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Original article

Epidemiology of suicide and suicide attempts in Belgium: results from the sentinel network of general practitioners

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Summary

Objectives: To estimate the evolution of incidence of (attempted) suicide between 1993 and 2001 in Belgium and to examine trends in methods, first caretaker and aspects of seasonality.
Methods: In 1993–1995 and 2000–2001, the national sentinel network of general practitioners registered, for each case of (attempted) suicide, age, sex, date, place of the event, first caretaker, method, and survival.
Results: Between 1993–1995 and 2000–2001, the incidence of suicide increased among men from 29/100 000 to 35/100 000, and decreased among women from 14/100 000 to 11/100 000. The incidence of attempted suicide increased among men (from 67/100 000 to 71/100 000) and women (from 131/100 000 to 141/100 000). None of the above mentioned changes were statistically significant however. The use of violent methods as opposed to non-violent methods remained unchanged in women (OR: 0.95 [0.63–1.41]).
Conclusions: No statistically significant trends were observed in the incidence of suicide, the fraction of cases with fatal outcome and the use of violent methods.

Keywords: Suicide – Attempted suicide – Incidence – Belgium – Family physicians.

Based on vital statistics data up to 1995, the incidence rate of suicide in Belgium was high in comparison with the other western European countries. In fact, Belgium had the second highest rates of the former 15 EU countries in both men and women. Between 1980 and 1995, age-standardised suicide rates according to death certificates declined in women, but slightly increased in men (Levi et al. 2003). Due to lack of recent official mortality statistics (more recent than 1997) and since there never existed a national suicide (or suicide attempt) register, suicide and attempted suicide have to be monitored through other data sources.
The Belgian sentinel network of general practitioners (GPs) is the only data source that can provide recent national data on both suicide and attempted suicide (Van Casteren et al. 1993b;Van Casteren & Van Der Veken 1993;Van Casteren 1999). This study aims to look at the evolution of the incidence rate of suicide and attempted suicide, to examine trends in methods, first caretaker and aspects of seasonality and more specifically to examine whether the fatal outcome percentage and the use of violent methods has changed between the periods 1993–1995 and 2000–2001.

Methods

Design
The sentinel surveillance network of general practitioners exists since 1979 and is very stable in terms of turnover rates. The network consisted yearly of approximately 150 regularly participating general practices, involving 175 GPs who, in comparison with the national statistics on general practitioners, are representative of the total group of Belgian general practitioners in terms of age sex and geographical distribution over the regions (Lobet et al. 1987). In 2000 and 2001, the sentinel GP's represented 1.3 % of all Belgian GP's. There was at least 1 GP in 41 of the 43 Belgian districts. The GPs participate on a voluntary basis and register weekly through paper forms. The registration form includes approximately 8 health problems for which the GP plays an important role in diagnosis, treatment or follow-up and is changed yearly.
From 1993 until 1995 and from 2000 until 2001, each time a patient of the GP committed (attempted) suicide, the GP registered age and sex of the patient, date and place of the event,

first caretaker, method, and survival within the first two weeks following the event. The registration included all patients for whom the GP was the first healthcare provider as well as all patients from the sentinel GP who were either seen by another GP on duty or by a healthcare provider from an ambulatory psychiatric care unit or who were hospitalised immediately and for whom the medical information concerning the (attempted) suicide was sent to the GP.

Suicide or attempted suicide was described as 'an act of self-inflicted injury or self-poisoning (excess of the generally recognized therapeutic dosage in the case of self-poisoning with drugs) with fatal or non-fatal outcome'. The outcome was classified 'fatal' if the patient died of the self-inflicted injuries within 2 weeks. Hereafter the term 'suicide' refers to cases of fatal suicide, whereas the term 'attempted suicide' refers to cases with non-fatal outcome.

Epidemiological denominator

In the period 1993–2001, yearly 129 to 158 Belgian GPs took part in the registration. Since no patient lists exist in Belgium, the population surveyed per district (Pi) is estimated by dividing the total number of patient contacts with the sentinel GPs (C_{SGPi}) within a district, by the average number of contacts per inhabitant (C_{GPi}/Ni) within the same district. The total population surveyed P is then estimated using the following formula:

$$P = \sum_{i=1}^{43} Pi = \sum_{i=1}^{43} \frac{C_{SGPi}}{C_{GPi}/Ni}$$

In this way, the sentinel network of general practitioners reached 1.46 % to 1.64 % of the total Belgian population.

