

# Smoking in nursing students

## A prevalence multicenter study

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### Abstract

The role of nursing students as future health promoters of healthy behaviors is influenced by their attitude towards smoking. A cross-sectional study using a self-administered survey was performed to analyze smoking prevalence among undergraduate the nursing students who attend nursing faculties in 2 European countries (Spain and Portugal) during academic period 2015 to 2016. A total of 1469 subjects were surveyed (response rate of 79.8%). An 80% of the students were female with a mean age of 21.9 (4.8) years. The overall prevalence of tobacco use was 18.9%, with an average percentage of 16.2% in Portugal and 18.3% in Spain. Statistical significance was observed in relation to smoke and previous studies (16.4% vs 27.1%;  $P < .001$ ). Only 1.1% of the students reported using electronic cigarette. 15.8% of smokers started smoking while at university with statistical gender and previous studies differences ( $P < .001$ ). Fagerström and Richmond test showed low nicotine dependence ( $2.8 \pm 2$ ) and moderate motivation to stop smoking ( $4.9 \pm 3$ ), respectively. Smoking prevalence among nursing students was slightly higher than the general European population. For that reason, measures to reduce tobacco use have to be focused on students and university policies on tobacco control should be a challenge in the future.

**Abbreviations:** CI = confidence interval, CEIME = thics Research Committee with Medicines, NDS = nicotine dependence score, OR = odds ratio, WHO = World Health Organization.

**Keywords:** multicentre study, nursing students, prevalence, smoking prevention, tobacco smoking, tobacco use cessation

### 1. Introduction

Smoking is considered the leading risk factor for developing noncommunicable diseases.<sup>[1]</sup> It is widely known that smoking is the cause of death in 21 established diseases, including cancer, cardiovascular disease, diabetes, chronic obstructive pulmonary

disease, and pneumonia. However, the number of pathologies attributable to smoking may be underestimated.<sup>[2]</sup>

Smoking is responsible for the death of about 6 million people each year. According to the World Health Organization (WHO), more than 5 million deaths are the result of direct tobacco use and more than 600,000 are the result of exposure to second-hand smoke.<sup>[4]</sup> Worldwide it is estimated that over 1.1 billion people consume tobacco.<sup>[1]</sup>

Smokers are estimated to die 10 years earlier than non-smokers. Stopping smoking before age 40 reduces the risk of premature death by approximately 90% and doing so before age 60 reduces it by 40%.<sup>[4]</sup>

Health professionals are in a strategic position to intervene at different levels of performance by promoting healthy habits and prevention of risky behaviors.<sup>[3]</sup> So, health professionals should be trained and supported to provide a consistent and effective intervention in tobacco users.<sup>[5,6]</sup> But smoking by health professionals constitutes a barrier to the development of intervention to promote healthy habits and the cessation of smoking with patients who does.<sup>[7]</sup>

Tobacco use among nurses has been identified as a prevalent habit over time and more than other health professionals.<sup>[8]</sup> The smoking status of nurses appears to have a negative impact on the delivery of smoking cessation practices. The overall level of nurses engagement with the delivery of smoking cessation intervention requires attention if nurses are to be effective agents of smoking cessation.<sup>[9]</sup>

Nursing students have an influential role in smoking prevention.<sup>[10]</sup> Health professions students are aware of their responsibility as role models for patients regarding tobacco cessation.<sup>[11,12]</sup> Their status of smoker or non-smokers affects

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their activity as health promoters, as smoker students are least likely to advice in smoking cessation.<sup>[12,13]</sup> Beliefs and attitudes of students toward tobacco control are negatively influenced by smoking.<sup>[14]</sup> In most WHO regions, health professional students who had received formal training on smoking cessation approaches are the minority (30%) and 80% of all students recognize that they should receive formal cessation training.<sup>[11]</sup> Nursing students have identified the reasons people smoke, smoking cessation techniques, nicotine replacement therapies, and use of anti-depressants in smoking cessation, as the major areas of inadequate training.<sup>[15]</sup> Educational intervention focused on smoking cessation among students have demonstrated to be successful in changing their attitude toward tobacco consumption.<sup>[16]</sup>

The acquisition of many skills, attitudes, and techniques for helping patients to stop smoking takes place during undergraduate training.<sup>[7,17,18]</sup> However, their own smoking status influences their professional behavioral responsibilities towards health promotion in their patients.<sup>[10,19]</sup>

The aim of the study was to assess smoking habits among undergraduate nursing students from 5 Spanish universities and a Portuguese university. More specifically this paper aims to describe the smoking habits among nursing students according to gender, university, academic course and previous studies as well as their nicotine dependence and motivation to quit.

