

Knowledge about epilepsy among health professionals: a cross-sectional survey in São Paulo, Brazil

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ABSTRACT

Objective: To evaluate the epilepsy knowledge among health professionals in São Paulo, Brazil.

Design: This is a cross-sectional study.

Participants: Professionals with academic degrees in physical education (n=134), nutrition (n=116), medicine (n=100), psychology (n=53), nursing (n=122) and physiotherapy (n=99) who lived in São Paulo City, Brazil.

Primary and secondary outcome

measures: Knowledge of health professionals about epilepsy.

Methods: Professionals with academic degrees in physical education (n=134), nutrition (n=116), medicine (n=100), psychology (n=53), nursing (n=122) and physiotherapy (n=99) who lived in São Paulo City, Brazil, were invited to participate in the study. The subjects (n=624) answered a questionnaire composed of 25 simple closed-ended questions from three areas: personal, educational and knowledge.

Results: Out of all subjects, 88.5% (n=552) had a postgraduate education, while 11.5% (n=72) had only an undergraduate degree. The authors found that physical educators, nutritionists and physiotherapists received lower scores on their epilepsy knowledge than other health professionals.

Conclusions: Health professionals are considered better-educated group inside the society, especially with regards to healthcare issues. Thus, it is important they also have an accurate and correct knowledge about epilepsy. The findings of the present study indicate an imperative improvement in education about epilepsy, as well as an inclusion of formal programmes for epilepsy education especially for non-medical professionals. An improvement in epilepsy education might contribute to an improvement in epilepsy care and management.

INTRODUCTION

Affecting approximately 50 million people worldwide, epilepsy is one of the most common and most serious neurological conditions.¹ Epilepsy is a disorder of the

ARTICLE SUMMARY

Article focus

- Health professionals' knowledge, attitudes and towards regarding epilepsy.

Key messages

- Campaigns promoting a greater knowledge about epilepsy to medical and non-medical professionals should be launched.
- Many health professionals are not very familiar with general epilepsy information or the initial procedures to employ when attending a person that is having a seizure.
- With specific instructions available to professionals, a more tolerant attitude towards epilepsy can be expected in the hope of achieving the objectives of the 'Out of the Shadow' world campaign. Furthermore, this content should be further disseminated by universities to their students.

Strengths and limitations of this study

- This study provides valuable information on the knowledge and attitudes of health professions regarding epilepsy.
- We interviewed a substantial number of health professionals (624), and although they were from only one country, we believe that similar problems, that is, a lack of knowledge about the disease in non-medical professionals, may be prevalent in other countries.

brain characterised by a continuous predisposition to generate epileptic seizures, normally leading to neurobiologic, cognitive, psychological and social consequences. To be diagnosed epileptic, one normally has to have suffered at least one epileptic seizure.² This is characterised by a transient occurrence of signs and/or symptoms due to abnormal, excessive or synchronous neuronal activity in the brain.² The most common risk factors for epilepsy development are cerebrovascular disease, brain tumours, alcohol, traumatic head injuries,

Table 1 Demographic characteristics of the health professionals

	Physical education (n=134) n (%)	Nursing (n=122) n (%)	Physiotherapy (n=99) n (%)	Medicine (n=100) n (%)	Nutrition (n=116) n (%)	Psychology (n=53) n (%)
Gender						
Male	93 (69)	13 (11)	38 (38)	69 (69)	9 (8)	5 (9)
Female	41 (31)	109 (89)	61 (62)	31 (31)	107 (92)	48 (91)
Age (mean ± SD)	26.7±4.6	28.7±6.3	26.2±5.0	32.9±10.3	26.0±5.2	30.0±8.7

malformations of cortical development, genetic inheritance and infections of the central nervous system. In Latin America, the incidence of epilepsy is around 78–190 new cases per 100 000 habitants per year, and the average prevalence is approximately 18 cases per 1000 habitants.³ The high incidence and prevalence of epilepsy have a great influence on socioeconomic factors⁴ and contribute to an increase in direct economic costs, such as medical expenses for drugs and hospitalisations, and indirect costs, such as from the loss of productive capacity, economic production by unemployment, sick license or premature death.

