

Suicide risk in schizophrenia – a follow-up study after 20 years

Part 1: Outcome and associated social factors

G Lippi, MB ChB, MMed (Psych), FCPsych (SA)

D J Smit, MB ChB, MMed (Psych), FCPsych (SA)

Department of Psychiatry, University of Pretoria and Weskoppies Hospital

J C Jordaan, BCom (Econometrics), BCom (Hons), MCom (Econometrics)

Department of Statistics, University of Pretoria

J L Roos, MB ChB, MMed (Psych), FCPsych (SA), MD

Department of Psychiatry, University of Pretoria and Weskoppies Hospital

Objective. This study re-evaluated, after a period of 20 years, a cohort of patients with schizophrenia who had been considered to be at high risk for suicide. The outcome and social factors associated with their suicide risk were investigated over the two decades.

Method. Subjects were contacted and interviewed face to face using a questionnaire devised for this purpose. The Beck Hopelessness Scale (BHS) was administered and ratings were compared with those from the original study. The Calgary Depression Scale for Schizophrenia (CDSS) was administered. Cross-tabulations were performed to identify factors associated with increased suicide risk. A psychological autopsy was performed for those subjects who had committed suicide since the original study.

Results. Fourteen of the original 33 high-suicide-risk schizophrenia patients were traced. Three subjects had committed suicide during the 20-year period. Among the living subjects, risks for suicide were found to be lower than those 20 years earlier. Male gender, poor social support, early age of illness onset, current admission to or recent discharge from hospital, and a higher level of education were all factors associated with increased suicide risk.

Conclusion. Demographic factors and those related to illness course found to be associated with suicide risk in patients with schizophrenia in this study are in accord with those reported in the literature.

Suicide has been identified as a common and serious complication of schizophrenia. Emil Kraepelin states: 'Suicide, especially in the first period of the malady, is not infrequent and occurs, sometimes without any recognisable cause.'¹ The incidence of completed suicide in the general population is estimated to be 14.5/100 000 per year worldwide and substantially higher at 32/100 000 per year in sub-Saharan Africa.² Recent research consistently indicates the incidence in people suffering from schizophrenia to be at least 20 times higher.^{1,3,4} More than half of schizophrenics contemplate suicide at some stage, approximately 40% attempt suicide, and 10% die by suicide.⁵ Suicide is one of the major contributors to the two to three times higher mortality in this population.⁶

A smaller proportion of suicide attempts in people suffering from schizophrenia than in those without the illness are planned – approximately 20% as against 47%.⁷ Compared with people who do not have schizophrenia, modes of suicide attempts in schizophrenics are often more active or violent,⁸ resulting in higher rates of mortality in both sexes.

In an extensive review by Hawton *et al.*⁹ of risk factors for suicide in schizophrenia, it was found that the presence of previous depressive disorders, previous suicide attempts, drug misuse, agitation or motor restlessness, fear of mental disintegration, poor treatment adherence and recent loss were associated with an increased risk of suicide. Hallucinations were associated with reduced risk. Only 5 cohort studies were included in this review,⁹⁻¹⁴ of which only 3 were prospective in design.^{9,12}

A 1989 study by Roos *et al.*,¹⁵ the control group of which became the subjects for the present study, was also included in Hawton *et al.*'s review,⁹ because the control group consisted exclusively of individuals at high risk of suicide. The present study seeks to add information on the subject to the few prospective and retrospective studies mentioned by Hawton *et al.*⁹ by re-evaluating suicide risk in high-risk individuals 20 years after initial contact, with relevant information on demographics, illness course, and treatment of these subjects over the preceding 20 years having also been retrospectively gathered.

In this article – the first of two – we report on the current suicide risk in the cohort and its association with the following factors:

(i) subsequent suicides, suicide attempts and self-harm behaviour since the initial (1989) study, with relevant information surrounding these incidents; and (ii) socio-demographic data, including significant socio-demographic changes and their impact.

Method

In 1992 Roos *et al.*¹⁵ published the retrospective empirical study, entitled 'Suicide among patients with schizophrenia' (translated). Thirty-three Caucasian subjects who had committed suicide and suffered from schizophrenia were compared with a control group of high-risk subjects with schizophrenia of the same ethnic background treated at Weskoppies Hospital, Pretoria.

Individuals from the control group of Roos *et al.*'s¹⁵ study who could be traced formed the cohort that was re-evaluated in the current study. The study protocol was approved by the Research Ethics Committee of the Faculty of Health Sciences of the University of Pretoria. Permission for the use of patient records was obtained in terms of the Promotion to Access to Information Act (2002).

