**SUPPLEMENTAL MATERIALS**

**Supplement to: Columbia-Suicide Severity Rating Scale Screen Version: Initial Screening For Suicide Risk In A Psychiatric Emergency Department**

Johan Bjureberg, PhD1,2, Marie Dahlin, MD, PhD3, Andreas Carlborg, MD, PhD, MBA3, Hanna Edberg, MD3, Axel Haglund, MD, PHD4, Bo Runeson, MD, PhD1

1Centre for Psychiatry Research, Department of Clinical Neuroscience, Karolinska Institutet, & Stockholm Health Care Services, Region Stockholm, Stockholm, Sweden

2Department of Psychology, Stanford University, Stanford, California, USA

3Centre for Psychiatry Research, Department of Clinical Neuroscience,
Karolinska Institutet, & Stockholm Health Care Services, Region Stockholm,
Norra Stockholms psykiatri, Stockholm, Sweden

4Centre for Psychiatry Research, Department of Clinical Neuroscience,
Karolinska Institutet, & The National Board of Forensic Medicine, Stockholm, Sweden

**Correspondence:** Johan Bjureberg,Department of Clinical Neuroscience, Karolinska Institutet,
Norra Stationsgatan 69, floor 7, SE-11364 Stockholm, Sweden. Email: Johan.Bjureberg@ki.se

Running Head: C-SSRS Screen in a psychiatric emergency department

**STable 1. Associations between Columbia Suicide Severity Rating Scale Screen Version: Suicidal Ideation Severity Scale (past 1 month) and Suicide Behavior Scale (past 3 months) and suicide within ≤7 days, ≤31 days, and ≤1 year follow-up and short-term clinical management. Analyses based on complete data. Associations expressed as odds ratios with 95% confidence intervals (CI).**

|  |  |  |
| --- | --- | --- |
|  | **Suicidal Ideation Scale** (N=15,222) | **Behavior Scale** (N=14,997) |
|  | Crude odds ratio(95% CI) | Adjusted odds ratio (95% CI)a | Crude odds ratio(95% CI) | Adjusted odds ratio (95% CI)a |
| **Suicide** |  |  |  |  |
|  ≤7 days | 1.5 (1.1-2.1) | 1.6 (1.2-2.2) | 6.5 (2.0-21.5) | 7.1 (2.2-23.5) |
|  ≤31 days | 1.5 (1.2-1.8) | 1.5 (1.2-1.9) | 5.0 (2.3-11.1) | 5.5 (2.5-12.1) |
|  ≤1 year | 1.3 (1.1-1.4) | 1.3 (1.2-1.5) | 2.7 (1.7-4.3) | 2.9 (1.8-4.6) |
| **Short-term Clinical Management** |  |   |  |  |
|  Inpatient | 1.3 (1.3-1.3) | 1.3 (1.3-1.4) | 2.9 (2.6-3.2) | 3.2 (2.9-3.5) |
|  Outpatient | 1.3 (1.3-1.3) | 1.3 (1.3-1.3) | 2.9 (2.6-3.1) | 3.1 (2.8-3.4) |

a Adjusted for sex and age.

**STable 2. Cross tabulation of observed suicides in relation to the Columbia Suicide Severity Rating Scale Screen Version: Suicidal Ideation Severity Scale (past 1 month) score (0-5) for suicides within ≤7 days, ≤31 days, and ≤1 year follow-up (based on complete data).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** |
| **≤7 days** |  |  |  |  |  |  |
|  No Suicide | 6,544  | 2,330  | 2,567  | 1,666  | 622  | 1,481 |
|  Suicide | 1 | 3 | 1 | 2 | 1 | 4 |
| **≤31 days** |  |  |  |  |  |  |
|  No Suicide | 6,540  | 2,330  | 2,564  | 1,663  | 622  | 1,476 |
|  Suicide | 5 | 3 | 4 | 5 | 1 | 9 |
| **≤1 year** |  |  |  |  |  |  |
|  No Suicide | 6,519  | 2,323  | 2,554  | 1,655  | 618  | 1,466 |
|  Suicide | 26 | 10 | 14 | 13 | 5 | 19 |