The occurrence of seizures is often associated with an imbalance between inhibitory and excitatory neurotransmission, mainly in favour of the latter.⁵ Seizures in epilepsy are usually divided into two groups: partial and generalised. Partial, or focal, seizures have clinical or electroencephalogram evidence of local onset and may spread to other parts of the brain during a seizure, whereas generalised seizures begin simultaneously in both cerebral hemispheres.⁶

The socio-cultural, economical and medical impact of epilepsy represents an important public health problem.⁷ It has influence on the emotional behaviour, ability to work, family stability and self-esteem of the people with epilepsy. Sometimes the social discrimination against persons with epilepsy may be more devastating than the condition itself.⁸ Fear and stigma are common among the general population and are shared by 40% of health staff.⁹ There is evidence that attitudes towards people with epilepsy are influenced by the degree of knowledge a person has of the disease. Vancini *et al*¹⁰ found a low knowledge of epilepsy in physical educators, mainly on aspects of pathophysiology and treatment procedures. In primary schoolteachers, some incorrect procedures used when attending a person that is having a seizure have been related to misconceptions. These misconceptions were associated with poor educational programmes for epilepsy.⁸ In contrast, higher levels of education are positively correlated with awareness, knowledge and attitude concerning epilepsy.¹¹ Unfortunately, many of the misconceptions about epilepsy that are prevalent in the local population are also present in health professionals⁹ and schoolteachers.¹² Taking into account that epilepsy management must be done by a multidisciplinary team, an evaluation of the knowledge about epilepsy among different health professionals could contribute to an

improvement in epilepsy care/management. Thus, the present study was designed to evaluate the epilepsy knowledge among health professionals.

METHODS

Subjects with academic degrees in physical education (n=134), nutrition (n=116), medicine (n=100), psychology (n=53), nursing (n=122) and physiotherapy (n=99) who lived in São Paulo City, Brazil, were recruited from community using different sources of advertisement (ie, internet, local newspapers, magazine and billboards in universities, clinics, hospitals and gyms) (table 1 summarises the general characteristics of the health professionals). The inclusion criteria to participate in the study were professionals with at least an undergraduate degree in physical education, nutrition, medicine,

Table 2 Questions that composed the epilepsy knowledge test

	Question
Q9	The epilepsy is a contagious disease
Q10	The epilepsy is a brain chronic disease that cannot be cured or controlled
Q11	Seizure occurs when an abnormal electric discharge happen in the brain
Q12	The epilepsy is the most common chronic neurological disorder in the world
Q13	The epilepsy can affect people of all races, genders, socioeconomic conditions and regions
Q14	In developing countries like Brazil, epilepsy affects a smaller number of people
Q15	People with epilepsy have more difficulties of learning
Q16	People with epilepsy will never be allowed to drive
Q17	People with epilepsy cannot drink alcoholic beverages
Q18	People with epilepsy cannot practice any physical activity
Q19	The epilepsy can have a genetic cause
Q20	Brain tumour can cause epilepsy
Q21	Malnutrition is one cause of epilepsy
Q22	The epilepsy is caused by brain trauma
Q23	Brain infections can cause epilepsy
Q24	For epilepsy, the ideal treatment is the use of drugs
Q25	Alternative therapies such as acupuncture can be used in the treatment of epilepsy

psychology, nursing or physiotherapy. The participants were informed of the intent of the study, and informed written consent was obtained from each participant before data collection. The university ethics committee approved all procedures involved in this study.