Analysis

Confidence intervals around the incidences were calculated applying the normal approach. For the comparison of total incidence rates over time or between sexes, the rates were age-standardised by means of direct standardisation using the total Belgian population of 2000 as reference population. Age differences between groups were compared by means of the Mann-Whitney U test.

Differences in attempted method or period were compared by means of a Chi square test and the odds ratio was calculated. Logistic regression was used to examine relationships between attempted method and other variables. For each specific method, a logistic regression model was developed using the explanatory variables age, sex, region, alcohol use, trimester, other method and service providing the first health care.

Frequency distributions were compared by means of the Chi square test for goodness of fit. All analyses were carried out using the software package SPSS 11.0.

Results

Incidence rates

In the period 2000–2001 333 cases of attempted suicide and 70 cases of suicide were registered, versus 466 cases of attempted suicide and 95 cases of suicide in 1993–1995. The yearly sentinel population varied between 148 771 and 164 134 persons.

In 2000–2001 the crude incidence rate of attempted suicide (107.4/100 000; 95 % CI 95.9–118.9) was almost five times the incidence rate of suicide (22.6/100 000; 95 % CI 17.3–27.9). The incidence of suicide was much higher among men than among women (35.4/100 000 v. 10.6/100 000; $p < 0.001$) whereas the incidence of attempted suicide was much higher among women than among men (141.4/100 000 v. 70.6/100 000; $p < 0.001$) (Tab. 1). Compared to 1993–1995, the male-female ratio for attempted suicide remained at 1:2.0. The male-female ratio for suicide however rose from 1.9:1 to 3.3:1.

Between 1993 and 2001, the incidence of suicide increased in men from 29/100 000 to 35/100 000 in 2000–2001 and decreased in women from 14/100 000 to 11/100 000. The resulting total incidence remained almost constant: 21/100 000 in 1993–1995 and 22/100 000 in 2000–2001. The incidence of attempted suicide slightly increased in men (from 67/100 000 to 71/100 000), women (from 131/100 000 to 141/100 000) and the total population (from 99/100 000 to 106/100 000). None of these changes were statistically significant however. The fraction of cases with fatal outcome increased from 28,8 % to 32,7 % in men and decreased from 9,6 % to 7,1 % in women.

The median age of persons committing attempted suicide was 36 years (interquartile range: 22.75–46 years) among men and 37 years (interquartile range: 25–47 years) among women, whereas the median age of persons who committed suicide was 45 years (interquartile range: 33–61.75 years) among men and 49 years (interquartile range: 31–74 years) among women. This difference in median age between persons committing attempted suicide and those who committed suicide, just like in 1993–1995, statistically significant ($p < 0.001$). The median age on which one commits suicide or attempted suicide remained however unchanged in comparison with the period 1993–1995.

Crude age-specific incidences of suicide were particularly high among people aged 80 years and older, especially in men. The highest rates of attempted suicide were found in young adults aged 15–29 years (Tab. 1). Between 1993–1995 and 2000–2001, none of the observed changes in age-specific incidences of suicide or attempted suicide were statistically significant.

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Table 1 Crude age-specific incidence rates (per 100 000) of suicide and attempted suicide, 2000–2001, Belgium, sentinel network of general practitioners

		Men		Women	
	Age	93–95	00–01	93–95	00–01
Suicide	0–14	0	0	0	0
	15–29	16	30	13	10
	30–64	38	46	20	11
	65–79	25	39	1	13
	80+	135	94	17	40
	Total (age-standardised)	29	35	14	11
Attempted suicide	0–14	0	1	30	30
	15–29	117	90	237	240
	30–64	72	98	157	170
	65–79	59	34	49	52
	80+	77	63	50	119
	Total (age-standardised)	67	71	131	141

Table 2 Attempted suicide and suicide: method of attempt, 2000–2001, Belgium, sentinel network of general practitioners

