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Surveillance of suicidal behaviour by the Belgian Network of Sentinel General Practices: trends over two decades

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Abstract

1

2	Objectives: Drawing on new (2011-2) and previous (1993-5, 2000-1 and 2007-8) data on suicidal
3	behaviour reported by the Belgian Network of Sentinel General Practices (SGP), we describe trends in
4	the key characteristics of suicidal events. We also examine patient age-related trends in the on-site
5	attendance of sentinel general practitioners (GPs) as first professional caregivers following suicidal
6	behaviour and the accuracy of suicide incidence estimates.
7	Design: Retrospective observational study
8	Setting: General practices from the nationwide representative Belgian Network of SGP.
9	Outcome measures: Patient age and gender, suicide methods, whether the GP was the first caregiver
10	on-site, whether the patient was new, and the outcome of the suicidal behaviour (fatal or not) were
11	recorded on standard registration forms. The accuracy of suicide incidence estimates was tested
12	against suicide mortality statistics.
13	Results: Over the four time periods, 1671 suicidal events were reported: 275 suicides, 1287 suicide
14	attempts and 109 events of suicidal behaviour of unknown outcome. In 2011-2, sentinel GPs' on-site
15	attendance following the suicidal behaviour of patients < 65 years had continued to decrease (from
16	71% in 1993-5 to 58% in 2000-1, 39% in 2007-8 and 25% in 2011-2). In 2011-2, it had also
17	decreased steeply in the population \geq 65 years (from 70% in 1993-5, 76% in 2000-1 and 79% in 2007-
18	8 to 35% in 2011-2). No significant differences were found between the SGP-based suicide incidence
19	estimates for 2011-2 and the available suicide mortality rates for people < 65 years and \geq 65 years.
20	Conclusions: GPs' on-site attendance as first professional caregivers following suicidal behaviour
21	continues to decline, since 2011-2 also in the population ≥ 65 years. Unawareness of patients' suicidal
22	behaviour endangers both care for surviving patients and the completeness of SGP surveillance data.
23	Yet, the incidence of suicide for 2011-2 was estimated accurately by the SGP.
24	Strengths and limitations of this study
25	- This is the first study of GPs' on-site attendance as first professional caregivers following suicidal
26	behaviour. We found that Belgian GPs are moving back from the first line of care for patients
27	who have engaged in suicidal behaviour.
28	- The plausible explanations for missing data may be considered an indicator of data quality.

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This type of surveillance is less well suited to monitor rare events such as suicidal behaviour. As a _ result, confidence intervals are wide and some characteristics of suicidal events are described broadly. Some definitions have changed over time. We did not examine the accuracy of the SGP estimates of the incidence of suicide attempts in the population.

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1 INTRODUCTION

The majority of people who seek care for mental health problems consult a primary care provider and general practitioners (GPs) have become the vanguard in the fight against suicide.¹⁻² On average, 45% of people who died by suicide had contact with a primary care provider in the month before their death.³ Improving depression recognition and suicide risk evaluation among GPs is therefore considered an important component of suicide prevention.⁴ Since 1982, the surveillance of suicidal behaviour, i.e. suicide (fatal outcome) and suicide attempts (non-fatal outcome) has been carried out by the Belgian Network of Sentinel General Practices (SGP). This surveillance includes all events the sentinel GPs are confronted with, including the suicidal behaviour of new patients seen (for the first time) during out-of-hours care, as well as the suicidal behaviour of their own patients as reported by other care providers. The surveillance provides preliminary data that is complementary to national mortality statistics and is one of the only sources to monitor suicide attempts in the Belgian population. Almost all inhabitants of Belgium (95%) have a regular GP and around half of all general practice patients have a "general health record", i.e. a GP-held record of all their medical information including reports from other health players.^{5,6} Having collected new surveillance data in 2011-2, we describe trends over four time periods in light of two previous findings. Firstly, we found that sentinel GPs' on-site attendance as first professional caregivers (called out) following the suicidal behaviour of patients < 65 years had declined from 71% (1993-5) to 58% (2000-1) and 39% (2007-8).⁷ Among people \geq 65 years, these rates have remained at the same average level of 74% since 1993-5. It is likely that sentinel GPs receive late reports or no reports at all from other care providers about the suicidal behaviour of their own patients to whom they were not called out, and as a result, sentinel GPs do not report these events on their weekly forms. GPs' unawareness of suicidal behaviour among practice patients impedes appropriate care for surviving patients and also jeopardizes the completeness of SGP reporting. Secondly, we found that the incidence of suicide in the Belgian population was underestimated for 2007-8 in comparison to the gold standard, the suicide mortality statistics based on death certificates for 2007-8 (available as of February 2013).¹⁰ Yet, the SGP-based incidence of suicide among people \geq 65 years for 2007-8 did not differ significantly from the national suicide mortality rate in the same

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1	period (see results). Previously, the SGP-based suicide incidence estimates had been comparable to
2	the mortality statistics. ^{8,9} No gold standard exists to which the SGP-based incidence estimates for
3	suicide attempts can be compared. However, the decrease in the SGP-based incidence estimates for
4	suicide attempts in 2007-8 is not in line with the absence of trends between 1993-5 and 2000-1.
5	In short, we assume that the underestimated incidence for 2007-8 is partly explained by sentinel GPs'
6	unawareness, and thus non-registration, of the suicidal behaviour by patients < 65 years that was not
7	"presented" to the GPs. Therefore, this study examines patient age-related trends in sentinel GPs' on-
8	site attendance as first professional caregivers following suicidal behaviour of patients and the
9	accuracy of the SGP-based estimates of suicide incidence in the population over four time periods.
10	First, we examine missing data and describe trends in patient age and gender, suicide methods,
11	whether the GP was the first caregiver on-site, whether the patient was new, and the outcome of the
12	suicidal behaviour (fatal or not).
13	METHODS
14	The Belgian network of SGP comprises approximately 150 general practices with one or more
15	sentinel GPs who purposively record routine clinical care data for the surveillance of specific health
16	problems or care delivery. The gender-age distributions of sentinel and non-sentinel GPs by region are
17	comparable and the network covers between 1.4% and 1.8% of the Belgian population throughout all
18	regions. ¹¹ As Belgian GPs do not serve a defined practice population, the size of the SGP patient
19	population is estimated by applying the ratio of patient contacts in the entire Belgian population to the
20	sum of weekly patient contacts in the network.
21	Data collection
22	Data were reported on weekly baseline forms and on follow-up forms either two weeks (1993-2008)
23	or four weeks (2011-2) after the event. Suicide and suicide attempt were briefly defined as 'an act of
24	self-inflicted injury or self-poisoning (excess of the generally recognized therapeutic dosage in the
25	case of self-poisoning with drugs) with fatal (suicide) or non-fatal outcome (suicide attempt)'. Any
26	suicidal behaviour which ultimately resulted in death after two to four weeks was considered suicide.
27	Follow-up forms were used to report the outcome of the suicidal behaviour, i.e. survival or not, and, if
28	necessary, to complete missing data. Since 2011, we have been sending lists of recorded suicidal

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events to the SGP on a regular basis, even when no events were reported, and requesting that they be returned after correction, completion or confirmation of their content. Besides patients' age and gender, three baseline variables are central to this paper. The pre-coded suicide methods are self-poisoning by pharmacological agents, gases or other toxic substances (free text space) and self-harm by hanging, drowning, firearm, wrist cutting, jumping from a height, crashing a car or jumping or lying in front of a train. Other suicide methods reported as free text were categorized according to ICD-10, e.g. suffocation and strangulation were categorized as hanging. We regrouped specific suicide methods into a single dummy variable with a value of one for self-harm, combined or not with self-poisoning, and a value of zero for self-poisoning only. The type of professional who was the first to provide care to the patient was recoded into a second dummy variable with a value of one when the sentinel GP had been the first professional caregiver (called out). The third dummy variable was presented as such on the registration form, i.e. with a box to be ticked if the patient was new or was seen (for the first time) during out-of-hours care. In 2000-1, sentinel GPs were asked to record only whether the patient was seen during out-of-hours care, not whether he or she was a new patient. Analysis The characteristics of suicidal events by period were reported with 95% binomial proportion confidence intervals (CIs). Missing data exceeding 1% were examined using a chi square test and multiple logistic regression. A score test for trend of odds was used to detect trend. Multiple logistic regression was used to examine adjusted trends in the use of self-harm and GPs' on-site attendance as first caregivers following suicidal behaviour. Variables in the latter model included age, gender, SGP region and suicide methods which were significantly (p<0.05) associated with GPs' on-site attendance, including interaction effects. A generalized estimating equation approach was used to account for the clustering of data within general practices. Annual incidence estimates were calculated by dividing the number of events by the sum of the person years covered by the SGP in the period concerned. CIs for incidence rates were calculated using a Poisson distribution. The accuracy of the SGP estimates of suicide incidence for 2000-1 and 2011-2012 was measured for Flanders alone, as mortality statistics for the entire country were not yet

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1	available for those years [assessed 15 March 2015). In 2013 Flanders was inhabited by 57.5% of the
2	Belgian population and was therefore the largest region in Belgium. ¹² We used a two-sample test of
3	proportion to measure the accuracy of the SGP estimates. Data were analysed using Stata 10 & 13.
4	RESULTS
5	Characteristics of suicidal events and missing data
6	A total of 1671 suicidal events were reported over the four time periods. Among these were 275
7	suicides, 1287 suicide attempts and 109 events of suicidal behaviour of unknown outcome (fatal or
8	non-fatal) (see online supplementary Table 1).
9	Missing data
10	The outcome of the suicidal behaviour was missing for 30 of 116 (25.9%) new patients or patients
11	seen (for the first time) during out-of-hours care and for 37 of 1002 (3.7%) regular practice patients
12	(p<0.001). Seeing the patient for the first time (versus otherwise) was the only variable multiply
13	associated with unknown outcome of suicidal behaviour (OR 8.4; 95%CI 4.4-16.0). No variables were
14	multiply associated with missing age for 25 of 1671 (1.5%) events. However, age was more often
15	missing when the patient was seen for the first time (6 of 116) than when the patient had been seen
16	before (9 of 1002) (p<0.001).
17	Data on the first professional caregiver on-site was missing for 67 of 275 (24.4%) suicides, 8 of 109
18	(7.3%) events of unknown outcome and 36 of 1287 (2.8%) suicide attempts (p<0.001). The first three
19	surveillance studies showed that data on the first professional caregiver was missing for 55 of 171
20	(32.2%) patients who were already deceased upon the arrival of the sentinel GP and for 4 of 44
21	(9.1%) patients who were still alive (p=0.001). Fatal outcome, i.e. suicide, was the only variable
22	multiply associated with missing data for the first professional caregiver (OR 9.9; 95%CI 5.9-16.8).
23	Time trends
24	Statistically significant time trends were seen for two characteristics. Firstly, the proportion of self-
25	harm was found to have increased in the total sample and in the sample of suicide attempts. Self-harm
26	was used in 553 of 1657 (33.4%) events, and combined with self-poisoning in 42 of 553 (7.6%)
27	events. Logistic regression adjusted for age and gender revealed that the odds of self-harm were not
28	significantly associated with time period in the sample of suicides, suicide attempts or overall (data
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not shown). Secondly, sentinel GPs' on-site attendance was found to have decreased in the samples of
suicides and suicide attempts (see next subsection). The proportion of patients seen for the first
time/during out-of-hours care in 2011-2 was the same as in 1993-5. The high proportion observed in
2000-1 is likely due to the inclusion of regular practice patients seen during out-of-hours care. The
increasing proportions of men and people < 65 years over time were both borderline significant in the
total sample but no trend was seen in the samples of suicides or suicide attempts. No time trend was
observed in survival rates.

8 Sentinel GPs' on-site attendance

9 In 2011-2, sentinel GPs' on-site attendance following the suicidal behaviour of patients < 65 years

10 continued to decrease and it had also dropped in the population \geq 65 years (Figure 1).

11 Figure 1 Percentages of suicidal events to which sentinel GPs were called out as first

12 professional caregivers over four time periods by patient age groups (< 65 years and \geq 65 years)





behaviour reveals a significant interaction between time period and age group (p=0.026) (Table 2).

