

## TASR in suicide risk evaluation in patients in crisis

### TASR w ocenie ryzyka samobójczego u pacjentów w kryzysie

Department of Affective and Psychotic Disorders, Medical University of Lodz, Łódź, Poland

Correspondence: Marcin Piotr Nowak, Department of Affective and Psychotic Disorders, Medical University of Lodz, Czechosłowacka 8/10, 92-216, Łódź, Poland, e-mail: marcin.nowak@stud.umed.lodz.pl

#### ORCID iDs

Marcin Piotr Nowak <https://orcid.org/0000-0001-6086-2006>

Tomasz Pawełczyk <https://orcid.org/0000-0002-1421-2050>

#### Abstract

**Introduction and objective:** To determine the value of the Tool for Assessment of Suicide Risk (TASR) for assessing suicide risk in the psychiatry admission room in patients in suicide crisis. **Materials and methods:** A case-control study was planned. The case group consisted of patients hospitalised after suicide attempt in suicide crisis (with diagnosed or suspected adjustment disorder). The control group comprised those with no previous suicide attempts. The TASR was performed in the admission room after psychiatric examination. Sociological data were also taken and included in the analysis. **Results:** In total, 82 patients hospitalised in psychiatric wards/acute poisons ward (aged 18–79 years) were recruited, of these 79 were included in the analysis (54 women, 25 men). No significant demographic nor socioeconomic differences were found between the case and control groups. Intergroup differences, at least at trend level, were observed for age over 65, harmful substance use, a history of physical or sexual abuse, anhedonia, anxiety and impulsive behaviour. No significant differences were noted in suicidal ideation, intention and plan. The proposed optimal total TASR score cut-off points between low, medium and high risk are 14 and 22 points. **Conclusions:** The TASR can be used in suicidal risk assessment in patients in crisis, but a holistic assessment is more important than one focused on individual risk factors, even suicidal thoughts or tendencies. However, the tool demonstrates low discriminatory power.

**Keywords:** psychiatry, preventive psychiatry, suicide, attempted suicide

#### Streszczenie

**Wprowadzenie i cel:** Określenie przydatności Narzędzia Oceny Ryzyka Samobójstwa (Tool for Assessment of Suicide Risk, TASR) w ocenie ryzyka samobójczego w izbie przyjęć szpitala psychiatrycznego u pacjentów w kryzysie samobójczym. **Materiał i metody:** Zaplanowano badanie kliniczno-kontrolne. Grupę badaną stanowili pacjenci hospitalizowani po próbie samobójczej w stanie kryzysu samobójczego (z rozpoznany lub podejrzanym zaburzeniem adaptacyjnym). Grupę kontrolną stanowiły analogiczne osoby, które nie podejmowały wcześniej prób samobójczych. TASR wykonano w izbie przyjęć po rutynowym badaniu psychiatrycznym. Zebrano także dane socjologiczne. **Wyniki:** Do badania zakwalifikowano łącznie 82 pacjentów hospitalizowanych na oddziałach psychiatrycznych/oddziale ostrych zatruc (w wieku 18–79 lat), z czego 79 objęto analizą (54 kobiety, 25 mężczyzn). Nie stwierdzono znaczących różnic demograficznych ani społeczno-ekonomicznych pomiędzy grupami badaną a kontrolną. Różnice między grupami, przynajmniej na poziomie trendu, zaobserwowano w przypadku wieku powyżej 65 lat, używania substancji psychoaktywnych, przemocy fizycznej lub seksualnej w wywiadzie, anhedonii, lęku i zachowań impulsywnych. Nie odnotowano istotnych różnic w zakresie myśli, intencji i planu samobójczych. Zaproponowano optymalne punkty odcięcia całkowitego wyniku TASR pomiędzy niskim, średnim i wysokim ryzykiem 14 i 22 punkty. **Wnioski:** Skalę TASR można stosować w ocenie ryzyka samobójstwa u pacjentów w kryzysie, jednak ważniejsza jest całościowa ocena stanu pacjenta niż skupienie się na indywidualnych czynnikach ryzyka, nawet na myślach i tendencjach samobójczych. Badane narzędzie wykazuje jednak niską moc dyskryminacyjną.

