Outline

- Tics: recognition and challenges
- Assessment of Tourette Syndrome
- Epidemiology
- Comorbidities
- Treatment

Tic disorders (ICD-10)

- Transient tic disorder
- Chronic motor or vocal tic disorder
- Combined vocal and motor tic disorder (Tourette Syndrome)
- Other tic disorder
- Tic disorder, unspecified

Tics and Tourette Syndrome

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Tic: differential diagnosis

- Fidgeting
- Tremor
- Dystonia
- Akathisia
- Myoclonus
- Chorea

- Stereotypy
- Mannerism
- Seizure
- Compulsion

Tic

- Sudden, rapid, repetitive, non-rhythmic movement or vocalisation
- Often premonitory urge
- Temporarily suppressible
- Simple or complex

Tourette Syndrome

- Vocal and motor tics
- Coprolalia
- Echolalia
Tourette Syndrome

- Vocal and multiple motor tics (not necessarily concurrently)
- Several times per day, almost every day
- Lasting longer than a year
- No more than 2 months without tics (?)
- Onset before the age of 18 years

Tourette syndrome: comorbidity

- Hyperkinetic disorder / ADHD – up to 50%
- OCD – up to 40%
- Obsessions/compulsions – up to 80%
- ASD and social communication difficulties – around 5 – 10% with ASD also have Tourette syndrome
- Learning difficulties
- Mood and anxiety disorders
- Aggressive outbursts – up to 70%

Tics: epidemiology

- Tics: 5 – 20% of children and adolescents
- 2-3 times more common in boys
- Tourette syndrome: approximately 1%
- Tourette triad: approximately 0.1%
- Usual onset: 5-7 years
- Usually deterioration around 10-11 years
- Most patients (up to 65%) have no or non-impairing tics by adulthood

Assessment: The usual questions

- Demographics (be curious ;-) 
  - Age
  - Education level child and parents
  - Work status (parents)
  - Ethnicity child and parents
  - Marital status (parents)
- When did it start?
  - Age at onset tics/OCD/ADHD
  - Age at worst period ever
- Do family members have tics/OCD/ADHD?
  - Make a family tree
How do you know it’s not ADHD?

<table>
<thead>
<tr>
<th>Disorder</th>
<th>ADHD</th>
<th>OCD</th>
<th>TS</th>
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</thead>
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<tr>
<td>Impulsive movements</td>
<td>Generally increased motor activity</td>
<td>Slowly increasing (intermittently by waiting situation)</td>
<td>Disorganized, tempo changes</td>
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How do you know it’s not OCD?

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Tourette’s Syndrome Triad
ADHD-OCD-TS

- Frequently comorbid with ADHD and OCD
- Complex relationship, controversial
  - ADHD approx 50% of the cases
  - Shared genetic risk factors, two independent pathologies
  - OCD approx 30-40% of the cases
- Similar background, intrinsically related
- Familial background

ADHD

- Childhood onset
- Prevalence around 3-5%
  - Inattentive
  - Hyperactive-impulsive
  - Combined
- Different settings-same symptoms
- Most common co-morbidity: disruptive behavior, tics, learning difficulties
Obsessive Compulsive Disorder

- Prevalence 1%
- Obsessive and compulsive symptoms can be normal developmental phenomena
- Autoimmune hypotheses
- Repetitive behavior
  - Obsessions
  - Compulsions

Intrusions/obsessions we all have...

- Impulse to hit or hurt someone
- Impulse to yell curses in a silent church
- Impulse to destroy something
- Impulse to cause a collision while driving
- Impulse to push other people away from a crowd or a row
- Impulse to jump off the roof of a tall building, mountain or cliff
- Impulse to jump from the platform when a train arrives
- Impulse to drop a baby
- Etc... etc. etc.

Compulsions

Examples of compulsions:

- Excessive cleaning (e.g., ritualized hand washing)
- Checking, ordering and arranging rituals
- Counting
- Repeating routine activities (e.g., going in/out of a doorway)
- Hoarding (e.g., collecting useless items)
- Mental rituals (e.g., silent recitation of nonsense words to vanquish a horrific image)

OCD

- Late onset
  - Female
  - Mainly obsessions, anxiety
- Early onset
  - Male
  - Familial
  - Chronic
  - More neurological soft signs, complicated birth etc.
  - More rituals, tic, trichotillomania
  - Higher frequency of sensory phenomena

Examples of obsessions:

- Concerns with contamination (e.g., fear of dirt, germs or illness)
- Safety/harm (e.g., being responsible for a fire)
- Unwanted acts of aggression (e.g., unwanted impulse to harm a loved one)
- Unacceptable sexual or religious thoughts (e.g., sacrilegious images of Christ)
- Need for symmetry or exactness
Repetitive behavior in OCD, TS

Compulsion
Tic

- Clear egodystonic feature
- Reduces anxiety
- Increase anxiety when suppressed or delayed

Not directly associated with an anxious mood nor with the wish to control a risk of damage

Anxiety disorders

- Common (4-8% of children and adolescents)
- Significant heritability
- Less likely to continue into adult life compared to behavioural disorders
- Significant comorbidity

Anxiety disorders: Common (4-8% of children and adolescents), Significant heritability, Less likely to continue into adult life compared to behavioural disorders, Significant comorbidity.

<table>
<thead>
<tr>
<th>Anxiety disorder</th>
<th>Combined</th>
<th>Intrinsic</th>
<th>Cognitive-Behavioral</th>
<th>Placebo</th>
<th>All Patients</th>
<th>P-Value</th>
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<tbody>
<tr>
<td>Generalized Anxiety</td>
<td>70.04</td>
<td>71.0</td>
<td>70.4</td>
<td>69.2</td>
<td>69.2</td>
<td>0.54</td>
</tr>
<tr>
<td>Social phobia</td>
<td>51.04</td>
<td>50.9</td>
<td>51.9</td>
<td>50.9</td>
<td>50.9</td>
<td>0.60</td>
</tr>
<tr>
<td>Separation anxiety</td>
<td>42.58</td>
<td>42.5</td>
<td>42.5</td>
<td>42.5</td>
<td>42.5</td>
<td>0.60</td>
</tr>
<tr>
<td>Agoraphobia</td>
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<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
<td>0.60</td>
</tr>
<tr>
<td>Obsessive-compulsive disorder</td>
<td>50.04</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
<td>0.60</td>
</tr>
<tr>
<td>Panic disorder</td>
<td>50.04</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
<td>0.60</td>
</tr>
</tbody>
</table>

Bloch et al, 2006
**PANDAS**

- Subgroup of children who develop tics and/or obsessive compulsive disorder in association with streptococcal infection
- Possible autoimmune-mediated effect - trials of immunomodulatory therapy had been tried
- Current clinical consensus is that tics or OCD should be treated in the usual way
- Antibiotics may be tried for acute onset tics/OCD with active infection

**Psychoeducation**

- The European guidelines recommends embedding each treatment within a psychoeducational and supportive context
- Psychoeducation alone may also be useful for families who do not engage with more comprehensive treatments due to very mild tics or lack of services

**Tourette Syndrome: Treatment**

- Psychoeducation - reassurance
- Liaison with school
- Behavioural approaches: Habit Reversal and Exposure and Response Prevention
- Pharmacological treatment
- Psychosurgery (extremely rarely!)

**Main questions about psychoeducation**

- For who?
- When?
- Why?
- What?
- How?

**Who to aim for?**

- Child/ adult (as patient)
- Parents / partner
- Siblings
- Teachers
- Classmates
- Relevant others
- +1: general public importance of increasing awareness of TS (diagnostic label alone is insufficient - Nussey, Pistrang, Murphy, 2012)
What is the ideal time for psychoeducation?

- Right after the diagnosis

Importance of psychoeducation

- Resolve misunderstanding, uncertainty and stigma in TS
- Improve knowledge, attitudes and behaviours
- Help the patient/environment to identify personal strengths
- Provide the child with the tools to explain to others (especially teachers and schoolmates)
- Help to understand the aim and the method of the behavioural therapy
- Provide educators with general information about TS

Content of psychoeducation

- Who has TS?
- Symptoms and natural history of TS
- Prevalence
- Types of tic disorders (DSM-V)
- Types of TS
- Types of tics
- Suppressing tics /Control
- Premonitory urges
- Causes of Tourette Syndrome
- TS and the brain
- Therapy
- Social difficulties and Comorbidity
- Other Risk or Protective Factors

Content of psychoeducation

- Give information about the natural course of TS
- Provide support
- Point out what kind of therapy is available
- Suggest patient organizations (e.g. Tourette Action)
- Dispels myths

Some examples of tics

- Blinking
- Coughing
- Shrugging
- Touching
- Hair flicking
- Sniffing
- Clicking
- Clearing your throat
- Saying the same word over and over
- Over and over
- And over and over
- And over AND OVER
- AND OVER AND OVER
- OVER AND OVE
**Tics Phenomenology**