16 Table 2 Results of marginal generalized estimating equation models for association between

17 sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour and

18 time period by patient age groups

Patients < 65 years (n=1343)

	Period	Adjusted OR(95%CI) ^a
	1993-5	reference
	2000-1	0.57(0.42-0.76)
	2007-8	0.27(0.19-0.40)
	2011-2	0.15(0.10-0.23)
	P	atients \geq 65 years (n=173)
	Period	Adjusted OR(95%CI) ^a
	1993-5	reference
	2000-1	1.95(0.71-5.38)
	2007-8	1.77(0.63-4.96)
	2011-2	0.26(0.12-0.57)
	^a Adjusted for SGP region, patient gender and su	icide method (i.e. self-harm by hanging, jumping from a height,
	crashing a car and jumping or lying in front of a	train and self-poisoning by toxic agents other than
	pharmacological agents and gases)	
	Modelling the factors on populations split b	y age group shows a decline in sentinel GPs' on-site
	attendance following the suicidal behaviour	of patients < 65 years in every period compared to the
	first surveillance period, while in the popula	ation \geq 65 years a significant decline was seen only in the
	most recent period. When the most recent p	eriod (2011-2) was contrasted to the three previous
	periods, no significant interaction was observed	rved between time period and age group in the overall
	model.	
7	Accuracy of SGP suicide incidence estimation	ates
5	In 2011-2 there were no significant differen	ces between the SGP estimates of suicide incidence
	among people < 65 years and people \ge 65 y	ears in Flanders and the corresponding suicide mortality
	rate (Table 3).	
	Table 3 SGP-based estimates of suicid	le incidence among inhabitants of Belgium or Flanders
	^a and suicide mortality statistics by popul	ation age groups over four periods

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1993-5 ^b	SGP estimates Belgium	Suicide mortality Belgium	P ^c
< 65 years	19.5(15.3-24.4)	18.9(18.4-19.4)	0.802
\geq 65 years	26.6(16.0-41.5)	34.6(33.0-36.3)	0.249
Total	20.6(16.6-25.1)	21.4(20.9-21.9)	
2000-1 ^b	SGP estimates Flanders	Suicide mortality Flanders	
< 65 years	18.5(12.3-26.7)	18.4(17.5-19.2)	0.979
\geq 65 years	26.5(11.4-52.2)	24.8(22.7-27.1)	0.856
Total	19.8(13.9-27.4)	19.5(18.7-20.3)	
2007-8 ^b	SGP estimates Belgium	Suicide mortality Belgium	
< 65 years	12.1(8.5-16.7)	17.4(16.8-18.0)	0.028
\geq 65 years	24.4(13.7-40.2)	21.4(19.9-22.9)	0.613
Total	14.2(10.6-18.6)	18.1(17.5-18.7)	
2011-2	SGP estimates Flanders	Suicide mortality Flanders	
< 65 years	17.7(12.0-25.2)	16.6(15.8-17.4)	0.714
\geq 65 years	22.7(10.4-43.2)	23.2(21.3-25.2)	0.954
Total	18.6(13.3-25.4)	17.8(17.1-18.5)	

^a Statistics available at <u>http://www.zorg-en-</u>

gezondheid.be/Cijfers/Sterftecijfers/Statistiek-van-de-doodsoorzaken/ and

https://spma.wiv-isp.be/SitePages/Home.aspx

^b Figures for 1993-5, 2000-1 and 2007-8 were published previously.¹³

^c Two-sample test of proportion

1 DISCUSSION

2 Surveillance of suicidal behaviour by the Belgian Network of SGP over two decades shows that

- 3 sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour
- 4 continued to decline in 2011-2. For the first time, this decline was seen not only in the population <
- 5 65 years but also in the population \geq 65 years. The SGP estimates of suicide incidence in Flanders for

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1	2011-2 were found to be accurate for both age groups. We were able to provide reasonable
2	explanations for the missing data on survival of patients and GPs' on-site attendance.
3	As the SGP network is representative of the national workforce, this study demonstrates that Belgian
4	GPs are moving back from the first line of care for patients who have engaged in suicidal behaviour.
5	Using the military metaphor again, the Belgian "vanguards in the fight against suicide" are falling
6	back from the frontline. This adjusted trend may be attributed to the increasing use of hospital
7	emergency services, now also among people \geq 65 years. Yet, it is known that older people in Belgium
8	have relatively more GP contacts and home visits and also that more older patients have a general
9	health record. ^{5,6} In contrast, many young and middle-aged people do not have a regular GP.
10	Moreover, few young men consult a GP in the period before suicide and the primary care contact rate
11	in the month preceding suicide is much lower among people < 55 years. ^{3,14}
12	In 2011-2 the incidence of suicide was again estimated accurately by the SGP, despite the growing
13	trend of "non-presented suicides" across the two age groups. Two interventions may have improved
14	the completeness of SGP reporting of suicidal behaviour. Firstly, we reported the underestimation of
15	the incidence of suicidal behaviour in 2007-8 in the SGP newsletter. Secondly, we began sending lists
16	of recorded events to the SGP on a regular basis in order to enhance the completeness of their
17	reporting. The completeness of hospitals' and other health services' reporting of suicidal behaviour to
18	GPs may also have improved. The Flemish Ministry of Health commissioned the development and
19	implementation of an Instrument for Psychosocial Evaluation and Care for Suicide Attempters
20	(IPEO), which included training hospital staff, developing a clinical pathway in hospitals and ensuring
21	continuity of care after discharge by involving GPs and community mental health centres. ¹⁵ Since
22	2013, the SGP surveillance programme has been monitoring the information received by GPs from
23	hospitals about suicide attempters in their practice.
24	As far as we know, this is the first study of GPs' on-site attendance as first professional caregivers
25	following suicidal behaviour. Surveillance by a network of sentinel GPs is a simple, flexible and
26	affordable method for collecting original data on health problems in general practice and their
27	management by GPs. The plausible explanations for missing data may be considered an indicator of
28	data quality. ¹⁶ This study shows, however, that this type of surveillance is less well suited to monitor
	11

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the occurrence of rare events, such as suicidal behaviour. As a result, confidence intervals for epidemiological estimates are wide and the characteristics of suicidal events are grouped into broader categories. Another study weakness is that definitions have changed over time and some lack specificity. The heterogeneity of methods of self-harm and the variable describing whether the patient was new or was seen (for the first time) during out-of-hours care exemplify this weakness. Finally, we did not examine the accuracy of the SGP estimates of the incidence of suicide attempts in the population. When using IPEO-based data from accident and emergency departments in Flemish general hospitals, estimates of the incidence of suicide attempts in Flanders for 2011-2 (183 per 100,000 in 2011 and 162 per 100,000 in 2012) were found to be much higher than the SGP estimates for 2011-2 (57 per 100.000).¹⁷ The discrepancy between these sources should gradually decrease if IPEO is successful in involving GPs in follow-up care for suicide attempters. SGP surveillance data for 2013-14 will provide the first data to examine this assumption. **CONCLUSION** Over two decades GPs' on-site attendance as first professional caregiver following suicidal behaviour of patients continues to decline, no longer in the population < 65 years alone but since 2011-2 also in the population ≥ 65 years. This trend endangers both care for surviving patients and the completeness of data. Yet, the most recent SGP estimates of suicide incidence in Flanders for 2011-2, were accurate for both population age groups. Since 2013, the SGP has been monitoring the information received by GPs from hospitals about practice patients who receive hospital care for self-inflicted injuries. Acknowledgements All GPs from the Belgian Network of Sentinel General Practices are gratefully acknowledged. Contributors NB, SM and VVC were involved in the study conception, study design, data collection, interpretation of results, and finalisation of the manuscript. NB was involved in data analysis and writing the manuscript. Funding The Belgian Sentinel Network of GPs is supported by the Flemish Agency for Care and Health and the Wallonia-Brussels Federation.

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2 3	1	Competing interests
4 5	2	None
6 7	3	Ethics Approval
8 9	4	The method of the Belgian SGP in its entirety was approved by the Ethical Committees of the
10 11	5	Scientific Society of Flemish GPs and the Catholic University of Louvain.
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	20)11-2	2	2007-8	20	00-1	19	93-5	A	All	
					All sui	cidal events					
	N	N=288 N=328 N=437 N=618 N=1671		1671	p						
]	n/N	%(95%CI)	r	n/N	%(9	5%CI)	n	/N	_
Men	129/288	44.8 (39.0-50.7)	129/321	40.2 (34.8-45.8)	171/436	39.2 (34.6-44.0)	233/616	37.8 (34.0-41.8)	662/1661	39.9 (37.5-42.2)	p=0.05
Age < 65 years	245/285	86.0 (81.4-90.0)	282/326	86.5 (82.3-90.0)	382/429	89.0 (85.7-91.8)	544/606	89.8 (87.1-92.1)	1453/1646	88.3 (86.6-89.8)	p=0.05
Self-harm (versus elf-poisoning only)	112/286	39.2 (33.5-45.1)	109/326	33.4 (28.3-38.8)	151/437	34.6 (30.1-39.2)	181/608	29.8 (26.2-33.6)	553/1657	33.4 (31.1-35.7)	p=0.00
GP was first caregiver	78/288	27.1 (22.0-32.6)	128/292	43.8 (38.1-49.7)	242/399	60.7 (55.7-65.5)	414/581	71.3 (67.4-74.9)	862/1560	55.3 (52.7-57.7)	p<0.00
Patient was new ^a	16/288	5.6 (3.2-8.9)	N	lo data	71/437	16.3 (12.9-20.0)	29/393	7.4 (5.0-10.4)	116/1118	10.4 (8.6-12.3)	p=0.17
Survival	220/279	78.9	268/319	84.0	333/403	82.6	466/561	83.1	1287/1562	82.4	p=0.27
					S	uicides					
	N	V=59]	N=51	Ν	=70	Ν	=95	N=	=275	
	n/N	%(95%CI)	n/N	%(95%CI)	n/N	n/N	%(95%CI)	n/N	%(95%CI)	n/N	
Mon	42/59	71.2	36/50	72.0	53/70	75.7	62/95	65.3	193/274	70.4	p=0.44
Men		(58.0-82.2)		(57.5-83.8)		(64.0-85.2)		(54.8-74.7)		(64.7-75.8)	
A	43/59	72.9	36/51	70.6	53/69	76.8	76/94	80.9	208/273	76.2	p=0.16
Age < 05 years		(59.7-83.6)		(56.2-82.5)		(65.1-86.1)		(71.4-88.2)		(70.7-81.1)	
Self-harm (versus	45/59	76.3	38/51	74.5	53/70	75.7	71/92	77.2	207/272	76.1	p=0.84
self-poisoning only)		(63.4-86.4)		(60.4-85.7)		(64.0-85.7)		(67.2-85.3)		(70.6-81.0)	
GP was first	13/59	22.0	13/27	48.2	28/47	59.6	49/75	65.3	103/208	49.5	p<0.00
caregiver		(12.3-34.7)		(28.7-68.0)		(44.3-73.6)		(53.5-76.0)		(42.5-56.5)	
Patient was new ^a	6/59	10.2	Ν	lo data	16/70	22.9	7/64	10.9	29/193	15.0	p=0.60
		(3.8-20.8)				(13.7-34.4)		(4.5-21.2)		(10.3-20.9)	
					Suicide atte	empts					
	N	=220	Ν	J=268	N=	=333	N=	=466	N=1	287	
	n/N	%(95%CI)	n/N	%(95%CI)	n/N	%(95%CI)	n/N	%(95%CI)	n/N	%(95%CI°)	
Men	86/220	39.1	91/264	34.5	109/333	32.7	153/464	33.0	439/1281	34.3	p=0.139

		(32.6-45.9)		(28.8-40.5)		(27.7-38.0)		(28.7-37.5)		(31.7-36.9)	
Age < 65 years	196/219	89.5	238/267	89.1	300/329	91.2	424/463	91.6	1158/1278	90.6	p=0.249
		(84.7-93.2)		(84.8-92.6)		(87.6-94.0)		(88.7-93.9)		(88.9-92.2)	
Self-harm (versus	63/218	28.9	66/266	24.8	90/333	27.0	97/461	21.0	316/1278	24.7	p<0.05
self-poisoning only)		(23.0-35.4)		(19.7-30.5)		(22.3-32.1)		(17.4-25.1)		(22.4-27.2)	
GP was first	62/220	28.2	111/256	43.4	192/321	59.8	325/454	71.6	690/1251	55.2	p<0.001
caregiver		(22.3-34.6)		(37.2-49.7)		(54.2-65.2)		(67.2-75.7)		(52.4-57.9)	
Patient was new ^a	5/220	2.3	No	o data	37/333	11.1	15/305	4.9	57/858	6.6	p=0.100
		(1.0-5.2)				(7.9-15.0)		(2.8-8.0)		(5.1-8.5)	

Missing values [n/N(%)]:gender: 10/1671(0.6%); age: 25/1671(1.5%); suicide methods (self-harm versus self-poisoning only): 14/1671(0.8%); GP was first caregiver: 111/1671(6.6%); patient was new: 0/1118(0.0%); survival: 109/1671(6.5%).

