Prevention of suicide by youth health care

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The objective of this study was to examine the effect of freely accessible consultation hours in secondary schools by youth health care departments, on population rates for suicide and parasuicide. To this end, an ecologic case-referent study design was used, with data from the Netherlands Bureau of Statistics, the National Hospital Discharge Register, the High-School Students Study, the youth health care departments in the Netherlands and relevant census. Cases were 137 suicide victims aged 15–19 y and 182 12–18 y old subjects admitted to hospital because of parasuicide and additionally coded as having had surgery as a consequence of the attempted suicide or having a pertinent psychiatric disorder. The relevant census in the regions of the participating youth health care departments served as referents. The High-School Students Study included 4997 students aged 12–18 y of which 303 reported having attempted suicide at least once.

In the ecologic case-referent studies the adjusted Odds Ratio for completed suicide in regions with open consultation hours was 0.98 (95% CI 0.69–1.38) and the weighted Odds Ratio for parasuicide was 1.30 (95% CI 0.97–1.75). Analysis of the data of the High-School Students Study resulted in an Odds Ratio of 0.96 (95% CI 0.72–1.75). The overall homogeneous Odds Ratio for (para)suicide in regions with open consultation hours for all three studies was 1.00 (95% CI 0.97–1.04); the heterogeneous Odds Ratio was 1.08 (95% CI 0.95–1.09).

This study does not support the hypothesis that regions, where youth health care departments have instituted freely accessible consultation hours in secondary schools, show lower rates of suicide or parasuicide compared to regions where no consultation hours were implemented.

Keywords: suicide; parasuicide; prevention; consultation hours; youth health care

Introduction

In the last four decades the suicide rate among adolescents has increased much more dramatically than it has in the general population. This rate increase is such that in most Western countries suicide is the second leading cause of death in this age group, only exceeded by death caused by accidents.1–7 In the past years this has led to an increased interest in the causes of adolescent suicide and possible preventive measures. The psychological characteristics of adolescents that successfully commit suicide are by definition hard to determine. In general, information is inferred from ‘psychological autopsies’ of completed suicides.2,8 In this way a multitude of different underlying causes was found, taking in almost every aspect of human physical, psychological or social functioning.1,6,8–20 Therefore, primary prevention can only be nonspecific, that is, preventive of poor adjustment to his or her family, occupational, and/or social environment.6 In addition, special attention should be given to youngsters who exhibit one of the five so-called warning signs described by the American Association of Suicidology (These signs are: (1) a suicide threat or other statement indicating a desire or intention to die, (2) a previous suicide attempt, (3) depression, (4) marked changes in behaviour, including eating and sleeping patterns, acting out, hyperactivity, (major) substance abuse, or high risk taking behaviour, and (5) making final arrangements or saying goodbye to possessions and/or individuals).2

Because of the rate increase, both in The Netherlands and other countries, there has been a surge of school-based programs to prevent adolescent suicide, in some cases in response to starting clusters of suicides or suicide attempts.21–23 However, these programs proved to have little effect in for instance changing attitudes of students who had made a previous suicide attempt, clearly the highest risk group.2,4,7,14,24,25

Youth health care and prevention of (para)suicide in the Netherlands

Youth health care (YHC) departments in the Netherlands are part of the Regional Health Services, often working for more than one municipality. They offer programs to all primary and secondary schools in the region and the take-up by the schools is almost 100%. The services are most often rendered on the school premises and may include health promotion programmes, screening for specific physical abnormalities, well-care visits and (freely accessible) consultation hours. For the most part these activities are carried out by youth health care physicians, less often by nurses, and medical assistants.

