



First suicide attempts in youth

Alastair J. S. McKean, MD

Assistant Professor of Psychiatry
Department of Psychiatry and Psychology
Mayo Clinic, Rochester, Minnesota

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Disclosures

Relevant Financial Relationships

None

Off-Label/Investigational Uses

None

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Learning objectives:

- Briefly review the current state of suicide research in youth
- Examine findings from a cohort of youth followed from their first suicide attempt coming to medical attention over a period of 25 years
- Consider the implications of these epidemiological findings for present management and future work with suicidal youth

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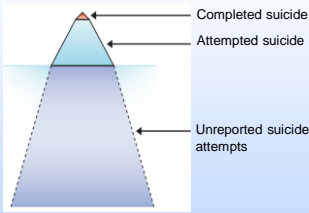
Discussion frame

What we ARE examining:

- Suicide = The act of intentionally taking one's own life
- Suicide attempt = An act of non-lethal self-harm with intent to die
- Index suicide attempt (IA)= First suicide attempt presenting to medical attention

What we're NOT examining:

- Medically unreported attempts
- Non-suicidal self-Injury



(Hawton K, Saunders KE, O'Connor RC., 2012)

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Defining youth

- No universally accepted definitions for "young people", "youth" or "adolescence" exist
- Definitions vary based on:
 - Chronology/legal
 - Physical Characteristics
 - Cognitive Development
- Studies use up to age 25
 - CDC typically classifies "young people ages 10-24"
 - United Nations/WHO goes up as high as 25th birthday

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Why is suicidal behavior important?

- Dunedin Multidisciplinary Health and Development Cohort examined for effects of early suicide attempts
- Tracked cohort of youth who had made a suicide attempt through age 24 (n=91)
- Compared to age matched controls who had not attempted through age 24 (N=946)

(Goldman-Mellor et al. 2014)

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Suicidal behavior and long-term morbidity

- Suicide attempters vs. non-attempters were **more likely to have:**
 - Mental health problems
 - Violent behaviors
 - Medical burden
 - Long term welfare and unemployment
- Persistent wide ranging problems in those who made suicide attempts in their youth



(Goldman-Mellor et al. 2014)

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Suicide rates rising across the United States



<https://www.cdc.gov/vitalsigns/suicide/infographic.html>

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Suicide mortality in US 10-24 year olds

- Second most common cause of death
- 6159 suicides in 2016 (13.7% of all suicides)
- Suicide Rates have increased between 1999-2017:
 - Females:
 - 10-14: 0.5 → 1.7 per 100,000
 - 15-24: 3.0 → 5.8 per 100,000
 - Males:
 - 10-14: 1.9 → 3.3 per 100,000
 - 15-24: 16.8 → 22.7 per 100,000



<https://www.cdc.gov/nchs/products/databriefs/db330.htm>

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Suicide attempts in youth

- Suicidal behaviors commonly begin in second decade of life
- Suicide attempt prevalence peaks in mid-adolescence
- Prevalence of suicidal ideation, plans, attempts: 12.1%, 4.0% and 4.1% respectively



(Bolger et al., 1989; Shaffer et al., 1996; Kessler et al., 1999; Lewinsohn et al., 2001; Nock et al., 2013)

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Suicide attempt as a risk factor for suicide

- Recurrent suicidal behavior increases likelihood of completed suicide
- Suicide attempt history most important risk factor for further attempts
- Suicide attempt history best predictor of future completed suicide
- Poorly understood relationship between attempts and completed suicide:
 - 50-200 attempts/completed suicide in youth



(Bridge, Goldstein & Brent, 2006; Lewinsohn et al., 1994; Beautrais, 2004; Shaffer et al., 1996; Husain, 1990; Goldsmith et al., 2002; Shain, 2016)

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Convenience samples limit accuracy of suicide research

- **Frequently use convenience samples accrued by:**
 - Attempt method, where they presented, where they were admitted
 - Arbitrary point in presentation
- **Therefore, suicide rates are underestimated:**
 - Subjects not accrued from index suicide attempt
 - Subjects completing suicide on first attempt are usually excluded from studies
- **What if we tracked mortality from first attempt presenting for medical care?**
 - Include first attempt completions and follow survivors
 - Calculate prevalence of completed suicides



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Suicide Attempt as a Risk Factor for Completed Suicide: Even More Lethal Than We Knew

J. Michael Bostwick, M.D., Chaitanya Pabbati, M.D., Jennifer R. Geske, M.S., Alastair J. McKean, M.D.

Objective: While suicide attempt history is considered to robustly predict completed suicide, previous studies have limited generalizability because of using convenience samples of specific methods/treatment settings, disregarding previous attempts, or overlooking first-attempt deaths. Eliminating these biases should more accurately estimate suicide prevalence in attempters.

