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Background:

During the Covid-19 pandemic health crisis, in some countries such as Spain, nursing students have offered to provide health assistance, but the role they have played, their degree of preparedness to face the situation, and what must be improved in their training to be ready for these situations is unknown.

Objective:

Describe the experience and perceptions of students of the Nursing university degree during their participation as health support in the Covid19 health crisis in Spain.

Design: We conducted a cross-sectional observational study.

Data: 503 students enrolled in the 4th course of the Nursing degree in Spain during the months of March and April 2020. An online questionnaire was developed, based on a pilot study and distributed through the Nursing Association, students' unions, and students' associations. Variables were used to describe their participation, degree of preparedness, and training needs to determine how to improve training, as well as non-parametric tests to analyse the relationship between training and degree of preparedness.

Results:

73.2% (368) of students offered to participate in healthcare aid, of which 225 were actively involved. 27.8% developed nursing tasks without supervision, and 47.7% assisted Covid-19 patients as any other nurse. Only 3.4% felt very prepared to work in the field of intensive care, and this degree of perceived preparedness statistically relates to prior training in personal protective equipment and mechanical ventilation ($p<0.005$). The highest scores for training activities that may improve their preparedness were simulations to improve levels of anxiety and stress when managing critical patients, simulation in ventilatory support, and mandatory practices in services where ventilators are used.

Conclusions:

Although three out of four students were willing to provide health assistance, they recognise that they are not specially prepared in the field of intensive care and demand training with simulation.

Relevance to clinical practice: Students have been vital resources for our health system and society when they have been needed. It is now up to us, both teachers and health authorities, to share their efforts by implementing the necessary improvements in training

and safety measures not only because these affects the health and safety of the patient, but because they will be essential parts in future pandemics.

Keywords: Covid-19; Students, Nursing; Simulation training

What does this paper contribute to the wider global clinical community?

- After the declaration of the Alarm status in Spain caused by the Covid-19 Pandemic, and the collapse of the health system, the government of Spain issued a ministerial order for the incorporation of medical and nursing students as health support.
- However, this collaboration has gone beyond what had been planned and has placed students with little experience on the front line of battle. There is currently no publication describing the role of nursing students during this pandemic.
- This manuscript describes the experience of nursing students in Spain in their participation as a healthcare aid during the Covid-19 Pandemic. The relationship between the degree of preparedness received in different areas of care and their prior training, as well as the main suggestions to improve their training in the face of new pandemics or outbreaks, is studied.
- Although three out of four students were willing to provide healthcare assistance, they recognise not feeling specially prepared in the field of intensive care and demand training with simulation in this field.

INTRODUCTION

Following the declaration by the World Health Organization (WHO) of Coronavirus Disease Pandemic (COVID-19) on 11 March 2020, much of the world has faced one of its biggest health challenges (World Health Organization, n.d.).

In Spain, as of 6 June 2020, a total of 27135 deaths have been recorded, 11604 persons admitted to intensive care units, and 124302 hospital admissions (Ministerio de Sanidad España.Centro de Coordinación de alertas y emergencias sanitarias, 2020). The Carlos III Institute of Health (ISCIII) through the National Epidemiological Surveillance Network (RENAVE), publishes the report on the situation of COVID-19 among health staff in Spain weekly. As of May 29, 2020, 40961 cases and 52 deaths were of health workers, accounting for 24.1% of all confirmed cases of Covid-19, considering health workers as a heterogeneous group of hospital, health centres and/or social-health centres workers (Instituto de Salud Carlos III, 2020).

BACKGROUND

In the 22 to 28 March week, the epidemiological peak of hospital admissions was reached at around 4000 daily admissions, which resulted in the healthcare collapse of many Spanish hospitals (Instituto de Salud Carlos III, n.d.). This same phenomenon was repeated in other parts of the world (WHO, 2020; Xiong & Peng, 2020). The different Spanish hospitals progressively adapted and transformed their units of other specialties into COVID-19 units and created from scratch COVID-19 units to attend to the needs of the high number of patients with this disease. However, as the epidemic progressed in Spain, human resources to care for these patients became insufficient (Instituto de Salud Carlos III, 2020). In view of this unprecedented situation, the Government of Spain published a ministerial order in the Official State Gazette (BOE) of March 15, 2020 (Ministerio de Sanidad de España, 2020), providing that students of nursing and medicine degrees could join in to work always as "support or under the supervision of a professional". This also occurred in other countries in a similar way (Jackson et al., 2020; Swift et al., 2020).

