Suicide, Impulsivity, and Comorbidity

Alan C. Swann MD
University of Texas Health Science Center, Houston

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Suicide

• Incidence of suicide
  – Greater than homicide
  – 20% of fatal trauma
  – #3 cause of death in 15-24 y/o, #2 in 25-34 y/o
• Severe suicide attempts
  – Increased all-cause, suicide, and homicide mortality
during next 5 years, especially next 12 months
• Suicide mortality is increased if history of impulsive aggressive behavior
• Increased in schizophrenia, bipolar disorder, or cluster B personality disorders if substance use disorder is also present: parallel to increased impulsivity

Suicide and the Initiation of Action

• Impulsivity and the initiation of action
• Clinical states that combine impulsivity and depression: interactions of impulsivity and hopelessness, depression and activation
• Impulsivity and suicide attempts
• How impulsivity and depression can interact
• Clinical conditions predisposing to activated depression
  – Substance use disorders
  – Bipolar disorder
• Treatment considerations
What is Impulsivity?

- **Inability to conform motivated behavior to its external or internal context**
  - Failure of behavioral feedback systems that normally operate outside of consciousness within the initial 0.5 seconds

- **No specific behavior is impulsive**
  - Any act can be either impulsive or non-impulsive

Barratt et al 1984; Moeller et al 2001

Matching Action to Context

- **Generation**
  - 0.2-0.5 seconds
- **Screening**
- **Conscious deliberation and choice**
- **Action**

Balance fails: action without opportunity to reflect
**Scientific Demonstration:** Components of Impulsivity

- **Inability to inhibit**
- **Initiation of action**

**Impulsivity: Balancing Factors**

<table>
<thead>
<tr>
<th>Neurotransmitter</th>
<th>Function</th>
<th>Impulsivity Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glutamate</td>
<td>Neural excitability/arousal</td>
<td>GABA</td>
</tr>
<tr>
<td>Norepinephrine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dopamine</td>
<td>Activation/motivation</td>
<td>Serotonin</td>
</tr>
<tr>
<td>GABA</td>
<td>Attention</td>
<td>NE, DA</td>
</tr>
<tr>
<td>Acetylcholine</td>
<td></td>
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</tbody>
</table>

More impulsive | Less impulsive

*Moses' first and last day as a lifeguard.*
Impulsivity as a Personality Characteristic

- Sensation-seeking
- Impulsivity: Cognitive/affective lability, Impetuousness, Lack of future orientation
- Risk-taking
- Extraversion


Adaptation to Impulsivity

Consequences of living with impulsivity include
- Attentional: Lack of ability to tolerate cognitive complexity or to apply cognitive effort over time
- Nonplanning: Lack of a sense of behavioral historicity: antecedents or consequences
State- and Trait-related Impulsivity

**State-impulsivity**: in response to mania, substance abuse, overstimulation, or stress, NE takes the prefrontal cortex off line, bypassing preintentional processing.

**Trait – impulsivity**: 5HT-DA balance; impairment of pre-intentional processing

Arnsten et al 2001

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Yohimbine Increases Impulsive IMT Errors

Swann et al, Biol. Psychiatry 57:1209-1211, 2005
Yohimbine was associated with a dose-dependent increase in subjective activation, showing that it is possible to recognize potentially risky internal states.

Trait and State Impulsivity in Bipolar Disorder


Impulsivity and Affect

<table>
<thead>
<tr>
<th></th>
<th>Mania</th>
<th>Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attentional</td>
<td>![Up Arrow]</td>
<td>![Up Arrow]</td>
</tr>
<tr>
<td>Motor</td>
<td>![Up Arrow]</td>
<td></td>
</tr>
<tr>
<td>Nonplanning</td>
<td></td>
<td>![Up Arrow]</td>
</tr>
</tbody>
</table>

Patients did not have severe substance abuse or similar comorbidities.
Activated Depression

- Natural history of illness
  - Mood lability
  - Mixed states
- Pharmacological
  - Prescribed: antidepressants
  - Self-treatment
  - Substance abuse
    - Intoxication or withdrawal
    - Alcohol, stimulants, nicotine
- Environmental
  - Overstimulation
  - Stress, especially if sensitized by earlier trauma

Definitions of Mixed States

- DSM-IV
  - Mixed mania: full mania plus nearly complete depressive syndrome > 7 days
- Real life
  - Mixed depression
  - Depressive syndrome + impulsivity?
- Elements of depressive and manic states can combine in any proportion and can vary over time during an episode.
NE and Mixed States

- Mixed > pure manic
- Reflects severe arousal, lability, and impulsivity
- May also reflect increased substance abuse liability

Swann et al Biol Psychiatry 35:803-813, 1994

Increased alcohol abuse and suicide attempt history with increased Mania Rating Scale score in Bipolar Depression