A questionnaire composed of 25 simple close-ended questions, adapted from Dantas *et al.*,¹³ Young *et al.*,¹⁴ Millogo and Siranyan,⁸ Ab Rahman,¹¹ Mecarelli *et al.*¹⁵ and Vancini *et al.*¹⁰ was applied. Questions were from three domains: personal (6 questions), educational (2 questions) and knowledge about epilepsy (17 questions). Questions in the personal and educational domains were evaluated separately. For the knowledge domain, an epilepsy knowledge test composed of 17 questions was created (see table 2), and a score was provided, varying from 0 (totally ill advised) to 10 (totally well informed). Additionally, the subjects were divided into two groups: those who declared YES to question 7 or 8 and NO to the same questions.

Statistical analysis

The results are presented as proportions (%). The comparisons between professions relative to the personal domain were made using the χ^2 test. A one-way analysis of variance (one-way ANOVA) was used to compare the performance among professions on their epilepsy knowledge test, followed by a Tukey multiple comparisons test. Student t test for independent samples was used to compare the performance on the epilepsy knowledge test among professionals with (answer YES to question 7 and 8) and without (answer NO to question 7 and 8) access to information about epilepsy. The level of significance assumed in all tests was 5%.

RESULTS

Out of all individuals, 88.5% (n=552) had a post-graduate degree and 11.5% (n=72) had only an undergraduate degree. As seen in table 3, the answers given by professionals on the questions related to the

Table 3 Health professionals' answers related to the personal domain of the questionnaire

Questions	Physical education (n=134)* n (%)	Nursing (n=122)†‡ n (%)	Physiotherapy (n=99)§ n (%)	Medicine (n=100) n (%)	Nutrition (n=116)¶**†† n (%)	Psychology (n=53) n (%)
Q1. Were you afraid of living with a person with epilepsy?						
Yes	4 (3)	2 (2)	0 (0)	6 (6)	8 (7)	1 (2)
No	128 (96)	117 (97)	99 (100)	94 (94)	102 (89)	52 (98)
Don't know	2 (1)	1 (1)	0 (0)	0 (0)	4 (4)	0 (0)
Q2. Would you maintain a relationship with someone with epilepsy?						
Yes	93 (69)	101 (84)	76 (77)	85 (85)	69 (61)	40 (76)
No	25 (19)	13 (11)	16 (16)	14 (14)	32 (28)	8 (15)
Don't know	16 (12)	6 (5)	7 (7)	1 (1)	13 (11)	5 (9)
Q3. Have you ever seen a seizure?						
Yes	89 (66)	110 (92)	71 (72)	95 (95)	58 (50)	31 (58)
No	44 (33)	10 (8)	28 (28)	5 (5)	56 (49)	21 (40)
Don't know	1 (1)	0 (0)	0 (0)	0 (0)	1 (1)	1 (2)
Q4. Did you have a friend or relative with epilepsy?						
Yes	43 (32)	46 (38)	29 (29)	38 (38)	37 (32)	16 (30)
No	83 (62)	74 (62)	67 (68)	62 (62)	78 (68)	37 (70)
Don't know	8 (6)	0 (0)	3 (3)	0 (0)	0 (0)	0 (0)
Q5. Have you already provided care to a person having a seizure?						
Yes	42 (31)	87 (72)	44 (44)	83 (83)	15 (13)	9 (17)
No	92 (69)	33 (28)	55 (56)	17 (17)	100 (87)	44 (83)
Don't know	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Q6. Have you provided service for people with epilepsy in your practice?						
Yes	22 (17)	89 (75)	47 (48)	85 (85)	9 (8)	20 (38)
No	103 (79)	29 (25)	50 (52)	15 (15)	104 (92)	33 (62)
Don't know	5 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

*To questions 6, four subjects did not answer.

†To questions 1–5, two subjects did not answer.

‡To question 6, four subjects did not answer.

§To question 6, two subjects did not answer.

¶To questions 1 and 2, two subjects did not answer.

**To questions 3–5, one subject did not answer.

††To question 6, three subjects did not answer.