^a Score test for trend of odds

^b In 1993-4 (no data are available for 1995) the SGP reported whether the patient was new and whether the patient was seen during out-of-hours care; in 2000-1 the SGP reported only whether the patient was new or seen during out-of-hours care?

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	ltem #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1,2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	
Objectives	3	State specific objectives, including any prespecified hypotheses	
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	NA
Data sources/	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe	6
measurement		comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	NA
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	6
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	6
Results			

Page	18	of	18
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Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility,	7
		confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential	7
		confounders	
		(b) Indicate number of participants with missing data for each variable of interest	7, TABLE 1
Outcome data	15*	Report numbers of outcome events or summary measures	7, TABLE 1
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence	7-10, TABLE 1
		interval). Make clear which confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	7-10, TABLE 1
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and	12
		magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from	12
		similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on	13
		which the present article is based	

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Trends from the surveillance of suicidal behaviour by the Belgian Network of Sentinel General Practices over two decades: a retrospective observational study.

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1	Trends from the surveillance of suicidal behaviour by the Belgian Network of Sentinel General
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12	Keywords:
13	Suicide, family practice
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1 Abstract 2 Objectives: First, we describe trends in characteristics of suicidal events using new (2011-2) and 3 previous (1993-5, 2000-1 and 2007-8) data reported by the Belgian Network of Sentinel General 4 Practices (SGP); second, we examine patient age-related trends in on-site attendance of sentinel 5 general practitioners (GPs) as first professional caregivers following suicidal behaviour; third, we 6 investigate the accuracy of suicide incidence estimates derived from the SGP data. 7 Design: Retrospective observational study 8 Setting: General practices from the nationwide representative Belgian Network of SGP. 9 Outcome measures: Patient gender and age, suicide methods, whether the patient was new, whether 10 the GP was the first caregiver on-site, and the outcome of the suicidal behaviour (fatal or not) were 11 recorded on standard registration forms. The accuracy of suicide incidence estimates was tested 12 against suicide mortality data. 13 Results: Over the four time periods, 1671 suicidal events were reported: 275 suicides, 1287 suicide attempts and 109 events of suicidal behaviour of unknown outcome. In 2011-2, sentinel GPs' on-site 14 15 attendance following the suicidal behaviour of patients < 65 years had continued to decrease (from 71% in 1993-5 to 58% in 2000-1, 39% in 2007-8 and 25% in 2011-2). In 2011-2, it had also 16 17 decreased steeply in the population ≥ 65 years (from 70% in 1993-5, 76% in 2000-1 and 79% in 2007-18 8 to 35% in 2011-2). No significant differences were found between the SGP-based suicide incidence 19 estimates for 2011-2 and the available suicide mortality rates for people < 65 years and ≥ 65 years. 20 Conclusions: GPs' on-site attendance as first professional caregivers following suicidal behaviour 21 continues to decline, since 2011-2 also in the population ≥ 65 years. Unawareness of patients' suicidal 22 behaviour endangers both care for surviving patients and the completeness of SGP surveillance data. 23 Yet, the incidence of suicide for 2011-2 was estimated accurately by the SGP. 24 Strengths and limitations of this study 25 This is the first study of GPs' on-site attendance as first professional caregivers following suicidal 26 behaviour. We found that Belgian GPs are moving back from the first line of care for patients 27 who have engaged in suicidal behaviour.

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We found that characteristics of suicidal events were missing, i.e. not reported by the SGP,	
largely due to their non-applicability or to loss of patients that were never seen before. This data-	
derived knowledge about item non-response may be considered an indicator of data quality.	
This type of surveillance is less well suited to monitor rare events such as suicidal behaviour. As a	
result, confidence intervals are wide and some characteristics of suicidal events are described	
broadly.	
The measure whether the patient was new was not recorded every year and the formulation	
changed over time.	
We did not examine the accuracy of the SGP estimates of the incidence of suicide attempts in the	
population.	, , ,
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1 **INTRODUCTION**

2 The majority of people who seek care for mental health problems consult a primary care provider and 3 general practitioners (GPs) have become the vanguard in the fight against suicide.¹² On average, 45% 4 of people who died by suicide had contact with a primary care provider in the month before their 5 death.³ Improving depression recognition and suicide risk evaluation among GPs is therefore considered an important component of suicide prevention.⁴ GPs play a key role in Belgian health care, 6 7 even though patients are basically free to consult any care provider. Overall, 95% of the general 8 population in Belgium has a regular GP and around half of all general practice patients have a 9 "general health record", i.e. a GP-held record of all their medical information including reports from other care providers.⁵⁶ Since 1982, the surveillance of suicidal behaviour, i.e. suicide (fatal outcome) 10 11 and suicide attempts (non-fatal outcome) has been carried out by the Belgian Network of Sentinel 12 General Practices (SGP). This surveillance includes all events of suicidal behaviour the sentinel GPs 13 are confronted with, including the suicidal behaviour of new patients seen (for the first time) during 14 out-of-hours care, as well as the suicidal behaviour of their own patients as reported by other care 15 providers. The surveillance provides preliminary data that is complementary to national mortality 16 statistics and is one of the only sources to monitor suicide attempts in the Belgian population. 17 In this paper, we describe trends over the last four time periods in light of findings from three 18 previous periods. Firstly, we found that sentinel GPs' on-site attendance as first professional 19 caregivers (called out) following the suicidal behaviour of patients < 65 years had declined from 71% (1993-5) to 58% (2000-1) and 39% (2007-8).⁷ Among people \geq 65 years, these rates have remained at 20 the same average level of 74% since 1993-5. This trend makes sense, as the overuse of hospital 21 emergency services by self-referred patients in Belgium⁸ may be less of a problem among older 22 people. Older people relatively have more consultations with their usual GP⁹, more GP contacts and 23 home visits ⁵ and relatively more older people have a general health record ⁶. It is likely that sentinel 24 25 GPs receive late reports or no reports at all from other care providers about the suicidal behaviour of 26 their own patients to whom they were not called out, and as a result, sentinel GPs do not report these 27 events on their weekly forms. GPs' unawareness of suicidal behaviour among practice patients

impedes appropriate care for surviving patients and also jeopardizes the completeness of SGP reporting. Secondly, we found that the incidence of suicide in the Belgian population was underestimated for 2007-8 in comparison to the gold standard, the suicide mortality data based on death certificates for 2007-8 (available as of February 2013). Yet, the SGP-based incidence of suicide among people ≥ 65 years for 2007-8 did not differ significantly from the national suicide mortality rate in the same period (see Table 4). Previously, the SGP-based suicide incidence estimates had been comparable to the mortality statistics.¹⁰¹¹ No gold standard exists to which the SGP-based incidence estimates for suicide attempts can be compared. However, the decrease in the SGP-based incidence estimates for suicide attempts in 2007-8 is not in line with the absence of any significant trend between 1993-5 and 2000-1. In short, this paper aims to study our hypothesis that the underestimated incidence for 2007-8 is partly explained by sentinel GPs' unawareness, and thus non-registration, of the suicidal behaviour by patients < 65 years that was not seen by the GPs. Therefore, we first describe trends in patient gender and age, suicide methods, whether the patient was new, whether the GP was the first caregiver on-site and the outcome of the suicidal behaviour (fatal or not). For these variables, we also examine missing data exceeding 1%. Second, we examine patient age-related trends in sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour of patients. Third, we investigate the accuracy of the SGP-based estimates of suicide incidence in the population over four time periods relative to suicide mortality data. **METHODS** Data source The Belgian network of SGP was developed in 1979 by the Belgian Institute of Public Health drawing on experiences of sentinel surveillance in the UK and the Netherlands.¹² The network comprises approximately 150 general practices with one or more sentinel GPs who purposively record routine clinical care data for the surveillance of specific health problems or care delivery. The gender-age distributions of sentinel and non-sentinel GPs by region are comparable and the network covers

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28 between 1.4% and 1.8% of the Belgian population throughout all regions.¹³ As Belgian GPs do not

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serve a defined practice population, the size of the SGP patient population is estimated by applying
 the ratio of patient contacts in the entire Belgian population to the sum of weekly patient contacts in
 the network.

4 Data collection

The data were reported by the SGP on weekly baseline forms and on follow-up forms either two weeks (1993-2008) or four weeks (2011-2) after the suicidal event. Suicide and suicide attempt were briefly defined 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 (suicide) or non-fatal outcome (suicide attempt)'. Any suicidal behaviour which ultimately resulted in death after two to four weeks was considered suicide. Follow-up forms were used to report the outcome of the suicidal behaviour, i.e. survival or not, and, if necessary, to complete data that were missing on the baseline form. Since 2011, the SGP program staff has been sending lists of recorded suicidal events to the SGP on a regular basis, even when no events were reported, and requesting that they be returned after correction,

14 completion or confirmation of their content.

15 Variables and measurements

Five variables, including patients' gender and age, are the common core of the baseline forms that were used in the four periods. Specific suicide methods listed on the form were regrouped into a single dummy variable with a value of one for violent methods, combined or not with nonviolent methods, and a value of zero for nonviolent methods only.¹⁴ Nonviolent methods include self-poisoning by pharmacological agents, gases or other toxic substances (free text space). Violent methods include hanging, drowning, firearm, wrist cutting, jumping from a height, crashing a car or jumping or lying in front of a train. Other suicide methods reported as free text were categorized according to ICD-10, e.g. suffocation and strangulation were categorized as hanging. The measure whether the patient was new has changed over time. In 1993-4, the sentinel GPs were requested to tick a box if the patient was never seen before. We did not use the information from another box to tick if the patient was seen out-of-hours. In 1995, no information was asked concerning this subject. In 2000-1, sentinel GPs were asked to record only whether the patient was seen during out-of-hours care, not whether he or she was a new patient. In 2011-2, a box was to be ticked if the patient "was

never seen before/during out-of-hours care". We show descriptive statistics on this measure for 2000-1 (see online supplementary Table 1), but in the analysis (see next subsection) we only use data from the first and the last period for the measure labeled as "the patient was new". The type of professional who was the first to provide care to the patient was recoded into a second dummy variable with a value of one when the sentinel GP had been the first professional caregiver (called out). Alternatives to the GP were immediate hospitalization, ambulatory mental health provision or other professional care (free text space). Analysis The characteristics of suicidal events by period were reported with 95% binomial proportion confidence intervals (CIs). Data from 2000-1 for the measure whether the patient was new were only used in univariate analysis. A score test for trend of odds was used to detect trend in the characteristics of suicidal events over time. Significant time trends (except GPs' on site attendance, see further) were examined by multiple logistic regression adjusted for age and gender. Univariate associations between missingness of data exceeding 1% and characteristics of suicidal events were examined by a chi square test. Significant variables (p < 0.05) were included in multiple logistic regression models for prediction of missingness. The measure whether the patient was deceased upon arrival of the sentinel GP, was only included in the univariate analysis of missingness but not in any multiple logistic regression model because of collinearity with survival. This subject was reported in the first three periods, not in the fourth period. Determinants of GPs' on-site attendance as first caregivers following suicidal behaviour were examined by multiple logistic regression. Variables in the full model included age, gender, SGP region and suicide methods which were significantly (chi square test p<0.05) associated with GPs' on-site attendance. Interaction effects between independent variables were tested in all models. A generalized estimating equation approach was used to account for the clustering of data within general practices. Annual incidence estimates were calculated by dividing the number of events by the sum of the person years covered by the SGP in the period concerned. CIs for incidence rates were calculated using a Poisson distribution. The accuracy of the SGP estimates of suicide incidence for 2000-1 and