However, this student collaboration has gone beyond healthcare support, as the lack of resources has put students with no working experience in the front line. Unions point out that though this is not a widespread practice, there are public and private hospitals with students in emergency services and intensive care units being subject to unnecessary stress and devastating emotional shock (ABC España, 2020; Radio Televion Española, 2020; Redacción Médica, 2020). On the other hand, other authors have observed that healthcare professionals who treat patients with Covid-19 present an increased risk of

mental health problems such as anxiety, depression, insomnia, and stress (Liu et al., 2020).

There is currently no publication describing the role of nursing and medical students in this pandemic. In Spain, a brief study was conducted on the knowledge and attitudes of 102 nursing and medical students on Covid-19 and their potential participation (Cervera-Gasch et al., 2020), where 63.0% said they did not feel prepared.

For this reason, it is considered relevant to describe the experience of Nursing university students during the Covid19 health crisis in Spain, as well as their degree of preparedness and what type of training improvements may be proposed to improve their training in the face of new waves of this pandemic.

METHODS

Design and selection of subjects under study

Cross-sectional observational study on students enrolled in the 4th course of the Nursing Degree in Spain, between April 25 and May 15, 2020. There were no exclusion criteria.

Sources of information

For data collection, an anonymous online self-prepared questionnaire was used containing 34 items (4 open questions, 30 closed questions) about sociodemographic characteristics, training characteristics, their participation in healthcare aid, perceived degree of preparedness to carry out their care work, and training needs to improve their professional competence.

The questionnaire had been previously piloted on a sample of 20 students, from which the main training needs that were declared to improve professional competence were extracted. Based on these data, the items and responses of the final questionnaire were created. This questionnaire was completely anonymous and distributed through the Nursing Association, students' unions and student organisations of Spain. Before starting to fill in the questionnaire, students had to read a fact sheet on the study, its objectives, etc., and give their consent to participate by ticking a box designed for that purpose. An email address was put at their service to answer all the questions raised during the completion of the questionnaire.

The following variables were collected:

Sociodemographic variables included age, sex, university to which they belonged, and province. Training variables included: previous clinical rotations in special units (ICU, Resuscitation, Surgical, Emergencies), university and clinical training in personal protective equipment (PPE) and mechanical ventilation. As variables related to the degree of preparedness, 4 Likert-type questions were included for Hospitalisation, Primary Care, Emergencies, and ICU areas. Variables related to their participation included: participation in healthcare aid, reasons for non-participation, service where they participated, work carried out, contact with patients infected by Covid-19, and duration of their care work.

Statistical analysis used

First, a descriptive analysis was performed using absolute and relative frequencies for categorical variables, mean with standard deviation (SD) for the quantitative variables with normal distribution, and median (Md) with interquartile range (IQR) for ordinal variables. Then, a bivariate analysis was performed using the Kruskall Wallis nonparametric test between prior PPE training and mechanical ventilation and the degree of preparedness to assist Covid-19 patients. All calculations were performed using the spSS 24.0 programme.

Research Ethics

This study was approved by the Ethics Committee of the General Nursing Council.

The study methods were compliant with the STROBE checklist.

RESULTS

Characteristics of the study sample

A total of 503 nursing students from all over Spain participated. The mean age was 22.7 years (SD = 3.18), with 89.4% (433) of women. 49.3% (248) had performed clinical

practices in intensive care units, 58.4% (294) had not received training in PPE at university, and 63.4% (319) had received it in their hospitals of residency. As for training in mechanical ventilation, 17.5% (88) had not received any training at university, and 39.5% (199) had not received it in their hospitals of residency either. The training characteristics are presented in more detail in Table 1. The distribution of students by university and province can be found in supplementary tables 1 and 2.

Degree of preparedness and participation in healthcare during the pandemic

Students were then asked about their degree of preparedness for caring for Covid-19 patients in different fields. The area in which students felt less prepared was critical care, where only 3.4% (17) expressed feeling very prepared, followed by emergency services' nurses, with 4.6% (23), primary care with 8.7% (44), and finally hospitalisation wards with 12.5% (63). Likert-type responses can be found in Table 2.

