleep problems, difficulty with task completion

Presentation of ADHD and Bipolar Mood Disorder

ADHD

- Lifelong
- Childhood onset
- Reactive mood
- Congruent mood
- Impulsive changes
- 1-2 days of increased goal directed behaviour with decreased sleep related to a deadline/interest/project
- Scattered thoughts
- Low self-esteem
- Family history of ADHD

Bipolar Mood Disorder

- Cyclic
- Early + late onset
- Objective change from baseline
- Decreased need for sleep
- Increased energy
- Non-congruent mood
- Grandiosity
- Family history of bipolar affective disorder

Prevalence of Depression in Adults With and Without ADHD

<table>
<thead>
<tr>
<th>Depression</th>
<th>Dysthymia</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.8%</td>
<td>1.9%</td>
</tr>
<tr>
<td>18.6%</td>
<td>12.8%</td>
</tr>
</tbody>
</table>

p=0.05 for both comparisons

Presentation of ADHD and Anxiety:

**ADHD**
- Childhood onset
- Restless
- Irritable
- Perseveration
- Easily overwhelmed
- Worries related to untreated ADHD symptoms – losing, forgetting, procrastinating, blurring, interrupting, risk taking

**Anxiety**
- Excessive worry causing physical symptoms
- Panic attacks with fear of recurrence
- Fear of being judged
- Repetitive, intrusive thoughts
- Compulsive behaviours to relieve anxiety
- History of trauma with flashbacks, hyperarousal and avoidance

Anxiety disorder may attenuate impulsivity related to ADHD

Differential Diagnosis of Personality Disorders and ADHD

**ADHD**
- Oblivious
- Unable to manage activities of daily living
- Self-esteem poor rather than unstable
- Non-malicious (remorseful immediately following impulsive act)
- Intense affect with quick recovery and no self harm

**Personality Disorders**
- Manipulative
- Empty
- Absence of remorse
- Deliberate cruelty
- Generates antipathy in others rather than frustration
- Lack of empathy
- Feelings of emptiness
- Fear of abandonment
- Self harm
- Mood Dysregulation

CADDRA Guidelines 2014

**TREATMENT**

**Biological Management**
- Establish treatment goals
- Discuss reasonable expectations of treatment, including possible medication side-effects
- Use long-acting stimulants
  - Start with lowest dose
  - Evaluate symptoms/side effects every 2 weeks using ASRS
- Re-evaluate treatment goals

**CADDRA Guidelines 2014**

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Dosages (mg)</th>
<th>Starting Dose (mg)</th>
<th>Weekly Titratin (mg)</th>
<th>Maximum Dose (mg)</th>
<th>Duration of Efficacy (hours)</th>
</tr>
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<tbody>
<tr>
<td>Adderall XR</td>
<td>5, 10, 15, 20, 25, 30</td>
<td>10</td>
<td>10</td>
<td>20-30</td>
<td>10 - 12</td>
</tr>
<tr>
<td>Biphentin (MHP HCL)</td>
<td>10, 15, 30, 40, 60, 80</td>
<td>10-20</td>
<td>10</td>
<td>80</td>
<td>10 - 12</td>
</tr>
<tr>
<td>Concerta (OROS MPH)</td>
<td>18, 27, 36, 54</td>
<td>18</td>
<td>18</td>
<td>72</td>
<td>10 - 12</td>
</tr>
<tr>
<td>Vyvanse (Lisdexamfetamine)</td>
<td>20, 30, 40, 50, 60</td>
<td>20-30 Clinical Discretion</td>
<td>60</td>
<td>13 - 14</td>
<td></td>
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</table>

Some patients may respond preferentially to one versus the other class of medications, so if response or side effects to one class of medication are not optimal... switch to the other class of stimulant.

Second-line/adjunctive agent recommendations include the long-acting non-stimulant atomoxetine and short-acting stimulants.

**Effect Sizes in Psychiatry**

<table>
<thead>
<tr>
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<th>Effect Size</th>
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<tbody>
<tr>
<td>Atypical Neuroleptics (schiz.)</td>
<td>0.25</td>
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<tr>
<td>SSRI’s for Major Depression</td>
<td>0.50</td>
</tr>
<tr>
<td>ADHD Medication Nonstimulants (as a group)</td>
<td>0.62</td>
</tr>
<tr>
<td>Extended Release Stimulants*</td>
<td>0.95</td>
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*Use caution with a meta analysis to draw conclusions about ADHD medication effects. American Psychiatric Association, May 25, 2000, San Francisco, CA.
Prefrontal Cortex Requires Proper “Tuning” of Catecholamine Levels for Optimal Function


- Minimize Side Effects
  - Establish treatment goals
  - Discuss reasonable expectations of treatment, including possible side-effects
  - Use long-acting stimulants with sustained release
    - Start with lowest dose
    - Titrator slowly
  - Evaluate symptoms/side effects every 2 weeks using ASRS
  - Evaluate dosing regimen
    - Food intake
    - Time of day
    - Taking every day vs. as needed
  - Ask about sleep
  - Re-evaluate treatment goals

- Stimulant Side Effects
  - Potential Contraindications to ADHD Pharmacotherapy*
    - Drug hypersensitivity
    - Pregnancy/Lactation
    - Cardiovascular disorder
      - Structural heart defect, arrhythmia, advanced atherosclerosis
    - Family history of sudden early death
    - Uncontrolled hypertension (mod-severe)
    - Unstable substance use disorder
    - Unstable/untried psychoses or mania
    - Glaucoma
    - Seizure or Tic disorder
    - Recent MAOI use (14 days)

*ADHD in Adulthood: Assessment and Pharmacotherapy. Craig Surman, Massachusetts General Hospital Adult ADHD Research Program, Harvard Medical School

- Marie: Treatment Considerations
  - Stimulants in pregnancy, breastfeeding
  - Alternatives to stimulants
  - Stimulants in context of Bipolar D/O
  - Impact of hormonal changes on ADHD

- Marie: Treatment Considerations post-partum
  - Important to monitor sleep and energy
  - Ask spouse/friend to help monitor for objective signs of mania
  - Once finished breastfeeding, trial a LA stimulant with frequent follow-up

- Marie: Response to Treatment
  - Marie responded very well to Concerta 45mg
  - She received positive feedback at work and was given increased responsibility
  - No longer behind on paperwork
  - Less socially anxious
  - Improved memory, less forgetful, not losing things
  - Less need to control her environment
  - Binge eating much better controlled
  - Improved marital relationship
  - Less overwhelmed at home and with her kids
Achieve and Maintain Functionality

- Assess functional impairment by asking about
  - Work/School
  - Family relationships
  - Social interactions
- Weiss Functional Impairment Tool or Sheehan Disability Scale may be valuable
- Discuss and evaluate patient defined goals
- Ensure daily use of medication
- Focus on basics (sleep hygiene, routines, exercise, healthy diet, use of a planner/pda)
- Discuss coping skills development, coaching and support options (ADHD support groups, psychologist, coach)

Conclusions

- Adult ADHD is under-diagnosed and patients with 'red-flags' must be screened
- Comorbidity must be assessed, diagnosed and treated in order to manage the global impairment
- First line treatment of Adult ADHD should be long-acting stimulants
- Treatment must be multimodal including behaviour interventions and psychotherapy
- Treatment expectations should be discussed in the context of patient defined goals

Questions?