Contact details from patient records were utilised, as well as information from local clinics. In many cases these details were outdated and insufficient, since a significant number of subjects had disengaged from services provided at Weskoppies Hospital many years earlier. The frequent socio-economic difficulties and high mobility of this patient population further hindered our ability to find many of the subjects.

Fourteen of the 33 subjects on record were traced. Information about the study relevant to the consent process was communicated both verbally and through the use of a printed section that formed part of the consent form that each subject read through. Signed, informed consent was obtained from the subjects individually. For subjects who had died since the 1989 study, informed consent was given by a family member. In the cases where the deceased subject's next of kin could not be traced, the informed consent was given by the chief executive officer of Weskoppies Hospital.

The subjects were interviewed individually or in the presence of family members who could provide collateral information. Additional information was obtained from the hospital records. The interviews were conducted face to face, except in one case where a telephonic interview was conducted with a family member of a deceased subject.

A questionnaire was designed specifically for the purpose of capturing information known to be contributory to suicide risk as well as for assessing this risk in a schizophrenic population.

The clusters of data were evaluated with reference to the subject's current presentation and situation, as well as his or her presentation and situation over the previous two decades, in an attempt to establish both the current suicide risk and the course and determinants of this risk over this time period.

The Beck Hopelessness Scale¹⁶ (BHS) and Calgary Depression Scale for Schizophrenia¹⁷ (CDSS) were administered as additional measures of evaluating current suicide risk.

The BHS was administered because it had been used in the original study.¹⁵ Moreover, in another study it identified 91% of eventual suicides when a score of 10 was used as cut-off, and this scale predicted suicide more accurately than the Beck Depression Inventory or the Scale for Suicide Ideation.¹⁸

The CDSS was added because it is the most validated and reliable measure of depression in schizophrenia.¹⁷

For subjects who had died since the original study, particulars surrounding their symptoms and social circumstances at the time of death were evaluated. For subjects who had committed suicide, additional information surrounding the act was explored using the previously published method of 'psychological autopsy' as framework.¹⁹

Statistical analysis

The data were analysed using the statistical package SPSS (Statistical Package for the Social Sciences). Since the sample size of 14 is relatively small, no inferential analysis was performed. Furthermore, the data were categorised into three subgroups: (i) living subjects; (ii) subjects who had died by suicide; and (iii) subjects who had died of natural causes.

For the categorical variables the analysis was mainly descriptive and consisted of frequency tables for single variables. Cross-tabulations were then performed. Variables pertaining to age and age at death were grouped with variables directly associated with or used in the measurement of suicide risk, namely: (i) current suicide risk; (ii) number of suicide attempts; (iii) regularity of suicide attempts; (iv) BHS score; and (v) CDSS score.

These variables were then individually cross-tabulated with all the other categorical variables within categories such as demographic details, extent of family involvement with the subject, level of education, religion, residential status, age of illness onset, course of illness, psychotic symptomology, depressive symptomology, anxiety symptoms, stressful life events, insight into illness, cannabis use, history of self-harm behaviour, and current as well as previous pharmacotherapy and adherence to it. Fisher's exact test was

applied to examine the significance of the association between any two variables. The Mann-Whitney U (MWU) test was performed to test for statistical significance between variables.

Scores on the BHS and CDSS were treated as continuous variables. For these variables, the descriptive statistics were calculated across the levels of the categorical variables.

Results

Of the 14 subjects who were traced, 11 were male and 3 female. Since the original study 3 had committed suicide, all of whom were male. One female had died of natural causes at the age of 66. The living subjects ranged from age 39 to 79, with the majority in their 5th or early 6th decade. The 3 who had committed suicide had been 26, 35 and 45 years old respectively at the time of their deaths.

Completed suicides

A thorough 'psychological autopsy' was carried out for all three of the subjects who had committed suicide. The circumstances surrounding their deaths differed in many respects, so it has been decided to describe each of these cases individually here.

Case 1

A 26-year-old single, homeless man was estranged from his family at the time of his death. A high-school dropout whose symptoms started in his early 20s, he committed suicide during his first admission at Weskoppies Hospital. This admission was as an involuntary patient and lasted more than a year.