Table 4 Health professionals' answers related to the educational domain of the questionnaire

Questions	Physical education (n=134)* n (%)	Nursing (n=122)† n (%)	Physiotherapy (n=99)‡ n (%)	Medicine (n=100) n (%)	Nutrition (n=116)* n (%)	Psychology (n=53)§ n (%)	p Value of χ^2 test
Q7. Did you have access to any kind of information about epilepsy?							
Yes	64 (49)	101 (86)	71 (73)	97 (97)	48 (42)	36 (69)	<0.001
No	62 (47)	17 (14)	26 (27)	3 (3)	65 (58)	16 (31)	
Don't know	5 (4)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	a		b		a	b	
Q8. Did you have access to any information of how to deal with epilepsy during your professional graduation?							
Yes	63 (48)	93 (79)	57 (59)	96 (96)	17 (15)	12 (23)	<0.001
No	64 (49)	25 (21)	40 (41)	4 (4)	96 (85)	41 (77)	
Don't know	4 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
	c		c		d	d	

Frequencies followed by similar letters, in the rows, do not differ.

*To questions 7 and 8, three subjects did not answer.

†To questions 7 and 8, four subjects did not answer.

‡To questions 7 and 8, two subjects did not answer.

§To questions 7, one subject did not answer.

personal domain show that a majority (over 95%) reported having no fear of living with a person with epilepsy. While 84% and 85% of nurses and physicians would maintain a relationship with a person with epilepsy, only 61% of nutritionists would do the same. Probably due to the inherent characteristics of their professional activities, over 90% of nurses and physicians have seen an epileptic seizure, in contrast to 70% or less of other professionals. Around 30%–40% of the volunteers reported having a relative or friend with epilepsy. Again, due to professional activities, over 70% of physicians and nurses have rescued people with epilepsy compared with <20% of nutritionists and psychologists.

Table 4 shows the results related to the educational questions. While 75% of nurses and physicians had access to information on how to deal with epilepsy in their graduate studies, these values fall to half among physical educators and physiotherapists and below 25% when referring to answers by nutritionists and psychologists. With respect to having information about epilepsy (question 7), the results of the comparison between all categories of health professionals showed that there were significant differences between the groups ($p<0.001$), with the exception of physical educators, who responded similarly to nutritionists (a to a), and the psychologists, who responded similarly to physiotherapists (b to b). As for having access to information about epilepsy during graduate study (question 8), there were statistically significant differences between all professionals ($p<0.001$), with the exception of physiotherapists, who were similar to physical educators (c to c), and psychologists, who were similar to nutritionists (d to d).

The questions and results of the epilepsy knowledge test are shown in tables 2 and 5, respectively. Physicians obtained the highest scores, which were significantly different from the other professional categories. Nurses, physiotherapists and psychologists had intermediate

performances with statistically similar results. Physical educators and nutritionists had statistically similar results and the worst performances. In regard to the epilepsy knowledge test, figure 1 shows, as expected, that professionals with access to epilepsy information presented statistically higher values than those without access to epilepsy information (6.2 ± 1.4 and 4.8 ± 1.6 , respectively).

DISCUSSION

The Brazilian population is estimated to be around 191 million.¹⁶ Thus, we estimated that 1.91 million people have active epilepsy (prevalence of 1%) and that 9.55 million will have an epileptic seizure at some time in their lives (lifetime prevalence of 5%). So, an investigation of health professionals' knowledge about epilepsy would be extremely important. Furthermore, to our knowledge, this is the first study to compare the knowledge of epilepsy among six different health professions. As mentioned before, some health professionals do not receive sufficient information or any formal instruction on epilepsy during their graduate study and training. This situation would prejudice the care/management of people with epilepsy.

Table 5 Scores on epilepsy knowledge test (0-10) among health professional categories

Professional category	Mean	SD
Medicine (n=100)	7.2	1.1
Nursing (n=122)	6.3 b	1.2
Psychology (n=53)	6.0 b	1.3
Physiotherapy (n=99)	5.9 b	1.4
Nutrition (n=116)	5.2 a	1.5
Physical education (n=134)	4.9 a	1.5

Means followed by similar letters, in the column, did not differ, Tukey test ($p>0.05$).