As for their participation, 73.8% of students who completed the questionnaire offered to participate in healthcare aid, and 44.7% finally participated in it (225). The most common support destination was hospitalisation wards in 54.7% (123) of cases, followed by UCIs with 20.4% (46). The mean duration of the aid was 42.1 days (SD = 13.7), during which 27.8% stated to have performed usual nursing tasks (medication administration, peripheral pathway channelling, etc.) without supervision from another professional, and 47.7% (98) cared for patients with Covid-19 without supervision as any other nurse. Finally, 51.9% (122) stated not to be satisfied with the economic and safety conditions during their work (Table 2).

Relationship between training and degree of preparedness

The next step was to determine whether the students' perceived degree of preparedness was related to the training they had received in terms of PPE and mechanical ventilation for the different areas of care. In this regard, a statistically significant association was observed between training received at the hospital level and the degree of preparedness in all areas. On the other hand, the area where the most correlation between training and preparedness is observed is in the field of intensive care, where the median scores of training carried out with simulations are higher than scores for theoretical training in all cases (Table 3).

Areas of improvement

Finally, students were asked, based on their responses during the pilot study, to indicate the degree of importance of enhancing certain teaching actions to improve students' training in the face of a new possible wave of the pandemic. These stated, with the highest median scores (5 points, very important), that simulations should be improved or enhanced to improve anxiety and stress levels in the management of critical patients; also simulation in ventilatory support; and the realisation of mandatory practices in services where ventilators exist (Table 4).

DISCUSSION

In order to describe the participation of nursing students and their training needs during the Covid-19 pandemic in Spain, an online questionnaire was published that was answered by 503 students of the 4th course of the Nursing degree.

In our sample, almost 2/3 parts of the students offered to participate during the health emergency, and almost half of them participated in direct care. Regarding this last point, there are currently no official volunteering participation figures. However, in a study performed on nursing students where they were involved in participating in a potential influenza pandemic, 67.9% stated they would participate as volunteers, and so, the authors were alerting to the need to create recruitment protocols already in 2010 (Yonge et al., 2010).

Although students' participation in this pandemic was designed to be under the supervision of another professional, a high percentage of them worked as any other nurse and in direct contact with infected patients. It is therefore necessary to recognise and value nursing students' aid in these moments and to be aware of the risks they have faced without having a consolidated degree or training, as also happens with medical students(Representatives of the STARSurg Collaborative, EuroSurg Collaborative, 2020) and residents without having completed their specialty (Legido-Quigley et al., 2020). This experience may also have an impact on their mental health as has happened in other pandemics, among which we may highlight Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS), where health workers suffered from high stress related to the high risk of infection, stigmatisation, lack of staff, and uncertainty (Lee et al., 2018; Maunder et al., 2003; Swift et al., 2020). In fact, during this pandemic, Chinese students who were outside their country have already suffered isolation and stigmatisation for being considered potential carriers(Zhai & Du, 2020). All

this is joined by the low salary these students have received, that is between 900 euros and 1200 euros depending on whether they were Nursing and/or Medical students, with precarious contracts that do not assure them whether they will be renewed or how long they will continue working (El Español, 2020).

On the other hand, students who had participated in training experiences for the management of PPE and mechanical ventilation felt more prepared to assist patients with Covid-19, especially in the area of critical care. In addition, simulation training presented better scores with respect to the degree of preparedness than exclusively theoretical training. These results are in line with several meta-analyses of clinical trials conducted in both nursing students (Cant & Cooper, 2017; La Cerra et al., 2019) and medical students (Beal et al., 2017), where simulation training has been observed to be one of the best teaching methodologies, especially for skills acquisition.