- **Involuntary** but may be suppressed
- **Premonitory urges** generally precede tics
- From simple to complex tics (examples)
  - **Simple motor:** eye blinking
  - **Simple vocal:** throat clearing
  - **Complex motor:** touching
  - **Complex vocal:** words and phrases

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**What is Tourette Syndrome?**

- Neurological disorder, not learned, but still influenced by surroundings
- More common in males (2:1 to 4:1)
- Contributes to social, academic, and occupational problems

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**Course of TS**

- As children grow into adulthood
  - Tics resolve in 50%
  - Tics become substantially less severe in 30-50%
  - Tourette syndrome is lifelong in the remainder of cases (5-10%)
- Adults may have a more chronic/severe form of the disorder

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**The natural course of TS**

- Starts in young children
- Prevalence: 3–8/1000 (Centers for Disease Control, 2009)
- Transient tics are common (24% in school-age group)
- Starts with motor tics, then vocal
- Starts in the head and face, then in the body
- Starts with simple tics, then more complex tics
- Peak severity is in early to mid teens

(Leckman et al. 2006, Bloch and Leckman, 2009)
Nature of tics

- Wax and wane; get better and worse over time
- Change; one tic stops and another starts
- May be made worse by stress and anxiety
- May be alleviated with relaxation or concentration on an absorbing task
- Individual differences in ability to suppress tics

Contextual Factors (Himle et al, 2014)

<table>
<thead>
<tr>
<th>Increase</th>
<th>Decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer games</td>
<td>Engagement in activities, focussed attention and fine motor control (study, playing drums, doctor visits...)</td>
</tr>
<tr>
<td>Home after school</td>
<td></td>
</tr>
<tr>
<td>Doing homework</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td></td>
</tr>
<tr>
<td>?viruses, PANDAS</td>
<td></td>
</tr>
</tbody>
</table>

What is Tourette Syndrome?

- Neurobiology
- Genetics
- Tourette Syndrome
- Environment
- Psychology

Risk from one single Parent with TS

<table>
<thead>
<tr>
<th>disorder</th>
<th>boy</th>
<th>girl</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS</td>
<td>10-12%</td>
<td>3-5%</td>
</tr>
<tr>
<td>Chronic Tic</td>
<td>15-20%</td>
<td>10-15%</td>
</tr>
<tr>
<td>OCB without Tic</td>
<td>3-7%</td>
<td>12-15%</td>
</tr>
</tbody>
</table>

Therapy of TS

Different ways to treat TS:
- Medication
- Comprehensive Behavioural Intervention Therapy (CBIT) (HRT, ER, functional intervention)
- Deep Brain Stimulation (DBS)
- Other approaches managing TS
Comorbidity

Other comorbidities

- **ASD** (Importance of differentiation of tics from stereotyped autistic movements!)
- **Mood disorders**
  - Depression in patient with Tourette syndrome: 13.76%, Lifetime risk: 10%, Prevalence: 1.8%-8.9% (Robertson, 2006)
  - Depression in TS usually associated with comorbid disorders (OCD, ADHD) (Cavanna et al., 2009)
- **Anxiety disorders**
- **Specific learning disorder**

Bibliotherapy

- Child & family (Buffolano, 2008)
- Schools (Pruitt and Dornbush, 2011)
- Adults – bibliographies
- Media (Twitter, Youtube, TV)
- Charities and Support groups

Effectiveness of psychoeducation

(Nussey, Postrang, Murphy, 2012)

- Altering content of information can alter outcomes
- Different tools have different efficiency (video more salient than written information?)
- Children require more information than adults for attitude change
- Further research is required to design more effective psychoeducational interventions

Psychoeducation for Professionals

  - 35% of psychologists knew of HRT, <10% knowing how to implement it.
  - Only 34% of medical doctors had any knowledge of HRT
  - 46% wanted to know more
  - Adults (N = 672) and parents (N = 740)
  - 17% of adults and 24% of children had received BT for tics
- Treatment utilization
- Barriers to care
- Factors influencing the person with TD to forego BT for their condition
- Problems seeking treatment
  - A knowledgeable treatment provider
  - Side effects, cost
  - Psychologists are less likely to be consulted than neurologists, psychiatrists, and GPs
- Many treatments with limited empirical support are used
  - A limited number of service providers knowledgeable about TD

Psychological Interventions
Overview

• Why use psychological intervention for TS / tics?
• Does it work?
• What are the models
• How does it work?
• Adaptations
• What might the future look like?

Why Psychological Therapies?

