

# Projecting the future size of the Lebanese pharmacy workforce: forecasts until the year 2050

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## Keywords

Lebanon; numerus clausus; pharmacists; projection

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## Abstract

**Background** Despite the rigorous regulations governing the pharmacy profession in Lebanon, the increasing numbers of pharmacy graduates seem to be the greatest threat of demise. No forecast is available to assess the long-term projections of pharmacists supply.

**Objective** The objective of this manuscript is to project the future size of the Lebanese pharmacy workforce till 2050 and discuss their potential consequences on the labour market.

**Methods** This study was carried out in collaboration with the Lebanese Order of Pharmacists (OPL), where official numbers were retrieved from the registered pharmacists' database from 2006 to 2017. The data were analyzed as time series using the Auto-Regressive Integrated Moving Average (ARIMA) method. Projected numbers were plotted using Microsoft Excel office.

**Results** The ratio of pharmacists to 10 000 inhabitants up till the end of 2017 was estimated at 17.52, compared with a worldwide mean of 5.09, with a continuous increase seen with the coming years, possibly reaching an estimated 41.17 pharmacists per 10 000 inhabitants by the year 2050. The total number of pharmacies increased from 1546 in 2006 up to 3174 at the end of 2017 nationwide, with a major increase seen in Bekaa (206.35%) and South Lebanon (171.08%) governorates, respectively.

**Conclusion** Our study shows that the dramatic increase in pharmacy graduates will worsen with time. To curb it, it is important to vote and apply new laws, and initiate a collaborative work between academia, professional associations, and employers from all sectors to find innovative solutions.

## Introduction

Workforce planning is an essential task for sustaining a healthy profession; this is of utmost importance since many people have predicted the demise of the pharmacy profession. The reasons stated for this demise have varied over the years and include government interference, the expansion of chain and mail-order pharmacies, managed care, loss of the compounding function, insurance systems reimbursement, national health insurance and pharmacy technicians.<sup>[1]</sup> In parallel to these projections, pharmacy

found itself a new role all over the world: pharmacy is no longer a product-oriented profession but a patient-oriented one, considering patient's health as a priority over other aspects,<sup>[2]</sup> to reach the optimization of patient care.<sup>[3]</sup> Additional roles of pharmacists have also emerged, such as in managed care, consultant pharmacy, academic pharmacy and the pharmaceutical industry.<sup>[1]</sup>

To fulfil these roles, the pharmacist must have all the necessary competencies before starting work, training

requirements before and after graduation having expanded, particularly in the clinical field<sup>[2]</sup>. On another hand, national competency needs are based on these new roles and generally defined by concerned authorities to maintain the quality of pharmacists' services to the patient. Studies are carefully conducted all over the world about the optimal numbers of pharmacists and community pharmacies related to population sizes, with respect to every competency field. For example, in the United Kingdom, workforce modelling has predicted a significant future oversupply of pharmacists, and action within the profession has attempted to address the situation through educational planning and regulation.<sup>[4]</sup>

Although the World Health Organization considers that pharmacists, in particular, are lacking in the workforce in many countries,<sup>[5]</sup> the situation differs between countries. In case of oversupply of health professionals, there is a risk of precarious work and or unemployment and the profession is generally expected to decline since the supply would exceed the demand. In the United States, the market for full-time pharmacists' labour is considered competitive, and employers pay wage premiums to those with advanced education and longer pharmacy practice experience. The evidence supported the hypothesis that demand was exceeding supply.<sup>[6]</sup> For the latter reason, many countries implement the numerus clausus law; Numerus clausus ('closed number' in Latin) is one of many methods used to limit the number of students who may study at a university. In many cases, the goal of the numerus clausus is simply to limit the number of students to the maximum feasible in some particularly sought-after areas of studies.<sup>[7–9]</sup> The goal of this law is simply to limit the number of students to the maximum feasible in the pharmacy area.<sup>[9–11]</sup>

Moreover, contrary to permanent employment, precarious work is often poorly paid, insecure, unprotected, and in many cases cannot support a household. The growth of precarious work among professionals, including pharmacists, has been documented in many countries such as the United Kingdom.<sup>[12]</sup> Precarious work was shown to be a risk factor of poor mental health among young professionals.<sup>[13]</sup>