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1 2011-12 was measured for Flanders alone, as mortality statistics for the entire country were not yet 2 available for those years [assessed 15 March 2015). In 2013 Flanders was inhabited by 57.5% of the 3 Belgian population and was therefore the largest region in Belgium.¹⁵ We used a two-sample test of proportion to measure the accuracy of the SGP estimates. Data were analysed using Stata 10 & 13. 4 5 RESULTS Trends in key characteristics of suicidal events and missing data 6 7 A total of 1671 suicidal events were reported over the four time periods. Among these were 275 8 suicides, 1287 suicide attempts and 109 events of suicidal behaviour of unknown outcome (fatal or 9 non-fatal) (see online supplementary Table 1). 10 Trends in key characteristics of suicidal events 11 Two characteristics showed a significant score test for trend of odds. Firstly, the proportion of violent 12 methods was found to have increased in the total sample and in the sample of suicide attempts. 13 Violent methods were used in 553 of 1657 (33.4%) events, and combined with nonviolent methods in 14 42 of 553 (7.6%) events. Logistic regression adjusted for age and gender revealed that the odds of 15 violent methods were not significantly associated with time period in the sample of suicides, suicide 16 attempts or overall (data not shown). Secondly, sentinel GPs' on-site attendance was found to have 17 decreased in the samples of suicides and suicide attempts (see next subsection). The proportion of 18 patients seen for the first time in 2011-2 was the same as in 1993-5. The increasing proportions of 19 men and people < 65 years over time were both borderline significant in the total sample but no trend 20 was seen in the samples of suicides or suicide attempts. No time trend was observed in survival rates. 21 Missing data exceeding 1% No variables were independently associated with missing age for 25 of 1671 (1.5%) events (see online 22 23 supplementary Table 2). However, age was more often missing when the patient was seen for the first 24 time than when the patient had been seen before (p < 0.05). 25 Data on the first professional caregiver on-site were more often missing for suicides than for suicide 26 attempts (p < 0.001). The first three surveillance studies showed that data on the first professional 27 caregiver were more often missing for patients who were already deceased upon the arrival of the 28 sentinel GP than for patients who were still alive (p < 0.001). Fatal outcome, i.e. suicide, was the only

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1	variable independently associated with missing data for the first professional caregiver (OR 11.2; 95%
2	CI 7.3-17.2).
3	The outcome of the suicidal behaviour was more often missing for new patients than for regular
4	practice patients (p<0.001). Seeing the patient for the first time (versus otherwise) was the only
5	variable independently associated with unknown outcome of suicidal behaviour (OR 11.4; 95% CI
6	4.8-27.1).
7	Sentinel GPs' on-site attendance
8	In 2011-2, sentinel GPs' on-site attendance following the suicidal behaviour of patients < 65 years
9	continued to decrease and it had also dropped in the population ≥ 65 years (Figure 1).
10	The overall model of factors associated with sentinel GPs' on-site attendance following suicidal
11	behaviour revealed a significant interaction between time period and age group (p=0.026) (Table 3).
12	

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1	Table 3	Results of marginal generalized estimating equation models for association between
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2 sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour and

3 time period by patient age groups

Patie	ents < 65 years (n=1343)	
Period	Adjusted OR(95% CI) ^a	
1993-5	reference	
2000-1	0.57(0.42-0.76)	
2007-8	0.27(0.19-0.40)	
2011-2	0.15(0.10-0.23)	
Pati	ients ≥ 65 years (n=173)	
Period	Adjusted OR(95% CI) ^a	
1993-5	reference	
2000-1	1.95(0.71-5.38)	
2007-8	1.77(0.63-4.96)	
2011-2	0.26(0.12-0.57)	
1993-5 2000-1 2007-8 2011-2	reference 1.95(0.71-5.38) 1.77(0.63-4.96) 0.26(0.12-0.57)	

^a Adjusted for SGP region, patient gender and suicide method (i.e. violent methods by hanging, jumping from a height, crashing a car and jumping or lying in front of a train and self-poisoning by toxic agents other than pharmacological agents and gases)

Modelling the factors on populations split by age group shows a decline in sentinel GPs' on-site attendance following the suicidal behaviour of patients < 65 years in every period compared to the first surveillance period, while in the population ≥ 65 years a significant decline was seen only in the most recent period. When the most recent period (2011-2) was contrasted to the three previous periods, no significant interaction was observed between time period and age group in the overall model. Accuracy of SGP suicide incidence estimates In 2011-2 there were no significant differences between the SGP estimates of suicide incidence

12 among people ≤ 65 years and people ≥ 65 years in Flanders and the corresponding suicide mortality

rate (Table 4).

SGP-based estimates of suicide incidence among inhabitants of Belgium or Flanders Table 4

^a and suicide mortality data by population age groups over four periods

	Annual incidence per 100,00	00 inhabitants and 95% CI	
1993-5 ^b	SGP estimates Belgium	Suicide mortality Belgium	p °
< 65 years	19.5(15.3-24.4)	18.9(18.4-19.4)	0.802
\geq 65 years	26.6(16.0-41.5)	34.6(33.0-36.3)	0.249
Total	20.6(16.6-25.1)	21.4(20.9-21.9)	
2000-1 ^b	SGP estimates Flanders	Suicide mortality Flanders	
< 65 years	18.5(12.3-26.7)	18.4(17.5-19.2)	0.979
\geq 65 years	26.5(11.4-52.2)	24.8(22.7-27.1)	0.856
Total	19.8(13.9-27.4)	19.5(18.7-20.3)	
2007-8 ^b	SGP estimates Belgium	Suicide mortality Belgium	
< 65 years	12.1(8.5-16.7)	17.4(16.8-18.0)	0.028
\geq 65 years	24.4(13.7-40.2)	21.4(19.9-22.9)	0.613
Total	14.2(10.6-18.6)	18.1(17.5-18.7)	
2011-2	SGP estimates Flanders	Suicide mortality Flanders	
< 65 years	17.7(12.0-25.2)	16.6(15.8-17.4)	0.714
\geq 65 years	22.7(10.4-43.2)	23.2(21.3-25.2)	0.954
Total	18.6(13.3-25.4)	17.8(17.1-18.5)	

^a Statistics available at <u>http://www.zorg-en-</u>

gezondheid.be/Cijfers/Sterftecijfers/Statistiek-van-de-doodsoorzaken/ and

https://spma.wiv-isp.be/SitePages/Home.aspx

^b Figures for 1993-5, 2000-1 and 2007-8 were published previously.¹⁶

^c Two-sample test of proportion

DISCUSSION

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1	Surveillance of suicidal behaviour by the Belgian Network of SGP over two decades shows that
2	sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour
3	continued to decline in 2011-2. For the first time, this decline was seen not only in the population <
4	65 years but also in the population \geq 65 years. The SGP estimates of suicide incidence in Flanders for
5	2011-2 were found to be accurate for both age groups. We showed that missing data on age and
6	survival were predominantly attributable to non-regular or new patients. We equally found that data
7	on the first caregiver were missing mainly because of non-applicability, i.e. no care was given to
8	patients who died on the spot.
9	As the SGP network is representative of the national workforce, this study demonstrates that Belgian
10	GPs are moving back from the first line of care for patients who have engaged in suicidal behaviour.
11	Using the military metaphor again, the Belgian "vanguards in the fight against suicide" are falling
12	back from the frontline. This trend may be attributed to the increasing use of hospital emergency
13	services, now also among people \geq 65 years. Yet, as described in the introduction, GPs are the care
14	providers par excellence for older people. This was confirmed by our study of suicide death
15	certificates in Flanders during six months in 2009-10, showing that GPs completed relatively more
16	suicide death certificates for people \geq 65 years compared to non-GPs. ¹⁷
17	In contrast, less young and middle-aged people have a regular GP. Moreover, international studies
18	found that few young men consult a GP in the period before suicide and the primary care contact rate
19	in the month preceding suicide is much lower among people < 55 years. ^{3 18} As a result, non-
20	consultation of people at risk limits both the scope of suicide prevention in general practice and the
21	inference of the SGP results for the general population.
22	In 2011-2 the incidence of suicide was again estimated accurately by the SGP, despite the growing
23	trend of suicides for which the sentinel GPs were not called out across the two age groups. Two
24	interventions may have improved the completeness of SGP reporting of suicidal behaviour. Firstly,
25	we reported the underestimation of the incidence of suicidal behaviour in 2007-8 in the SGP
26	newsletter. Secondly, the SGP program staff began sending lists of recorded events to the SGP on a
27	regular basis in order to enhance the completeness of their reporting. The completeness of hospitals'
28	and other health services' reporting of suicidal behaviour to GPs may also have improved. The

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Flemish Ministry of Health commissioned the development and implementation of an Instrument for Psychosocial Evaluation and Care for Suicide Attempters (IPEO), which included training hospital staff, developing a clinical pathway in hospitals and ensuring continuity of care after discharge by involving GPs and community mental health centres.¹⁹ Since 2013, the SGP surveillance programme has been monitoring the information received by GPs from hospitals about suicide attempters in their practice. As far as we know, this is the first study of GPs' on-site attendance as first professional caregivers following suicidal behaviour. Surveillance by a network of sentinel GPs is a simple, flexible and affordable method for collecting original data on health problems in general practice and their management by GPs. Our finding that characteristics of suicidal events were missing mainly because of their unavailability or non-applicability, not because of non-understanding or non-compliance by the sentinel GPs, may be considered an indicator of data quality.²⁰ This study shows, however, that this type of surveillance is less well suited to monitor the occurrence of rare events, such as suicidal behaviour. As a result, confidence intervals for epidemiological estimates are wide and the characteristics of suicidal events are grouped into broader categories. Another study weakness lies in its rough measures. The heterogeneity of violent methods and the change of the variable describing whether the patient was new or was seen (for the first time) during out-of-hours care exemplify this weakness. Finally, we did not examine the accuracy of the SGP estimates of the incidence of suicide attempts in the population. When using IPEO-based data from accident and emergency departments in Flemish general hospitals, estimates of the incidence of suicide attempts in Flanders for 2011-2 (183 per 100,000 in 2011 and 162 per 100,000 in 2012) were found to be much higher than the SGP estimates for 2011-2 (57 per 100,000).²¹ The discrepancy between these sources should gradually decrease if IPEO is successful in involving GPs in follow-up care for suicide attempters. SGP surveillance data for 2013-14 will provide the first data to examine this assumption. CONCLUSION Over two decades GPs' on-site attendance as first professional caregiver following suicidal behaviour

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of patients continues to decline, no longer in the population < 65 years alone but since 2011-2 also in

28 the population \geq 65 years. This trend endangers both care for surviving patients and the completeness

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1	of data. Yet, the most recent SG	estimates of suicide incidence in	Flanders for 2011-2, were accurate
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- 2 for both population age groups. Since 2013, the SGP has been monitoring the information received by
- 3 GPs from hospitals about practice patients who receive hospital care for self-inflicted injuries.

4 Acknowledgements

5 All GPs from the Belgian Network of Sentinel General Practices are gratefully acknowledged.

6 **Contributors**

- 7 NB, SM and VVC were involved in the study conception, study design, data collection, interpretation
- 8 of results, and finalisation of the manuscript. NB was involved in data analysis and writing the
- 9 manuscript.

10 Funding

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- 12 the Wallonia-Brussels Federation.

13 **Competing interests**

14 None

15 **Ethics Approval**

- 16 The method of the Belgian SGP in its entirety was approved by the Ethical Committees of the
- 17 Scientific Society of Flemish GPs and the Catholic University of Louvain.