**STable 3. Average cross tabulation of suicides in relation to the Columbia Suicide Severity Rating Scale Screen Version: Suicidal Ideation Severity Scale (past 1 month) score (0-5) for suicides ≤7 days, ≤31 days, and ≤1 year follow-up, across multiple imputed data sets.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** |
| **≤7 days** |  |  |  |  |  |  |
|  No Suicide | 8141.88 | 2846.34 | 3120.22  | 2018.68 | 751.96  | 1791.92 |
|  Suicide | 1.28 | 3.12 | 1.26 | 2.18 | 1.04  | 4.12 |
| **≤31 days** |  |  |  |  |  |  |
|  No Suicide | 8137.44  | 2846.1  | 3116.74  | 2015.48  | 751.74  | 1786.5 |
|  Suicide | 5.72 | 3.3 | 4.74 | 5.38 | 1.2 | 9.54 |
| **≤1 year** |  |  |  |  |  |  |
|  No Suicide | 8110.9  | 2836.58  | 3103.94  | 2005.22  | 746.72  | 1773.64 |
|  Suicide | 32.26 | 12.88 | 17.54 | 15.64 | 6.28 | 22.4 |

**STable 4. Frequency of suicide methods (International Classification of Diseases, Tenth Revision codes) within 1 year from screening with Columbia Suicide Severity Rating Scale Screen Version by sex and disorder.**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Total** | **Women**(%) | **F30-48** Anxiety (%) | **F30-39**Mood (%) | **F10-19**Substance (%) | **F90**ADHD (%) | **F84-89**ASD (%) | **F20-29**Psychotic (%) | **F60**Personality (%)  |
| **X70** Hanging, strangulation | 30 | 9 (30.0) | 10 (33.3) | 9 (30.0) | 6 (20.0) | 2 (6.7) | 1 (3.3) | 4 (13.3) | 2 (6.7) |
| **Y10–14** Poisoning | 21 | 10 (47.6) | 8 (38.1) | 6 (28.6) | 15 (71.4) | 3 (14.3) | 1 (4.8) | 2 (9.5) | 3 (14.3) |
| **X61–64** Self-poisoning | 18 | 13 (72.2) | 8 (44.4) | 11 (61.1) | 8 (44.4) | 5 (27.8) | 4 (22.2) | 6 (33.3) | 3 (16.7) |
| **X81** Jumping, moving object | 15 | 2 (13.3) | 5 (33.3) | 7 (46.7) | 8 (53.3) | 3 (20.0) | 2 (13.3) | 6 (40.0) | 3 (20.0) |
| **X80** Jumping from a height | 6 | 2 (33.3) | 1 (16.7) | 1 (16.7) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (16.7) | 0 (0.0) |
| **X78** Sharp object | 5 | 1 (20.0) | 2 (40.0) | 2 (40.0) | 4 (80.0) | 0 (0.0) | 0 (0.0) | 1 (20.0) | 0 (0.0) |
| **X71** Drowning | 3 | 2 (66.7) | 2 (66.8) | 0 (0.0) | 1 (33.3) | 0 (0.0) | 0 (0.0) | 2 (66.7) | 0 (0.0) |
| **X72-73** Firearm | 2 | 0 (0.0) | 1 (50.0) | 2 (100.0) | 1 (50.0) | 2 (100.0) | 1 (50.0) | 1 (50.0) | 0 (0.0) |
| **X76** Smoke/fire | 2 | 0 (0.0) | 1 (50.0) | 1 (50.0) | 0 (0.0) | 1 (50.0) | 0 (0.0) | 2 (100.0) | 0 (0.0) |
| **Y21** Drowning | 2 | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| **Y32-33** Crash | 2 | 1 (50.0) | 0 (0.0) | 1 (50.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| **Y20** Hanging, strangulation | 1 | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 1 (100.0) | 1 (100.0) | 0 (0.0) |

ADHD=Attention-deficit hyperactivity disorder; ASD=Autism Spectrum Disorder

**STable 5. Demographic and descriptive characteristics of participants with complete data respective missing data on the C-SSRS Screen.**

|  |  |  |
| --- | --- | --- |
|  | **Complete data (N=14,820)** | **Missing on C-SSRS Screen (N=3,864)** |
|  | Mean  | SD | Mean  | SD | *p****a*** |
| Age (years) | 39.2 | 16.5 | 41.6 | 18.2 | <.001 |
|  |  |  |  |  |  |
|  | n | % | n | % | *pa* |
| Sex (Women) | 7,820 | 52.8 | 1,919 | 49.7 | .001 |
| *Mental Disorderb* |  |  |  |  |  |
| Anxiety disorders (F30-48) | 5,750 | 38.8 | 1,006 | 26.0 | <.001 |
| Mood disorders (F30-39) | 4,551 | 30.7 | 794 | 20.6 | <.001 |
| Substance use disorders (F10-19) | 3,370 | 22.7 | 944 | 24.4 | .026 |
| ADHD (F90) | 1,561 | 10.5 | 304 | 7.8 | <.001 |
| Autism spectrum disorder (F84-89) | 879 | 5.9 | 160 | 4.1 | <.001 |
| Psychotic disorders (F20-29) | 1,699 | 11.5 | 581 | 15.0 | <.001 |
| Personality disorders (F60) | 1,088 | 7.3 | 182 | 4.7 | <.001 |