Between youth health care departments, there is a large variety in the total number, content and intensity of programmes, screenings, and well-care visits as well as the availability of consultation hours in schools. This variety is largely due to different views and priorities in the various health care regions with regard to the content of preventive services for children and adolescents. With respect to suicide prevention, the differences in access of open consultation hours is of particular interest; because of the diversity of underlying causes and relatively low incidence of (para)suicide, experts (JA Jenner, MD PhD, youth psychiatrist, University Hospital...
Mortality rates for suicide

For the mortality data an ecologic case-referent study was designed with the total population of 15–19 y olds in the Netherlands in the consecutive years 1988–1993 as the source population. Cases in the population were identified from the mortality statistics of the Netherlands Bureau of Statistics for the period 1988–1993. Based on postal code of place of residence, cases were allocated to the youth health care departments that were divided into two determinant categories. One category included 13 youth health care departments that had consultation hours in schools for secondary education all through the study period, the other category contained 25 departments that did not have consultation hours at any year in that period. A remaining group of 23 departments (with approximately 37% of the total population of 15–19 y olds and 40% of the suicide victims) was excluded for one of the following reasons: (a) the institution of consultation hours in any year later than 1987 (11 departments); (b) consultation hours only held at certain types of schools for secondary education, not on the school premises, or otherwise not freely and generally accessible (3 departments); or (c) activities unknown (9 departments). For these reasons a total of 90 of the 227 cases were not classifiable.

The distribution of the remaining 137 suicide victims over the two determinant categories is compared to that of the relevant census of 15–19 y olds. The size of the referent population in the period 1988–1993, that is the total number of 15–19 y olds was 485,597 for youth health care departments with consultation hours and 876,196 for those without. Odds Ratios were calculated both before and after weighting for possible differences between the two categories in degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, type of secondary education and percentage of people on social security.

Population and methods

Allocation of the youth health care departments in the Netherlands to those with or without open consultation hours in schools for secondary education in the period of 1987–1992 was based on their annual reports, and additional sources where necessary. Only one youth health care department refused to participate.

In 1995 the Dutch Institute for Research on Government Spending published a study in which it was determined, which variables could reliably be used to predict regional differences in prevalence of psychosocial problems among 0–18 y olds. The seven variables chosen (gender, age, degree of urbanisation, proportion of ethnic minorities, percentage of single-parent families, type of secondary education and percentage of people on social security) are good predictors for suicide and parasuicide as well, and were consequently used to balance the regions with respect to differences in the prevalence of psychosocial problems. This was done by weighting the data with overall-weights for each region, composed of the weights for each variable for each region. The relevant information was obtained from the National Institute of Public Health and Environmental Protection and the Netherlands Bureau of Statistics. The three different data sources used were the Netherlands Bureau of Statistics, the National Hospital Discharge Register (SIG Services) and the High-School Students Study from the Netherlands Institute for Budget Information. Each of these required a different study design.

Population and methods

Allocation of the youth health care departments in the Netherlands to those with or without open consultation hours, compared to regions that have not. As reporting practices were comparable throughout the Netherlands, these mortality data are considered most reliable.

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Hospital discharge data

For these data again an ecologic case-referent study was designed, with the total population of 12–18 y olds in the Netherlands in the consecutive years 1990–1993 as the source population. The Institute for Informatics in Health and Welfare (SIG Services) provided data concerning the number of hospital admissions for attempted suicide during the years 1990 through 1993 by youth health care region. Information concerning hospital admissions before 1990 were considered to be less reliable and were therefore excluded. To minimise the effect of the widespread differences in referral practice of physicians and admission policy of hospitals throughout the country, only cases were included that additionally underwent surgical intervention (that is the operating procedures, for which hospitalisation was necessary) because of the severity of the resulting injuries and/or were diagnosed with a relevant psychiatric disorder. These disorders were chosen based on their known association with a higher incidence of (para)suicide. (The following ICD-10 (International Classification of Diseases, 10th edition) codes were included: 291-3, 295-301, 303-5, 307-9, 311-3, and 315-6).

Cases therefore included all 12–18 y old patients who had on discharge a main diagnosis of ‘attempted suicide’ and additionally were coded as having had surgery as a consequence of the attempted suicide or having a relevant psychiatric disorder. Also included was information regarding age, year of admittance, gender and postal code of place of residence. The two groups were analysed independently, because cases in the first group are even more likely to be treated uniformly throughout the country. Consequently, data on the group with severe injuries are more reliable than those on the group with a psychiatric disorder.

Based on the year of admittance, cases were manually allocated to one of the two categories of youth health care departments according to the existence of open consultation hours at least one year before the suicide attempt took place. A total of 19 youth health care departments had open consultation hours in schools for secondary education in the period of 1989–1992 at least one year prior to the registered suicide attempt and 25 departments did not. The remaining group of 17 departments had either constituted consultation hours in the same year as the suicide attempt or their activities were unknown (n = 8 and n = 9 respectively with approximately 23% of the total population in the relevant age group and 12% of the admissions).