	Attempted Suicide		Suicide	
	Men (N = 107)	Women (N = 223)	Men (N = 53)	Women (N = 17)
Drug overdose	52 %	80 %	19 %	41 %
Other toxic substance	4 %	4 %	4 %	0 %
Gas / CO	6 %	1 %	4 %	6 %
Hanging or strangulation	17 %	1 %	43 %	35 %
Drowning	2 %	2 %	4 %	6 %
Firearm	2 %	0 %	19 %	6 %
Wrist cutting	17 %	13 %	0 %	6 %
Jumping from high place	3 %	1 %	6 %	6 %
Train	0 %	0 %	9 %	6 %
Car	2 %	0 %	0 %	0 %
Other	0 %	0 %	2 %	12 %

Method of attempt

In the subgroup of suicides, among men hanging (43 %) was the most frequently used method, followed by drug overdose (19 %) and firearms (19 %). The most frequent used methods for fatal suicide among women were drug overdose (41 %) and hanging (35 %). Attempted suicide was most frequently carried out by means of drug overdose (52 % in men and 80 % in women) and wrist cutting (17 % in men and 13 % in women) (Tab. 2). (The total sum of percentages exceeds 100 % because sometimes a combination of methods was applied in one single attempt.)

As for individual methods of attempt, the odds of use of the methods 'hanging' (OR 10.1; 95 % CI 4.7–21.5, adjusting for age and immediate hospitalisation), 'domestic gas/carbon monoxide' (OR 4.2; 95 % CI 1.1–15.9, adjusting for age) and 'firearms' (OR 23.1; 95 % CI 2.9–186.6, adjusting for age) was higher among men than among women whereas the odds of use of the method 'drug overdose in combination with alcohol use' (OR 2.6; 95 % CI 1.1–5.7, adjusting for age) and 'drug overdose without alcohol use' (OR 7.3; 95 % CI 4.0–13.3, adjusting for age) were higher among women than among men. The odds of committing (attempted) suicide by means of drowning (OR 1.04; 95 % CI 1.01–1.08, adjusting for sex) or firearms (OR 1.06; 95 % CI 1.02–1.09, adjusting for sex) increased with each age increase of one year. Drug overdose involved in 68 % of cases benzodiazepines. In 40 % of cases more than one drug was taken. There were no important changes between 1993–1995 and 2000–2001 in use of specific methods, except for an increased use of domestic gas/carbon monoxide (OR = 5.3, $\chi^2 = 8$, $P < 0.05$).

Overall, men used more often violent methods (hanging or strangulation, drowning, firearm, wrist cutting, jumping from a high place, train or car accidents) instead of non-violent methods (drug overdose, ingestion other toxic substance, domestic gas/carbon monoxide) than women (OR 4.8; 95 % CI 3.1–7.3, univariate analysis). Obviously, the odds of survival was considerably higher if non-violent methods were used (OR 8.2; 95 % CI 4.5–14.7, univariate analysis). Between 1993–1995 and 2000–2001, the use of violent methods as opposed to non-violent methods increased in men (OR: 1.45 ; 95 % CI 0.97–2.18, adjusting for age) and remained unchanged in women (OR: 0.98; 95 % CI 0.66–1.46 adjusting for age).

First caretaker

The sentinel GP was the first caretaker in half of the cases (51 %), followed by immediate hospitalisation (32 %), other service/caretaker (15 %) and an ambulatory mental health service (2 %). Evidently the method used frequently determines who will be the first caretaker i.e. the chance to be hospitalised proves to be significantly smaller for hanging.

Seasonality

Over the whole range of recording years (1993, 1994, 1995, 2000, 2001), significantly more cases of suicide and attempted suicide were noted in the first ($\chi^2 = 5.3$, $p < 0.05$) and second ($\chi^2 = 5.5$, $p < 0.05$) trimester of the year and less cases in the third trimester ($\chi^2 = 16.4$, $p < 0{,}001$). This pattern is even more pronounced if only the cases of attempts with violent methods are taken into account (trimester 1: $\chi^2 = 7.3$, $p < 0.05$; trimester 3: $\chi^2 = 9.2$, $p < 0.05$).