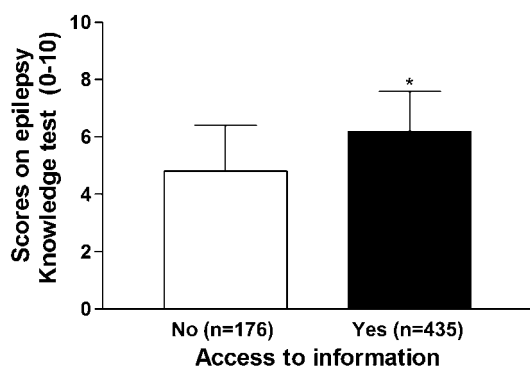


Figure 1 Epilepsy knowledge test results (0–10) separated by professional categories without (n=176) or with (n=435) access to information about epilepsy. Data are the means \pm SD. * $p < 0.05$, Student t test.

We evaluated three fundamental points, such that the questionnaire was divided into the personal domain, educational domain and an epilepsy knowledge test. In relation to the personal domain, the vast majority (95%) of health professionals reported to not have fear of living with a person with epilepsy. However, these values decreased with respect to having a personal relationship with a person with epilepsy, mainly among the nutritionists (61%). Therefore, in general, most of the professionals interviewed presented good attitude towards epilepsy; these data are important since, despite the low level of knowledge presented by physical educators, nutritionists, physiotherapists and psychologists, their attitude towards the disease is similar to the professionals of medicine and nursing.

Due to the workplace and inherent characteristics of professional activities, physicians and nurses have seen seizures and rescued people with epilepsy more than other professional categories. This greater contact with patients, inherent in professional practice, was also reflected by the better performance obtained by these professionals in the epilepsy knowledge test. Concerning the educational domain, the physicians and nurses had also more access to information than the other professions.

There is not a specific system of classification for general knowledge. Because of this, we used a score that most educational institutions use to classify performance: very good (10.0–8.0), good (7.9–6.0), regular (5.9–4.0), bad (3.9–2.0) and very bad (1.9–0.0). Considering this classification, the physical educators (4.9), nutritionists (5.2) and physiotherapists (5.9) had regular performance and the psychologists (6.0), nurses (6.3) and physicians (7.2) had good performance. No health professional category in our study had a very good performance. These findings are in accordance with other studies showing an insufficient knowledge about epilepsy among professionals from different areas.^{8 10 17 18} It is important to note that, in accordance with these results, misconceptions could happen. For instance, Kankirawatana¹⁸ reports that 15% of schoolteachers were in favour of placing children with epilepsy in a special classroom. This

attitude has been linked to a fear of seizures or a lack of information about how to manage them. The insufficient information about epilepsy among health professionals could also decrease the participation of persons with epilepsy in sports and leisure activities.¹⁹

In our study, physical educators, nutritionists and physiotherapists received lower scores on their knowledge of epilepsy than the others health professionals. These results are probably a consequence of two hypotheses: (1) a considerable lack of information and any formal instruction on epilepsy during their graduate study and training and (2) these professionals are not usually included in a workplace of primary healthcare, such as health centres, clinics and hospitals; consequently, they might have less contact with people with epilepsy when compared with physicians and nurses as described in table 3 (questions 5 and 6). We suggest that the universities could provide increased information about this prevalent neurologic disorder. Another action should be taken by these professionals, who should be constantly updated on the field. It is important to point out that a guide may be needed to provide a more multidisciplinary approach.

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Contributors RLV: study concept and design; data acquisition, analysis and interpretation and manuscript preparation. AAB-S and BSS: data analysis, interpretation and manuscript preparation. SGS and MIS-V: data acquisition and critical revision of the manuscript. CRV-C, FRC, CdL: data acquisition, analysis and interpretation. CABL: study concept and design, data analysis, interpretation and critical revision of the manuscript.