Method: This observational retrospective-prospective cohort study using the Rochester Epidemiology Project identified 490 index (male, N=355; female, N=135) Olmsted County residents making index suicide attempts (first suicides at-tempt requiring medical attention) between January 1, 1996, and December 31, 2007. The historical Death Index identified suicides between enrollment and December 31, 2010 (follow-up < 25 years). Medical records were queried for sex, age, method, and follow-up care for index attempt survivors. Coroner records yielded data on index attempt deaths.

Results: During the study period, 311,690 females (8,412 died by suicide. Of the 61,483 (99.2%) enrolled on index at-tempt, 27% of the surviving 35 index attempt survivors (8,628) listed themselves as suicidal. Rates were disproportionately

represented (62/92 [11.2% of men, 78.5% of suicides) compared with 126/1,222 (5.3% of women, 21.5% of suicides). Of index attempters, 72.3% used guns, yielding an odds ratio for gunshot deaths compared with all other methods of 66.0 (95% CI=6.0–32.5). When adjusted for covariates, survivors given follow-up psychiatric appointments had significantly lower likelihood of subsequent suicide (odds ratio=0.212, 95% CI=0.109–0.457).

Conclusions: At 5.4%, completed suicide prevalence in this community cohort of suicide attempters was almost 90% higher than previously reported. An innovative aspect of this study explains the discrepancy: by including index attempt deaths—approximately 60% of total suicides—suicide prevalence is more than doubled. We contend that counting both index and subsequent attempt deaths more accurately reflects prevalence. Our findings support suicide attempt as an even more lethal risk factor for completed suicide than previously thought. Research should focus on identifying risk factors for populations vulnerable to making first attempts and larger risk reduction in these groups.

APR in Advance issue 33.12/15/September 2016, 1097-1104

Bostwick JM, Pabbati C, Geske JR, McKean AJ. Suicide Attempt as a Risk Factor for Completed Suicide: Even More Lethal Than We Knew. *Am J Psychiatry*. 2016;163(11):1094-1100.

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Olmsted county study design

- Track mortality from index attempt
 - Include first attempt completed suicides
 - Follow survivors of first attempts
- Calculate prevalence of completed suicides
- Consider temporal relationship between first attempt survival and eventual completed suicide

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Rochester Epidemiology Project (REP)

- Olmsted County isolated population served by a discrete number of care centers
- REP contains complete medical records and autopsy reports for all Olmsted County patients since the 1960s
- Results are broadly generalizable nationally



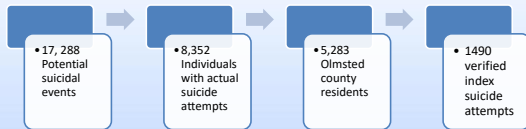
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Methods

- Retrospective-prospective cohort of Olmsted County residents making first suicide attempt coming to medical attention (IA) between 1/1/1986 & 12/31/2007 (22 yrs)
- REP queried electronically for patients with HICDA diagnostic codes consistent with suicide attempt during study period
 - Search terms: SI, SA, self-injurious behavior
- Medical records of potential cases eyes-on searched for IA's:
 - SA's made during study period
 - **AND** no evidence of SA's prior to study period
- National Death Index queried for deaths of study subjects between 1/1/1986 & 1/1/2011 (range of f/u 0-25 yrs)

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Identifying the cohort



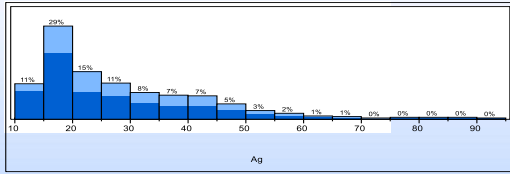
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Key findings:

- **1490 IAs (M=555; F=935)**
 - 81/1490 (5.4%) died by suicide overall
 - 48/81 (59.3%) died on index attempt
 - 27/33 (81.8%) survivors died by suicide within first year
- 62/81 (76.5%) males –11.2% of males died by suicide
- 19/81 (23.5%) females –2.0% of females died by suicide
- Overall, 72.9% of IA deaths were by firearms
 - Compared to all other methods, OR =140 (95% CI=60-325)

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Most index suicide attempts occur before age 25



*****54.6% of first suicide attempts coming to medical attention occurred before age 25*****



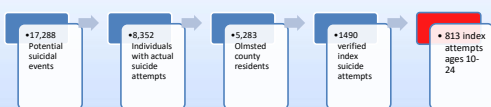
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What about youth?



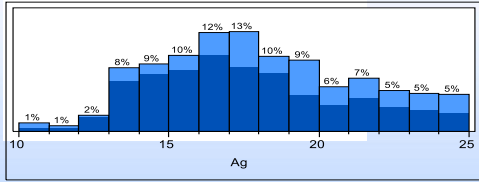
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Identifying the youth subsample



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Age distribution of suicide attempts (ages 10-24)



Light Blue = Males; Dark Blue = Females

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Youth subsample

- Males represented 258/813 (31.7%)
- Females represented 555/813 (68.3%)
- 29/813 (3.6%) died by suicide
 - 28 of these deaths occurred before the age of 25
- **20/28 (71.4%) of youth dying by suicide did so on IA**

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Suicide attempts in males

- Accounted for 23/29 (79.3%) of suicides:
 - Overall, 23/258 (8.9%) males died by suicide
- 16/23 (69.6%) died on IA
 - 6.2% male cohort died on IA
 - 2.9% male survivors died in subsequent attempt

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Suicide attempts in females

- Accounted for 6/29 (20.7%) of suicides:
 - Overall, 6/555 (1.1%) of females died by suicide
- 4/6 (66.7%) died on IA:
 - 0.7% female cohort died on IA
 - 0.4% females survivors died in subsequent attempt

MIND CLINIC (PT)

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Suicide attempt methods

- Most common:
 - Medication overdose 480/813 (59.0%)
- Followed by:
 - Cutting or piercing 198/813 (24.4%)
 - Non-medication overdose 30/813 (3.7%)
 - Firearms 27/813 (3.3%)
 - Hanging 24/813 (3.0%)

MIND CLINIC (PT)

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Firearm lethality

- Accounting for 3.3% of IAs but...
- 85.0% dead on IA used a gun
 - 82.8% of all completed suicides were with firearms
 - Regardless of age or sex, compared to all other methods, guns imparted an OR=334 (75.6, >999; p<0.0001) of dying on index attempt

MIND CLINIC (PT)

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Young males, guns and suicides

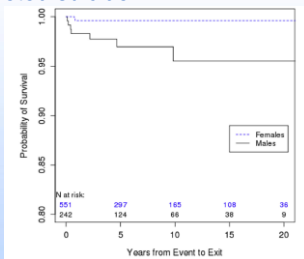
- Males overwhelmingly used firearms:
 - 87% of all male suicides by guns
 - Overall, 7.8% of the male cohort died by firearms
- Males more likely to die on subsequent suicide attempt (OR=6.6, 95% CI=1.394-34.716; p<0.018)
 - 71.4% of male survivors who died on subsequent attempt used a gun

MSD
CLINIC
EPF

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Kaplan-Meier curve corresponding to survival probability from completed suicide

- All females that died on subsequent attempt perished within a year
- 57.1% of males that died on subsequent attempt perished within six months of IA



MSD
CLINIC
EPF

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Antecedents: psychiatric care history prior to IA

- Overall, 41.2% of all IAs had no prior psychiatric history
 - 68.6% were not on a psychiatric medication
 - 52.4% had no psychiatric diagnosis
- Lack of psychiatric history highest in the 10-14 year old group and lowest in 20-24 year old group

MSD
CLINIC
EPF

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Methodological limitations

- Did not include attempts not presenting for medical care
 - Overestimation of suicide rate?**
 - Some attempts not severe enough to declare for medical care and/or attempter did not disclose to medical practitioner
 - Underestimation of suicide rate?**
 - Possible that some suicides are not coded as such
 - Recognition that this does happen in youth
- Rolling enrollment with variable follow-up failed to capture all subsequent attempts in survivors