## 2. Methods

The line of research related to smoking and university students has been worked on for years by the authors. In this study, the subject will focus on nursing students and their relationship with smoking in a cross-sectional study, using a methodology already used in previous studies of the authors although with certain differences.<sup>[10,18,20,21]</sup>

### 2.1. Population studied

Participants in the study were Nursing degree students in the first, second, third, and fourth academic year. In total, 1469 students from Spanish and Portuguese Health Sciences Faculties and Schools of Nursing took part voluntarily in this study. The study was conducted in a 1-year period in 2016.

The criterion for inclusion was for students to be enrolled in the Nursing degree course taught at the Faculty in the University. Eleven respondents were excluded from the analyses because their answers regarding their socio-demographic characteristics and smoking status were incomplete. Consent for participation in the study was tacitly implied by return of the completed questionnaire.

### 2.2. Variables studied

An anonymous questionnaire, issued to the students by the teacher responsible, was utilized to collect the data. Once completed, these questionnaires were collected by the same teacher, who then forwarded them to the principal researchers. The questionnaire was designed in accordance with the recommendations of the European Regional Office of the World Health Organization<sup>[22]</sup> and had been validated in a previous study.<sup>[23]</sup>

The data collected included age, gender, university, course, and previous studies. The considered subjects were “current

smokers”, divided into subcategories like smoked at least 1 cigarette a day, smoked occasionally (under 1 cigarette per day), vaping or smoking, and vaping at the time of the study, “ex-smokers” if they had stopped smoking or vaping and “non-smokers” if they had never smoked or vaped.

For smokers, the questionnaire also collected data including the age when they first smoked, the age when they became regular smokers, the number of years they had been smoking, their main reason for starting, whether they felt that their friends were smokers, and if they had started smoking while at university. Nicotine dependence was assessed using the Fagerström test.<sup>[24]</sup> There is no standard cut-off point for the presence or absence of nicotine dependence. However, 1 suggested scoring system is: 1 or 2 = very low dependence; 3 or 4 = low dependence; 5 = medium dependence; 6 or 7 = high dependence; 8 to 10 = very high dependence.<sup>[25]</sup> The level of motivation to quit smoking was also analyzed using the Richmond test.<sup>[26]</sup> Motivation to quit was categorized from 0 to 5 points = poor motivation, 6 to 8 points = moderate motivation, and over 8 points = high motivation.<sup>[26]</sup> In addition, for participants classified as ex-smokers, information was collected on the age when they had started to smoke, the time since they stopped and the 2 main reasons for giving up the habit.

### 2.3. Statistical analysis

A database was created using Epi Info 7 software for the statistical analysis of the data obtained from the questionnaire. Bi-variate analysis for continuous variables (ages) was performed employing a T-test if they presented a normal distribution, and, if not, a Mann–Whitney *U* test. A chi-squared test or an exact Fisher test (as appropriate) was used for bi-variate analysis of the categorical variables (sex, academic year, previous studies). A *P* value of <.05 was considered statistically significant.

### 2.4. Ethical considerations

All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Research Committee with Medicines (CEIM) of the health areas of Leon and Bierzo (Spain) with registration number 1872.

Anonymity, voluntariness, and confidentiality were procured throughout the process. The students were assured that the no-participation in the study would not affect their academic progress.

## 3. Results

### 3.1. Description of participants

A total of 1469 questionnaires were collected among students enrolled on nursing courses in the 7 Universities, corresponding to a participation rate of 79.8% (1469 out of 1840). The lowest participation was found among the students of Lisbon (4.6%) and the largest among the students of the University of Huelva (25.6%). The socio-demographic characteristics of the participants are given in Table 1. The majority coming from secondary education (66.4%), were female (80%) and had a mean age of 21.9 (4.8) years.