He suffered from severe, treatment-refractory delusions, mostly persecutory, referential and grandiose in nature, as well as concomitant nihilistic delusions at the time of his death. He had severe auditory hallucinations and thought form disorder throughout his illness. The hallucinations partially remitted on antipsychotics, but unfortunately treatment adherence was periodic due to absence of insight into his illness. The thought-form disorder did not improve on pharmacotherapy. The patient was plagued with alogia, affective blunting, social withdrawal and avolition. He experienced occasional episodes of severe depression complicated by anxiety, which partially remitted on antidepressant treatment.

At the time of his suicide he was being treated with trifluoperazine and depot fluphenazine, after flupentixol and zuclopentixol had been tried previously. Clomipramine was prescribed for his depressive symptoms. He complained of parkinsonian and sedative adverse effects.

The patient's clinical records contained many warning signs of what was to follow. He attempted suicide more than 20 times. These attempts ranged from self-laceration to jumping in front of a car. Ominously, he also attempted to hang himself.

On the morning of his suicide he asked to see his doctor, who was then contacted. Upon the doctor's arrival in the ward the patient was found dead, hanging in his room. Retrospectively it was found that there had been a recent deterioration in both psychotic and depressive symptoms.

Case 2

This 35-year-old man, single and unemployed at the time of his death, lived with his parents after failing to complete his tertiary education. Schizophrenia was diagnosed when he was 19 years old. During his 16 years of illness he was admitted on five occasions for a couple of months at a time. For the 6 years prior to his death he was an outpatient.

He suffered from severe persecutory and referential delusions which were refractory to treatment. He was not burdened by hallucinations or disorders of thought form, but did suffer from anhedonia, affective blunting, social withdrawal and avolition. Ongoing depressive symptoms were resistant to treatment.

The patient understood the implications of his illness and the functional limitations it imposed. Despite this, his treatment adherence was only periodic and he frequently used cannabis.

At the time of death he was on oral risperidone, since both olanzapine and clozapine caused unacceptable weight gain. He was prescribed citalopram for depressive symptoms and a benzodiazepine for insomnia. Other adverse effects of medication experienced were akathisia and parkinsonism.

He attempted suicide on three occasions, each time by overdosing on his prescribed medication. On the day of his suicide he had an argument with his mother, the result of conflict with her related to his worsening persecutory delusions and daily cannabis use. He had been chronically demoralised due to his loss of autonomous functioning and took an overdose in the family home.

Case 3

A 45-year-old single man living with his brother, this patient had had his first psychotic episode in his late 20s, a decade after matriculation. The course of his illness was characterised by frequent short admissions, but he was an outpatient when he committed suicide.

He had severe persecutory delusions, grandiose delusions and auditory hallucinations, all partially responsive to antipsychotic treatment. Anhedonia, avolition and social withdrawal were present. Severe treatment-resistant depressive symptoms were a hallmark of his illness. Insight into his condition was non-existent and he increasingly abused cannabis during the 5 years that preceded his death.

He was initially treated with trifluoperazine, and then haloperidol, before being switched to flupentixol depot due to non-adherence. He was also on fluoxetine at the time of his death. Adverse effects of his medication included parkinsonism and sedation.

The patient had a history of approximately 10 suicide attempts, which included overdosing, carbon monoxide poisoning and self-laceration. While alone at home he committed suicide by ingesting an unknown toxic substance. At the time he was under the influence of alcohol and experienced severe hopelessness, as well as psychotic and depressive symptoms.

Previous suicide attempts

Previous suicide attempts were recorded in 80% of the living subjects and all of those who eventually completed suicide. Overdose as a method coincided with increased regularity of suicide attempts.

The importance of hopelessness as a risk factor for suicide in schizophrenia was illustrated by the higher BHS scores in the 8 living individuals who had previously attempted suicide (means of 7.75 v. 1; standard deviations (SD) 6.07 and 1.41). Furthermore, the importance of depressive symptomology was illustrated by statistically significantly higher CDSS scores in these subjects (means 9.13 v. 1; SD 6.53 and 1.41; MWU 0.5; *p*-value 0.04). Individuals who had attempted suicide by means of overdose, self-laceration or jumping from a height had higher BHS and CDSS scores than those who had used other methods.

The use of alcohol was associated with suicide attempts in 20% of the subjects interviewed and with 1 case of successful suicide. These individuals had higher mean CDSS scores (11 v. 7.57; SD 1.41 and 7.35).

In terms of the apparent reasons for the suicide attempts, depressive symptoms and hopelessness dominated – as opposed to psychotic or anxiety symptoms, alcohol or cannabis use, medication-related problems or environmental and situational factors.

Only 1 subject alluded to his suicidal intentions before a suicide attempt.