As mania increases → Emergence of *impulsivity *EtOH abuse *Suicidality

Behavioral Risk: Mixed vs Nonmixed Depression

All differences significant, Fisher Exact Test < 0.05

Adapted from Swann et al Bipolar Disord., 9:206-212, 2007

'B Mixed' = MRS>7

Bipolar Disorder and Substance Abuse

- Increased substance abuse in bipolar disorder
- Increased bipolar disorder in substance abuse
- Worsens course of illness and treatment outcome
- Associated with increased suicide, violence
- Both must be treated
Alcohol and Impulsivity

Biphasic effect on behavior

Ascending limb of BAC: Stimulant
- Increased impulsivity,
- catecholamines

Descending limb: Sedative

Binge drinking
- Expression of stimulant effect?
- Precedes onset of classic dependence
- Binge drinking without other heavy drinking:
  - Accidents, fights, suicide attempts

Biphasic Ethanol Effects

**Ascending BAC**
- Elevated
- Energized
- Excited
- Stimulated
- Talkative
- Up
- Vigorous

**Descending BAC**
- Difficulty concentrating
- Down
- Heavy head
- Inactive
- Sedated
- Slow thoughts
- Sluggish

Martin et al. Alc CEM 17:140-146, 1993
Alcohol and Suicide: Odds Ratios for Medically Severe Attempts

Strongest predictor across all levels of exposure: drinking within 3 hours (O.R. = 6-8).

Odds Ratio by Exposure Category – Full Range of Analyses
**Substance Abuse and State-dependent Impulsivity in Bipolar Disorder**

Swann et al, Bipolar Disorders 6:204-212, 2004

**Impulsivity and Suicide**

Self-Inflicted Gunshot Wounds

Premeditated
- Clear intent to die
- Angry about rescue
- Planned
- Severe hopelessness

Impulsive
- Apparently trivial precipitant
- No intent or expectation of death
- Bewildered, frightened and relieved

Study of 30 consecutive subjects rescued by helicopter. Ubiquitous binge-like drinking regardless of alcohol-use disorder diagnosis.

Peterson et al, AJP, 1985

Method vs Intent in Impulsive Suicide Attempts

CDC/NIAAA study of “nearly lethal” suicide attempts in Houston.
Simon et al SLTB 32 (suppl):49-59, 2001
Comparison of Impulsive and Nonimpulsive Suicide Attempts

Bipolar Disorder and Suicide

- About 5-10% of individuals with bipolar disorder eventually die by suicide
- Highest incidence is in men, during the first few years of illness
- Increased risk if early onset; substance/EtOH abuse; history of impulsive/aggression
- 89% in depressive or mixed episodes
- Roughly 25% of completed suicides are individuals with bipolar disorder
- Suicide, and mortality in general, decreases in patients treated with lithium, and increases if treatment is stopped.
Impulsivity and Attempt Severity

F(2,41) = 7.1, p = 0.002

Response Latency and Suicidality

F(2,41) = 5.8, p = 0.006

Swann et al Am J Psychiatry 162:1680-1687, 2005

Swann et al AJP 162:1680-1687, 2005
Impulsivity and Suicide

Self-Inflicted Gunshot Wounds
- Minor precipitant, no intent or expectation of death, deadly method

Case Control Study of Attempted Suicide
- 25% of medically severe suicide attempts
- Lethality of method > lethality of intent
- Impulsive attempters were hopeless but not depressed

Subjects with bipolar disorder
- Increased impulsivity: rapid initiation of action
- Mood lability, ethanol abuse, mixed states

Reducing Suicide Risk

- Use medicines that reduce recurrence and impulsivity
- Work for early recognition of risky internal states and of early signs of recurrence
- Foster a forward-looking approach
  - Social structure and contact
  - Sequential, attainable goals
  - Constructive anticipation of changes and problems
  - Responsibility for health and decisions

Interaction of Stable and State-Dependent Characteristics

Strategy depends on rate-limiting step
Swann et al J Affective Disord 73:105-111, 2003

Consequences of Treatment Discontinuation: Suicide Risk

How (not) to Study Treatment Effects on Suicide

- Retrospective or prospective naturalistic study
  - Patients in groups not comparable
  - Reasons for leaving treatment
- Randomized clinical treatment trials
  - Suicidal patients excluded
- Prospective randomized inclusive study
  - “Intercept” schizophrenia trial

Impulsivity: Processes and Treatments

- Generation
- Arousal
- Activation
- Mood stab.
- Antipsychotic

- Screening
- Behavioral inhib.
- Attention
- Mood stabilizer
- 5-HT enhancer
- Stimulant

- Conscious deliberation and choice
- Cognitive-behavioral and related treatments
Impulsivity, Comorbidities, and Suicide

- Risk for suicide is increased with the combination of depression/hopelessness and activation/impulsivity
- Affective and substance use disorders, especially when combined, increase this probability
- Treatment requires strategies that combine a focus on the specific disorder(s) present and the general management of problems related to severe impulsivity