**Table 1**  
**Sociodemographic characteristics according to gender, previous studies, university and age.**

University	Total		Gender				Previous studies				Age	
	n	%	Male		Female		Secondary education		Other		Mean	SD
			n	%	n	%	n	%	n	%		
A Coruña	116	7.9	21	18.1	95	81.9	86	60.3	46	39.7	22.5	4.6
Atlántica (Lisbon)	68	4.6	13	19.1	55	80.9	34	50.7	33	49.3	21.8	4.6
Cantabria	282	19.2	54	19.2	227	80.8	193	69.7	84	30.3	20.6	5.3
Huelva	376	25.6	70	18.7	305	81.3	236	62.9	139	37	21.3	4.6
Leon (Campus of Leon)	336	22.9	65	19.4	270	80.6	264	79.3	69	20.7	24.5	3.6
Leon (Campus of Ponferrada)	162	11	32	19.8	130	80.2	113	69.8	49	30.2	21.7	3.5
Vigo (Campus of Pontevedra)	129	8.8	24	18.6	105	81.4	58	45	71	55	24.6	6.5

**Table 2**  
**Student information on tobacco use according to university of origin.**

	A Coruña		Atlántica (Lisbon)		Cantabria		Huelva		Campus of Leon		Campus of Ponferrada		Campus of Pontevedra	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Non-smoker who has never smoked	88	75.9	41	60.3	196	69.5	262	69.7	222	66.1	104	64.2	96	74.4
Non-smoker who has quit	13	11.2	16	23.5	31	11	42	11.2	31	9.2	21	13	10	7.8
Smoker who does not want to quit	6	5.2	5	7.4	28	9.9	30	8	42	12.5	12	7.4	6	4.7
Smoker who is prepared to make a serious effort to quit	8	6.9	6	8.8	26	9.2	31	8.2	37	11	25	15.4	15	11.6
Vaper	0	0	0	0	1	0.4	3	0.8	1	0.3	0	0	1	0.8
Smoker and vaper	1	0.9	0	0	0	0	6	1.6	3	0.9	0	0	1	0.8
Non-vaper who has quit	0	0	0	0	0	0	2	0.5	0	0	0	0	0	0

**3.2. Smoking history**

The prevalence of smoking cigarettes among the students studied was 18.9% (277 out of 1469), of whom 8.8% (129) did not want to stop smoking and 10.1% (148) would be willing to make a serious attempt to quit. Six students (0.4%) declared using e-cigarette vapor and 11 (0.7%) both (e-cigarette vapor and cigarette smoke). Only 2 students stated e-cigarette vapor users who quit recently. Table 2 presents the distribution of students description of tobacco use according to the university of origin.

The global prevalence of tobacco use among students (considering e-cigarette vapor and cigarette smoke) was 20% (294/1469; IC95%: 18–22.2). The prevalence of smoking according to university, previous studies, and gender are shown

in Table 3. Statistically we found differences by gender in prevalence so that males had higher prevalences than females (24.4% vs 19%;  $P < .05$ ); in the University of Huelva the differences were also higher (27.1% vs 16.7%;  $P < .05$ ). Differences were also found in prevalences depending on previous studies, according to which, those who came from high school smoked less than those from other origins (16.4% vs 27.1%;  $P < .001$ ). Students from the University of Huelva (24.5% vs 15.3%;  $P < .05$ ), Campus of León (43.5% vs 19.7%;  $P < .001$ ) and Campus of Ponferrada (42.9% vs 14.2%;  $P < .001$ ) had lower figures according to previous studies (Table 3).

Forty three students (15.8%) started smoking while at university: 2 (3.4%) in first grade, 13 (17.1%) in second grade,

