

## **Association Between Changes in Psychiatric Services and Increases in Suicide Rates**

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**Summary.** The purpose of the study is to discover whether there is an association between changes in the psychiatric services offered by the largest psychiatric hospital in Iceland during the period 1955–1978 and changes in the rate of suicide. Marked changes occurred in the services after 1965. The rate of suicide in the patient population was significantly higher during 1965–1978 than during 1955–1964. It is concluded that the changes in the psychiatric services are associated with an increase in the rate of suicide and that this increase may to some extent be a side effect of therapeutic methods introduced after 1965. The conclusion is thought to imply the necessity for further evaluation of those therapeutic methods as applied in the hospital and increasing the application of measures for the prevention of suicide.

**Key words:** Iceland – Psychiatric services – Suicide – Epidemiology

### **Introduction**

The Psychiatric Department of the University Hospital is by far the largest psychiatric institution in Iceland and offers a large part of the psychiatric services available there. Marked quantitative and qualitative changes have occurred in the services offered by this hospital since 1955, similar to the changes in other countries. New psychotropic drugs were introduced in 1955, but other modern therapeutic methods, such as milieu therapy, group therapy, family therapy, marital therapy, and behavioural therapy, were mainly introduced after 1965, for inpatients as well as daypatients and outpatients. Milieu-therapeutic ideas began to influence the work at the hospital in 1968 and three therapeutic community wards were opened in 1971–1973. Group therapy began in 1965 and family therapy and marital therapy in 1967. After 1965 there was a marked increase in the number of psychiatrists and other mental health workers, such as psychologists, social work-

ers and psychiatric nurses working at this hospital. Also the non-professional workers were encouraged to take a more active part in treatment. Before 1965 the mental health workers had a tendency to take all responsibility for the patients and to rely on protective and restrictive measures. After 1965 they allowed the patients to take more responsibility for themselves. This is reflected in an increase in the number of open wards, a decrease in restrictions on leaves, shorter stay and increased outpatient treatment after 1965. The changes that have occurred in the psychiatric services offered by this hospital have been shown by Thorsteinsson (1974) to be associated with an increase in the rate of first and total admissions and a decrease in the length of stay. He considered this to be an indication that the changes constituted an improvement in the services offered.

Psychiatric treatment may lead to the improvement or cure of patients with mental disorders associated with a high risk of suicide. It therefore seems reasonable to assume that a quantitative and qualitative improvement in psychiatric services may decrease the rate of suicide even if the improvement has occurred without the express purpose of suicide prevention. According to Ratcliffe (1962) the improvement of psychiatric services in Dingleton, Scotland, was reflected in a significant fall in the rates of suicide for his region. However, other studies have shown no change and some have even shown an increase in the rate of suicide. Walk (1967) studied the incidence of suicide in the population of the Community Psychiatric Service at Chichester and among the patients within a year of contact, comparing 5-year periods before and after the introduction of community care methods. He found that the introduction of community care had no clear effect on suicide in the whole area population or among younger patients, but may have protected some elderly patients from suicide. Nielsen and Videbech (1973) studied the suicide frequency in a Danish island before and after the introduction of a community psychiatric service and found no difference in the suicide rate. Ödegård (1967) in a study of mortality in Norwegian psychiatric hospitals found an increase in the rate of suicide after 1955 associated with the introduction of various modern therapeutic methods. In a study of suicide in the psychiatric hospitals in Norway Hessö and Retterstöl (1975) found an association between the introduction of modern therapeutic methods and an increase in the rate of suicide. In a study of suicide in Norwegian, Finnish and Swedish psychiatric hospitals Hessö (1977) found that the suicide rate in the psychiatric hospitals in all the countries had risen materially. He ascribed this partly to the admission of a large number of patients at suicidal risk and partly to the effect of modern therapeutic methods.

The suicide rate has increased in various psychiatric hospitals in Switzerland (Ernst et al. (1980), Burri (1980), Maier (1981). Ernst et al. (1980) found that the increased rate in hospitalized patients was real in the sense that it was not balanced by a decreased rate in newly discharged patients. Recently Schlosser and Strehle-Jung (1982) found an increase in the rate of suicide in a German psychiatric hospital following a change in its organization and therapeutic policies.

The weight of the evidence presented above seems to favour the hypothesis that the changes that have occurred since 1965 in the services offered by the Psychiatric Department of the University Hospital are associated with an increase in the rate of suicide. This hypothesis will be tested in the present study.