Self-harm behaviour

Six individuals displayed self-harm behaviour at some stage. The specific modes of self-harm used did not seem to influence suicide risk. These patients had higher BHS scores than those who did not harm themselves (means 7.33 v. 5; SD 5.43 and 7.57). Higher BHS and CDSS scores were specifically found in those who harmed themselves by means of head bumping or ingestion of harmful substances. The CDSS scores indicated that self-harm was associated more with hopelessness than depression. The CDSS mean score was 7.17 (SD 6.18) for those who harmed themselves and 8 (SD 8.45) for those who did not.

Social support

Marital status

At the time of the study 10 subjects had never been married, 3 were divorced or separated, and only 1 was still married. The 3 subjects who had committed suicide were all single. The married individual had a BHS score of 0, much lower than the mean scores of divorced/separated (6.50; SD 3.54) and single people (7.29; SD 6.75). This trend is echoed by the CDSS scores, which were 3 versus 11 (SD 1.41) and 7.14 (SD 7.73), respectively.

Those who had a high risk of suicide at the time of evaluation were all single, divorced or separated.

Family contact

Four of the living subjects stayed with their families and 3 had frequent personal contact with their families. In 2 cases the contact was reported to be infrequent and 1 subject reported having no contact with his family. Of the patients who had died by suicide, 2 were living with their families at the time of their deaths and 1 was estranged from his family.

The BHS scores of those currently living with their families (mean 4; SD 4) were lower than the scores of those who were not (mean 7.43; SD 6.78). In the CDSS scores this pattern was repeated (means 5 v. 8.5; SD 3.51 and 7.95). The scores were also lower for those who were in the hospital at the time of the study compared with those living in halfway houses, shelters or missions, but, conversely, were increased for involuntary versus voluntary inpatients. Subjects who had no or infrequent family contact had more lifetime suicide attempts and a higher current suicide risk.

Highest level of education

Of the 5 individuals who had attended tertiary institutions only 1 had completed his education. All the subjects had reached

high-school level but only half had matriculated. In the 3 who had committed suicide levels of education ranged from only attending secondary education and completing secondary level, to attending a tertiary institution.

BHS and CDSS scores were higher for those with a higher level of education.

Age at onset of schizophrenia

All the subjects had an age at onset of below 30 years. Eleven of these had had their first psychotic episode before the age of 25, and 6 before they had reached 20.

The BHS scores for those with an age at onset of younger than 20 were double those whose illness started later than that age (means 9.2 v. 4.5; SD 6.83 and 4.12). The CDSS scores for these same categories were even more divergent (means 12 v. 3; SD 6.67 and 2.94). Unsurprisingly, the subjects with earlier onset of illness had more lifetime suicide attempts and were higher current suicide risks.

Time since last admission

Four subjects were inpatients at Weskoppies Hospital at the time of the study and 3 had been discharged within the preceding 6 months. Six subjects had not been admitted for 6 years or more and their BHS scores were lower than for the others (means 2.5 v. 9; SD 3.79 and 6.13). The CDSS scores highlighted the risk of suicide posed by recent discharge from hospital. Those admitted at the time of the study had a mean score of 7.33 (SD 7.01) compared with 13.67 (SD 7.01) for those discharged within the preceding 6 months.

Discussion

Processing the results of our study made it increasingly clear that the BHS and CDSS correlated well with each other (correlation coefficient 0.90; p-value 0.00) and were associated with current suicide risk, which was independently evaluated. This pattern was consistent throughout the evaluation of the factors influencing suicide risk, justifying our choice of these two rating scales for the measurement of suicide risk in schizophrenic subjects. Hopelessness, however, is an especially difficult symptom to use and interpret in isolation because of the difficulty of responding empathetically to it, due to a pervasive assumption that the hopelessness of persons with schizophrenia is realistic and therefore not a proper target of treatment.¹¹

As part of the inclusion criteria of the Roos *et al.*¹⁵ study all the subjects had to have a BHS score of 10 or more. Twenty years

later the mean BHS score in the current follow-up study was 6.4 (SD 6.08) and only 1 subject had a score of more than 10 (16). Two individuals had a score of 0. This finding indicates that in 9 of the 10 living subjects the level of hopelessness had decreased to such a degree that they would not have been considered high risk for suicide and would not have been included in the original study by Roos *et al.*¹⁵ This lower current suicide risk compared with the previous risk of suicide indicates that risk had diminished with age in these patients with schizophrenia. This finding is not unexpected, since half of schizophrenics who commit suicide do so within the first 2 years after the onset of illness.²⁰ Furthermore, the mean age of the subjects in the study was 50.4 years (SD 11.08), compared with the mean age at time of suicide of 33 years according to the literature,²¹ which in turn is similar to the mean age at time of death (35.33; SD 9.5) of the subjects in the current study who had committed suicide.