Lebanon is a developing country with a population of around 5 million individuals, distributed all over the regions (10% in Beirut, 37% in Mount Lebanon, 20% in the North, 13% in Bekaa and 20% in the South).<sup>[14]</sup> In Lebanon, there are five universities graduating pharmacists, four of which graduating an average of 70–80 pharmacists per year (one public and three private institutions), and one graduating 120–150 (private institution). In Lebanon, all pharmacists must be registered in the Order of Pharmacists of Lebanon (OPL) in order to practice. By the end of 2017, the pharmacy workforce in

Lebanon (active pharmacists) was distributed as follows: 61.1% of females versus 38.9% of males; 3.5% of active pharmacists have more than 60 years, 31.6% are between 38 and 59 years, 34.9% between 27 and 37, and 30% below 27 years. Moreover, 49.7% are community pharmacy owners, 13.3% work in a community pharmacy, 13.3% work as medical representatives, 11.8% in public or private administrations, while 2.8% work in academia.

Any registered pharmacist can order and operate a community pharmacy if he/she does not have a full-time job in another institution or pharmaceutical company. The distance between two pharmacies must be at least 300 m or more. This law is set by the OPL and the Ministry of Public Health; inspectors from both institutions control the distance and location to see if the new pharmacy meets all the requirements. Each pharmacist has the right to own one pharmacy only, with the pharmacy chains being forbidden by law. Despite the rigorous laws and regulations governing the pharmacy profession (medications only sold in pharmacies even non-prescription ones, no advertisement allowed to both prescription and non-prescription medications), thus theoretically preserving it from declining, the increasing numbers of pharmacy graduates seem to be the greatest threat of demise. While the number of pharmacists is increasing with respect to the rise in the population size,<sup>[15]</sup> community pharmacists' financial situation and related occupational satisfaction are degrading over time.<sup>[16]</sup> This might be anticipated due to the increased competition and decreased quality of pharmaceutical care. In fact, this dissatisfaction is reflecting on public perception and attitude towards community pharmacists in Lebanon, which was found to be poor in a recent study.<sup>[17]</sup>

In Lebanon, five universities teach pharmacy with growing numbers of graduates (particularly for the private ones), and there are other private universities seeking the permission of the Ministry of Education and Higher Education (MEHE) to start teaching pharmacy programs. The MEHE does regulate the opening of new schools of pharmacy according to current legislations, but the latter does not take into account the market labour needs in terms of quantity or specialty of graduates. Added to these are graduates from outside the country who have to pass oral and written examinations (termed 'colloquium'), allowing them to register and practice in Lebanon. Moreover, no forecast is available to assess the long-term projections of this seemingly ongoing increase in pharmacists supply in Lebanon. The objective of this manuscript is to show the projections of pharmacists' increase till 2050 and discuss their potential consequences on the labour market.

## Methods

### General study design and data collection

A study was carried out in collaboration with the OPL, where official numbers were retrieved from the registered pharmacists' database. We obtained the data from 2006 to 2017 concerning the following items:

Number of pharmacists registered in the OPL, whether graduated from local universities or from abroad.

Number of pharmacists who died, retired or cancelled their registration.

Number of pharmacies in each governorate (Beirut, Mount Lebanon, North, South and Bekaa)

The population size per year, used as a denominator for our calculations, was obtained from the Central Statistical Administration;<sup>[14]</sup> the estimated increase in the population size was taken into account when applying the projections.

The total number of active pharmacists per year was calculated by adding the number of pharmacists graduating from Lebanese universities and those coming from abroad for a certain year who registered in the OPL, minus the number of pharmacists who retired or died during that same year. The ratio of pharmacist per 10 000 inhabitants was calculated by dividing the previously obtained number by the total population for that specific year.

### Statistical analysis

The statistical package SPSS version 23.0 (IBM Corp, Armonk, NY, USA) was used for all statistical analysis. Descriptive statistics were calculated for all study variables. The data were analyzed as time series using the Auto-Regressive Integrated Moving Average (ARIMA)

method. Projected numbers were plotted using Microsoft Excel office.