The distribution of the remaining 182 cases over the two determinant categories (youth health care regions with and without consultation hours) was compared to that of the population of 12–18 y olds. In the period 1990–1993, the total size of the referent population of 12–18 y olds was 671 192 for youth health care departments that held consultation hours and 835 033 for those that did not. Table 1 gives an overview of the distribution of parasuicide cases according to diagnosis group among the categories of youth health care departments. Odds Ratios were calculated both before and after weighting for possible differences between the determinant categories for the six relevant variables mentioned previously. Separate analyses were carried out for parasuicide patients that during their stay in hospital had had surgery because of their suicide attempt (n = 31) and those that were coded as having psychiatric disorders (n = 151).

High-School students study

In 1992 the Netherlands Institute for Budget Information conducted the High-School Students Study in which more than 11 000 students were asked to complete a questionnaire.27 This questionnaire included among others questions about age, gender, ethnic origin, type of education, family situation, parental background (education, jobs), and suicide attempts, (Question: ‘Did you ever seriously attempt to put an end to your life?’ (possible answers: ‘never’, ‘once’, ‘more than once’). The questionnaires were completed in the classroom and had a response of more than 95%. A random selection of 50% was made available for this analysis.

As the High-School Students Study data were unevenly distributed among the cities and counties of the Netherlands, the data were standardised for age and gender, based on the population in the respective youth health care departments. The relevant demographic data were obtained from the Netherlands Bureau of Statistics.

Also, data were available from a survey of local preventive activities in 1992 of the Regional Institutes for Ambulant Mental Welfare, aimed at reducing suicidal deaths and suicide attempts by enhancing the professional ability of teachers in the recognition of the warning signs mentioned earlier.28 Therefore, information could be included about preventive activities other than and unrelated to those of youth health care departments.

Based on the school postal code, it was determined which of the students that had answered the relevant questions could have used open consultation hours and whether the school as a whole could have benefited from the Mental Welfare activities.

The data were analysed as an ecologic case-referent study with 4997 students aged 12–18 y as subjects of which 1983 could have visited during the open consultation hours and 3014 could not. Table 2 gives an overview of the distribution of the number of students among the youth health care departments in the two determinant categories, before and after standardisation for age and gender.

In a dichotomous variable the answers ‘once’ and ‘more than once’ were combined into one category. With this variable as dependant, in a logistic regression procedure with forward stepwise selection the influence of having access to open consultation hours on the prevalence of parasuicide was determined. Apart from

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Distribution of cases of parasuicide among the Youth health care departments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consultation hours</td>
</tr>
<tr>
<td>Parasuicide + surgery</td>
<td>16</td>
</tr>
<tr>
<td>Parasuicide + psych disorder</td>
<td>65</td>
</tr>
<tr>
<td>Total number of parasuicides</td>
<td>81</td>
</tr>
</tbody>
</table>

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the variable ‘consultation hours’, the following variables were included in the regression equation: age, gender, ethnicity, grade, type of education, family situation, parental work situation, degree of urbanisation of place of residence of the subject and Mental Welfare activities. Variables were added to the model at an alpha less than 0.05.

Overall odds ratio

Based on the weighted Odds Ratios for suicide, hospital admission for parasuicide and reported parasuicide, both a homogeneous and heterogeneous overall Odds Ratio was calculated using the method described for computing overall Odds Ratios for meta-analyses.29

Results

Table 3 shows the Odds Ratios with 95% confidence interval for the risk of completed suicide in youth health care departments, with and without freely accessible consultation hours, both before and after the weighting procedure. An Odds Ratio of more than 1.00 signifies an adverse effect. No effect of open consultation hours could be measured (adjusted Odds Ratio = 0.98, 95% CI = 0.69 – 1.38). In a further analysis, the sensitivity of the study was estimated by adding all 90 non-classifiable cases with their referent population to the with consultation hours category. The resulting Odds Ratio was 1.36 (95% CI = 1.04 – 1.77). When added to the without consultation hours category, the Odds Ratio shows 0.77 (95% CI = 0.56 – 1.05).