**Table 3**  
**Student smokers stratified by gender, previous studies and university.**

	Total smokers		Gender				P Value	Previous studies					
	n	%	Male smokers		Female smokers			Secondary Education		Other		P Value	
			n	%	N	%		N	%	n	%		
A Coruña	15	12.9	3	14.3	12	12.6		11	15.7	4	8.7		
Atlántica (Lisbon)	11	16.2	3	23.1	8	14.5		4	11.8	7	21.2		
Cantabria	55	19.5	11	20.4	44	19.4		33	17.1	21	25		
Leon (Campus of Leon)	83	24.7	22	33.8	61	22.6		52	19.7	30	43.5	<.001	
Leon (Campus of Ponferrada)	37	22.8	6	18.8	31	23.8		16	14.2	21	42.9	<.001	
Huelva	70	18.6	19	27.1	51	16.7	<.05	36	15.3	34	24.5	<.05	
Vigo (Campus of Pontevedra)	23	17.8	4	16.7	19	18.1		7	12.1	16	22.5		
Total	294	20	68	24.4	226	19	<.05	159	16.4	133	27.1	<.001	

**Table 4**  
**Scores of Fagerström test and Richmond test according to university of origin.**

	Fagerström test		Richmond test	
	Mean	SD	Mean	SD
A Coruña	2.3	1.9	5.4	2.4
Atlántica (Lisbon)	2.9	1.8	5.7	3.4
Cantabria	2.4	2.1	4.5	3
Leon (Campus of León)	2.7	1.9	4.2	2.9
Leon (Campus of Ponferrada)	3.3	2.1	5.8	2.9
Huelva	2.8	2.1	5.1	2.9
Vigo (Campus of Pontevedra)	2.8	1.9	5.8	3.2
Total	2.8	2	4.9	3

12 (16.7%) in third grade and 16 (23.2%) in fourth grade. That implies an incidence of initiation of 3.6% ( $8 \div (1469-294) \times 100$ ). We found statistical differences in sex and procedence, so that males (27.4% vs 12.1%;  $P < .001$ ) and those who came from high school (22.3% vs 7.9%;  $P < .001$ ) commenced smoking prior to university.

**3.3. Characteristics of smokers**

Students started smoking their first cigarette at an average age of 15.3 (2), declared they had smoked regularly since 17.4 (2.2) years old and the average time they had been smoking was  $5.8 \pm 4.6$  years for all of the assessments conducted. 65.9% of smokers considered a group of friends as smokers and the main reasons to smoke were because all my friends are smokers (34.9%) and because I liked it (21.1%).

In the surveys carried out, 79.4% (216) of students who smoked reported that they consumed between 1 and 10 cigarettes per day, 19.9% (54) between 11 and 20, and 0.7% (2) more than 20 cigarettes. The Fagerström test showed low nicotine dependence ( $2.8 \pm 2$ ) and the Richmond test revealed moderate motivation to stop smoking ( $4.9 \pm 3$ ). Table 4 presents the results of the Fagerström and Richmond test according to the university attended.

**3.4. Characteristics of former smokers**

Former smokers stated smoked their first cigarette at the mean age of 15.7 (2.6) years old and they had stopped smoking for a mean of 2.6 (3.7) years. The main reasons for quitting put forward by former smokers were “tobacco damages my health”

(55.3%), “I do not want tobacco to dominate me” (12.2%) and “cost” (9.4%).

**3.5. Secondhand smoke**

41.5% (607/1462) of the students surveyed stated that they cohabited with smokers and the percentage was statistically higher among those who smoked (52.2% vs 38.8%,  $P < .001$ ). Ninety seven percent of students were very concerned about the health risks and consequences of tobacco use (1421/1465).

We have found scores statistically significant ( $P < .001$ ) in the students opinion about consequences of secondhand smoke in non-smokers. In smokers, we observed 23.5% males and 15.9% of females stated less agreement about it (OR: 4.3; CI95%:1.9–9.3).

Stratified by gender, males stated less agreement more frequently (OR: 2.4; CI95%:1.5–3.7) about the consequences of secondhand smoke in non-smokers. And stratified by tobacco use we have found that male students (OR: 6.7; CI95%:4.3–10.5) ( $P < .001$ ) showed little or no agreement about it (Table 5).

