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## **Suicide in a clinical and a general population, with focus on comorbidity. Studies from the Lund Suicide Research Center and the Lundby Study.**

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2016

*Document Version:*

Publisher's PDF, also known as Version of record

[Link to publication](#)

*Citation for published version (APA):*

Holmstrand, C. (2016). *Suicide in a clinical and a general population, with focus on comorbidity. Studies from the Lund Suicide Research Center and the Lundby Study*. [Doctoral Thesis (compilation), Psychiatry (Lund)]. Lund University: Faculty of Medicine.

*Total number of authors:*

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# Risk factors of future suicide in suicide attempters – A comparison between suicides and matched survivors

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Holmstrand C, Niméus A, Träskman-Bendz L. Risk factors of future suicide in suicide attempters – A comparison between suicides and matched survivors. *Nord J Psychiatry* 2006;60:162–167. Oslo. ISSN 0803-9488.

The objective of this study was to find risk factors for suicide by looking for clinical and care/treatment consumption differences between 15 hospitalized suicide attempters, who later committed suicide (“completers”), and 15 suicide attempters who did not (“non-completers”), matched according to sex, age and principal diagnosis. Completers had significantly more often attempted suicide after the index admission. After index, completers had received more psychiatric care and treatment than non-completers. Comorbidity was common in both groups of patients. Personality disorders according to the DSM III-R, axis II, Cluster B, however, tended to be more common in the completer group. Increased comorbidity over time could also be seen to a larger extent in completers. In spite of the matching of principal diagnosis, completers tended to have higher Montgomery–Åsberg Depression Rating Scale ratings than non-completers. They also had significantly higher Suicide Assessment Scale (SUAS) scores. From this study, it is apparent that suicide attempters at risk of future suicide have major and multiple psychiatric problems, which cause difficulties in the care and treatment.

• *Comorbidity, Hospital care, Suicide attempt, Suicide.*

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The risk of suicide during the first year after a suicide attempt is known to be 1–2% (1). After 14 years, the risk reported by Suokas et al. was 6.7% (2). After 15 years, Hawton et al. reported a risk of 3% (3). In a 5-year follow-up, Nordström et al. (4) reported a suicide risk of 8.3% among men and 4.3% among women who had all been hospitalized in psychiatry after a suicide attempt. Another 5-year follow-up study of inpatients after a suicide attempt showed that 13% of the subjects had died from suicide (5).

Most suicide victims have suffered from a psychiatric illness at the time of suicide (6–8). For example, Waern et al. (8) showed that 97% of old-age suicides were subjected to a mental disorder. According to different studies, personality disorders existed in about one-third of suicides (9, 10). Pokorny (11) found that a personality disorder was common in people who attempted suicide, but not in those who committed suicide.

Among psychiatric symptoms, depressed mood has been reported to be more common among suicides than controls (12). Longitudinal shifts from recurrent brief depression to major depressive disorder (MDD) were

suggested to reflect risk of future suicide in a study by Pezawas et al. (13).

The impact of comorbidity on suicidal behaviour has increasingly been discussed (14–17). Our group has reported that 25% of patients who were hospitalized after a suicide attempt had comorbidity within axis I of the DSM system (18), mainly mood disorders and substance use disorders (19). Isometsä et al. (10) found that suicide victims with personality disorders had a concomitant depressive syndrome and/or a substance use disorder in 95% of cases.

When it comes to contact with health authorities, Andersen et al. (20) reported a high rate of contacts with general practitioners close to suicide.

Association between psychiatric hospital-consumption matters and suicidal behaviour has been studied by Gunnell et al. (21), who presented that standardized admission ratios for psychiatric illness correlated positively to both standardized admission ratios for parasuicides and standardized mortality ratios for suicide.

Comparisons between suicide attempters and suicide completers with major depression were made in a study by Gladstone et al. (22), and they found that completers

had a more severe illness over their life time, and had more admissions to a psychiatric unit. Hoyer et al. (23) found a history of multiple psychiatric admissions to be associated with an increased risk of suicide in persons first hospitalized for an affective disorder.