Eleven of the 14 subjects were male (78.6%), compared with 20 of the 33 (60.6%) in the original control group.¹⁵ Male gender is considered to be an independent risk factor for suicide among schizophrenia sufferers.^{3,7,22}

The married individual in this sample had a much lower suicide risk than the rest of the subjects. Married individuals are less isolated and withdrawn (risk factors for suicide) and have more social support and family responsibilities. Early onset of illness and the presence of severe positive and negative symptoms diminish the likelihood of getting married. Similarly, subjects who lived with their family and had more frequent family contact were found to be at a lower risk for suicide. Conversely, having a patient with severe positive and negative symptoms living in the family home can be a huge stressor and a source of family conflict, which was a contributing factor in 2 of the 3 completed suicides in this study.

Subjects with higher levels of education scored higher on the BHS, and to a lesser degree the CDSS, pointing more towards feelings of demoralisation than those associated with depression in this cohort. Patients with higher levels of education often have a later onset of illness, and therefore better premorbid functioning. This often leads to greater insight into their illness and fear of mental disintegration and functional deterioration, both of which are associated with greater suicide risk.^{3,9,23,24}

Earlier age at onset of illness was associated with greater depression, hopelessness and current suicide risk and, as expected, more lifetime suicide attempts. Early onset of schizophrenia equates to longer duration of illness with more subsequent functional deterioration. Severe positive and negative

symptoms are more common in patients with early illness onset. These patients experience more frequent relapses and hospitalisations,^{25,26} leading to feelings of hopelessness and the disintegration of a social support network. When considering the levels of functionality of this patient population, a bimodal distribution of high risk therefore becomes evident.

Both admission to and recent discharge from hospital are significant stressors^{5,23,27} and were associated with more severe depression and hopelessness in this study. 'Post-psychotic depression' could explain this increased risk related to recent hospital discharge.

The presence of self-harm behaviour coincided more with hopelessness than with depressive symptoms.

The living subjects who had attempted suicide not only had higher BHS and CDSS scores than those who had not, but also admitted to hopelessness and depressive symptoms being the most common reasons for previous suicide attempts. Two living subjects and 1 who committed suicide had a history of attempting suicide under the influence of alcohol. In these cases alcohol may have been used in an attempt to reduce the anxiety associated with the impending suicide attempt. It is also possible that suicide intent only developed in these subjects secondary to the depressive effects of alcohol and increased impulsivity associated with alcohol intoxication. The living subjects in this category had higher CDSS scores than those who had not attempted suicide under the influence of alcohol, raising the possibility that either the use of alcohol led to worsening depressive symptoms or that these subjects suffered from severe depressive symptoms and used alcohol in an attempt to self-medicate. Only 1 subject alluded to his suicidal ideation prior to a suicide attempt, which highlights how unpredictable suicidal behaviour in this population is, despite knowledge surrounding the risks. This unpredictability is underlined by the fact that the 3 subjects who had completed suicide had relatively varied presentations and social circumstances, even though all of them were known to be at high risk for suicide through the presence of multiple risk factors.

The limitations and strengths of this study are discussed in more detail in the second article, but it is worthwhile noting that very few results reached statistical significance because of the small sample size. This, however, is also true of the other cohort studies on this subject, especially those where the period of time between initial and subsequent evaluations has been longer.^{9,14}

Conclusion

Over the period of follow-up in this cohort study of schizophrenic patients at high risk for suicide, 3 subjects had committed suicide.

Suicide risk was currently lower among the living subjects at follow-up than 20 years previously. Despite this, many factors were identified that were associated with an increase in suicide risk in this population. Of these, poor social support, early age at onset of illness, current admission to or recent discharge from hospital and higher levels of education were the most noteworthy. Clinical and psychopharmacological variables will be discussed in Part 2.