**4. Discussion**

A total of 1469 students were surveyed in 7 Universities, corresponding to a participation rate of 79.8%. In this study, the response rate was similar to those in prevalence studies conducted in European faculties of health studies in recent years.<sup>[21,27]</sup>

Findings showed that tobacco use was predominant in relation to the consumption of electronic cigarettes in all sites surveyed. E-cigarette consumption was nominal, not finding any participant who consumed e-cigarettes in 2 of the 7 universities surveyed (Portugal and Campus of Ponferrada), in the same way as a study carried out in Italy in 2016 where e-cigarette use among nursing students was not significant.<sup>[28]</sup> However, these results are contradictory with previous studies. A recent European survey about the e-cigarette use in the European Union that included 28 countries, found that 1.8% of the adult population were current regular e-cigarette users.<sup>[29]</sup> The prevalence of e-cigarette use has increased from 7.2% in 2012 to 15% in 2017.<sup>[30]</sup> Younger population living in urban areas with high educational level has found to be associated to e-cigarette use.<sup>[31]</sup> According to this, it is expected that the nursing students were users of electronic cigarettes.

In 5 of the 7 sites, the tobacco use rate was over 20% of the total participants. In 2 of the 7 universities it was found that the prevalence was lower, over 15% (Portugal and A Coruña). The

**Table 5**  
**Distribution of the answer “less agreement” for the students ‘opinion about the consequences of secondhand smoke, by gender and smoking.**

Tobacco use	Gender	n		Percentage (%)		Value	OR	Confidence interval 95%	P Value
		n	N	Value	Confidence interval (95%)				
Smokers	Female	35	220	15.9	11.3–21.4	1			
	Male	16	68	23.5	14.1–35.4				
Nonsmokers	Total	51	288			4.3	1.9–9.3		<.001
	Female	22	943	2.3	1.5–3.6	1			
	Male	14	208	6.7	3.7-11	7.9	4.5–13.8		<.001
	Total	36	1151						

(N) number of responses, (n) number of responses “less agreement”, (OR) Odds Ratio.

Stratified by gender: OR = 2.4 (CI95%: 1.5–3.7) ( $P < .001$ ).

Stratified by tobacco use: OR = 6.7 (CI95%: 4.3–10.5) ( $P < .001$ ).



overall percentage of smokers found was 20%, a rate slightly higher than that (18.5%) recorded for the European general population aged between 15 and 24.<sup>[32]</sup> Studies in the last years found a wide variety in the prevalence rate<sup>[33]</sup> from 41.9% in Germany,<sup>[34]</sup> 33.1% in Greece<sup>[35]</sup> and 12.3% in Turkey.<sup>[36]</sup> In different geographical areas of Spain, prevalence rates were 20.4%, 21% and 19.6%, corresponding to 2006, 2014 and 2015, respectively.<sup>[21,37,38]</sup> Compared with these data, it can be said that nursing students in our study smoked in line with the geographical trend of smoking prevalence.

When comparing the results with the use of other psychoactive substances among nursing students, we found that the tobacco use of the studied sample is lower than the consumption of alcohol in similar studies, which was consumed by 95.3% of the students of which 33.6% consumed it weekly<sup>[39]</sup> and has been described as harmful in 30% of students.<sup>[40]</sup> Tobacco use was more frequent than cannabis use 17.8% identified in a similar population<sup>[41]</sup> and sedative use 13.1%<sup>[39]</sup> and cocaine use 2.2%.<sup>[41]</sup>

The evidence consulted has shown that campaigns to combat smoking have not been effective within this particular group, who continue to smoke at a rate similar to that existing more than 10 years ago.<sup>[37]</sup> Cessation interventions by healthcare professionals were shown to be one of the most important factors in successfully encouraging patients to stop smoking.<sup>[3]</sup> But smoking habits affect how they work with tobacco-dependent patients,<sup>[9,42]</sup> according to La Torre<sup>[7]</sup> and Warren.<sup>[43]</sup> All surveys consulted reported a prevalence of smokers among nursing students higher than that of the general population, showing a negative adherence to a healthy lifestyle as future health agents with the mission of supporting patients in improving their behavior against smoking. Smoking status among healthcare providers has a negative impact on the clinical practice.<sup>[8]</sup>

Of the participants classified as smokers, 15.8% reported that they started the habit during university nursing studies, with an incremental percentage increase per academic year. It is obvious that there should be a decrease in the incidence of onset in tobacco use according to the knowledge acquired in promoting healthy habits during their academic training, so the findings are controversial. This rate could be considered as a direct negative indicator of curricula of schools and faculties of Health Science or a negative indicator of acquired training and attitudes developed as a future promoter of healthy behaviors. As shown by previous studies,<sup>[20,21,44]</sup> faculties of Health Science should incorporate additional education on healthy habits into their curricula in order to discourage non-smokers from starting to smoke.