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Patient consent Obtained.

Ethics approval Committee of Ethics in Research from UNIFESP (Federal University of São Paulo).

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Data sharing statement No additional data.

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Correction

Vancini RL, Benedito-Silva AA, Sousa BS, *et al.* Knowledge about epilepsy among health professionals: a cross-sectional survey in São Paulo, Brazil. *BMJ Open* 2012;**2**:e000919. The author affiliation of Claudio Andre Barbosa de Lira and name citation in the PubMed database are not correct. Claudio Andre Barbosa de Lira's affiliation should be "Setor de Fisiologia Humana e do Exercício" and his name should be cited as "de Lira CA". We apologise for these errors.

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Introdução ao Estudo e ao Termo de Consentimento

Você está sendo convidado(a) a tomar parte em um estudo de pesquisa clínica. Este termo de consentimento lhe dará informações essenciais sobre este estudo e sobre seus direitos, de modo a facilitar suas decisões. Sua concordância e assinatura indicarão que você leu e entendeu o conteúdo deste termo, que suas dúvidas foram respondidas e que você concorda voluntariamente em participar.

Propósito do estudo

Nosso grupo está desenvolvendo este estudo a fim de avaliar o conhecimento de profissionais de diferentes áreas da saúde sobre a epilepsia.

Possíveis benefícios

O diagnóstico das dificuldades psicossociais e emocionais enfrentados por pessoas com epilepsia permite individualizar as orientações e condutas da equipe de saúde, o que pode levar a uma melhor qualidade de vida dos pacientes.

Espera-se que as conclusões deste estudo beneficiem pacientes com epilepsia.

Estrutura e procedimentos

Caso você concorde em tomar parte, logo após a assinatura do termo de consentimento, você será submetido(a) a um questionário detalhado para avaliação do seu conhecimento sobre a epilepsia.

Confidencialidade

Seu nome não será revelado em nenhum relatório ou publicação oriundo deste estudo. O sigilo de sua identidade é assegurado por normas éticas internacionais.

Participação voluntária

Sua decisão em participar deste estudo é inteiramente voluntária. Sua eventual recusa em participar não implica em qualquer penalidade. Além disso, é permitido a você se retirar do estudo em qualquer tempo, à sua escolha – igualmente sem que isto resulte em qualquer penalidade.

CONSENTIMENTO INFORMADO

Eu,.....

concordo voluntariamente em participar do projeto de pesquisa: Conhecimento multidisciplinar dos profissionais da área da saúde sobre epilepsia.

Os detalhes deste estudo foram satisfatoriamente explicados e todas as minhas dúvidas respondidas.

.....
Assinatura do voluntário

Declaro que expliquei pessoalmente este termo de consentimento informado, respondendo as dúvidas apresentadas.

.....
Assinatura do pesquisador responsável
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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	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 and 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
Objectives	3	State specific objectives, including any prespecified hypotheses	4
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	4 and 5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	4 and 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Not applicable
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5 and 6
Bias	9	Describe any efforts to address potential sources of bias	Not applicable
Study size	10	Explain how the study size was arrived at	
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	Not applicable
		(d) If applicable, describe analytical methods taking account of sampling strategy	Not applicable
		(e) Describe any sensitivity analyses	Not applicable
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Not applicable
		(b) Give reasons for non-participation at each stage	Not applicable
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	5
		(b) Indicate number of participants with missing data for each variable of interest	Not applicable
Outcome data	15*	Report numbers of outcome events or summary measures	6-11
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Not applicable
		(b) Report category boundaries when continuous variables were categorized	Not applicable
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
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 magnitude of any potential bias	
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-13
Generalisability	21	Discuss the generalisability (external validity) of the study results	12-13
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 which the present article is based	14

*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.