Table 4 shows the crude and adjusted Odds Ratios with 95% confidence interval for the risk of hospital admission due to parasuicide in the two categories of youth health care Departments. Overall, no effect could be measured (adjusted Odds Ratio = 1.30, 95% CI = 0.97 – 1.75), but in the case of parasuicide with concomitant surgery the risk in regions with open consultation hours was significantly higher (adjusted Odds Ratio = 2.59, 95% CI = 1.30 – 5.16).

Regarding the High-School Students Study, in the final logistic regression model the following variables were found to have a statistically significant influence: gender, age, grade, type of education, family situation, parental work situation, degree of urbanisation of the place of residence of the subject and preventive activities of the Mental Welfare organisations. No effect could be

Table 2 Total number of students with and without reported suicide attempts per determinant category (High-School Students Study)

<table>
<thead>
<tr>
<th>Determinant Category</th>
<th>Consultation hours</th>
<th>No consultation hours</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No (or more) suicide attempt(s)</td>
<td>84</td>
<td>119</td>
<td>219</td>
</tr>
<tr>
<td>No suicide attempts</td>
<td>1899</td>
<td>2410</td>
<td>2795</td>
</tr>
<tr>
<td>Total</td>
<td>1983</td>
<td>2529</td>
<td>3014</td>
</tr>
</tbody>
</table>

Table 3 Odds Ratios (95% CI) for suicide in youth health care departments with freely accessible consultation hours

<table>
<thead>
<tr>
<th>Cases</th>
<th>Weighted cases</th>
<th>Referents</th>
<th>OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultation</td>
<td>52</td>
<td>49</td>
<td>485,957</td>
<td>1.10 (0.78 – 1.55)</td>
</tr>
<tr>
<td>No consultation</td>
<td>85</td>
<td>90</td>
<td>876,196</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Odds Ratios (95% CI) for parasuicide in youth health care departments with freely accessible consultation hours

<table>
<thead>
<tr>
<th>Cases</th>
<th>Standardised cases</th>
<th>Referents</th>
<th>OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital admission for parasuicide and surgery</td>
<td>16</td>
<td>25</td>
<td>671,192</td>
<td>1.33 (0.66 – 2.68)</td>
</tr>
<tr>
<td>No consultation</td>
<td>15</td>
<td>12</td>
<td>835,033</td>
<td>0.94 (0.68 – 1.29)</td>
</tr>
<tr>
<td>Hospital admission for parasuicide and psychiatric disorder</td>
<td>65</td>
<td>64</td>
<td>671,192</td>
<td>0.99 (0.73 – 1.43)</td>
</tr>
<tr>
<td>All hospital admissions for parasuicide</td>
<td>82</td>
<td>89</td>
<td>671,192</td>
<td>0.99 (0.73 – 1.43)</td>
</tr>
</tbody>
</table>

Table 2: Total number of students with and without reported suicide attempts per determinant category (High-School Students Study)

Table 3: Odds Ratios (95% CI) for suicide in youth health care departments with freely accessible consultation hours

Table 4: Odds Ratios (95% CI) for parasuicide in youth health care departments with freely accessible consultation hours

aStandardised for age and gender, based on the population in the respective youth health care departments.
demonstrated for open consultation hours (adjusted Odds Ratio = 0.96, 95% CI = 0.72 – 1.26), whereas the preventative activities of the Mental Welfare organisations did have a positive influence (adjusted Odds Ratio = 0.60, 95% CI = 0.44 – 0.81). Exclusion of the variable ‘Mental Health activity’ did not significantly change the Odds Ratio for open consultation hours, so a confounding influence of this variable is less likely.

The overall homogeneous Odds Ratio was 1.00 (95% CI = 0.97 – 1.04); the heterogeneous Odds Ratio was 1.08 (95% CI = 0.95 – 1.09). The test for homogeneity resulted in a chi-square of 3.06 (DP = 2, P > 0.10).

Discussion
This study does not support the hypothesis that regions where youth health care departments have instituted freely accessible consultation hours in secondary schools, show lower rates of suicide or parasuicide compared to regions where no consultation hours were held. Each of the three data sets used and their analyses present their own difficulties and methodological issues.