By gender, the global smoking rate among male nursing students (24.4%) showed an increase of between 5 to 6% compared to female nursing students (19%). According to the information provided by the European Health Survey, the results were proportional and similar to those obtained from the general population of the same age group, males 21.4% and females 15.5%.<sup>[32]</sup> The statistical gender differences in prevalence were also shown in a study carried out in 2016<sup>[41]</sup> where consumption in males was higher than in females. This is similar to a study carried off in a Spanish university,<sup>[38]</sup> gender determines the development of risky behaviors among nursing students.

The age at which respondents first smoked was 15.3 years, similar to that recorded in previous European nursing studies.<sup>[21,34,41,45]</sup> Nursing students started smoking prior to access to university studies so, according to previous studies,<sup>[21,34,46,47]</sup> it is

necessary to implement healthy measures while they attended secondary education.

In general, the literature shows that the smoking status of family members and friends affects the smoking behavior of nursing students.<sup>[45]</sup> Results of our study shown that more than half of smoker students considered a group of friends as smokers and a considerable percentage of students stated that they started smoking because friends were smokers.

The nicotine dependence score (NDS) obtained in Fagerström test ( $2.8 \pm 2$ ) of the students who smoked has shown a minimal dependent on nicotine. This dependence rate is the lowest of the mean scores reported in the literature available for nursing students. In 2003, Patkar<sup>[48]</sup> reported a NDS of  $4.7 \pm 1$  and rates of 3.6–2.2 and 4.7–2.8 were found in 2 studies in 2015.<sup>[21,36]</sup> Low NDS registered and the moderate motivation for smoking cessation according to the Richmond test suggested that nursing students could be a susceptible group to the application of tobacco control measures, especially smoking cessation measures.<sup>[49]</sup>

Among former smokers, economic motives are presented third in importance as a reason for smoking cessation. Previous studies<sup>[18,36]</sup> have shown this rationale to be more important than the results obtained in our study, so increasing the price of tobacco-related products could be an effective measure in reducing the prevalence of consumption.

Almost all of the students were in agreement with the direct consequences of smoking, in the same way as in previous studies.<sup>[36]</sup> About half of the students surveyed cohabited with smokers, being the statistically highest percentage among those students smoking. Thus, smoking was influenced mainly by people nearby who smoked.<sup>[50]</sup>

Male students opinion of the consequences of secondhand smoke stated less statistically significant agreement than females about it, and stratified by tobacco use also found that male nursing students were less in agreement about these consequences, similar to previous results in 2007.<sup>[10]</sup> According to Barrientos-Trigo, gender determines the development of risky behavior among nursing students.<sup>[38]</sup>

#### 4.1. Study limitations

The main limitations are related to the study design. Use of closed questions meant that participants could answer only by choosing from the set of present options. Classification of students in relation to consumption could be subjective as a result of occasional recall bias.

As far as external validity is concerned, as the survey was performed in selected faculties and schools of Nursing in each country, the generalization of findings needs to be done with caution. Nevertheless, the questionnaire was designed in accordance with the recommendations of the European Regional Office of the World Health Organization.<sup>[22]</sup> Finally, a larger sample size of Portuguese nursing students could help to better define the profile of this group.

Smoking prevalence among nursing students was slightly higher than the general European population, and, by gender, male students smoked proportionally more than females. E-cigarette consumption was nominal among nursing students.

Nursing students respond to the known pattern of the society in which they are integrated in relation to tobacco use, although they differ in the use of electronic cigarettes. The low nicotine dependence and the moderate motivation to quit resulted could

be considered as facilitating factors to implement measures of consumption control in this population.

Measures to reduce tobacco use should be focused on students prior to commencing university due to the fact the nursing students studied started smoking their first cigarette at an average of 15 years old.

Reviewing the curriculum in Public Health and developing university policies focused on tobacco control should be a challenge in the future in order to reduce the number of nursing students who start consumption during university training. Also promoting healthy behaviors among nursing students could be considered a key factor in the fight against smoking because the social environment of smokers is statistically related to smoking behavior.

## Author contributions

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