This result goes in line with the suggestions proposed by students to improve training in the management of patients with Covid-19. Among the areas of teaching improvements proposed by students, simulations to improve anxiety and stress in the management of critical patients, simulation in ventilatory support, and the realisation of mandatory practices in services where there are ventilators were highlighted. In this way, students also bring to light the need to better train them in the field of critical care. In Spain, there is no specialist nurse in critical care (Cubel, 2006), and training in this field is carried out by each centre, as well as self-training and the professional experience acquired over the years. During this pandemic, the need to improve this area of care has been highlighted as, although there may be sufficient material resources such as ventilators, their management is highly complex and requires qualified staff that cannot be trained in just days. For this reason, if this apprenticeship were enhanced during the training degree by including mandatory practices and specific simulation workshops, students could be better prepared for new situations alike.

Among the study limitations, a selection bias is possible since this was an online questionnaire and participation might be conditioned by factors others from the study which are difficult to control. Another limitation also attributable to the online participating system is that some students did not participate due to lack of media disposition, although it is considered unlikely nowadays. With all, the distribution by sex and age is representative of the nursing students' population.

Among the strength of the study, it stands out for being the first remarkable one to describe the experience of nursing students during the Covid-19 pandemic which may serve to guide teaching leaders on the urgent need to adopt students' training suggestions.

CONCLUSIONS

Students have been vital resources for our health system and society when they have been needed. It is now up to us, both teachers and health authorities, to share their efforts by implementing the necessary improvements in training and safety measures not only because their health may become affected as well as patient's safety, but also because they will be essential parts in future pandemics.

RELEVANCE TO CLINICAL PRACTICE

Three out of four students were willing to provide healthcare assistance, they recognise not feeling specially prepared in the field of intensive care and demand training with simulation in this field.

Students have been vital resources for our health system and society when they have been needed. It is now up to us, both teachers and health authorities, to share their efforts by implementing the necessary improvements in training and safety measures not only because these affects the health and safety of the patient, but because they will be essential parts in future pandemics.

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Table 1: Characteristics of the study subjects

Variable	n (%) n=503
Age years (Mean ± SD)	22.7 (3.18)
Sex	
Male	70 (13.9)
Female	433 (89.4)
Previous clinical rotations	
Intensive Care Unit	248 (49.3)
Resuscitation Service	151 (30.0)
Surgery Service	281 (55.9)
Emergency Service	293 (58.3)
PPE training at university	
No	294 (58.4)
Yes, but only theoretical	161 (32.0)
Yes, and with simulation	48 (9.5)
PPE training in the hospital of residency	
No	319 (63.4)
Yes, but only theoretical	85 (16.9)
Yes, and with simulation	99 (19.7)
Mechanical ventilation training at university	
No	88 (17.5)
Yes, but only theoretical	260 (51.7)
Yes, and with simulation	155 (30.8)
Mechanical ventilation training in the hospital of residency	
No	199 (39.6)
Yes, but only theoretical	87 (17.3)
Yes, and with simulation	217 (43.1)

Table 2. Degree of preparedness and healthcare aid participation among Nursing students

Variable	n (%)
You feel prepared to work with Covd-19 patients in the field of critical care	n=503
Not at all	114 (22.7)
Little	165 (32.8)
Somehow	139 (27.6)
Quite	68 (13.5)
Very	17 (3.4)
You feel prepared to work with Covd-19 patients in the field of hospitalization	n=503
Not at all	19 (3.8)
Little	41 (8.2)
Somehow	160 (31.8)
Quite	220 (43.7)
Very	63 (12.5)
You feel prepared to work with Covd-19 patients in the field of emergencies	n=503
Not at all	83 (16.5)
Little	126 (25.0)
Somehow	**152 (30.2)**
Quite	119 (23.7)
Very	23 (4.6)
You feel prepared to work with Covd-19 patients in the field of Primary Care	n=503
Not at all	22 (4.4)
Little	54 (10.7)
Somehow	161 (32.0)
Quite	222 (44.1)
Very	44 (8.7)
During the crisis, you have offered for healthcare aid	n=503
Yes	368 (73.2)