• Limited efficacy medication / surgical interventions
• Historically, behavioural therapies have shown promise
• Learning more about the relationship between therapy and the brain (Porto et al, 2009)

European Clinical Guidelines for Tourette Syndrome and other Tic Disorders
ECAP, 2011

I: Assessment
II: Pharmacological Treatment
III: Behavioural & psychosocial interventions (Verdellen et al, 2011)
IV: Deep Brain Stimulation

• 140 articles
• No meta-analyses
• 12 (systematic) reviews
• 8 controlled trials (7 RCT’s)
• No studies comparing behavioural therapy with medication
• No Cochrane reviews

Beliefs about Behavioural Therapy
Woods, TSA USA 2009

—HRT will inhibit other functional behaviours (Woods CPT task, 11% reduced accuracy when focused on suppression & distraction)

Tourette Syndrome and Tics

— Tics:
  • Behavioural Therapies
  • Function based interventions

— Acceptance:
  • Learning adequate coping strategies
  • Cognitive therapy
  • Social skills training
  • Self-esteem work
  • Patient organizations (Tourette Action, TSA – USA)

— Co-occurring conditions:
  • OCD: behavioural therapy (ERP), medication
  • Impulse control disorders: self-monitoring techniques
  • ADHD: medication, behavioural therapy
  • Anger Management: Cognitive Behavioural Therapy

"Young man, go to your room and stay there until your cerebral cortex manners.”
Premonitory Urge (Tic signals)

- Sensory discomfort in muscle or muscle groups preceding tic
- Physical tension, pressure, tickle, itch, or other sensory experience
- Results in relief of sensation
- “Just right” in order to relieve sensation
- Is it the premonitory urge which is involuntary or the tic?

Habit Reversal Training

- Awareness Training
- Competing Response
- Relaxation
- Social Support

Competing Response (Woods et al, 2008 CBITs)

<table>
<thead>
<tr>
<th>Tic</th>
<th>Competing Response</th>
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<tbody>
<tr>
<td>Head jerking</td>
<td>Tense neck muscles gently, fixate eyes</td>
</tr>
<tr>
<td>Jaw movement</td>
<td>Let jaw hang loose while relaxed breathing, holding breath for 2.5 seconds before exhale</td>
</tr>
<tr>
<td>To even up</td>
<td>Hold arms at side</td>
</tr>
<tr>
<td>Facial grimacing</td>
<td>Purse lips together</td>
</tr>
<tr>
<td>Curling toes</td>
<td>Press all toes flat on ground</td>
</tr>
<tr>
<td>Picking lips</td>
<td>Place hands on knees</td>
</tr>
<tr>
<td>Mouth opening</td>
<td>Purse lips, push teeth together</td>
</tr>
<tr>
<td>Neck rolling</td>
<td>Tense neck muscles with chin positioned downwards</td>
</tr>
<tr>
<td>Spitting</td>
<td>Purse lips and use diaphragmatic breathing</td>
</tr>
<tr>
<td>All vocal tics</td>
<td>Diaphragmatic breathing and relaxation</td>
</tr>
</tbody>
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Conclusions:

- HRT has been studied for over 30 years
- 7 RCTs have been published
- N’s between 10-124; adults and children, TS/CTD
- Controls have either been WL, Supportive Therapy (ST) or another behavioural treatment (MS, CBT, ERP)
- Superiority to Waiting list, MS, ST
- Comparability to CBT, ERP

Overall:

- HRT can be considered an evidence based treatment
- Awareness training and competing response training seem to be the active components

Antecedents (Himle et al, 2014)
Exposure and Response Prevention

**Intervention:**
Prolonged exposure to sensations while resisting tics

2 case studies (1 N=4, 1 N=1): positive results
1 RCT comparing ER (n=22) with HR (n=21)
(Verdellen et al., 2004)

ER=HR
ES YGTSS: HRT 1.06, ERP 1.42
Indications for habituation, no rebound effects

**Conclusion:**
ER is a promising treatment for tics, which needs further research

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**Does Symptom Substitution Occur?**

- Vocal tics decreased, untreated motor tics did not change or decreased
- 83% reduction in vocal tics
- 26% reduction in motor tics
- Untreated symptoms may improve following behavioral intervention
- Other studies evaluating habit reversal have also not found symptom substitution

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**Which Approach?**

- Patient needs
- 1 RCT compared ER with HR (Verdellen et al., 2004)
  - No significant difference between ER and HR was found
- ERP
  - Several tics
  - Strong premonitory urges
- HRT
  - A few different tics
  - Weak premonitory urges
  - No tics during the session
  - Intervention (Woods et al., 2008)