18 Data sharing statement

19 No additional data are available.

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Table 1	Trends in the characteristics of suicidal events, suicides and suicide attempts reported by the SGP over four time periods
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					All sui	icidal events					p ^a
	N	=288	N	=328	N=	=437	N	=618	N=	1671	
	n/N	%(95% CI)	n/N	%(95% CI)	n/N	%(95% CI)	n/N	%(95% CI)	n/N	%(95% CI)	
Men	129/288	44.8 (39.0-50.7)	129/321	40.2 (34.8-45.8)	171/436	39.2 (34.6-44.0)	233/616	37.8 (34.0-41.8)	662/1661	39.9 (37.5-42.2)	0.05
Age < 65 years	245/285	86.0 (81.4-90.0)	282/326	86.5 (82.3-90.0)	382/429	89.0 (85.7-91.8)	544/606	89.8 (87.1-92.1)	1453/1646	88.3 (86.6-89.8)	0.053
Violent methods	112/286	39.2 (33.5-45.1)	109/326	33.4 (28.3-38.8)	151/437	34.6 (30.1-39.2)	181/608	29.8 (26.2-33.6)	553/1657	33.4 (31.1-35.7)	0.009
Patient was new ^b	16/288	5.6 (3.2-8.9)	No	o data	71/437	16.3 (12.9-20.0)	29/393	7.4 (5.0-10.4)	116/1118	10.4 (8.6-12.3)	0.344
GP was first caregiver	78/288	27.1 (22.0-32.6)	128/292	43.8 (38.1-49.7)	242/399	60.7 (55.7-65.5)	414/581	71.3 (67.4-74.9)	862/1560	55.3 (52.7-57.7)	< 0.001
Survival	220/279	78.9	268/319	84.0	333/403	82.6	466/561	83.1	1287/1562	82.4	0.273
					S	uicides					
	Ν	√ =59	Ň	I=51	S N	uicides =70	N	1=95	N=	275	
	N n/N	√=59 %(95% CI)	N n/N	I=51 %(95% CI)	S N n/N	uicides =70 %(95% CI)	N n/N	(=95 %(95% CI)	N= n/N	275 %(95% CI)	
Mar	N n/N 42/59	N=59 %(95% CI) 71.2	N n/N 36/50	I=51 %(95% CI) 72.0	8 N n/N 53/70	uicides =70 %(95% CI) 75.7	N n/N 62/95	1=95 %(95% CI) 65.3	N= n/N 193/274	275 %(95% CI) 70.4	0.449
Men	N n/N 42/59	N=59 %(95% CI) 71.2 (58.0-82.2)	N n/N 36/50	I=51 %(95% CI) 72.0 (57.5-83.8)	S N <u>n/N</u> 53/70	uicides =70 %(95% CI) 75.7 (64.0-85.2)	N n/N 62/95	1=95 %(95% CI) 65.3 (54.8-74.7)	N= n/N 193/274	2275 %(95% CI) 70.4 (64.7-75.8)	0.449
Men	N n/N 42/59 43/59	V=59 %(95% CI) 71.2 (58.0-82.2) 72.9	N n/N 36/50 36/51	T=51 %(95% CI) 72.0 (57.5-83.8) 70.6	s N <u>n/N</u> 53/70 53/69	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8	N n/N 62/95 76/94	1=95 %(95% CI) 65.3 (54.8-74.7) 80.9	N= n/N 193/274 208/273	275 %(95% CI) 70.4 (64.7-75.8) 76.2	0.449
Men Age < 65 years	N n/N 42/59 43/59	N=59 %(95% CI) 71.2 (58.0-82.2) 72.9 (59.7-83.6)	N n/N 36/50 36/51	I=51 %(95% CI) 72.0 (57.5-83.8) 70.6 (56.2-82.5)	S N <u>n/N</u> 53/70 53/69	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8 (65.1-86.1)	N n/N 62/95 76/94	H=95 %(95% CI) 65.3 (54.8-74.7) 80.9 (71.4-88.2)	N= <u>n/N</u> 193/274 208/273	275 %(95% CI) 70.4 (64.7-75.8) 76.2 (70.7-81.1)	0.449
Men Age < 65 years Violent methods	N n/N 42/59 43/59 45/59	N=59 %(95% CI) 71.2 (58.0-82.2) 72.9 (59.7-83.6) 76.3	N n/N 36/50 36/51 38/51	T=51 %(95% CI) 72.0 (57.5-83.8) 70.6 (56.2-82.5) 74.5	S N n/N 53/70 53/69 53/70	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8 (65.1-86.1) 75.7	N n/N 62/95 76/94 71/92	1=95 <u>%(95% CI)</u> 65.3 (54.8-74.7) 80.9 (71.4-88.2) 77.2	N= n/N 193/274 208/273 207/272	275 %(95% CI) 70.4 (64.7-75.8) 76.2 (70.7-81.1) 76.1	0.449
Men Age < 65 years Violent methods	N n/N 42/59 43/59 45/59	N=59 %(95% CI) 71.2 (58.0-82.2) 72.9 (59.7-83.6) 76.3 (63.4-86.4)	N n/N 36/50 36/51 38/51	I=51 %(95% CI) 72.0 (57.5-83.8) 70.6 (56.2-82.5) 74.5 (60.4-85.7)	S N 53/70 53/69 53/70	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8 (65.1-86.1) 75.7 (64.0-85.7)	N 62/95 76/94 71/92	=95 <u>%(95% CI)</u> <u>65.3</u> (54.8-74.7) <u>80.9</u> (71.4-88.2) <u>77.2</u> (67.2-85.3)	N= <u>n/N</u> 193/274 208/273 207/272	275 %(95% CI) 70.4 (64.7-75.8) 76.2 (70.7-81.1) 76.1 (70.6-81.0)	0.449 0.169 0.843
Men Age < 65 years Violent methods Patient was new ^b	N n/N 42/59 43/59 45/59 6/59	V=59 %(95% CI) 71.2 (58.0-82.2) 72.9 (59.7-83.6) 76.3 (63.4-86.4) 10.2	N n/N 36/50 36/51 38/51 No	$\frac{1=51}{\%(95\% \text{ CI})}$ 72.0 (57.5-83.8) 70.6 (56.2-82.5) 74.5 (60.4-85.7) o data	S N n/N 53/70 53/69 53/70 16/70	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8 (65.1-86.1) 75.7 (64.0-85.7) 22.9	N n/N 62/95 76/94 71/92 7/64	1=95 %(95% CI) 65.3 (54.8-74.7) 80.9 (71.4-88.2) 77.2 (67.2-85.3) 10.9	N= <u>n/N</u> 193/274 208/273 207/272 29/193	275 %(95% CI) 70.4 (64.7-75.8) 76.2 (70.7-81.1) 76.1 (70.6-81.0) 15.0	0.449 0.169 0.843 0.890
Men Age < 65 years Violent methods Patient was new ^b	N n/N 42/59 43/59 45/59 6/59	J=59 %(95% CI) 71.2 (58.0-82.2) 72.9 (59.7-83.6) 76.3 (63.4-86.4) 10.2 (3.8-20.8)	N n/N 36/50 36/51 38/51 No	I=51 %(95% CI) 72.0 (57.5-83.8) 70.6 (56.2-82.5) 74.5 (60.4-85.7) o data	S N n/N 53/70 53/69 53/70 16/70	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8 (65.1-86.1) 75.7 (64.0-85.7) 22.9 (13.7-34.4)	N n/N 62/95 76/94 71/92 7/64	1=95 <u>%(95% CI)</u> 65.3 (54.8-74.7) 80.9 (71.4-88.2) 77.2 (67.2-85.3) 10.9 (4.5-21.2)	N= n/N 193/274 208/273 207/272 29/193	275 %(95% CI) 70.4 (64.7-75.8) 76.2 (70.7-81.1) 76.1 (70.6-81.0) 15.0 (10.3-20.9)	0.449 0.169 0.842 0.890
Men Age < 65 years Violent methods Patient was new ^b GP was first	N n/N 42/59 43/59 45/59 6/59 13/59	V=59 %(95% CI) 71.2 (58.0-82.2) 72.9 (59.7-83.6) 76.3 (63.4-86.4) 10.2 (3.8-20.8) 22.0	N n/N 36/50 36/51 38/51 No 13/27	I=51 %(95% CI) 72.0 (57.5-83.8) 70.6 (56.2-82.5) 74.5 (60.4-85.7) o data 48.2	S N n/N 53/70 53/69 53/70 16/70 28/47	uicides =70 %(95% CI) 75.7 (64.0-85.2) 76.8 (65.1-86.1) 75.7 (64.0-85.7) 22.9 (13.7-34.4) 59.6	N n/N 62/95 76/94 71/92 7/64 49/75	1=95 %(95% CI) 65.3 (54.8-74.7) 80.9 (71.4-88.2) 77.2 (67.2-85.3) 10.9 (4.5-21.2) 65.3	N= <u>n/N</u> 193/274 208/273 207/272 29/193 103/208	275 %(95% CI) 70.4 (64.7-75.8) 76.2 (70.7-81.1) 76.1 (70.6-81.0) 15.0 (10.3-20.9) 49.5	0.449 0.169 0.843 0.890 <0.001

Suicide attempts

⊿0

	N	=220	Ν	=268	N	=333	N	=466	N=1	287	
	n/N	%(95% CI)	n/N	%(95% CI)	n/N	%(95% CI)	n/N	%(95% CI)	n/N	%(95% CI°)	
Men	86/220	39.1	91/264	34.5	109/333	32.7	153/464	33.0	439/1281	34.3	0.13
		(32.6-45.9)		(28.8-40.5)		(27.7-38.0)		(28.7-37.5)		(31.7-36.9)	
Age < 65 years	196/219	89.5	238/267	89.1	300/329	91.2	424/463	91.6	1158/1278	90.6	0.249
		(84.7-93.2)		(84.8-92.6)		(87.6-94.0)		(88.7-93.9)		(88.9-92.2)	
Violent methods	63/218	28.9	66/266	24.8	90/333	27.0	97/461	21.0	316/1278	24.7	< 0.05
		(23.0-35.4)		(19.7-30.5)		(22.3-32.1)		(17.4-25.1)		(22.4-27.2)	
Patient was new b	5/220	2.3	N	o data	37/333	11.1	15/305	4.9	57/858	6.6	0.119
		(1.0-5.2)				(7.9-15.0)		(2.8-8.0)		(5.1-8.5)	
GP was first	62/220	28.2	111/256	43.4	192/321	59.8	325/454	71.6	690/1251	55.2	< 0.00
caregiver		(22.3-34.6)		(37.2-49.7)		(54.2-65.2)		(67.2-75.7)		(52.4-57.9)	
s new: 0/1118(0.0%); ignificance of score te he score test for trend 00-1 the SGP reported	survival: 10 est for trend of of odds was l only wheth	9/1671(6.5%). of odds a calculated using er the patient was	g data from the	e first and the four out-of-hours care;	th period. In 1 in 2011-2 the	993-4 (no data an SGP reported wh	re available fo nether "the pa	r 1995) the SGP tient was new/see	reported whethe	er the patient was no -hours care"	ew; in
s new: 0/1118(0.0%); ignificance of score te the score test for trend 00-1 the SGP reported	survival: 10 est for trend of of odds was l only wheth	9/1671(6.5%). of odds calculated using er the patient was	g data from the	e first and the four out-of-hours care;	th period. In 1 in 2011-2 the	993-4 (no data an SGP reported wh	re available fo nether "the pa	r 1995) the SGP tient was new/see	reported whethe	er the patient was no	ew; in
s new: 0/1118(0.0%); ignificance of score te he score test for trend 00-1 the SGP reported	survival: 10 est for trend of of odds was l only wheth	9/1671(6.5%). of odds s calculated using er the patient was	g data from the	e first and the four out-of-hours care;	th period. In 1 in 2011-2 the	993-4 (no data an SGP reported wh	re available fo nether "the pa	r 1995) the SGP tient was new/see	reported whethe	er the patient was no	ew; in
s new: 0/1118(0.0%); ignificance of score te he score test for trend 00-1 the SGP reported	survival: 10 est for trend of of odds was l only wheth	9/1671(6.5%). of odds calculated using er the patient was	g data from the	e first and the four out-of-hours care;	th period. In 1 in 2011-2 the	993-4 (no data an SGP reported wh	re available fo nether "the pa	r 1995) the SGP tient was new/sed	reported whethe	er the patient was no -hours care"	ew; in
s new: 0/1118(0.0%); ignificance of score te the score test for trend 00-1 the SGP reported	survival: 10 est for trend o of odds was l only wheth	9/1671(6.5%). of odds calculated using er the patient was	g data from the s seen during	invien14. contin	th period. In 1 in 2011-2 the 1 u/epipine	993-4 (no data an SGP reported wi	re available fo nether "the pa	r 1995) the SGP tient was new/sed	reported whether en during out-of	er the patient was no -hours care"	ew; in