## Results

### Pharmacists in Lebanon from 2006 to 2017

The descriptive analysis of the registered pharmacists from 2006 until 2017 is summarized in Table 1. The results showed that the total number of pharmacists increased from 3980 in 2006 up to 8574 at the end of 2017. The highest number of pharmacists registering with OPL per year was seen in 2014 and 2015, with 523 and 518 new registered pharmacists respectively.

### Community pharmacies in Lebanon from 2006 to 2017

The descriptive analysis of the pharmacies from 2006 until 2017 is summarized in Table 2. The results showed that the total number of pharmacies increased from 1546 in 2006 up to 3174 at the end of 2017, with a major increase seen in Bekaa (206.35%) and South Lebanon (171.08%) governorates respectively.

### Forecast of pharmacists per 10 000 inhabitants

The ARIMA model used was (0,0,0). The mean *R*-squared was 0.988, RMSE 0.294 and MAPE 1.416. The ratio of pharmacists to 10 000 in Lebanon up till the end of 2017 was estimated at 17.52, compared with a worldwide mean of 5.09. Figure 1 shows the forecast of the ratio of pharmacists to 10 000 inhabitants, with a continuous increase seen with the coming years, possibly reaching an

**Table 1** Description of the pharmacists in Lebanon from 2006 to 2017

	Newly Registered pharmacists	Dead Pharmacists	Retired pharmacists	Pharmacists graduating abroad	Total number of pharmacists	Population in Lebanon
2006	228	4	14	68	3980	3 750 000
2007	226	6	7	71	4206	3 825 000
2008	343	4	28	93	4549	3 900 000
2009	454	6	19	108	5003	3 975 000
2010	451	4	16	101	5454	4 050 000
2011	429	5	14	109	5883	4 125 000
2012	363	5	10	76	6246	4 200 000
2013	360	3	6	81	6606	4 275 000
2014	523	1	9	59	7129	4 350 000
2015	518	6	16	89	7588	4 500 000
2016	333	7	18	25	8352	4 695 750
2017	223	7	18	25	8574	4 891 500

**Table 2** Description of the pharmacies in Lebanon from 2006 to 2017

	Total number of pharmacies	Pharmacies in Beirut	Pharmacies in Mount Lebanon	Pharmacies in North Lebanon	Pharmacies in South Lebanon	Pharmacies in Bekaa
2006	1546	173	712	228	166	173
2007	1641	178	753	246	173	190
2008	1754	188	798	260	185	217
2009	1893	194	845	288	196	254
2010	2074	205	925	306	224	285
2011	2257	208	1009	336	245	320
2012	2431	211	1078	357	270	355
2013	2571	216	1126	384	288	379
2014	2724	221	1201	401	304	410
2015	2897	230	1258	424	332	447
2016	3035	234	1309	442	474	488
2017	3174	238	1360	460	616	530

estimated 41.17 pharmacists per 10 000 inhabitants by the year 2050.

### Forecast of the number of pharmacies per governorate

Figure 2 shows the forecast of the number of pharmacies per governorate, with a continuous increase in the number of pharmacies seen with the coming years in all governorates except in Beirut, where this number seems stable.

### Forecast of the total number of pharmacists registered at the OPL

The ARIMA model used was (0,0,0). The mean *R*-squared was 0.993, RMSE 138.26 and MAPE 1.657. Figure 3 shows the forecast of the total number of pharmacists registered in OPL, with a continuous increase in the number of pharmacists seen with the coming years, possibly reaching 22 765 registered pharmacists by the year 2050.

### Forecast of the total number of registered pharmacies if a *numerus clausus* is applied versus currently

Figure 4 shows the forecast of the total number of pharmacists registered in OPL if the situation continues (no action is taken) as is versus a scenario of a *numerus clausus* law application. The ratio of pharmacists will continue to rise up to approximately 41.17 in 2050 if the situation continues with the same trend, whereas it will remain at 17.52 in case the *numerus clausus* law is applied.