No	135 (26.8)
Reason for not participating (multiple answer)	n=135
Fear of getting infected	17 (12.5)
Fear of infecting the family	56 (41.5)
I don't feel prepared	46 (34.1)
Other reasons	69 (51.1)
Service in which healthcare has been offered	n=225
Resuscitation	6 (11.1)
Emergencies	25 (5.0)
Hospitalisation	123 (54.7)
Nursing homes	22 (9.8)
Primary care	3 (1.3)
ICU	46 (20.4)
During healthcare aid, you have carried out nursing tasks (medication administration, peripheral pathway channelling, catheterisation, etc)	n=261
No	24 (4.8)
Yes, but under the supervision of a professional	78 (15.5)
Yes, and without supervision, as any other nurse	140 (27.8)
During healthcare aid, you have assisted Covid-19 patients	n=263
No	82 (16.3)
Yes, but under the supervision of a professional	60 (25.0)
Yes, and without supervision, as any other nurse	98 (47.7)
Satisfaction with the working conditions (both safety and economical) of the healthcare aid contract	n=235
No	122 (51.9)
Yes	113 (48.1)
Duration of healthcare aid; days (mean ± SD)	42.1 (13.7)

Table 3: Relationship between PPE and mechanical ventilation training and perceived degree of preparedness to work with Covid-19 patients

Training	Degree of preparedness to work with Covid-19 patients (Likert-type scale 1-5) in:							
	Primary Care		Hospitalisation ward		Emergencies		Intensive Care	
	Md (IQR)	P value	Md (IQR)	P value	Md (IQR)	p value	Md (IQR)	P value
PPE training at university		**<0.001**		0.164		0.060		**0.018**
No	3 (1)		4 (1)		3 (2)		2 (2)	
Yes, but only theoretical	4 (1)		4 (1)		3 (2)		2 (1)	
Yes, and with simulation	4 (1)		4 (1)		3 (2)		3 (2)	
PPE training in the hospital of residency		**0.002**		**0.002**		**0.022**		**0.003**
No	3 (1)		4 (1)		3 (1)		2 (2)	
Yes, but only theoretical	4 (1)		4 (1)		3 (2)		2 (1)	
Yes, and with simulation	4 (1)		4 (1)		3 (2)		3 (2)	
Mechanical ventilation training at university		0.225		0.127		0.140		<0.001
No	3 (1)		3 (1)		3 (1)		2 (2)	
Yes, but only theoretical	4 (1)		4 (1)		3 (2)		2 (1)	
Yes, and with simulation	4 (1)		4 (1)		3 (2)		3 (2)	
Mechanical ventilation training in the hospital of residence		**0.009**		**0.008**		**0.019**		**<0.001**
No	3 (1)		3 (1)		3 (1)		2 (2)	
Yes, but only theoretical	4 (1)		4 (1)		3 (2)		2 (2)	
Yes, and with simulation	4 (1)		4 (1)		3 (2)		3 (2)	

Table 4: Students' assessment of specific training actions to improve the degree of preparedness to assist Covid_19 patients

Actions	Not at all 1 n (%)	Little 2 n (%)	Somehow 3 n (%)	Quite 4 n (%)	Very 5 n (%)	Score Md (IQR)
Simulations to improve teamwork and communication between professionals	9 (1.8)	15 (3.0)	111 (22.1)	176 (35.0)	192 (38.2)	4 (2)
Simulations to improve communication with patients and families	6 (1.2)	23 (4.6)	109 (21.7)	163 (32.4)	202 (40.2)	4 (2)
Simulations to improve anxiety and stress in managing critical patients	8 (1.6)	18 (3.2)	94 (18.7)	125 (24.9)	260 (51.7)	5 (1)
Mechanical ventilation simulations	7 (1.4)	8 (1.6)	78 (15.5)	96 (19.1)	314 (62.4)	5 (1)
Training in epidemiology	15 (3.0)	50 (9.9)	171 (34.0)	158 (31.4)	109 (21.7)	4 (1)
Training in palliative care	5 (1.0)	16 (3.2)	91 (18.1)	145 (28.8)	246 (48.9)	4 (1)
Relation of compulsory training in services with ventilators	6 (1.2)	8 (1.6)	86 (17.1)	91 (18.1)	312 (62.0)	5 (1)