MIND CLINIC (PT) (Hawton & Goldacre, 1982; Lewinsohn, Rohde, & Seeley, 1994; Gosney and Hawton, 2007)

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Methodological strengths

- First community study to show suicide risk in a naturalistic community cohort of youth:
 - Followed from first lifetime suicide attempt coming to medical care
 - Inclusive of all types of attempt methods
 - Inclusive of those dying on first attempt
 - No comparable study in youth

MIND CLINIC (PT)

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Rethinking the relationship between suicide attempts and suicide completion

- **Suicide attempts in young people are serious:**
 - 1 in 11 males in this cohort died by suicide
 - 1 in 16 male attempters died on IA
 - 1 in 93 females in this cohort died by suicide
 - 1 in 139 female attempters died on IA
- Overall, 1 in 41 perished by suicide on IA
- **Greater** than the commonly reported death to attempt ratio of 1 in 50 to 1 in 200 quoted in the literature

MIND CLINIC (PT) (Husain, 1990; Goldsmith et al., 2002; Shain, 2016)

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First attempt lethality

- Rough equivalence in overall IA death rates in males and females (69.6% in males; 66.7% in females)
- Psychological autopsies in young people:
 - Two studies observe split between males and females:
 - Marttunen et al. 1989 – 73% of males and 34% of females died on first attempt
 - Brent et al. 1999 – 63.1% of males and 38.1% of females died on first attempt
 - Shaffer et al., 1996 – reports 67% had no history of prior attempt but does not report sex differences

MIND CLINIC (PT)

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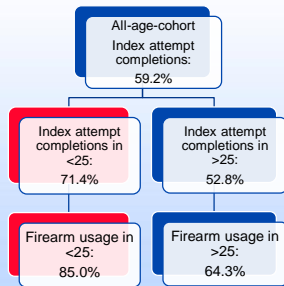
Not including index attempt underestimates odds of suicide completion

- 20/813 (2.5%) died on IA
- Whereas only 9/793 (1.1%) of IA survivors died in a subsequent suicide
- This observation holds true for males and females:
 - Male rate: 6.9% → 2.9%
 - Female rate: 0.7% → 0.4%
- Tracking suicide from IA is critical for showing true severity given lethality of index attempts

MIND CLINIC (PT)

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Youth IAs are more lethal than their elders



MIND CLINIC (PT)

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Deadliness of firearms in youth

- Our findings connect with the literature:
 - High firearm usage likely related to rural nature of cohort
 - Fontanella et al., 2015: suicide rates double for rural vs. urban youth partially attributable to guns?
- Household gun ownership:
 - Knopov et al. 2018: for each 10% increase in household gun ownership by state youth suicide increased by 26.9%



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State suicide rates and gun ownership

Table 1. Average Youth Suicide Rates, Gun Ownership Rates, and Suicidal Behavior Rates

State	Suicide rate (per 100,000)	Household gun ownership prevalence (%)	Severe negative affect prevalence (%)	Suicide plan prevalence (%)	Suicide attempt prevalence (%)
Alaska	15.2	59.8	27.7	13.8	9.4
South Dakota	14.9	59.9	24.3	13.5	8.7
Wyoming	13.8	60.5	25.5	15.8	9.9
Montana	11.1	62.6	26.6	13.8	8.2
New Mexico	10.9	28.7	36.4	14.5	11.1
North Dakota	10.5	59.2	22.7	11.6	8.8
Idaho	9.4	55.7	28.7	14.0	7.9
Colorado	8.4	34.6	23.2	10.8	7.2
Utah	8.2	44.8	26.5	12.5	7.9
Oklahoma	7.1	46.5	27.8	11.9	6.9
Arizona	6.8	32.2	34.4	15.1	9.8
Iowa	6.6	45.7	23.4	11.4	6.6
Nebraska	6.4	46.8	23.6	12.2	8.0
Arkansas	6.3	58.8	30.0	14.9	11.1
Florida	6.2	42.8	22.7	10.2	6.7
Minnesota	6.2	41.2	—	—	—
Michigan	6.0	32.0	28.7	15.1	9.9
Washington	6.0	34.6	—	—	—
Oregon	5.9	39.8	—	—	—
Hawaii	5.9	10.2	30.5	16.0	11.3