The aim of the present study was to find risk factors for future suicide in suicide attempters by comparing various clinical factors between those who later committed suicide and those who were still alive.

## Subjects and Methods

### Subjects

Each year during the study period, about 200 persons older than 18 years arrived in the Medical Emergency Inpatient Unit of the University Hospital in Lund (USIL) after having tried to commit suicide. During weekdays, the patients met a psychiatrist and a social worker for an evaluation. About 50% of the suicide attempters were referred to a psychiatric ward at USIL, which was specialized in affective disorders and suicide prevention, while about 10% were referred to psychiatric wards elsewhere. Roughly 40% were treated as out-patients.

The participants in the present study had all been staying in a specialized psychiatric ward after a suicide attempt (i.e. index) during the period 1987–1994. We used the definition of suicide attempt described by Beck et al. (24). Psychiatric and somatic diagnoses were determined by two independent psychiatrists according to the DSM III-R (18). If the diagnoses were not in accordance, they were settled after a consensus discussion. The patients who were discharged after a few days, or were in need of medical treatment immediately, or were treated under commitment, did not take part in the study. About 10% of patients who were asked to participate refused.

Patients who later committed suicide (“completers”) were matched according to sex, age (5-year interval) and main Axis I diagnosis with patients who had been staying on the same ward after a suicide attempt and who were still alive (“non-completers”), by a third independent person. In case more than one control patient was found, the control was picked out in a blind manner.

It was then possible to find 15 pairs of patients, which makes a sample of 30 patients altogether. There were 10 pairs of women and five pairs of men. The mean ( $\pm$  standard deviation) age at index was  $43.6 \pm 14.1$  years.

## Methods

### Ratings

In the Medical Intensive Care Unit, the patients were evaluated by a psychiatrist and a social worker and scored on the Suicidal Intent Scale (SIS; 25).

After admission to the psychiatric ward, the patients filled in the Beck Hopelessness Scale (BHS; 26), and were rated according to the Comprehensive Psychopathological Rating Scale (CPRS; 27), from which the Montgomery–Åsberg Depression Rating Scale (MADRS) was extracted (28) The Suicide Assessment Scale (SUAS) was also used (29, 30).

### Chart investigation

Information on hospital care and treatment after the index hospitalization was retrieved from case sheets. The number and lengths of hospitalizations, the number of drugs used for treatment, psychotherapeutic intervention, and the number of suicide attempts were counted for a time from the index suicide attempt until suicide for each pair of subjects. The length of the study periods thus differed from one pair to another.

We also studied possible change of comorbidity (new axis I or axis II diagnoses) over time as a factor reflecting the progress of the psychiatric condition. In the case sheets, the most common diagnostic system was the International Classification of Diseases, 9th revision (ICD-9). Therefore, the main and comorbid diagnoses found in case sheets during the study period often had to be transformed to the DSM system.

### Statistical methods

Non-parametric statistics (the Wilcoxon signed rank test, Mann–Whitney *U*-test, chi-square with continuity correction for small samples and Fisher’s Exact Test) were used from the Statistical Program for Social Sciences (SPSS) software versions 4.0 and 6.1 (31).

This study was approved by the Lund University Medical Ethics Committee.

## Results

### Methods of suicide and suicide attempts

The distribution of suicide attempt methods, main diagnoses, age, sex and observation time (from index to suicide) for each pair and methods of suicide are shown in Table 1.

Subjects who later committed suicide made more suicide attempts after index ( $P=0.018$ ) than non-completers. Seven of the suicides (47%) occurred during the first year after index.

### Comorbidity at the index suicide attempt

As the pairs of suicide attempters were matched for diagnoses, we studied DSM III-R comorbidity (Table 2).

Axis I comorbidity with Axis II existed in 10 of the completers and nine of the non-completers. The comorbidity differences between the groups were all non-significant.