Supplementary tables 1. Distribution of participants by university

Universities	n	%
Antonio de Nebrija University	2	0.4
Autonomous University of Barcelona	1	0.2
Autonomous University of Madrid	24	4.8
Cardenal Herrera - CEU University	1	0.2
Valencia Catholic University	3	0.6
Complutense University	1	0.2
University of Alcala	19	3.8
University of Alicante	8	1.6
University of Barcelona	9	1.8
University of Cadiz	2	0.4
University of Cantabria	1	0.2
University of Castilla la Mancha	132	26.2
University of Cordoba	3	0.6
University of Extremadura	10	2.0
University of Granada	4	0.8
University of Huelva	2	0.4
University of Jaen	29	5.8
University of La Coruña	15	3.0
University of La Laguna	16	3.2
University of La Rioja	8	1.6
University of the Balearic Islands	13	2.6
University of Lleida	31	6.2
University of Malaga	2	0.4
University of Murcia	20	4.0
University of Navarra	17	3.4
University of Oviedo	6	1.2
University of Salamanca	5	1.0
University of Santiago de Compostela	20	4.0
University of Sevilla	2	0.4
University of Valencia	2	0.4
University of Valladolid	4	0.8
University of Vic - Central University of Catalunya	3	0.6
University of Vigo	1	0.2
University of Zaragoza	13	2.6
Francisco de Vitoria University	18	3.6
International University of Catalunya	1	0.2

Pompeu Fabra University	1	0.2
Pontificia Comillas University	2	0.4
Navarra Public University	3	0.6
Ramon Llull University	1	0.2
Rey Juan Carlos I University	2	0.4
Rovira i Virgili University	7	1.4
San Pablo - CEU University	14	2.8
Not specified university	25	5.0
Total	503	100.0

Supplementary tables 1. Distribution of participants by province of origin

Province	n	%
Alava	1	0.2
Albacete	1	0.2
Alicante	9	1.8
Asturias	7	1.4
Avila	10	2.0
Badajoz	2	0.4
Baleares	13	2.6
Barcelona	17	3.4
Caceres	8	1.6
Cadiz	2	0.4
Cantabria	1	0.2
Ceuta	4	0.8
Ciudad Real	67	13.3
Autonomous Community of Madrid	91	18.1
Cordoba	3	0.6
Cuenca	37	7.4
Huelva	2	0.4
Jaen	29	5.8
La Coruña	35	7.0
La Rioja	8	1.6
Lerida	31	6.2
Malaga	2	0.4
Navarra	21	4.2
Palencia	1	0.2
Region of Murcia	21	4.2
Santa Cruz de Tenerife	16	3.2

Sevilla	2	0.4
Tarragona	8	1.6
Teruel	13	2.6
Toledo	27	5.4
Valencia	8	1.6
Valladolid	3	0.6
Zamora	3	0.6
Total	503	100.0

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found **PAGES 1**
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported **PAGE 3,4**
Objectives	3	State specific objectives, including any prespecified hypotheses **PAGE 4**
Methods		
Study design	4	Present key elements of study design early in the paper **PAGE 4**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection **PAGE 5**
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants **PAGE 5**
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable **PAGE 5**
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 **PAGE 5**
Bias	9	Describe any efforts to address potential sources of bias **PAGE 5**
Study size	10	Explain how the study size was arrived at **PAGE 5**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why **PAGE 5**
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding **PAGE 5**
		(*b*) Describe any methods used to examine subgroups and interactions **PAGE 5**
		(*c*) Explain how missing data were addressed **PAGE 5**
		(*d*) If applicable, describe analytical methods taking account of sampling strategy **PAGE 5**
		(*e*) Describe any sensitivity analyses **PAGE 5**
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 **PAGE 5,6**
		(b) Give reasons for non-participation at each stage **PAGE 5,6**
		(c) Consider use of a flow diagram **PAGE 5,6**
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders **PAGE 5,6**
		(b) Indicate number of participants with missing data for each variable of interest **PAGE 5,6**
Outcome data	15*	Report numbers of outcome events or summary measures **PAGE 5,6**
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 **PAGE 5,6**
		(*b*) Report category boundaries when continuous variables were categorized

		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period **PAGE 5,6**
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses **PAGE 5,6**
Discussion		
Key results	18	Summarise key results with reference to study objectives **PAGE 7,8**
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 **PAGE 8**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence **PAGE 7,8**
Generalisability	21	Discuss the generalisability (external validity) of the study results **PAGE 8**
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 **NO FUNDING**

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. Information on the STROBE Initiative is available at www.strobe-statement.org.