Knopov et al., 2019

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REVIEW

Check for updates

Master Clinician Review: Saving Holden Caulfield: Suicide Prevention in Children and Adolescents

David A. Brent, MD

Objective: The rate of adolescent suicide and suicidal behavior has risen dramatically in the past decade. The title of this article comes from the classic coming-of-age novel by J.D. Salinger, *The Catcher in the Rye*. Its protagonist, Holden Caulfield, is a precocious adolescent who, in the face of his inability to cope with his own self-destructive urges, imagines himself saving "Tricky kids playing some game in the big field of hay." He is standing on the edge of a cliff trying to catch "thousands of kids kilt" before they fall to their demise. This vignette from *The Catcher in the Rye* provides a useful metaphor for the relationship between mental health professionals and youth at risk for suicide, and suggests more efficient and effective alternative interventions to prevent youth suicide compared to standing by a cliff.

Method: These four alternative approaches are described, namely: (1) leading youth away from the cliff (ie, prevention); (2) going to where youth are (ie, improving access to care); (3) working with others to change the rules in the field (ie, changing the way care is delivered); and (4) putting a fence around the cliff (ie, restriction of access to lethal agents). The evidence to support the utility and cost-effectiveness of each of these approaches is reviewed.

Conclusion: These are urgent, empirically supported, cost-effective approaches to the prevention and management of adolescent suicidal behavior that, if implemented widely, are likely to significantly reverse the decade-long rise in adolescent suicide.

Key words: suicide, prevention, intervention

J Am Acad Child Adolesc Psychiatry 2019;58(1):25-35. [e6](#) [1](#)



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Individual vs. population care

- Tension between **individual care vs. population care**
- Suicide prevention requires more than a clinician's work with their patient
- Most advances in suicide prevention need to happen at primary and secondary prevention with populations



McKean and Bostwick, 2019 – JAACAP in press

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Epidemiology can inform suicide prevention

- Primary prevention (reducing suicide risk factors in populations):
 - Maltreatment prevention
 - ACE (poverty, parental illness, incarceration, domestic violence)
- Secondary prevention (early detection in populations):
 - Primary care
 - Schools
 - Families



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Firearms and means restriction: Needed at every level of prevention

- Needs to occur at primary, secondary and tertiary level prevention
- More than a psychiatrist's responsibility
- More than primary care can handle
- Others need to be involved:
 - Communities?
 - Government/legislative?
 - Role for manufacturers and retailers?



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What can you do about means restriction?

- Screen for firearms access in all youth
 - Vital when patient has a history of attempting suicide
 - Securing/removing guns from home
- Don't assume that other people have had this conversation
- Don't assume that the information is static
 - Family and patient concern often wanes when the crisis passes → **reevaluate**
- Recall: IA survivors that perished in subsequent attempt → ~70% used firearms



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Summary

- 71.4% of youth dying by suicide did so on IA, this is 18.6 percentage points higher than for those 25 and older in the original all-age cohort
- Firearms play disproportionate role in lethality – responsible for 85.0% IA deaths
- For about 40%, the IA was their first mental health encounter



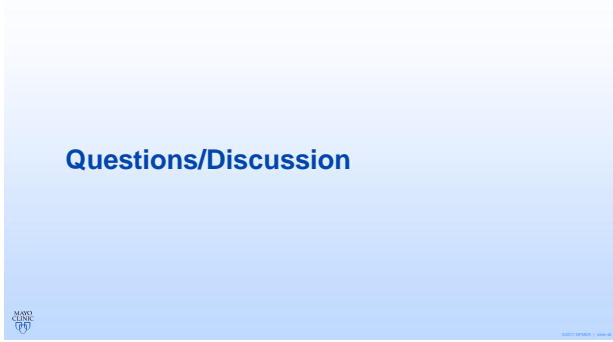
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Conclusions

- With most youth perishing on IA, suicide prevention efforts that target attempt survivors are too late for the majority of youth who die by suicide
- Future prevention strategies in American youth must move beyond the clinician's office:
 - Identify and target youth prior to first attempt
 - Means restriction of guns is vital for reducing completed suicides



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