Eight of the 10 women who were still alive had an Axis II diagnosis, as compared with one of the five men

Table 1. Distribution of suicide attempt methods, main diagnoses, age, sex and observation time for each pair, and method of suicidal behaviour.

Completer– non-completer	Main axis I index diagnosis	Age (years)	Sex	Observation time (days)	Index suicide attempt method	Suicide method
Pair 1	Dysthymia	48	F	839	Wrist-cut	Intox
		46			Intox	–
Pair 2	MDD	39	F	1517	Intox	Drowning
		40			“	–
Pair 3	MDD	53	M	136	Intox	Gun shot
		50			“	–
Pair 4	Adjustment disorder	23	M	485	Cut his neck	Hanging
		23			Intox	–
Pair 5	MDD	42	F	2012	Wrist-cut	Intox
		44			Intox	–
Pair 6	Depressive dis. NOS	30	F	139	Intox	Intox
		26			Wrist-cut	–
Pair 7	MDD	76	F	208	Intox	Drowning
		73			“	–
Pair 8	MDD	30	F	2207	Intox	Intox
		29			“	–
Pair 9	Dysthymia	24	F	188	Intox	Intox
		22			“	–
Pair 10	MDD	54	F	1945	Intox	Intox
		55			“	–
Pair 11	MDD	60	F	308	Intox	Intox
		64			“	–
Pair 12	Psychotic syndrome	49	M	121	Intox	Train
		47			“	–
Pair 13	Anxiety disorder	46	M	733	Intox	Carbon monoxide
		35			“	–
Pair 14	Dysthymia	43	F	113	Intox	Carbon monoxide
		39			“	–
Pair 15	MDD	51	M	608	Intox	Hanging
		48			“	–

MDD, major depressive disorder; NOS, not otherwise specified.

(NS). Seven of the 10 female completers were diagnosed as having a personality disorder and so were three of the five male completers (NS). When looking at the cluster categorization of Axis II disorders according to the DSM III-R task force, there was a predominance of cluster B in both completers and non-completers, but most markedly among completers ( $P=0.056$ ; Fig. 1).

#### **Changes of chart diagnoses during the observation period after index**

During the observation period, nine of the completers had increased comorbidity, compared with only one of the subjects still alive ( $P=0.007$ ).

Completers had a larger number of new diagnoses than non-completers ( $P=0.006$ ). In case we found a new episode of a diagnosis set at index, this was not taken into account (Table 2).

#### **Rating scales**

The only significant difference between suicide attempters and completers was found concerning the SUAS ( $P=0.017$ ). Psychopathology accounting for depression

in the MADRS showed a trend of distinction between the groups ( $P=0.056$ ). When the MADRS was subtracted from the CPRS (reflecting non-depressed symptoms) and compared between the two groups, no significant difference appeared.

Concerning the other comparisons, we refer to Table 3.

Persons who committed suicide less than 1 year after index ( $n=7$ ) were compared with those who survived the first year, but later took their lives. The results showed a significant difference in BHS ratings, where those who died within the first year had significantly lower scores ( $P=0.042$ ). SUAS ratings were significantly higher ( $P=0.043$ ) among suicides within 1 year than among those who died later.

#### **Hospital care**

On average, completers had a greater number of hospitalizations than non-completers ( $P=0.012$ ) during the actual time span from index until suicide (Table 4).

Their length of hospitalization was also significantly greater ( $P=0.005$ ). The number of prescribed psychotropic drugs used after index tended to be higher among

Table 2. Diagnostic development (DSM III-R) of completers and non-completers during the observation period.