## Material and Methods

A list of all persons known to have committed suicide during the period 1955–1978 was made by examination of death certificates, and by comparing this list with the roster of our hospital a list was made of all patients known to have committed suicide during the period.

The study period was divided into two parts for comparison. Period I (1955–1964), characterized by the introduction of psychotropic drugs, and Period II (1965–1978), characterized by the introduction of various other therapeutic methods, detailed in the introduction.

The size of the general population for each of the years of the study period was obtained from the National Registry. Three patient populations were considered — inpatients (P1), patients last discharged less than 1 year ago (P2), and former patients — people admitted at least once to the hospital (P3). Their size was determined from the records and annual reports of the Psychiatric Department of the University Hospital. The records show the number of first and total admissions but not the number of different patients admitted each year. P2 could therefore not be determined exactly but only given a range between the number of first admissions and the number of total admissions. Mortality was not taken into account in determining the size of the population of former patients. It was assumed that there had been no change with time in mortality in the population of former patients and that the ratio between its size for each of the parts of the study period would therefore not be changed by mortality.

For each population under consideration in this study the rate of suicide in Period I was compared to the rate in Period II by comparing the number of suicides observed to the number of suicides expected during each period. The expected number of suicides was calculated in the following way. The number of suicides expected in a population during a period of time is a function of the rate of suicide, the size of the population, and the length of the period. If it is assumed that the rate of suicide is constant, then the number of suicides expected in a population during a part of a period can be calculated by multiplying the number of suicides observed during the whole period by the ratio between the cumulative size of the population during that part of the period and the cumulative size during the whole period. The cumulative size of a population during a period is defined as the sum of the mean size of the population for each of the years of the period. The cumulative size of a population during a period can also be calculated by multiplying its mean size during the period by the length of the period. When expected numbers are calculated in this way a significant difference between the number of suicides expected and observed implies a significant difference between rates.

The following nonparametric statistical tests (Siegel 1955) were used to test hypotheses: the  $X^2$  test and the Mann-Whitney U test.

## Results

Table 1 shows that there have been marked changes from Period I to Period II in the size of the populations under consideration in this study. With the exception of inpatients their absolute size has increased. The size of the patient populations relative to the size of the general population has also increased, again with the exception of the inpatients.

There has been no significant change in the age and sex distribution of the patient population from Period I to Period II. There has been a significant change in the distribution of patients into diagnostic categories. The main change is an increase in the relative size of the category of alcoholics and drug addicts.

Table 2 shows that there has been a significant increase in the rate of suicide in the general population when the expected numbers are calculated from the size of the general population aged 0+. When the expected numbers are calculated from the size of the general population aged 15+ the increase is not significant.

**Table 1.** Mean size of populations by period

	GP	P1	P2		P3
			FA	TA	
Period I					
1955-1964	173674	297	102	268	2055
Period II					
1965-1978	208605	266	248	902	4251
Period I+II					
1955-1974	194051	279	180	638	3336
GP General population					
P1 Inpatients					
P2 Patients with last discharge less than 1 year ago (range)					
P3 Former patients — people admitted at least once to the hospital					

**Table 2.** The observed (O) and expected (E) number of suicides in the populations by period

	GP		P1		P2		P3	
	O	E	O	E	O	E	O	E
Period I								
1955-1964	158	177	3	8.95	6	13.66	17	24.12
Period II								
1965-1978	317	298	21	15.05	54	46.34	77	69.88
Period I+II								
1955-1978	475		24		60		94	
Significance of difference between observed and expected numbers — $\chi^2$ test.								
P	0.038		0.006		0.008		0.047	

There has been a significant increase in the rate of suicide of inpatients when expected numbers are calculated from the size of the inpatient population. However, this increase could to some extent be due to the decrease in the size of the inpatient population relative to the size of the general population. In order to correct for this the expected numbers of inpatient suicides have been calculated from the size of the general population and as Table 2 shows there has been a significant increase in the rate of suicide in the inpatients. There has been a significant increase, in the rate of suicide in patients discharged less than 1 year ago when the expected numbers are calculated from the number of first admissions, but the increase is not significant when they are calculated from the number of total admissions. There has also been an increase in the rate of suicide in former patients. From the Table it can be seen that during Period II 24% of all suicides