**Słowa kluczowe:** psychiatria, psychiatria prewencyjna, samobójstwo, próba samobójcza

## INTRODUCTION

Suicide is a significant medical and social problem. It is estimated that globally, around 800,000 people commit suicide annually (World Health Organization, 2019), 78% of whom live in developing countries (Bachmann, 2018), with a mortality rate of 10.5 (World Health Organization, 2019) to 10.7 per 100,000 people (Bachmann, 2018). It remains the leading death cause in the second and third decades of life, being responsible for 1.4% of premature deaths (Bachmann, 2018), and around 25 million suicide attempts (SA) are recorded each year (O'Connor et al., 2020). Suicide is also a significant problem in Poland (Karnecki et al., 2023).

Despite the significant prevalence of suicide, the assessment of its risk (SR) remains problematic. While some studies have looked for SR biomarkers (Johnston et al., 2022), its assessment still requires a psychiatric examination, determining admission to a psychiatric ward: suicidal patients with psychotic or severe affective episodes usually must be admitted, sometimes against their will, to receive adequate treatment. The situation is more complicated in the case of patients with suicidal thoughts or tendencies that manifest after difficult life events, i.e. as part of "suicide crisis syndrome", according to the interpersonal theory of suicide (Van Orden et al., 2010). They are often characterised by significant SR, and admission can sometimes prevent SAs, which may have been lethal. However, as these patients are not mentally ill, Polish law requires their consent for treatment; to complicate the situation, the patients can often perceive psychiatric hospitalisation as harmful, unhelpful, irrelevant to their problems, or even violating their autonomy: a basic human need and right. Such patients are usually diagnosed with, or suspected of, adjustment disorders. An assessment of SR is based on an interview and an unstructured examination covering SR factors, however, it can also include specific diagnostic risk-measurement tools. A number of these tools are currently in use for both children/adolescents and adults (Nowak and Pawelczyk, 2018), however, many of them remain relatively unstudied.

One tool routinely used to assess SR in the emergency room of the Central Clinical Hospital (Centralny Szpital Kliniczny, CSK), Medical University of Lodz is the Tool for Assessment of Suicide Risk (TASR). However, has not yet been subjected to thorough evaluation. Therefore, the aim of the present work is to assess the value of the TASR as a tool for assessing SR in the emergency room for patients diagnosed with adjustment disorder who are experiencing a suicide crisis.

## MATERIALS AND METHODS

### Inclusion and exclusion criteria

A case-control study was planned. The case group consisted of patients hospitalised in the psychiatric clinics of the Medical University of Lodz or the Acute Poisons Department

of the Nofer Institute of Occupational Medicine in Lodz. The following inclusion criteria were applied: (1) age 18–80; (2) diagnosed or suspected adjustment disorder (F43.2) according to the criteria of the 10<sup>th</sup> version of the International Classification of Diseases, Injury and Causes of Death (ICD-10), (3) informed consent by the patient to participate in the study. The exclusion criteria comprised: (1) an initial diagnosis of another psychiatric disorder, excluding adjustment disorder, according to the ICD-10 criteria; (2) a history of head injury with loss of consciousness or any other unstable somatic disease that could affect the results of the study or limit participation; (3) participation in another clinical trial.

The control group was composed of patients hospitalised in the same psychiatric clinics with no suicide attempt in their history. Otherwise, all other inclusion and exclusion criteria used in the study group also applied.

## TASR

The TASR was created by Stan Kutcher and Sonia Chehil, published in the book *Suicide Risk Management: A Manual for Health Professionals* (Kutcher and Chehil, 2007). The TASR has been translated into Polish by two independent translators, a psychiatrist and an English translator, both of whom specialise in translating texts in psychiatry/psychology/psychotherapy. After the translation, the text was re-translated into English by two other translators. The translation was found to be accurate, with 82% and 89% agreement observed between the two translations (Johnson, 1984). The TASR was designed to be used by clinicians to document and summarise the assessment of a patient who may be suicidal, and to ensure that the clinician has covered the most relevant details of the case, as well as the symptoms and history necessary to assess SR.