Completer– non-completer	Main axis I index diagnosis	Additional axis I index diagnoses	Index axis II cluster	Comorbid diagnosis during the observation period (post index)
Pair 1	Dysthymia	–	B	Substance use dis.
Pair 2	MDD	–	–	Anxiety dis., schizoaffective dis.
Pair 3	MDD	–	NOS	–
Pair 4	Adjustment disorder	–	B	Depressive dis. NOS
Pair 5	MDD	Pain dis.	B	–
Pair 6	Depressive dis. NOS	–	A	–
Pair 7	MDD	–	B	–
Pair 8	MDD	–	C	Dysthymia
Pair 9	MDD	–	B	Dysthymia
Pair 10	Dysthymia	–	NOS	–
Pair 11	Dysthymia	Substance use dis.	B	Adjustment dis.; depr. dis. NOS
Pair 12	MDD	–	–	Bipolar dis.
Pair 13	MDD	Substance use dis.	–	–
Pair 14	MDD	Substance use dis.	–	–
Pair 15	Psychotic syndrome	–	A	–
Pair 16	Anxiety dis.	Major depression	NOS	–
Pair 17	Anxiety dis.	Substance use dis.	–	–
Pair 18	Dysthymia	Pain dis; Substance use dis.	B	Anxiety dis., depr. dis. NOS, conversion dis.
Pair 19	Dysthymia	–	B	Depressive dis. NOS
Pair 20	MDD	Substance intox. delirium	–	–
Pair 21	MDD	–	–	–

MDD, major depressive disorder; NOS, not otherwise specified.

completers ( $P=0.073$ ). In the completer group, seven out of 15 had received psychotherapy compared with six of the non-completers (NS).

In the case sheets, we also identified the age of onset of psychiatric illness, which was similar in completers and non-completers ( $P=0.570$ ; Table 4).

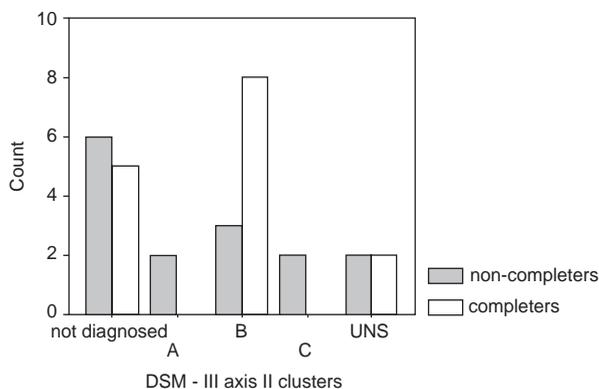


Fig. 1. Distribution of DSM-III-R Axis-II clusters among completers and non-completers (chi-square; NS after Continuity correction).

## Discussion

In our study, comorbidity was common in both completers and non-completers. Comorbidity of Axis II, mainly cluster B, tended however to be more often found among completers. Henriksson et al. (9) found that 31% of patients with major depression who later committed suicide had a personality disorder. We had similar results, but we found no significant difference between completers and non-completers.

Among our patients, completers had significantly higher index scores of the SUAS than the non-completers, and concerning the MADRS, a similar trend was seen. High SUAS ratings seem to predict suicide occurring within 1 year after a suicide attempt, which is in line with previous studies by our group (29). Hence, the SUAS might be a useful tool for estimating suicide risk and for separating suicide attempters who later commit suicide from those who do not. Similarly to findings by Beck et al. (32), who studied suicide among former inpatients, we found low, rather than high, BHS ratings of patients who committed suicide during the first year after their index suicide attempt. The somewhat higher MADRS scores of

Table 3. Rating-scale comparisons between completers and non-completers (Wilcoxon signed ranks test).

Rating- scale	Pairs ( <i>n</i> )	Completers mean ( <i>s</i> )	Non-compl. mean ( <i>s</i> )	Compl. median	Non-compl. median	Z	P two-tailed
SIS	7	16.4 (4.7)	15.0 (6.5)	16.0	19.0	-0.423	0.667
BHS	11	13.4 (7.0)	10.2 (6.6)	17.0	12.0	-0.889	0.374
SUAS	10	43.2 (16.4)	23.1 (11.0)	43.0	24.5	-2.395	0.017
CPRS-R	11	23.6 (9.4)	17.2 (8.5)	22.0	15.5	-1.600	0.109
CPRS-O	11	14.5 (5.0)	8.7 (5.1)	6.5	2.0	-1.467	0.142
MADRS	11	14.6 (4.8)	8.3 (5.1)	14.5	7.0	-1.912	0.056