References

- De Hert M, Peuskens J. Psychiatric aspects of suicidal behaviour: schizophrenia. In: Hawton K, Van Heeringen K, eds. *The International Handbook of Suicide and Suicidal Behaviour*. Chichester: Wiley, 2000: 121-135.
- World Health Organization: Violence and Injury Prevention Taskforce. http://www.who.int/violence_injury_prevention/violence/world_report/factsheets/en/selfdirectedviolfacts.pdf [accessed 20 January 2009].
- Caldwell CB, Gottesman II. Schizophrenia – a high-risk factor for suicide – clues to risk reduction. *Suicide Life Threat Behav* 1992; 22: 479-493.
- Rascon ML, Gutierrez MD, Valencia M, et al. Family perception of the suicide attempt and suicidal ideation of relatives with schizophrenia. *Salud Ment* 2004; 27: 44-52.
- Siris SG. Suicide and schizophrenia. *J Psychopharmacol* 2001; 15: 127-135.
- Auquier P, Lancon C, Rouillon F, et al. Mortality in schizophrenia. *Pharmacoeconomical Drug Saf* 2006; 15: 873-879.
- Mann JJ. A current perspective of suicide and attempted suicide. *Ann Intern Med* 2002; 136: 302-311.
- Marusic A, Jovanovic N. 'Suicide-ophrenia': when schizophrenia and suicide behavior overlap. *Adv Schizophr Clin Psychiatry* 2008; 3(3): 70-77.
- Hawton K, Sutton L, Haw C, Sinclair J, Deeks JJ. Schizophrenia and suicide: systematic review of risk factors. *Br J Psychiatry* 2005; 187: 9-20.
- Casadebaig F, Philippe A. Mortalité chez des patients schizophrènes. Trois ans de suivi d'une cohorte. [Mortality in schizophrenic patients. Three years follow-up of a cohort.] *Encephale* 1999; 25: 329-337.
- Cohen IJ, Test MA, Brown RL. Suicide and schizophrenia: data from a prospective community treatment study. *Am J Psychiatry* 1990; 147: 602-607.
- Lim LC, Tsoi WF. Suicide and schizophrenia in Singapore – a fifteen year follow-up study. *Ann Acad Med Singapore* 1991; 20: 201-203.
- Dingman CV, McGlashan TH. Discriminating characteristics of suicides. Chestnut Lodge follow-up sample including patients with affective disorder, schizophrenia and schizoaffective disorder. *Acta Psychiatr Scand* 1986; 74: 91-97.
- Stephens JH, Richard P, McHugh PR. Suicide in patients hospitalized for schizophrenia: 1913-1940. *J Nerv Ment Dis* 1999; 187(1): 10-14.
- Roos JL, Boraine H, Bodemer W. Selfmoord by pasiënte met skisofrenie. [Suicide among patients with schizophrenia.] *S Afr Med J* 1992; 81: 365-369.
- Beck AT, Weissman A, Lester A, Trexler L. The measurement of pessimism: the hopelessness scale. *J Consult Clin Psychol* 1974; 42: 861-865.
- Addington D, Addington J, Schissel B. A depression rating scale for schizophrenics. *Schizophr Res* 1990; 3: 247-251.
- Beck AT, Steer RA, Kovacs M, Garrison B. Hopelessness and eventual suicide: a 10-year prospective study of patients hospitalized with suicidal ideation. *Am J Psychiatry* 1985; 142: 559-563.
- Scott CL, Swartz E, Warburton K. The psychological autopsy: solving the mysteries of death. *Psychiatr Clin North Am* 2006; 29: 805-822.
- Tandon R, Jibson MD. Suicidal behaviour in schizophrenia: diagnosis, neurobiology, and treatment implications. *Curr Opin Psychiatry* 2003; 16: 193-197.
- Caldwell CB, Gottesmann II. Schizophrenics kill themselves too: A review of risk factors for suicide. *Schizophr Bull* 1990; 16: 571-589.
- Montross LP, Zisook S, Kasckow J. Suicide among patients with schizophrenia: a consideration of risk and protective factors. *Ann Clin Psychiatry* 2005; 17(3): 173-182.
- American Psychiatric Association: Practice guideline for the assessment and treatment of patients with suicidal behaviour. *Am J Psychiatry* 1995; 160(11): suppl, 1-60.
- Drake RE, Gates C, Whittaker A, Cotton PG. Suicide among schizophrenics: a review. *Compr Psychiatry* 1985; 26: 90-100.
- Modestin J, Zarro I, Wallvogel D. A study of suicide in schizophrenic in-patients. *Br J Psychiatry* 1992; 160: 398-401.
- Raymont V. Suicide in schizophrenia – how can research influence training and clinical practice? *Psychiatr Bull* 2001; 25: 46-50.
- Hunt IM, Kapur N, Windfuhr K, et al. Suicide in schizophrenia: findings from a national clinical survey. *J Psychiatr Pract* 2006; 12: 139-147.