Discussion

Main findings

There was no evidence of an increasing incidence of suicide or attempted suicide, nor of an increased use of violent methods. This study confirms again the strikingly higher incidence of suicide among men, a gender gap that could be explained by perceived reduction in social role opportunities leading to social exclusion (Moller-Leimkuhler 2003). There are also indications of a less favorable trend in men.

The relative distribution of used methods remained stable over time. Hanging was the most frequently used method for committing suicide and drug overdose for attempted suicide. Benzodiazepines were responsible for two third of deliberate self-poisonings, which was slightly higher than the 55 % found in a hospital based study in the emergency department of a large university hospital in the Belgian city of Ghent (Verstraete & Buylaert 1995).

This study corroborates the literature on the evidence of seasonality (more specifically a peak in spring and a low in late autumn) in suicides committed by violent methods (Preti & Miotto 1998; Maes et al. 1993).

The results for suicide are highly comparable with the official death statistics in Belgium. On the national level only mortality data up to 1997 are available. In 1995 mortality due to suicide amounted to 31/100 000 (95 % CI 30–33) among men and 12/100 000 (95 % CI 11–13) among women in the vital statistics (Puddu et al. 2003) compared to 35/100 000 (95 % CI 26–44) among men and 11/100 000 (95 % CI 6–16) among women in the sentinel network of GPs.

More recent official mortality statistics are only available for Flanders (the northern, Dutch-speaking part of the country). In the Flemish region, in 2001–2002 the suicide mortality rate was 28/100 000 among men and 10/100 000 among women in the vital statistics (2003) compared to 29/100 000 (95 % CI 18–40) among men and 11/100 000 (95 % CI 4–18) among women in the sentinel network of GPs. The relative distribution of methods used was also highly comparable.

The comparison with figures concerning attempted suicide is more problematic. No national data are available. The incidence data of the sentinel network of GPs are only half those of the WHO/Euro Multicentre Study on Suicidal Behaviour in the city of Ghent (Van Heeringen & Reyserhove 2002). The relative use of methods proves, however, to be similar in both recordings.

Suicide in primary care

The incidence data of the sentinel network of GPs are only half those of the WHO/Euro Multicentre Study on Suicidal Behaviour in the city of Ghent. This difference could partially be explained by the fact that data provided by GPs may be underestimations since suicide attempts in people who do not have a regular GP will not be registered. Moreover the GP is not always informed of a suicidal attempt of one of his patients, especially if no severe physical harm was caused. There are no indications that the difference in incidence is due to a problem with case definitions, as the case definition for attempted suicide was included in the instructions for the sentinel GP's, and no inconsistencies were noticed regarding the number of registered cases per GP. A more detailed comparison of the data on first caretaker could provide information on the level of underreporting by GPs.

Within this context it is important to bear in mind that, although the GP usually is the person within the health care setting who is best informed of the mental health status of a person, the incidence of suicidal symptoms (such as thoughts of death, whishes for death, suicidal thoughts and attempted suicide) in primary health care does not well predict actual suicide rates at the national level (Lester 2000).

Strengths and weaknesses of the study

The strength of this study lies in the fact that it is the only single source that can timely provide figures on both suicide and attempted suicide at the national level for several years, enabling a close and detailed monitoring of suicide. In the past, the network proved to be able to capture morbidity and mortality from other causes such as stroke (Devroey et al. 2003) or accidents (Devroey et al. 2002). Also, the longstanding collaboration with other European primary care surveillance networks ensures an ongoing process of quality improvement of the instrument (Van Casteren et al. 1993a; Van Casteren & Leurquin 1992; Donker et al. 2004). Such networks are considered to be potential valuable tools for public health surveillance in Europe (Deckers et al. 2006; Fleming et al. 2003).

Still, it should be taken into account that due to the sampling only large trends can be detected and that the network may not be able to adequately capture data for rare events. However, though enumeration may be incomplete, based on the comparability of the figures with existing fact sources it is assumed that the trends may hold.