ADHD=Attention-deficit hyperactivity disorder.
a *P* Value resulting from significance tests comparing patients with missing data on the C-SSRS Screen to patients with complete data.
b Mental disorders were defined as any record of ICD-10 principal disorder registered at inpatient or outpatient care, extracted from the medical record, at any time during the follow-up period. Participants could have none or several principal disorders during follow-up.

**STable 6. Accuracy statistics and effect sizes with 95% confidence intervals (CI) for different cut-off values of the Columbia Suicide Severity Rating Scale Screen Version: Suicidal Ideation Severity Scale (past 1 month), predicting suicide for ≤7 days, ≤31 days, and ≤1 year follow-up.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Follow-up / Cut-off** | **Sensitivity (95% CI)** | **Specificity****(95% CI)** | **Likelihood ratio (+)****(95% CI)** | **Likelihood ratio (-)****(95% CI)** | **PPV****(95% CI)** | **NPV****(95% CI)** | **Crude odds ratio** **(95% CI)** | **Adjusted odds ratio** **(95% CI)**a |
| **≤7 days** |  |  |  |  |  |  |  |  |
| ≥1 | 90.2 (88.4–91.7) | 43.6 (43.5–43.7) | 1.6 (1.6–1.6) | 0.2 (0.2–0.3) | 0.1 (0.1–0.1) | 100 (100.0–100.0) | 7.5 (1.0–56.9) | 8.8 (1.2–67.9) |
| ≥2 | 66.2 (63.5–68.7) | 58.9 (58.8–58.9) | 1.6 (1.6–1.7) | 0.6 (0.5–0.6) | 0.1 (0.1–0.1) | 100.0 (100.0-100.0) | 2.8 (0.8–9.3) | 3.3 (1.0–11.3) |
| ≥3 | 56.5 (53.7–59.2) | 75.6 (75.5–75.6) | 2.3 (2.2–2.4) | 0.6 (0.5–0.6) | 0.2 (0.1–0.2) | 100.0 (100.0-100.0) | 4.0 (1.3–12.6) | 4.7 (1.5–14.8) |
| ≥4 | 39.7 (37.0–42.4) | 86.4 (86.3–86.4) | 2.9 (2.7–3.1) | 0.7 (0.7–0.7) | 0.2 (0.2–0.2) | 100.0 (99.9–100.0) | 4.2 (1.3–13.0) | 4.7 (1.5–14.8) |
| ≥5 | 31.7 (29.2–34.3) | 90.4 (90.4–90.4) | 3.3 (3.1­–3.6) | 0.8 (0.7–0.8) | 0.2 (0.2–0.3) | 99.9 (99.9–100.0) | 4.4 (1.3–14.4) | 4.8 (1.5–16.1) |
| **≤31 days** |  |  |  |  |  |  |  |  |
| ≥1 | 80.9 (79.5–82.3) | 43.6 (43.6–43.7) | 1.4 (1.4–1.5) | 0.4 (0.4–0.5) | 0.2 (0.2–0.2) | 99.9 (99.9–99.9) | 3.3 (1.3–8.7) | 3.8 (1.4–9.4) |
| ≥2 | 69.7 (68.1–71.4) | 58.9 (58.8–59.0) | 1.7 (1.7–1.7) | 0.5 (0.5–0.5) | 0.3 (0.3–0.3) | 99.9 (99.9–99.9) | 3.3 (1.5–7.5) | 3.7 (1.6–8.6) |
| ≥3 | 53.9 (52.1–55.7) | 75.6 (75.5–75.7) | 2.2 (2.1–2.3) | 0.6 (0.6–0.6) | 0.4 (0.3–0.4) | 99.9 (99.9–99.9) | 3.6 (1.7–7.7) | 4.0 (1.9–8.6) |
| ≥4 | 36.0 (34.3–37.7) | 86.4 (86.3–86.4) | 2.7 (2.5–2.8) | 0.7 (0.7–0.8) | 0.4 (0.4–0.4) | 99.9 (99.9–99.9) | 3.6 (1.6–7.8) | 3.9 (1.8–8.4) |
| ≥5 | 31.8 (30.1–33.5) | 90.4 (90.4–90.5) | 3.3 (3.2–3.5) | 0.8 (0.7–0.8) | 0.5 (0.5–0.6) | 99.9 (99.9–99.9) | 4.4 (2.0–9.7) | 4.7 (2.1–10.3) |
| **≤1 year** |  |  |  |  |  |  |  |  |
| ≥1 | 69.9 (69.0–70.7) | 43.7 (43.6–43.7) | 1.2 (1.2–1.3) | 0.7 (0.7–0.7) | 0.7 (0.7–0.7) | 99.6 (99.6–99.6) | 1.8 (1.1–2.8) | 2.0 (1.2–3.1) |
| ≥2 | 57.8 (56.9–58.8) | 58.9 (58.9–59.0) | 1.4 (1.4–1.4) | 0.7 (0.7–0.7) | 0.8 (0.8–0.8) | 99.6 (99.6–99.6) | 2.0 (1.3–3.0) | 2.1 (1.4–3.3) |
| ≥3 | 41.4 (40.5–42.4) | 75.6 (75.6–75.7) | 1.7 (1.7–1.7) | 0.8 (0.8–0.8) | 1.0 (0.9–1.0) | 99.6 (99.5–99.6) | 2.2 (1.4–3.4) | 2.4 (1.5–3.6) |
| ≥4 | 26.8 (26.0–27.7) | 86.4 (86.4–86.5) | 2.0 (1.9–2.0) | 0.9 (0.8–0.9) | 1.1 (1.1–1.2) | 99.5 (99.5–99.5) | 2.3 (1.5–3.7) | 2.5 (1.5–4.0) |
| ≥5 | 20.9 (20.2–21.7) | 90.5 (90.4–90.5) | 2.2 (2.1–2.3) | 0.9 (0.9–0.9) | 1.2 (1.2–1.3) | 99.5 (99.5–99.5) | 2.5 (1.5–4.1) | 2.6 (1.6–4.3) |