SIS, Suicidal Intent Scale; BHS, Beck Hopelessness Scale; SUAS, Suicide Assessment Scale; CPRS-R, Comprehensive Psychopathological Rating Scale-Reported; CPRS-O, Comprehensive Psychopathological Rating Scale-Observed; MADRS, Montgomery-Åsberg Depression Rating Scale.

completers indicate that they suffered from depressive symptoms to a larger extent than did non-completers at index, and it is remarkable that this was the situation in spite of the matching of main diagnoses. This trend of more depressive symptoms among those who later committed suicide was found by Egede-Borg & Ståhl (12), who also had a matched psychiatric population with mixed diagnoses.

When looking closer at the time period from the index suicide attempt to the time of suicide, and using the same time length for matched non-suicides, our results indicate that completers have lived through months, but mostly years, of intensive suffering from psychiatric illness before taking their lives. These results are in agreement with findings by Gunnell et al. (21).

The great use of different psychotropic drugs by completers probably reflects difficulties in handling their conditions and/or treatment resistance, maybe because of comorbidity.

In comparison with non-completers, completers also had more comorbidities and a higher number of new diagnoses during the study period. A possible reason for these results may be a discontinuity of doctors during the observation period.

The fact that many of the completers already had started their suicidal career before index may explain some of the differences between the two groups in the present study. However, the mean age of illness onset did not differ between them.

The number of patients with repeated suicidal behaviour in our sample of suicides confirms to some extent findings by Roy (33) in a population of psychiatric patients who had committed suicide. However, all our patients had already initiated their suicidal career by making a suicide attempt.

Apart from the small number of subjects, a weakness of our study is the variability of observation times. All suicide attempters should be looked upon as suicide-prone individuals, and we cannot exclude the possibility that some of the non-completers in the study later on will commit suicide.

## Conclusions

We suggest that suicide attempters who later commit suicide have had a period of months but mostly years of long-lasting and frequent sufferings from psychiatric illness before the suicide. Their conditions are often hard to treat, and suicide attempts complicate the situation. They have repeatedly been hospitalized, spent many days on a psychiatric ward (often hundreds of days) and have been prescribed a great number of drugs, often without expected effect. They have also received psychotherapy, but to the same extent as non-completers. One important reason for future suicide seems to be comorbidity.

The SUAS was shown to be a good marker of future suicide.

Table 4. Chart variable comparisons between completers and non-completers (Wilcoxon signed ranks test).

	Pairs ( <i>n</i> )	Completers mean ( <i>s</i> )	Non-completers mean ( <i>s</i> )	Completers median (rank)	Non-compl. median (rank)	Z	P two-tailed
Age of onset	15	32 (12.9)	32 (10.2)	30 (14-64)	33 (16-49)	-0.568	0.570
Hospitalizations* ( <i>n</i> )	15	5 (4.1)	2 (1.6)	3 (1-15)	1 (1-5)	-2.507	0.012
Inpatient duration (days)†	15	211 (253)	48 (46.3)	125 (2-884)	26 (2-154)	-2.783	0.005
Post index suicide attempts ( <i>n</i> )	15	2 (4.0)	0 (0.3)	0 (0-14)	0 (0-1)	-2.375	0.018
Drugs ( <i>n</i> )‡	15	5 (3.1)	3 (3.1)	6 (0-12)	2 (0-12)	-1.795	0.073

\*Index hospitalization included.

†Index hospitalization included.

‡Drugs prescribed from index suicide attempt.

*Acknowledgements*—These studies were supported by grants from the Swedish Medical Research Council nos. 08319 and 7833, and funds from the Lund University. The nursing staff, research assistant Ulla Persson and Dr Göran Regnéll are greatly acknowledged.

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