## Discussion

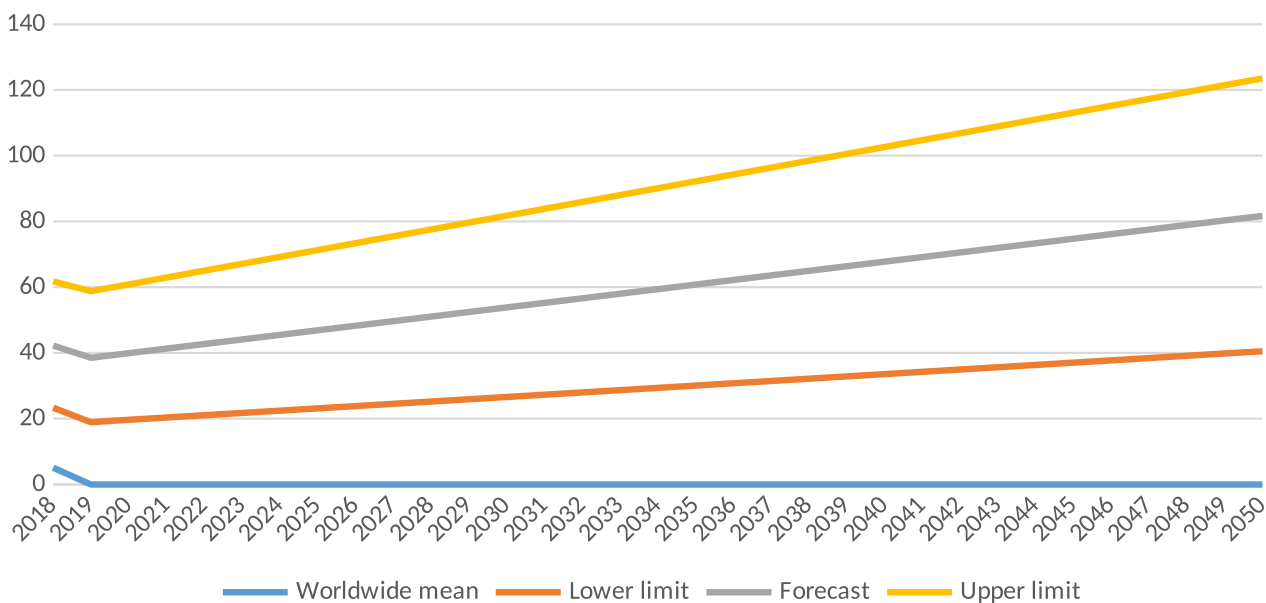
In this study, we found that the ratio of pharmacists per 10 000 in Lebanon up till the end of 2017 was equal to 17.52, possibly reaching 41.17 pharmacists per 10 000

inhabitants by the year 2050, which is considered very high. In a study conducted on 80 countries, the sample mean was 6 pharmacists per 10 000 inhabitants. There was considerable variation between the surveyed countries/territories ranging from 0.02 (Somalia) to 25.07 (Malta) pharmacists per 10 000 inhabitants.<sup>[18]</sup>