a Adjusted for sex and age.

**STable 7. Associations between Columbia Suicide Severity Rating Scale Screen Version: Suicidal Ideation Severity Scale (past 1 month) and Suicide Behavior Scale (past 3 months) and suicide across diagnostic groups within ≤1 year follow-up. Associations expressed as odds ratios (OR) with 95% confidence intervals (CI).**

|  |  |  |
| --- | --- | --- |
|  | **Suicidal Ideation Scale**  | **Behavior Scale**  |
|  | Crude OR(95% CI) | Adjusted OR (95% CI)a | Crude OR(95% CI) | Adjusted OR (95% CI)a |
| **Suicide ≤1 year** |  |  |  |  |
|  Anxiety disorders (F30-48) | 1.2 (0.9-1.4) | 1.2 (1.0-1.5) | 2.1 (1.0-4.5) | 2.3 (1.1-5.1) |
|  Mood disorders (F30-39) | 1.1 (0.9-1.3) | 1.1 (0.9-1.3) | 1.6 (0.7-3.5) | 1.7 (0.8-3.7) |
|  Substance use disorders (F10-19) | 1.1 (0.9-1.3) | 1.1 (0.9-1.3) | 1.9 (1.0-3.9) | 2.2 (1.0-4.2) |
|  ADHD (F90) | 1.2 (0.9-1.6) | 1.2 (0.9-1.6) | 3.2 (1.1-9.2) | 3.7 (1.2-10.9) |
|  Autism spectrum disorder (F84-89) | 1.2 (0.8-1.7) | 1.2 (0.8-1.8) | 0.9 (0.2-6.5) | 0.9 (0.1-7.1) |
|  Psychotic disorders (F20-29) | 1.3 (1.0-1.7) | 1.3 (1.0-1.7) | 3.7 (1.4-9.4) | 3.7 (1.5-9.8) |
|  Personality disorders (F60) | 1.2 (0.8-1.7) | 1.2 (0.9-1.8) | 1.5 (0.4-5.8) | 1.5 (0.4-6.1) |

ADHD=Attention-deficit hyperactivity disorder.

a Adjusted for sex and age.