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	Age missing		First caregiver missing		Survival missing	
	n/N(%)	p ^a	n/N(%)	p ^a	n/N(%)	p ^a
Gender						
Men	18/999(1.8%)	0.124	43/999(4.3%)	-0.001	30/662(4.5%)	-0.0
Women	6/662(0.9%)	0.134	66/662(10.0%)	<0.001	76/999(7.6%)	<0.0:
Age						
< 65			93/1453(6.4%)	0.100	87/1453(6.0%)	0.20
≥ 65			19/193(9.3%)	0.128	8/193(4.2%)	0.302
Violent methods						
No	17/1104(1.5%)	0.002	40/1104(3.6%)	-0.001	77/1104(7.0%)	0.000
Yes	8/553(1.5%)	0.883	69/553(12.5%)	<0.001	30/553(5.4%)	0.226
GP was first caregiver						
No	6/698(0.9%)				32/698(4.6%)	
Yes	19/862(2.2%)	< 0.05			69/862(8.0%)	< 0.0
Patient was new						
No	5/636(0.8%)	10.05	19/636(3.0%)	0.505	21/636(3.3%)	-0.00
Yes	2/45(4.4%)	< 0.05	2/45(4.4%)	0.585	12/45(26.7%)	<0.00
Suicide		C				
No	9/1287(0.7%)	0.0.00	36/1287(2.8%)	.0.001		
Yes	2/275(0.7%)	0.960	67/275(24.4%)	<0.001		
Deceased upon arrival GP						
No	3/44(6.8%)	< 0.05	4/44(9.1%)	-0.001		
Yes	1/171(0.6%)	< 0.05	55/171(32.2%)	<0.001		
Total	25/1671(1.5%)		111/1671(6.6%)		109/1671(6.5%)	
^a Value of significance test b	by chi square					1

Table 2 Characteristics of suicidal events with missing data exceeding 1%

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Figure 1 Percentages of suicidal events to which sentinel GPs were called out as first professional caregivers over four time periods by patient age groups (< 65 years and \geq 65 years)

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	ltem #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1,2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	NA
Data sources/	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe	6
measurement		comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	NA
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7
		(b) Describe any methods used to examine subgroups and interactions	7
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	7
Results			

Page	22	of	22
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Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility,	8
		confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential	8
		confounders	
		(b) Indicate number of participants with missing data for each variable of interest	8-9, TABLE 1
Outcome data	15*	Report numbers of outcome events or summary measures	8-9, TABLE 1
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence	8-11, TABLE 1-4
		interval). Make clear which confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	8-11, TABLE 1-4
Discussion			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and	13
		magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from	12
		similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on	14
		which the present article is based	

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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BMJ Open

Trends from the surveillance of suicidal behaviour by the Belgian Network of Sentinel General Practices over two decades: a retrospective observational study.

Journal:	BMJ Open
Manuscript ID	bmjopen-2015-008584.R2
Article Type:	Research
Date Submitted by the Author:	15-Oct-2015
Complete List of Authors:	Boffin, Nicole; Scientific Institute of Public Health, Public Health and Surveillance Moreels, Sarah; Scientific Institute of Public Health, Public Health and Surveillance Van Casteren, Viviane; Scientific Institute of Public Health, Public Health and Surveillance
Primary Subject Heading :	General practice / Family practice
Secondary Subject Heading:	Mental health
Keywords:	Suicide & self-harm < PSYCHIATRY, EPIDEMIOLOGY, PUBLIC HEALTH



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1	Trends from the surveillance of suicidal behaviour by the Belgian Network of Sentinel General
2	Practices over two decades: a retrospective observational study.
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12	Keywords:
13	Suicide, family practice
14	

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1 Abstract 2 Objectives: First, we describe trends in characteristics of suicidal events using new (2011-2) and 3 previous (1993-5, 2000-1 and 2007-8) data reported by the Belgian Network of Sentinel General 4 Practices (SGP); second, we examine patient age-related trends in on-site attendance of sentinel 5 general practitioners (GPs) as first professional caregivers following suicidal behaviour; third, we 6 investigate the accuracy of suicide incidence estimates derived from the SGP data. 7 Design: Retrospective observational study 8 Setting: General practices from the nationwide representative Belgian Network of SGP. 9 Outcome measures: Patient gender and age, suicide methods, whether the patient was new, whether 10 the GP was the first caregiver on-site, and the outcome of the suicidal behaviour (fatal or not) were 11 recorded on standard registration forms. The accuracy of suicide incidence estimates was tested 12 against suicide mortality data. 13 Results: Over the four time periods, 1671 suicidal events were reported: 275 suicides, 1287 suicide attempts and 109 events of suicidal behaviour of unknown outcome. In 2011-2, sentinel GPs' on-site 14 15 attendance following the suicidal behaviour of patients < 65 years had continued to decrease (from 71% in 1993-5 to 58% in 2000-1, 39% in 2007-8 and 25% in 2011-2). In 2011-2, it had also 16 17 decreased steeply in the population ≥ 65 years (from 70% in 1993-5, 76% in 2000-1 and 79% in 2007-18 8 to 35% in 2011-2). No significant differences were found between the SGP-based suicide incidence 19 estimates for 2011-2 and the available suicide mortality rates for people < 65 years and ≥ 65 years. 20 Conclusions: GPs' on-site attendance as first professional caregivers following suicidal behaviour 21 continues to decline, since 2011-2 also in the population \geq 65 years. Unawareness of patients' suicidal 22 behaviour endangers both care for surviving patients and the completeness of SGP surveillance data. 23 Yet, the incidence of suicide for 2011-2 was estimated accurately by the SGP. 24 Strengths and limitations of this study 25 This is the first study of GPs' on-site attendance as first professional caregivers following suicidal 26 behaviour. We found that Belgian GPs are moving back from the first line of care for patients 27 who have engaged in suicidal behaviour.

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2 3 4	1	- We found that characteristics of suicidal events were missing, i.e. not reported by the SGP,
5	2	largely due to their non-applicability or to loss of patients that were never seen before. This data-
7 8	3	derived knowledge about item non-response may be considered an indicator of data quality.
9 10	4	- As suicidal behaviour is a relatively rare event, confidence intervals are wide and some
10 11 12	5	characteristics of suicidal events are described broadly.
13 14	6	- The measure recording whether a patient was new was not included every year, and also varied
15 16	7	over time.
17 18	8	- We did not examine the accuracy of the SGP estimates of the incidence of suicide attempts in the
19 20	9	population.
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1 INTRODUCTION

2 The majority of people who seek care for mental health problems consult a primary care provider and 3 general practitioners (GPs) have become the vanguard in the fight against suicide.¹² On average, 45% 4 of people who died by suicide had contact with a primary care provider in the month before their 5 death.³ Improving depression recognition and suicide risk evaluation among GPs is therefore considered an important component of suicide prevention.⁴ GPs play a key role in Belgian health care, 6 7 even though patients are basically free to consult any care provider. Overall, 95% of the general 8 population in Belgium has a regular GP and around half of all general practice patients have a 9 "general health record", i.e. a GP-held record of all their medical information including reports from other care providers.⁵⁶ Since 1982, the surveillance of suicidal behaviour, i.e. suicide (fatal outcome) 10 11 and suicide attempts (non-fatal outcome) has been carried out by the Belgian Network of Sentinel 12 General Practices (SGP). This surveillance includes all events of suicidal behaviour the sentinel GPs 13 are confronted with, including the suicidal behaviour of new patients seen (for the first time) during out-of-hours care, as well as the suicidal behaviour of their own patients as reported by other care 14 15 providers. The surveillance provides preliminary data that is complementary to national mortality 16 statistics and is one of the only sources to monitor suicide attempts in the Belgian population. 17 In this paper, we describe trends over the last four time periods in light of findings from three 18 previous periods. Firstly, we found that sentinel GPs' on-site attendance as first professional 19 caregivers (called out) following the suicidal behaviour of patients < 65 years had declined from 71% (1993-5) to 58% (2000-1) and 39% (2007-8).⁷ Among people \geq 65 years, these rates have remained at 20 the same average level of 74% since 1993-5. This trend makes sense, as the use of hospital emergency 21 services for standard and less urgent problems by self-referred patients in Belgium⁸ may be less of a 22 problem among older people. Older people relatively have more consultations with their usual GP⁹, 23 more GP contacts and home visits ⁵ and relatively more older people have a general health record.⁶ It 24 25 is likely that sentinel GPs receive late reports or no reports at all from other care providers about the 26 suicidal behaviour of their own patients to whom they were not called out, and as a result, sentinel 27 GPs do not report these events on their weekly forms. GPs' unawareness of suicidal behaviour among

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practice patients impedes appropriate care for surviving patients and also jeopardizes the
completeness of SGP reporting.
Secondly, we found that the incidence of suicide in the Belgian population was underestimated for
2007-8 in comparison to the gold standard, the suicide mortality data based on death certificates for
2007-8 (available as of February 2013). Yet, the SGP-based incidence of suicide among people \geq 65
years for 2007-8 did not differ significantly from the national suicide mortality rate in the same
period. ¹⁰ Previously, the SGP-based suicide incidence estimates had been comparable to the mortality
statistics. ^{11 12} No gold standard exists to which the SGP-based incidence estimates for suicide attempts
can be compared. However, the decrease in the SGP-based incidence estimates for suicide attempts in
2007-8 is not in line with the absence of any significant trend between 1993-5 and 2000-1.
In short, the overall aim of this paper is to study our assumption that the underestimated incidence for
2007-8 is partly explained by sentinel GPs' unawareness, and thus non-registration, of the suicidal
behaviour by patients < 65 years that was not seen by the GPs. Therefore, we first describe trends in
patient gender and age, suicide methods, whether the patient was new, whether the GP was the first
caregiver on-site and the outcome of the suicidal behaviour (fatal or not). The aforementioned
variables are also examined where missingness exceeds 1%. Second, we examine patient age-related
trends in sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour
of patients. Third, we investigate the accuracy of the SGP-based estimates of suicide incidence in the
population over four time periods relative to suicide mortality data.
METHODS
Data source
The Belgian network of SGP was developed in 1979 by the Belgian Institute of Public Health drawing
on experiences of sentinel surveillance in the UK and the Netherlands. ¹³ The network comprises
approximately 150 general practices with one or more sentinel GPs who purposively record routine
clinical care data for the surveillance of specific health problems or care delivery. The gender-age
distributions of sentinel and non-sentinel GPs by region are comparable and the network covers
between 1.4% and 1.8% of the Belgian population throughout all regions. ¹⁴ As Belgian GPs do not
serve a defined practice population, the size of the SGP patient population is estimated by applying
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2007-8 in comparison to the gold standard, the suicide mortality data based on 2007-8 (available as of February 2013). Yet, the SGP-based incidence of suiciyears for 2007-8 did not differ significantly from the national suicide mortality period.¹⁰ Previously, the SGP-based suicide incidence estimates had been com statistics.¹¹¹² No gold standard exists to which the SGP-based incidence estimate can be compared. However, the decrease in the SGP-based incidence estimate 2007-8 is not in line with the absence of any significant trend between 1993-5 In short, the overall aim of this paper is to study our assumption that the under 2007-8 is partly explained by sentinel GPs' unawareness, and thus non-registr behaviour by patients < 65 years that was not seen by the GPs. Therefore, we patient gender and age, suicide methods, whether the patient was new, whethe caregiver on-site and the outcome of the suicidal behaviour (fatal or not). The variables are also examined where missingness exceeds 1%. Second, we exam trends in sentinel GPs' on-site attendance as first professional caregivers follo of patients. Third, we investigate the accuracy of the SGP-based estimates of s population over four time periods relative to suicide mortality data. **METHODS** Data source