TASR consists of three parts:

- individual risk profile: sex, age, suicide family history, chronic diseases, mental disorders, poor social support, substance abuse, physical/sexual abuse (one point for each factor);
- symptoms from the risk group: depressive symptoms, positive symptoms, hopelessness, worthlessness, anhedonia, anxiety/agitation, panic attacks, anger, impulsiveness (two points);
- risk factors from the history, in fact, this part largely includes symptoms from the current psychiatric examination: recent (operationalised as a week) psychoactive substance use, suicidal thoughts, intentions, suicide planning, suicidal/homicidal imperatives, past SA, perception of current problems as unsolvable, access to lethal means (three points).

Higher scores are indicative of a higher SR; however, the authors do not propose any risk score ranges. The TASR also includes a subjective SR assessment by the examiner which is independent of the obtained score, viz. A (high SR), B (moderate) or C (low). For example, a patient with

Variable	Sex	n	AM	Me	Min	Max	SD	CV%
Age	Total	78	35.79	33.5	18	77	16.1	45.0
	Male	25	38.0	34	18	73	16.9	44.37
	Female	53	34.75	32	18	77	15.8	45.59

*n* – group size; *AM* – arithmetic mean; *Me* – median; *Min* – minimal value; *Max* – maximal value; *SD* – standard deviation; *CV%* – coefficient of variation.

Tab. 1. Demographic characteristics of the study population – age

suicidal intentions, regardless of the score, may be included in the high-risk group.

A modified version of the TASR, the TASRm (TASR modified), was published by Chehil and Kutcher in the 2<sup>nd</sup> edition of their above cited book. In contrast to the previous version, the TASRm no longer assigns number points to symptoms, it defines the listed risk factors in a slightly different way (draws attention to self-injury, collects demographic factors into a single point) and contains three additional points regarding protective factors: reasons to live, internal and external strengths that can be used to cope. However, the older version was used in the present study, because its Polish translation has been used in CSK for years, and the aim of the study was to perform a practical analysis of SR in the conditions of the Emergency Room.

The TASR examination was carried out in the Admissions Room of the psychiatric hospital (CSK), mostly by a psychiatrist or a physician during a specialisation in psychiatry; in most cases, the interview was unrelated to the present study. Besides the TASR, socio-demographic data were also collected.

### Approval and consent

The study was approved by the university bioethics committee (Resolution No. RNN/328/17/KE, November 21, 2017).

Variable	Value	Statistics n (%)
Education	Elementary	4 (5.06)
	Gymnasium (lower secondary)	12 (15.19)
	Vocational	8 (10.13)
	Upper secondary	42 (53.16)
Higher		12 (15.19)
Employment	Unemployed	25 (31.64)
	Other form	20 (25.32)
	Full-time contract	33 (41.77)
Marital status	Bachelor/Miss	30 (37.98)
	Married	24 (30.78)
	Another relationship	11 (13.32)
	Divorced	10 (12.66)
	Widow/widower	4 (5.06)
Financial situation	Financial troubles	22 (27.85)
	Average	24 (30.38)
	Good	28 (35.44)
Habitual residence	Village	15 (18.99)
	Small town (<100,000)	13 (16.46)
	Big town (>100,000)	46 (58.23)

*n* – group size. Differences in numbers are caused by missing data. Only people who answered the question were included.

Tab. 2. Characteristics of the study population – socioeconomic variables

Informed consent to participate was obtained from all patients before participation in the study. The patients were informed as to the purpose of the study, and any questions they may have had were answered. They were also informed that they could withdraw from the study at any time; if the patient withdrew their consent during the study, none of the collected information was included in the analysis.

### Statistical evaluation of results

The collected data were analysed statistically. In the case of quantitative features, the arithmetic mean and median were calculated to provide a measure of the central tendency (for all participants and in the analysed subgroups). The total range of variability of a given feature was presented using minimum and maximum values; in addition to the total range, the interquartile range was calculated. The standard deviation was used as a measure of dispersion. Compliance with the assumed normal distribution was assessed with the Kolmogorov–Smirnov test.

In the case of nominal features, groups were compared using the  $\chi^2$  test of independence, considering the appropriate number of degrees of freedom (at low numbers, the  $\chi^2$  independence test was used with Yates' correction or Fisher's exact test). Two-sided tests were used in the analyses. In the case of quantitative variables, the Student's *t*-test or the Mann–Whitney *U*-test were used, depending on the distribution of the tested parameter.