**Table 3.** Median interval in years from last admission and last discharge to suicide of former patients by period

	Last admission	Last discharge
Period I 1955-1964	2.31	2.23
Period II 1965-1978	0.46	0.15
Significance of difference between medians — Mann-Whitney U-test		
P	0.014	0.004

**Table 4.** Number of suicides in the patient population by period and diagnosis

	Diagnosis				Total
	Psychosis	Neurosis Pers. Disord.	Alcoholism Drug Abuse	Other	
Period I 1955-1964	7	2	8	0	17
Period II 1965-1978	38	11	26	2	77
Period I+II 1955-1978	45	13	34	2	94

$\chi^2$  test — Difference between distributions not significant

were former patients compared to 11% during Period I. The increase is shown by a two-tailed  $\chi^2$  test to be statistically significant at the 5% level of significance.

Table 3 shows a significant decrease in the median interval from last admission and last discharge to suicide of former patients. This decrease implies an increase in the rate of suicide.

Of the 24 patients committing suicide, 14 were on open wards and 10 on closed wards. However, 20 had permission to leave their wards without special surveillance. Thus the wards were open to most of the inpatients committing suicide. Three inpatients committed suicide on their ward, 15 on the premises of the hospital and 6 outside the hospital.

Table 4 shows the distribution of suicides in the patient population by period and diagnostic category. There is no significant difference between the distribution in the two periods using the  $\chi^2$  test.

## Discussion

There has been a marked quantitative increase and qualitative change in the psychiatric services offered by the Psychiatric Department of the University Hospital from Period I to Period II. It has been assumed that these changes are associated

with an improvement in the outcome of mental disorders, but studies showing this to be true remain to be done in Iceland and at the present time the assumption is mainly supported by circumstantial evidence. The increase in the rate of first and total admissions and the decrease in the length of stay may perhaps suggest such an improvement.

Because of the large share of the Psychiatric Department of the University Hospital in the psychiatric services in Iceland, improvements in its services could be expected to decrease the rate of suicide. However, contrary to expectations, there has been an increase in the rate of suicide in the patient population – both in inpatients and former patients. This increase may be caused by many factors singly or in various combinations.

The increase could be only apparent and due to inaccurate determination of the number of suicides in the patient populations or of the size of the populations. At this point it should be stressed that it is futile to apply statistical tests to the results of this study if it is not possible to determine the number of suicides and the size of populations with sufficient accuracy.

It is unlikely that the rate of suicide is due to an increase in the reporting of suicide. It is possible that the actual number of suicides is higher than the identified number because death certificates are supposed to under report suicide as a cause of death. However, the way in which the cause of death is determined in Iceland has not changed during the study period and there seems to be no change in the general attitude towards suicide. There is no reason to believe that there has been any change in the reporting of suicide as a cause of death and it can be assumed that there has been no change between the two parts of the study period in the ratio between the number of identified and actual suicides.

It is also unlikely that the increase in the rate of suicide in patients is due to inaccurate determination of the size of the patient populations. The cumulative sizes of the inpatient population during the two parts and the whole of the study period, as well as the ratio between those sizes, could be accurately determined. This was not the case for the population of patients that had been discharged for 1 year or less and inferences made from the increase in the number of suicides in this population is open to question. Because mortality could not be taken into account the cumulative sizes of the population of former patients could not be accurately determined. However, on the assumption that the mortality had not changed with time, the ratio between the cumulative sizes could be considered accurate. Furthermore, the decrease in the median interval from last admission and last discharge to suicide shows that there has been an increase in the rate of suicide in former patients. It should be noted that the calculation of the median does not depend upon knowledge of the size of the population of former patients.

The increase in the rate of suicide in hospitalized patients might be balanced by a decrease in the rate in discharged patients, and the increase would then be only a temporary phenomenon and not indicative of a long-term increase in the rate. However, this is not the case, as shown by the increase in the rate of suicide in all former patients. This is in accordance with the result of Ernst et al. (1980) as referred to earlier.

The increase in the number of observed suicides in the patient population is to some extent due to a difference in the size of the patient population and in the

length of the two parts of the study period. However, comparison of observed and expected numbers of suicides shows that the increase is also due to a significant increase in the rate of suicide.