The Belgian network of SGP was developed in 1979 by the Belgian Institute of on experiences of sentinel surveillance in the UK and the Netherlands.¹³ The r approximately 150 general practices with one or more sentinel GPs who purpo clinical care data for the surveillance of specific health problems or care delive distributions of sentinel and non-sentinel GPs by region are comparable and th between 1.4% and 1.8% of the Belgian population throughout all regions.¹⁴ As serve a defined practice population, the size of the SGP patient population is e

Data collection The data were reported by the SGP on weekly baseline forms and on follow-up forms either two weeks (1993-2008) or four weeks (2011-2) after the suicidal event. Suicide and suicide attempt were briefly defined 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 (suicide) or non-fatal outcome (suicide attempt)'. Any suicidal behaviour which ultimately resulted in death after two to four weeks was considered suicide. Follow-up forms were used to report the outcome of the suicidal behaviour, i.e. survival or not, and, if necessary, to complete data that were missing on the baseline form. Since 2011, the SGP program staff has been sending lists of recorded suicidal events to the SGP on a regular basis, even when no events were reported, and requesting that they be returned after correction, completion or confirmation of their content. Variables and measurements Five variables, including patients' gender and age, are the common core of the baseline forms that were used in the four periods. Specific suicide methods listed on the form were regrouped into a single dummy variable with a value of one for violent methods, combined or not with nonviolent methods, and a value of zero for nonviolent methods only.¹⁵ Nonviolent methods include self-poisoning by pharmacological agents, gases or other toxic substances (free text space). Violent methods include hanging, drowning, firearm, wrist cutting, jumping from a height, crashing a car or jumping or lying in front of a train. Other suicide methods reported as free text were categorized according to ICD-10, e.g. suffocation and strangulation were categorized as hanging. The measure whether the patient was new has changed over time. In 1993-4, the sentinel GPs were requested to tick a box if the patient was never seen before. We did not use the information from another box to tick if the patient was seen out-of-hours. In 1995, no information was asked concerning this subject. In 2000-1, sentinel GPs were asked to record only whether the patient was seen during out-of-hours care, not whether he or she was a new patient. In 2011-2, a box was to be ticked if the patient "was never seen before/during out-of-hours care". We show descriptive statistics on this measure for 2000-

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1 (see online supplementary table S1), but in the analysis (see next subsection) we only use data from
 2 the first and the last period for the measure labeled as "the patient was new". The type of professional
 3 who was the first to provide care to the patient was recoded into a second dummy variable with a
 4 value of one when the sentinel GP had been the first professional caregiver (called out). Alternatives
 5 to the GP were immediate hospitalization, ambulatory mental health provision or other professional
 6 care (free text space).

7 Analysis

8 The characteristics of suicidal events by period were reported with 95% binomial proportion

9 confidence intervals (CIs). Data from 2000-1 for the measure whether the patient was new were only

10 used in univariate analysis. A score test for trend of odds was used to detect trend in the

11 characteristics of suicidal events over time. Significant time trends (except GPs' on site attendance,

12 see further) were examined by multiple logistic regression adjusted for age and gender.

13 Univariate associations between missingness of data exceeding 1% and characteristics of suicidal

events were examined by a chi square test. Significant variables (p < 0.05) were included in multiple

15 logistic regression models for prediction of missingness. The measure whether the patient was

16 deceased upon arrival of the sentinel GP, was only included in the univariate analysis of missingness

17 but not in any multiple logistic regression model because of collinearity with survival. This subject

18 was reported in the first three periods, not in the fourth period.

19 Determinants of GPs' on-site attendance as first caregivers following suicidal behaviour were

20 examined by multiple logistic regression. Variables in the full model included age, gender, SGP

21 region and suicide methods which were significantly (chi square test p<0.05) associated with GPs' on-

22 site attendance. Interaction effects between independent variables were tested in all models. A

23 generalized estimating equation approach was used to account for the clustering of data within general24 practices.

25 Annual incidence estimates were calculated by dividing the number of events by the sum of the

26 person years covered by the SGP in the period concerned. CIs for incidence rates were calculated

27 using a Poisson distribution. The accuracy of the SGP estimates of suicide incidence for 2000-1 and

28 2011-12 was measured for Flanders alone, as mortality statistics for the entire country were not yet

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1	available for those years [assessed 15 March 2015). In 2013 Flanders was inhabited by 57.5% of the
2	Belgian population and was therefore the largest region in Belgium. ¹⁶ We used a two-sample test of
3	proportion to measure the accuracy of the SGP estimates. Data were analysed using Stata 10 & 13.
4	RESULTS
5	Trends in key characteristics of suicidal events and missing data
6	A total of 1671 suicidal events were reported over the four time periods. Among these were 275
7	suicides, 1287 suicide attempts and 109 events of suicidal behaviour of unknown outcome (fatal or
8	non-fatal) (see online supplementary table S1).
9	Trends in key characteristics of suicidal events
10	Two characteristics showed a significant score test for trend of odds. Firstly, the proportion of violent
11	methods was found to have increased in the total sample and in the sample of suicide attempts.
12	Violent methods were used in 553 of 1657 (33.4%) events, and combined with nonviolent methods in
13	42 of 553 (7.6%) events. Logistic regression adjusted for age and gender revealed that the odds of
14	violent methods were not significantly associated with time period in the sample of suicides, suicide
15	attempts or overall (data not shown). Secondly, sentinel GPs' on-site attendance was found to have
16	decreased in the samples of suicides and suicide attempts (see next subsection). The proportion of
17	patients seen for the first time in 2011-2 was the same as in 1993-5. The increasing proportions of
18	men and people < 65 years over time were both borderline significant in the total sample but no trend
19	was seen in the samples of suicides or suicide attempts. No time trend was observed in survival rates.
20	Missing data exceeding 1%
21	No variables were independently associated with missing age for 25 of 1671 (1.5%) events (see online
22	supplementary table S2). However, age was more often missing when the patient was seen for the first
23	time than when the patient had been seen before ($p < 0.05$).
24	Data on the first professional caregiver on-site were more often missing for suicides than for suicide
25	attempts (p<0.001). The first three surveillance studies showed that data on the first professional
26	caregiver were more often missing for patients who were already deceased upon the arrival of the
27	sentinel GP than for patients who were still alive (p<0.001). Fatal outcome, i.e. suicide, was the only

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1	variable independently associated with missing data for the first professional caregiver (OR 11.2; 95%
2	CI 7.3-17.2).
3	The outcome of the suicidal behaviour was more often missing for new patients than for regular
4	practice patients (p<0.001). Seeing the patient for the first time (versus otherwise) was the only
5	variable independently associated with unknown outcome of suicidal behaviour (OR 11.4; 95% CI
6	4.8-27.1).
7	Sentinel GPs' on-site attendance
8	In 2011-2, sentinel GPs' on-site attendance following the suicidal behaviour of patients < 65 years
9	continued to decrease and it had also dropped in the population ≥ 65 years (figure 1).
10	The overall model of factors associated with sentinel GPs' on-site attendance following suicidal
11	behaviour revealed a significant interaction between time period and age group (p=0.026) (table 1).
12	

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1	Table 1	Results of marginal generalized estimating equation models for association between
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2 sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour and

3 time period by patient age groups

Patie	ents < 65 years (n=1343)	
Period	Adjusted OR(95% CI) ^a	
1993-5	reference	
2000-1	0.57(0.42-0.76)	
2007-8	0.27(0.19-0.40)	
2011-2	0.15(0.10-0.23)	
Pati	ients ≥ 65 years (n=173)	
Period	Adjusted OR(95% CI) ^a	
1993-5	reference	
2000-1	1.95(0.71-5.38)	
2007-8	1.77(0.63-4.96)	
2011-2	0.26(0.12-0.57)	
1993-5 2000-1 2007-8 2011-2	reference 1.95(0.71-5.38) 1.77(0.63-4.96) 0.26(0.12-0.57)	

^a Adjusted for SGP region, patient gender and suicide method (i.e. violent methods by hanging, jumping from a height, crashing a car and jumping or lying in front of a train and self-poisoning by toxic agents other than pharmacological agents and gases)

Modelling the factors on populations split by age group shows a decline in sentinel GPs' on-site attendance following the suicidal behaviour of patients < 65 years in every period compared to the first surveillance period, while in the population ≥ 65 years a significant decline was seen only in the most recent period. When the most recent period (2011-2) was contrasted to the three previous periods, no significant interaction was observed between time period and age group in the overall model. Accuracy of SGP suicide incidence estimates In 2011-2 there were no significant differences between the SGP estimates of suicide incidence

12 among people ≤ 65 years and people ≥ 65 years in Flanders and the corresponding suicide mortality

rate (table 2).

SGP-based estimates of suicide incidence among inhabitants of Belgium or Flanders Table 2

^a and suicide mortality data by population age groups over four periods

	Annual incidence per 100,00	00 inhabitants and 95% CI	
1993-5 ^b	SGP estimates Belgium	Suicide mortality Belgium	p °
< 65 years	19.5(15.3-24.4)	18.9(18.4-19.4)	0.802
\geq 65 years	26.6(16.0-41.5)	34.6(33.0-36.3)	0.249
Total	20.6(16.6-25.1)	21.4(20.9-21.9)	
2000-1 ^b	SGP estimates Flanders	Suicide mortality Flanders	
< 65 years	18.5(12.3-26.7)	18.4(17.5-19.2)	0.979
\geq 65 years	26.5(11.4-52.2)	24.8(22.7-27.1)	0.856
Total	19.8(13.9-27.4)	19.5(18.7-20.3)	
2007-8 ^b	SGP estimates Belgium	Suicide mortality Belgium	
< 65 years	12.1(8.5-16.7)	17.4(16.8-18.0)	0.028
\geq 65 years	24.4(13.7-40.2)	21.4(19.9-22.9)	0.613
Total	14.2(10.6-18.6)	18.1(17.5-18.7)	
2011-2	SGP estimates Flanders	Suicide mortality Flanders	
< 65 years	17.7(12.0-25.2)	16.6(15.8-17.4)	0.714
\geq 65 years	22.7(10.4-43.2)	23.2(21.3-25.2)	0.954
Total	18.6(13.3-25.4)	17.8(17.1-18.5)	

^a Statistics available at <u>http://www.zorg-en-</u>

gezondheid.be/Cijfers/Sterftecijfers/Statistiek-van-de-doodsoorzaken/ and

https://spma.wiv-isp.be/SitePages/Home.aspx

^b Figures for 1993-5, 2000-1 and 2007-8 were published previously.¹⁷

^c Two-sample test of proportion

DISCUSSION

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1	Surveillance of suicidal behaviour by the Belgian Network of SGP over two decades shows that
2	sentinel GPs' on-site attendance as first professional caregivers following suicidal behaviour
3	continued to decline in 2011-2. For the first time, this decline was seen not only in the population <
4	65 years but also in the population \geq 65 years. The SGP estimates of suicide incidence in Flanders for
5	2011-2 were found to be accurate for both age groups. We showed that missing data on age and
6	survival were predominantly attributable to non-regular or new patients. We equally found that data
7	on the first caregiver were missing mainly because of non-applicability, i.e. no care was given to
8	patients who died on the spot.
9	As the SGP network is representative of the national workforce, this study demonstrates that Belgian
10	GPs are moving back from the first line of care for patients who have engaged in suicidal behaviour.
11	Using the military metaphor again, the Belgian "vanguards in the fight against suicide" are falling
12	back from the frontline. This trend may be attributed to the increasing use of hospital emergency
13	services, now also among people \geq 65 years. Yet, as described in the introduction, GPs are the care
14	providers par excellence for older people. This was confirmed by our study of suicide death
15	certificates in Flanders during six months in 2009-10, showing that GPs completed relatively more
16	suicide death certificates for people \geq 65 years compared to non-GPs. ¹⁰ In contrast to older people,
17	less young and middle-aged people have a regular GP. ⁵ Moreover, international studies found that few
18	young men consult a GP in the period before suicide and the primary care contact rate in the month
19	preceding suicide is much lower among people < 55 years. ^{3 18} As a result, non-consultation of people
20	at risk limits both the scope of suicide prevention in general practice and the inference of the SGP
21	results for the general population.
22	In 2011-2 the incidence of suicide was again estimated accurately by the SGP, despite the growing
23	trend of suicides for which the sentinel GPs were not called out across the two age groups. Two
24	interventions may have improved the completeness of SGP reporting of suicidal behaviour. Firstly,
25	we reported the underestimation of the incidence of suicidal behaviour in 2007-8 in the SGP
26	newsletter. Secondly, the SGP program staff began sending lists of recorded events to the SGP on a
27	regular basis in order to enhance the completeness of their reporting. The completeness of hospitals'
28	and other health services' reporting of suicidal behaviour to GPs may also have improved. The