The significance level was taken as  $\alpha = 0.05$ . Due to the premature termination of the study, because of the COVID-19 pandemic, the results at the trend level were also taken into account; these could turn out to be statistically significant when achieving the planned size of the study group, assuming a cut-off  $\alpha = 0.08$ .

One-way analysis of variance (ANOVA) was used to analyse the assigned SR groups. J Youden's statistics (Youden, 1950) was used to identify the optimal cut-off points of the TASR summary score in the assessment of suicide risk. The collected data was encoded in Microsoft Excel. Statistical analyses were performed using Dell Statistica 13.1 PL for Windows, licensed by the Medical University of Lodz (Dell Inc., 2016).

## RESULTS

### Examined population

The study included 82 patients aged 18–79, hospitalised in psychiatric wards/acute poisons ward. As three patients

Risk factor	State after suicide attempt		$\chi^2$ ( <i>df</i> = 1)	<i>p</i>
	No <i>n</i> (%)	Yes <i>n</i> (%)		
Male	13 (28.89)	12 (35.29)	0.367	0.5445
Age 15–35	20 (58.82)	25 (55.56)	0.084	0.7715
Age >65	3 (8.82)	0 (0.0)	-	0.0757*
Family history of suicide	8 (24.24)	7 (15.91)	0.835	0.3609
Chronic medical illness	13 (38.24)	18 (40.91)	0.057	0.8109
Psychiatric illness	32 (94.12)	44 (97.78)	0.062 <sup>#</sup>	0.8039
Poor social support/isolation	10 (29.41)	16 (35.56)	0.331	0.565
Substance abuse	6 (17.65)	16 (35.56)	3.091	0.0787
Sexual/physical abuse	3 (8.82)	13 (29.55)	3.86 <sup>#</sup>	<u>0.0494</u>
Depressive symptoms	26 (78.79)	36 (80.0)	0.172	0.896
Positive psychotic symptoms	0 (0.0)	1 (2.22)	-	0.57 <sup>§</sup>
Hopelessness	19 (57.6)	21 (47.7)	0.733	0.39
Worthlessness	21 (63.6)	23 (51.1)	1.215	0.27
Anhedonia	20 (60.6)	17 (38.6)	3.646	0.056
Anxiety/agitation	25 (75.7)	24 (53.3)	4.099	<u>0.043</u>
Panic attacks	6 (18.2)	2 (4.2)	2.554 <sup>#</sup>	0.11
Anger	3 (9.1)	11 (25.0)	2.228 <sup>#</sup>	0.1355
Impulsivity	9 (27.3)	37 (82.2)	23.76	<u>&lt;0.001</u>
Suicidal ideation	15 (45.5)	19 (45.2)	0.019	0.985
Suicidal intent	8 (24.2)	13 (29.6)	0.268	0.605
Suicide plan	8 (24.2)	8 (18.2)	0.421	0.517
Recent substance use (last week)	3 (9.1)	20 (45.5)	11.903	<u>&lt;0.001</u>
Current problems seem unsolvable	12 (36.4)	20 (45.5)	0.642	0.423
Access to lethal means	26 (78.8)	31 (68.9)	0.948	0.33

$\chi^2$  – Chi<sup>2</sup> independence test statistic value; <sup>#</sup> – Chi<sup>2</sup> independence test statistic value with Yates' correction; *df* – number of degrees of freedom; *p* – the value of the two-tailed test probability for the Chi<sup>2</sup> test statistic; <sup>§</sup> – the value of the two-tailed test probability for Fisher's exact test; significant relationships were underlined (*p* < 0.05); differences in numbers are caused by missing data.

Tab. 3. The intergroup differences in the frequencies of given suicide risk factors noted during examination using the TASR in the emergency room

withdrew their consent to participate during in the study, a total of 79 participants were included in the final analysis: 54 women (68.35%) and 25 men (31.65%), mean age 35.79 years. No significant differences regarding sex were found between groups (Mann–Whitney test;  $U = 573$ ;  $Z = 0.9529$ ;  $p = 0.3406$ ). Demographic and socioeconomic descriptions of the examined population are given in Tabs. 1, 2.