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**Psychoeducation**

- Child & family (Buffolano, 2008)
- Schools (Pruitt and Dornbush, 2011)
- Group work (Psychoeducation- Murphy & Heyman, 2007; Anger Management - Sudkolsky et al 2009)
- Charities and Support groups
- GOSH website

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**Is there a Rebound Effect?**

- 7 children with TS
- Three conditions
  - Baseline
  - Reinforced suppression
  - Rebound evaluation
- All conditions were 5 min
- Tics were reduced in suppression condition
- Rebound did not occur

Himle & Woods (2006)

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**Psychoeducation Group: Child**

- Tourette Syndrome & Tic Management
- Self-esteem building
- School & bullying
- Anger
- OCD and Anxiety
- Attention Building
- Executive Function
- Review, quiz & feedback
Habit Reversal Training Group: Child
- Psychoeducation
- Tic awareness / Tic signal / Functional analysis
- Tic hierarchy detection & description
- Competing response and relaxation (Tic 1)
- Competing response training (Tic 1)
- Competing response (Tic 2)
- Competing response (Tic 3)
- Relapse prevention

Therapeutic Approaches
- Activity based
- Behavioural approaches
- Social learning approach (e.g. modeling)
- Developing Problem-solving
- Independence building
- Toolkit booklet
Cost-effective Interventions

Exercise on Tics
(Nixon et al, 2014)

FUTURE TRENDS

Factors that will impact on behavioural treatments

Living with Tourette Syndrome
(Storch et al, 2014)

Psychopharmacology
Tourette Syndrome: Pharmacological treatments

- Studies of pharmacological interventions in TS can be hard to interpret:
  - Large interindividual variation in tic frequency and severity. Small studies may include patients that are very different at baseline
  - The severity of tics in individuals varies markedly over time, making it difficult to separate drug effect from natural variation
  - No adequate studies. Publication bias.
  - Comorbidities
  - Complementary or alternative therapies (around 50% report benefit from these)

FGAs - Pimozide

- Cochrane review (Pringsheim et al, 2009): Pimozide has demonstrated robust efficacy in a meta analysis of 6 trials
  - Pimozide vs. haloperidol (one trial)
  - Pimozide vs. placebo (one trial)
  - Pimozide vs. haloperidol and placebo (two trials)
  - Pimozide vs. risperidone (two trials)
- More effective than placebo, as effective as risperidone and slightly less effective than haloperidol in reducing tics. It was associated with fewer adverse reactions compared to haloperidol but did not differ from risperidone
- ECG essential
- Most authors now do not recommend FGA

Tourette Syndrome: Pharmacological treatments

- Clonidine
- Aripiprazole
- Risperidone
- (Haloperidol)
- (Pimozide)
- Other antipsychotics
- Other medication (baclofen, nicotine, pergolide, metoclopramide, botulinum toxin, ondansetron, clomiphene, tramadol, ketanserin, cyproterone, levetiracetam)
- Treatment of comorbidity!

SGAs

- Aripiprazole: 10-week multicentre double-blind randomised placebo-controlled trial (N=61) demonstrated the efficacy of aripiprazole in tic reduction in TS. Increased mean body weight (by 1.6kg), body mass index, and waist circumference (Yoo et al, 2013).
- Risperidone has been shown to be more effective than placebo in a small (N=34), randomised study. Fatigue and increased appetite and a mean weight gain of 2.8kg over 8 weeks was reported (Scahill et al, 2003).
- Same monitoring rules with use of SGAs for psychosis (NICE 2014)

Clonidine

- Start low and increase slowly (25 – 50 mcg daily in divided doses initially increased by 25 mcg per week)
- Usual dose 3-5 mcg/kg/day
- Sedation can be problematic (or welcome...)
- Beware: possibility or rebound hypertension on discontinuation (reduce even more slowly by 25mcg every 1-2 weeks) and warn families from the start
- ECG not universally advised but advisable.

Treatment of ADHD in Tic disorders

- Methylphenidate, clonidine, guanfacine, desipramine and atomoxetine
- Not increasing frequency or severity of tics overall
- They may worsen tics in individual cases
- In such cases use of alpha agonists/atomoxetine
- Desipramine use limited due to safety concerns

Cochrane Review, Pringsheim et al, 2011
Tics/Tourette treatment principles

Take home messages

• Do not panic!
• Assessment of impairment and what drives it
• Psychoeducation is first line intervention
• Rationale and proportionate treatment
• Evaluate comorbidities: Tics may just be the ticket to your clinic!
• Benefit vs. Risk of treatment
• Remember it will most likely get better!

Thank you
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