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Flemish Ministry of Health commissioned the development and implementation of an Instrument for Psychosocial Evaluation and Care for Suicide Attempters (IPEO), which included training hospital staff, developing a clinical pathway in hospitals and ensuring continuity of care after discharge by involving GPs and community mental health centres.¹⁹ Since 2013, the SGP surveillance programme has been monitoring the information received by GPs from hospitals about suicide attempters in their practice. As far as we know, this is the first study of GPs' on-site attendance as first professional caregivers following suicidal behaviour. Surveillance by a network of sentinel GPs is a simple, flexible and affordable method for collecting original data on health problems in general practice and their management by GPs. Our finding that characteristics of suicidal events were missing mainly because of their unavailability or non-applicability, not because of non-understanding or non-compliance by the sentinel GPs, may be considered an indicator of data quality.²⁰ This study shows, however, that this type of surveillance is less well suited to monitor the occurrence of rare events, such as suicidal behaviour. As a result, confidence intervals for epidemiological estimates are wide and the characteristics of suicidal events are grouped into broader categories. Another study weakness lies in its rough measures. The heterogeneity of violent methods and the change of the variable describing whether the patient was new or was seen (for the first time) during out-of-hours care exemplify this weakness. Finally, we did not examine the accuracy of the SGP estimates of the incidence of suicide attempts in the population. When using IPEO-based data from accident and emergency departments in Flemish general hospitals, estimates of the incidence of suicide attempts in Flanders for 2011-2 (183 per 100,000 in 2011 and 162 per 100,000 in 2012) were found to be much higher than the SGP estimates for 2011-2 (57 per 100,000).²¹ The discrepancy between these sources should gradually decrease if IPEO is successful in involving GPs in follow-up care for suicide attempters. SGP surveillance data for 2013-14 will provide the first data to examine this assumption. CONCLUSION Over two decades GPs' on-site attendance as first professional caregiver following suicidal behaviour of patients continues to decline, no longer in the population < 65 years alone but since 2011-2 also in

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the population ≥ 65 years. This trend endangers both care for surviving patients and the completeness

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1	of data. Yet, the most recent SGP estimates of suicide incidence in Flanders for 2011-2, were accurate
2	for both population age groups. Since 2013, the SGP has been monitoring the information received by
3	GPs from hospitals about practice patients who receive hospital care for self-inflicted injuries.
4	Acknowledgements
5	All GPs from the Belgian Network of Sentinel General Practices are gratefully acknowledged.
6	Contributors
7	NB, SM and VVC were involved in the study conception, study design, data collection, interpretation
8	of results, and finalisation of the manuscript. NB was involved in data analysis and writing the
9	manuscript.
10	Funding
11	The Belgian Sentinel Network of GPs is supported by the Flemish Agency for Care and Health and
12	the Wallonia-Brussels Federation.
13	Competing interests
14	No, there are no competing interests.
15	Ethics Approval
16	The method of the Belgian SGP in its entirety was approved by the Ethical Committees of the
17	Scientific Society of Flemish GPs and the Catholic University of Louvain.
18	Data sharing statement
19	No additional data are available.
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17		



upplementary table 1	Trend	s in the charact	eristics of suid	cidal events, suici	des and suicio	le attempts repo	rted by the S	SGP over four ti	megerigis		
	20)11-2	20	007-8	20	00-1	19	93-5	n-20 yrigh	All	
					All sui	cidal events)15-(
	Ν	=288	Ν	=328	N	=437	N	=618	רבו N=	1671	F
	1	n/N	%(9	5% CI)	1	n/N	%(9	5% CI)	ding	n/N	
Men	129/288	44.8 (39.0-50.7)	129/321	40.2 (34.8-45.8)	171/436	39.2 (34.6-44.0)	233/616	37.8 (34.0-41.8)	0 n 10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	39.9 (37.5-42.2)	
Age < 65 years	245/285	86.0 (81.4-90.0)	282/326	86.5 (82.3-90.0)	382/429	89.0 (85.7-91.8)	544/606	89.8 (87.1-92.1)	es love 1985 1986 1986 1986 1986 1986 1986 1986 1986	88.3 (86.6-89.8)	
Violent method	112/286	39.2 (33.5-45.1)	109/326	33.4 (28.3-38.8)	151/437	34.6 (30.1-39.2)	181/608	29.8 (26.2-33.6)	er 20215 asmust ted to to	33.4 (31.1-35.7)	
Patient was new ^b	16/288	5.6 (3.2-8.9)	No	o data	71/437	16.3 (12.9-20.0)	29/393	7.4 (5.0-10.4)	5. Dogwn Nogessch	10.4 (8.6-12.3)	
GP was first caregiver	78/288	27.1 (22.0-32.6)	128/292	43.8 (38.1-49.7)	242/399	60.7 (55.7-65.5)	414/581	71.3 (67.4-74.9)	loade0 data60 mi	55.3 (52.7-57.7)	<
Survival	220/279	78.9	268/319	84.0	333/403	82.6	466/561	83.1	fron 19287/17562	82.4	
					S	uicides					
	N=59		N=51		N=70		N=95		N=275		
	n/N	%(95% CI)	n/N	%(95% CI)	n/N	n/N	%(95% CI)	n/N	g %(95%CI) nd s	n/N	
Men	42/59	71.2 (58.0-82.2)	36/50	72.0 (57.5-83.8)	53/70	75.7 (64.0-85.2)	62/95	65.3 (54.8-74.7)	93/274	70.4 (64.7-75.8)	
Age < 65 years	43/59	72.9 (59.7-83.6)	36/51	70.6 (56.2-82.5)	53/69	76.8 (65.1-86.1)	76/94	80.9 (71.4-88.2)	08/273	76.2 (70.7-81.1)	
Violent method	45/59	76.3 (63.4-86.4)	38/51	74.5 (60.4-85.7)	53/70	75.7 (64.0-85.7)	71/92	77.2	16 07/272 09 165.	76.1 (70.6-81.0)	
Patient was new ^b	6/59	10.2	No	o data	16/70	22.9	7/64	10.9	29/1 25 29/1 2 29/1 2	15.0	
GP was first	13/59	(2.0 20.0) 22.0 (12 3.34 7)	13/27	48.2	28/47	59.6 (44.3-73.6)	49/75	(1.5 21.2) 65.3 (53 5-76 0)	103/ 20 8	(10.5 20.5) 49.5 (42 5-56 5)	<
carcgiver		(12.5-54.7)		(20.7-00.0)	Suicida att	emnts		(33.3-70.0)	ent	(+2.5-50.5)	
	N	=220	N	=268	N:	=333	N	=466	GEZ N=	1287	
	n/N	%(95% CI)	n/N	%(95% CD	n/N	%(95% CI)	n/N	%(95% CI)	<u>+</u>	%(95% CI°)	

ge 19 of 22					BMJ	Open			136/b cted b		
Men	86/220	39.1	91/264	34.5	109/333	32.7	153/464	33.0	<u> </u>	34.3	0.13
		(32.6-45.9)		(28.8-40.5)		(27.7-38.0)		(28.7-37.5)	pyri	(31.7-36.9)	
Age < 65 years	196/219	89.5	238/267	89.1	300/329	91.2	424/463	91.6		90.6	0.24
		(84.7-93.2)		(84.8-92.6)		(87.6-94.0)		(88.7-93.9)	5-0 , inc	(88.9-92.2)	
Violent method	63/218	28.9	66/266	24.8	90/333	27.0	97/461	21.0		24.7	<0
violent method	05/210	(23.0-35.4)	00/200	(19.7-30.5)	201222	(22, 3, 32, 1)	211101	(17.4-25.1)	1ing	(22.4-27.2)	
Patient was new b	5/220	(25.0-55.4)	No	(17.7-50.5)	37/333	11.1	15/305	(17.4-25.1)		66	0.1
I attent was new	5/220	(1052)	INC	Juata	577555	(7, 0, 15, 0)	15/505	$(2 \times 2 \times 0)$		(5 1 9 5)	0.1
	(2/220)	(1.0-3.2)	111/056	12.4	102/201	(7.9-13.0)	225/454	(2.8-8.0)		(3.1-8.3)	.0.0
GP was first	62/220	28.2	111/256	43.4	192/321	59.8	325/454	/1.6		55.2	<0.0
caregiver		(22.3-34.6)		(37.2-49.7)		(54.2-65.2)		(67.2-75.7)	er : asn ted	(52.4-57.9)	
2000-1 the SGP reporte	d only wheth	er the patient was	seen during o	out-of-hours care;	; m 2011-2 the	SGP reported wh	nether "the pa	tient was new/see	fout-of form http://bmjopen.bmj.com/ of mng, Al training, and similar te	t-hours care"	
									n June 3, 2025 at chnologies.		
									Department G		

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	Age missing		First caregiver		Survival	
			missing		missing	
	n/N(%)	pª	n/N(%)	pª	n/N(%)	pª
Gender						
Men	18/999(1.8%)	0 1 2 4	43/999(4.3%)	10.001	30/662(4.5%)	10.05
Women	6/662(0.9%)	0.134	66/662(10.0%)	<0.001	76/999(7.6%)	<0.05
Age						
< 65			93/1453(6.4%)	0.129	87/1453(6.0%)	0.202
≥ 65			19/193(9.3%)	0.128	8/193(4.2%)	0.302
Violent methods						
No	17/1104(1.5%)	0.000	40/1104(3.6%)	<0.001	77/1104(7.0%)	0.226
Yes	8/553(1.5%)	0.883	69/553(12.5%)	<0.001	30/553(5.4%)	
GP was first caregiver						
No	6/698(0.9%)	< 0.0F			32/698(4.6%)	-0.05
Yes	19/862(2.2%)	< 0.05			69/862(8.0%)	<0.05
Patient was new						
No	5/636(0.8%)	< 0.05	19/636(3.0%)	0 5 9 5	21/636(3.3%)	<0.001
Yes	2/45(4.4%)	< 0.05	2/45(4.4%)	0.565	12/45(26.7%)	
Suicide						
No	9/1287(0.7%)	0.060	36/1287(2.8%)	<0.001		
Yes	2/275(0.7%)	0.960	67/275(24.4%)	<0.001	_	
Deceased upon arrival GP						
No	3/44(6.8%)	< 0.05	4/44(9.1%)	<0.001		
Yes	1/171(0.6%)	< 0.05	55/171(32.2%)	- <0.001		
Total	25/1671(1.5%)		111/1671(6.6%)	6	109/1671(6.5%)	
^a Value of significance test b	y chi square	1				1

Supplementary table 2 Characteristics of suicidal events with missing data exceeding 1%

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of cross-sectional studies

Section/Topic	ltem #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1,2
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	NA
Data sources/	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe	6
measurement		comparability of assessment methods if there is more than one group	
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	NA
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7-8
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	7
		(b) Describe any methods used to examine subgroups and interactions	7
		(c) Explain how missing data were addressed	NA
		(d) If applicable, describe analytical methods taking account of sampling strategy	NA
		(e) Describe any sensitivity analyses	7
Results			

Page	22	of	22
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Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility,	8
		confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential	8
		confounders	
		(b) Indicate number of participants with missing data for each variable of interest	8-9, TABLE 1
Outcome data	15*	Report numbers of outcome events or summary measures	8-9, TABLE 1
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence	8-11, TABLE 1-4
		interval). Make clear which confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	NA
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	8-11, TABLE 1-4
Discussion			
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and	13
		magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from	12
		similar studies, and other relevant evidence	
Generalisability	21	Discuss the generalisability (external validity) of the study results	12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on	14
		which the present article is based	

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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