### TASR results

In most cases, no statistically significant differences were noted between the study and control groups with regard to the analysed demographic and socio-economic factors (sex, age, employment, education, marital status, actual relationship, religiousness, financial situation, place of residence, fertility rate, number of children), as well as all TASR questions analysed separately. Differences between groups, at least at the trend level, were obtained for the following: age over 65, harmful substance use, a history of physical/sexual abuse, anhedonia, anxiety and impulsive behaviour.

Suicidal imperatives (not reported by any study participant) and SA were not included: being in a post-SA state formed part of the inclusion criteria in the case group (Tab. 3).

Significantly higher TASR results were observed in the study group (Tab. 4). However, only trend-level results were observed between the risk groups assigned by the clinicians, *viz.* A, A/B, B/A, B, B/C, C/B and C (contrary to the intentions of TASR creators). Despite this, statistically significant results were observed when these were reorganised into three main groups, *viz.* A, B and C (A/B was ascribed to A, B/A to B etc.; Tab. 5).

Significant differences in total TASR score were found between the risk categories assigned during the examination. The general ANOVA test indicated significant heterogeneity in the mean TASR scores between the risk groups (A, B, C), as confirmed by post hoc analyses (Tab. 6).

A receiver operating characteristics (ROC) test was performed to estimate the cut-off points for the total TASR score in the examined group. The area under the curve (AUC) was 0.947 for distinguishing risk A from B, and

State after suicide attempt	Score							t	df	p
	n	AM	Me	Min	Max	SD	CV%			
Yes	45	21.05	20	8	35	7.262	34.51	2.068	76	<u>0.042</u>
No	34	17.44	17	3	32	8.091	46.39			

*n* – group size; *AM* – arithmetic mean; *Me* – median; *Min* – minimum value; *Max* – maximum value; *SD* – standard deviation; *CV%* – coefficient of variation; *t* – Student's *t*-test value; *df* – number of degrees of freedom; *p* – the value of the two-tailed asymptotic test probability; differences in numbers are caused by missing data; significant differences are underlined.

Tab. 4. The significance of inter-group differences regarding overall TASR score

0.862 for distinguishing risk B; these results indicate that the differentiation criterion used was good quality (A vs. B and B vs. C, both  $p < 0.001$ ). Youden's statistics indicated the optimal A/B and B/C score cut-off points to be 14 and 22 points (Tab. 7).

### DISCUSSION

Previous studies of SR in broader populations, i.e. not limited to patients with a diagnosed/suspected adjustment disorder, have found it to be influenced by a number of possible factors. These include male sex (Bachmann, 2018), both young (Bachmann, 2018) and senior age (Raue et al., 2014), unemployment (Nordt et al., 2015), certain occupations such as doctors (Fink-Miller and Nestler, 2018; Hawton et al., 2011; Stack, 2004), dentists, nurses, pharmacists (Hawton et al., 2011) possibly veterinarians (Fink-Miller and Nestler, 2018), loneliness, especially divorce, widowhood or separation (Puzo et al., 2018; Wyder et al., 2009), childlessness (Dehara et al., 2021), living in the countryside (Ivey-Stephenson et al., 2017), poverty (Choi et al., 2019; Hoffmann et al., 2020), mental disorders in the family (Martello et al., 2019). Conversely, a lower SR has been confirmed in pregnant women (Mota et al., 2019), higher-educated people (Phillips and Hempstead, 2017; Puzo

et al., 2018), as well as those who are married (Windfuhr and Kapur, 2011) or belong to a religious community (Martello et al., 2019; Windfuhr and Kapur, 2011). However, in the present study, no significant socio-demographic differences were found between those with a history of SA and those without. This may be related to the more restrictive selection of the study group.

Moreover, contrary to the prevailing view, and some studies (Hubers et al., 2018), neither suicidal thoughts, nor suicidal intentions, nor even suicide planning were significantly more common in the group of patients in suicide crisis, as previously other authors reported (Hall et al., 1999).