The increase in the rate of suicide in the patient population could be due to an increase in the mean probability of suicide on admission to the patient population. The assumption has been made in this study that this probability has not increased, which is reasonable because of the increase in the size of the patient population relative to the size of the general population. This has presumably led to a decrease in the overall severity of mental disease in the patient population, and therefore to a decrease in the mean probability of suicide on admission to the patient population. However, if there has been an increase in the rate of suicide in the general population or a change in the selection of patients, then the probability of suicide on admission may have increased, explaining the increase in the rate of suicide.

There has been little or no increase in the rate of suicide in the general population. There has been no change in the selection of patients according to sex and age, but there has been a change in the selection according to diagnostic categories, the main change being an increase in the relative size of the category of alcoholics and drug addicts, perhaps increasing the mean probability of suicide on admission to the patient population. However, Table 4 shows that this category does not contribute more than expected from its relative size to the increase in the number of suicides, and from this it can be inferred that the increase in the relative size of this category has not increased the mean probability of suicide on admission to the patient population.

The increase in the rate of suicide in the patient population could be due to an increase in the mean probability of suicide after admission and this could be due to the effect of e.g. therapeutic policies or methods.

An increase in the circulation with a decrease in the mean length of stay may or may not cause an increase in the mean probability of suicide in inpatients. On one hand a decrease in the mean length of stay could imply too early discharge, a higher mean probability of suicide on discharge and hence in the inpatients. On the other hand a decrease in the mean length of stay could imply early admission and hence a lower mean probability of suicide in the inpatients. It is clear that the net effect of an increase in circulation on the probability of suicide can not be determined by such *à priori* reasoning and the question must be left open.

The increase in the rate of suicide from Period I to Period II may be seen as a side effect of therapeutic policies or methods introduced after 1965. The extent to which specific changes in psychiatric services may contribute to the increase in the rate of suicide is difficult to assess.

The introduction and use of psychotropic drugs may have an effect on the rate of suicide in many ways. Because these drugs were in use during the whole study period it would seem that their use was unlikely to contribute to a difference in the suicide rate. However, many of the changes in the psychiatric services were made possible by the use of psychotropic drugs, which therefore may have contributed indirectly to the increase in the suicide rate.

It seems obvious that the open-door policy may lead to an increase in the rate of suicide but it is not clear whether it has in fact done so (Lange 1966; Ravn 1966;

Ernst and Kern 1974). In this respect it is of interest that at our hospital the wards were open to most of the inpatients committing suicide.

The short stay policy may lead to an increase in the rate of discharge of patients that are at a high suicidal risk increasing the burden placed upon them, decreasing the opportunity for preventive measures, and therefore increasing the rate of suicide. The median interval from last admission and last discharge to suicide was shorter during Period II than Period I and this may be an indication that the short stay policy may have led to an increase in the suicide rate.

Isohanni (1976) studied the suicide problem in the therapeutic community through a discussion of the case histories of 10 patients that had committed suicide in a community or shortly after discharge from it. He thought that "the therapeutic principles to be observed in the treatment of a patient in acute danger of suicide are to some extent in conflict with the principles guiding the work of a therapeutic community". He was of the opinion that the treatment principles of the therapeutic community might increase the risk of suicide in some patients. Whether the opening of three therapeutic community wards has in fact increased the risk of suicide in patients at our hospital can not be determined from the results of the present study.

It seems to be difficult to escape the conclusion that the changes that have occurred in the psychiatric services offered by the Psychiatric Department of the University Hospital are associated with an increase in the rate of suicide, and that this increase may to some extent be a side effect of therapeutic methods introduced after 1965. The latter part of this conclusion is open to doubt. However, the benefit of the doubt should not be given to the mental health worker but to the patient that is at suicidal risk. If this is granted then it is mandatory to intensively study the effectiveness of modern therapeutic methods as applied at our hospital considering not only the usual parameters such as the length of stay and the clinical state at discharge. It is also mandatory to increase the application of measures for the prevention of suicide, but they must be applied so that there is no decrease in the benefit that the majority of patients may derive from modern therapeutic methods.

## Conclusion

1. The changes that have occurred after 1965 in the psychiatric services offered at the Psychiatric Department of the University Hospital are associated with an increase in the rate of suicide.

2. The increase in the rate of suicide may to some extent be a side effect of therapeutic methods introduced after 1965

3. If so, it is mandatory to intensively study the effectiveness of those therapeutic methods as applied at our hospital for the eventual improvement in patients with mental disorders.

4. It must also be considered mandatory to increase the application of effective measures for the prevention of suicide.

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