In the case of the analysis of the mortality and hospital admission rates, when comparing the distribution of cases between the two determinant categories the danger mainly lies in misclassification of subjects. Indeed, the information concerning the working methods of the youth health care departments could be insufficient or even incorrect. Given the comprehensive method of data gathering however, this is less likely. Internal migration can be a second reason for misclassification of cases and can have led to some dilution of the effect. A third reason for misclassification can be a difference between place of residence and place of the secondary school and therefore the youth health care region.

It should be stressed that in all of these instances misclassification of cases is nondifferential. Differential misclassification is very unlikely in this type of study. The same applies to selection bias, because there was no selection of a referent population and the theoretical study base is almost identical to the reference population.

In most cases, open consultation hours were instituted in response to budgetary cutbacks, because of which well-care visits in grade 4 of the secondary schools had to be discontinued. Therefore, selection by indication—for instance when instead, consultation hours were instituted in response to a higher prevalence of (para)suicide or mental health problems in general—is not likely.

For the mortality figures the starting year is 1988, because information on the preceding years was considered to be less reliable; in the years prior to 1990 not all hospitals supplied (complete) data. The rationale for including 1993 is mentioned above, and again the Odds Ratios over the years 1990 – 1992 were comparable to those over the period 1990 – 1993. The two diagnosis groups on discharge, that is, parasuicide with severe trauma requiring surgery, and parasuicide with a relevant psychiatric disorder, were analysed separately because cases belonging to the first category are most likely to be treated uniformly across the country. Therefore, Odds Ratios computed for this category are more reliable. As such the resulting Odds Ratio indicating that in regions with consultation hours the rates for hospitalisation because of severe trauma following parasuicide is significantly higher—even for these small numbers—is not particularly encouraging. Clearly, further studies are necessary to determine the significance of this finding.

Due to the widespread differences in referral practice of physicians and admission policies of individual hospitals, the discharge data on cases other than those belonging to the two diagnosis groups are considered to be unreliable. This of course is unfortunate, because those cases will constitute a substantial and from the viewpoint of prevention a potentially very important group.

The methodological problems described above are for the most part not applicable to the analysis of data from the High-School Students study. As the data were standardised for age and gender, based on the population of the respective youth health care departments and in the basic logistic regression model the various relevant variables were included, it is hard to ascribe possible differences between the two determinant categories to anything other than the existence of open consultation hours. As the uneven distribution of subjects among cities and counties was due to differences in ease of access to schools and geographic preferences and not to variations in prevalence of (para)suicide, this will not have led to differential misclassification.

Apart from that, the effect, if any, of nondifferential misclassification seems to be small, seeing that a much more equivocal and general variable—the regional school-oriented preventive activities of Mental Welfare organisations—does prove to have a significant positive effect on the prevention of parasuicide. Therefore, this variable can more or less be considered as a control for the
sensitivity of the study. Also, it suggests a possibly more effective approach regarding the prevention of (para)-suicide than the institution of consultation hours. Furthermore, nondifferential misclassification because of a difference between place of residence and place of the secondary school is not possible as in this case the postal code of the school is used for allocation. By combining the results in one overall Odds Ratio the importance of possible methodological shortcomings of the three separate studies is further reduced.

Conclusion

From the individual Odds Ratios and the overall Odds Ratio it is concluded that maintaining open consultation hours by youth health care departments does not contribute to the prevention of suicide or parasuicide.

Further studies are necessary to determine the implications of the unexpected adverse Odds Ratio for parasuicide (with surgery) in regions with open consultation hours. Also, new and/or different approaches should be considered concerning the prevention of (para)suicide. In this respect, the positive effect of the Mental Welfare activities can be considered an interesting and valuable starting point.

Acknowledgements

The authors would like to thank Dr Jenner for his help in determining the relevant ICD10-codes and discussing the possible preventive activities. Also we thank Dr Kienhorst and Dr Reesink for their help and valuable suggestions. To the members of the advisory committee, Dr Meulmeester and Dr Verbrugge, we are grateful for their valuable comments and critical review of the article. The Regional Health Service Groningen and Praeventiefonds the Netherlands financed the acquisition of the data.

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