Risk level: A – high B – intermediate C – low	State after suicide attempt		$\chi^2$ (df)	p
	No n (%)	Yes n (%)		
A	13 (39.39)	25 (56.82)	7.734 (2)	<u>0.034</u>
B	7 (21.21)	13 (29.55)		
C	13 (39.39)	6 (13.64)		

$\chi^2$  – Chi<sup>2</sup> independence test statistic value; *df* – number of degrees of freedom; *p* – the value of the two-tailed test probability for the Chi<sup>2</sup> test; significant relationships were indicated when  $p < \alpha = 0.05$ ;  $\alpha$  – statistical significance level; differences in numbers are caused by missing data.

Tab. 5. The intergroup differences in suicide risk, as assessed by a psychiatric hospital emergency room doctor

Risk	Score							F (df)	p	Post hoc	p**
	n	AM	Me	Min	Max	SD	CV%				
A	38	25.39	25	14	35	4.89	19.26	62.778 (2.74)	<0.001	A vs. B	<0.001
B	20	16.95	17	12	21	2.65	15.61			A vs. C	<0.001
C	19	11.16	10	3	28	5.84	52.37			B vs. C	<0.001

*n* – group size; *AM* – arithmetic mean; *Me* – median; *Min* – minimum value; *Max* – maximum value; *SD* – standard deviation; *CV%* – coefficient of variation; *F* – Fisher's test statistic value; *df* – number of degrees of freedom; *p* – the value of the two-tailed asymptotic test probability; differences in numbers are caused by missing data; significant differences are underlined, \*\* – Tukey's test for different *N*.

Tab. 6. The intergroup differences in overall TASR score between patients assigned to three risk groups by a doctor of the admission room of a psychiatric hospital

Risk level	Estimated value	Estimation	95% CU upper limit	95% CU lower limit
A vs. B	Cut-off point	22	23	20
	Youden's index	0.7632	0.8421	0.5684
B vs. C	Cut-off point	14	12	17
	Youden's index	0.6895	0.4211	0.8447

CU – confidence interval.  
Notes: confidence intervals calculated using the BCA method; number of bootstrap attempts: 1,000.

Tab. 7. Estimated cut-off points for suicide risk category, as assigned by a doctor of the emergency room of a psychiatric hospital

This can be explained in two ways. Firstly, patients may be discouraged by discussing their suicide attempt due to stigma, which can be more pronounced than for other psychiatric problems (Rogers et al., 2018), and may also result in admission to a psychiatric hospital without consent. Secondly, according to the interpersonal theory of suicide (Van Orden et al., 2010), suicidal thoughts appear at an early stage of the suicidal process, but may only progress into intentions following a reduction of the fear of death; in addition, a reduction in the feeling of pain can increase the lethality of the SA. Similar conclusions are reached by regarding suicide as a process approach (Bloch-Elkouby et al., 2020; Cohen et al., 2018; Hawes et al., 2017; Schuck et al., 2019).

The obtained results confirm that TASR can be a useful tool for the assessment of SR in patients in crisis. They also demonstrate the need for a holistic assessment of the patient's condition, rather than focusing on individual risk factors, even suicidal thoughts or tendencies. However, the difference between the mean TASR results for the two groups was not large, and the ranges largely overlapped, indicating low discriminatory power.

Another limitation of the study is its case-control format, however, a prospective study based on observing patients in SR and waiting for an attempt would be both ethically questionable and require a large study group. In addition, the patient giving their consent to participate in the study may be related to their degree of cooperation, i.e. including providing true information regarding their state after the SA. Finally, the ICD-10 was used instead of the ICD-11, as the former was in routine use during the time of the study. In conclusion, psychiatric assessment of SR is difficult; it requires a holistic assessment of the patient rather than focusing on any single symptom, even reported suicidal ideation. In such cases, the TASR may be of significant help in assessing the risk among patients in crisis. The study also presents cut-off levels for the TASR, which may be of assistance to clinicians working with such patients in the emergency department of psychiatric hospitals.

### Conflict of interest

*The authors do not report any financial or personal connections with other persons or organisations that could negatively affect the content of this publication and claim authorship rights to this publication.*

### Author contributions

*Original concept of study: TP. Collection, recording and/or compilation of data: MPN. Analysis and interpretation of data: TP. Writing of manuscript: MPN. Critical review of manuscript: TP. Final approval of manuscript: MPN, TP.*

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