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References

Cloots H, Hooft P, Smets H (2003). Sterfte en geestelijke gezondheid. In: H Cloots, P Hooft, H Smets, eds. Gezondheidsindicatoren 2001–2002. Brussel: Ministerie van de Vlaamse Gemeenschap – Entiteit Beleidsondersteuning:

Deckers JGM, Paget WJ, Schellevis F, Fleming DM (2006). European primary care surveillance networks : their structure and operation. Fam Pract 1–8. 2006. Ref Type: Abstract

Devroey D, Van Casteren V, Buntinx F (2003). Registration of Stroke through the Belgian Sentinel Network and Factors Influencing Stroke Mortality. Cerebrovasc Dis *16*: 272–9.

Devroey D, Van Casteren V, Walckiers D (2002). The added value of the registration of home accidents in general practice. Scand J Prim Health Care *20*: 113–7.

Donker GA, Fleming DM, Schellevis FG, Spreeuwenberg P (2004). Differences in treatment regimes, consultation frequency and referral patterns of diabetes mellitus in general practice in five European countries. Fam Pract *21*: 364–9.

Fleming DM, Schellevis FG, Paget WJ (2003). Health monitoring in sentinel practice networks: the contribution of primary care. Eur J Public Health *13*: 80–4.

Lester D (2000). Suicidality in primary health care and national suicide rates. Psychol Rep *87*: 688.

Levi F, La Vecchia C, Lucchini F, et al. (2003). Trends in mortality from suicide, 1965–99. Acta Psychiatr Scand *108*: 341–9.

Lobet MP, Stroobant A, Mertens R, et al. (1987). Tool for validation of the network of sentinel general practitioners in the Belgian health care system. Int J Epidemiol *16*: 612–8.

Maes M, Cosyns P, Meltzer Hy, De Meyer F, Peeters D (1993). Seasonality in violent suicide but not in nonviolent suicide or homicide. Am J Psychiatry *150*: 1380–5.

Moller-Leimkuhler AM (2003). The gender gap in suicide and premature death or: why are men so vulnerable? Eur Arch Psychiatry Clin Neurosci *253*: 1–8.

Preti A, Miotto P (1998). Seasonality in suicides: the influence of suicide method, gender and age on suicide distribution in Italy. Psychiatry Res *81*: 219–31.

Puddu M, Drieskens S, Tafforeau J, et al. (2003). Overlijden en oorzaakspecifiek overlijden in de Vlaamse Gemeenschap, 1992–1994.Bruxelles: Centre de Recherche Opérationnelle en Santé Publique, Ministère de l'Aide à la Jeunesse et de la Santé, Communauté française.

Van Casteren V (1999). Surveillance van zelfmoord en zelfmoordogingen door een netwerk van huisartsenpeilpraktijken in België. Vergelijking van de periode 1993–1995 met 1990–1992. Tijdschr voor Geneeskunde *55*: 83–7.

Van Casteren V, Leurquin P (1992). Eurosentinel: development of an international sentinel network of general practitioners. Methods Inf Med *31*: 147–52.

Van Casteren V, Leurquin P, Bartelds A, et al. (1993a). Demand patterns for HIV-tests in general practice: information collected by sentinel networks in 5 European countries. Eur J Epidemiol *9*: 169–75.

Van Casteren V, Van Der Veken J (1993). The Belgian sentinel general practitioners as a tool for surveillance of suicide and attempted suicide. Arch Public Health *51*: 267–78.

Van Casteren V, Van Der Veken J, Tafforeau J, Van Oyen H (1993b). Suicide and attempted suicide reported by general practitioners in Belgium, 1990–1991. Acta Psychiatr Scand *87*: 451–5.

Van Heeringen C & Reyserhove E (2002). De epidemiologie van zelfmoordpogingen in de regio Groot Gent in 2000. In: H Cloots, P Hooft, H Smets, eds. Gezondheidsindicatoren 2000. Brussel: Ministerie van de Vlaamse Gemeenschap – Entiteit Beleidsondersteuning: 174–7.

Verstraete AG, Buylaert WA (1995). Survey of patients with acute poisoning seen in the Emergency Department of the University Hospital of Gent between 1983 and 1990. Eur J Emerg Med *2*: 217–23.

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