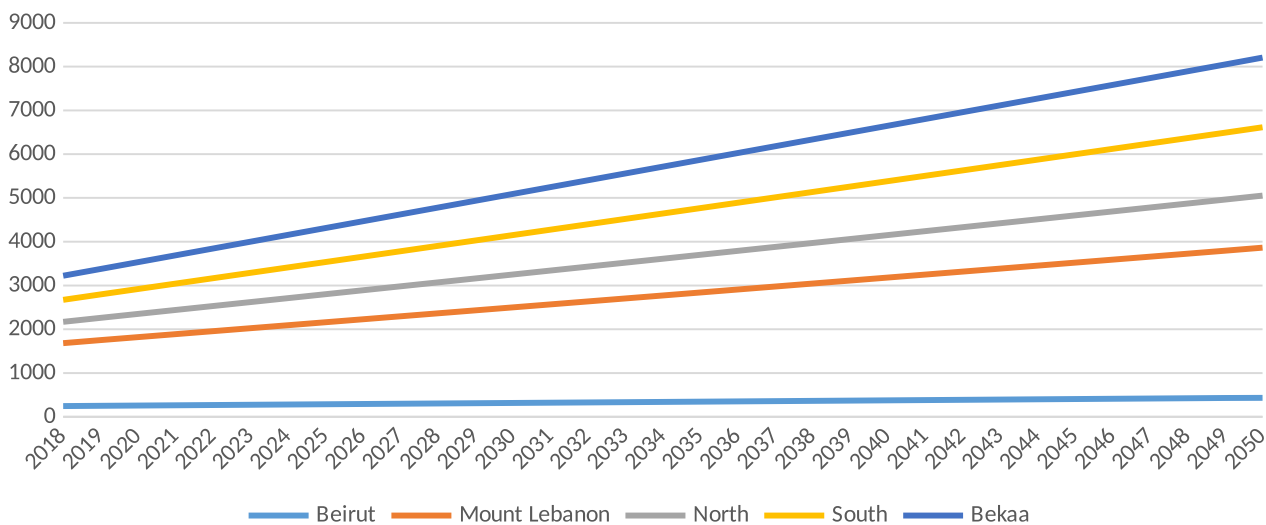
There is an obvious oversupply of pharmacy graduates in Lebanon, particularly from some private institutions; the number of registered pharmacists and in parallel, the number of community pharmacies in exponentially increasing. As a matter of fact, the schools of pharmacy are not taking into account the necessity of adapting to national needs in terms of number of graduates; this issue was expressed several times by the Lebanese Order of Pharmacists, without positive collaboration from the schools of pharmacy. A similar issue was encountered in other countries; for example in France, the schools of pharmacy seemed only concerned about their scientific recognition, disregarding professional practice needs through their educational or scholarly activities.<sup>[19]</sup>

Reducing the number of graduates will require voting and implementing the *numerus clausus* law or taking any other measure to help with that; in parallel, focusing on the innovative professional roles of the pharmacists requires the acquisition and development of competencies in the fields of management, leadership, marketing, information technologies, teamwork abilities, and behavioural and communication skills in addition to an updated scientific knowledge.<sup>[20]</sup> This should lead to a generation of pharmacists fulfilling most aspects of pharmacy services relevant to Lebanese patients, such as respect, empathy, a friendly staff, listening carefully, giving quality time, responding quickly to their needs and respecting their privacy.<sup>[17]</sup>

Moreover, important profession-related issues exist in developing countries, including lack of proper education and training of practicing pharmacists, weak or no implementation of existing laws, and lack of recognition of the



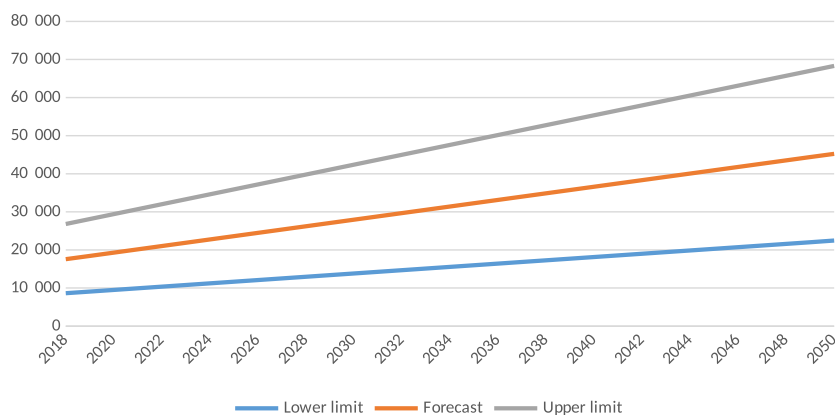
**Figure 1** Forecast of the rate of pharmacists per 10 000 inhabitants in Lebanon. The worldwide mean was taken from a document prepared by the International Pharmaceutical Federation. Available from: [https://www.fip.org/files/fip/.../2017-09-Pharmacy\\_at\\_a\\_Glance-2015-2017.pdf](https://www.fip.org/files/fip/.../2017-09-Pharmacy_at_a_Glance-2015-2017.pdf). [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]



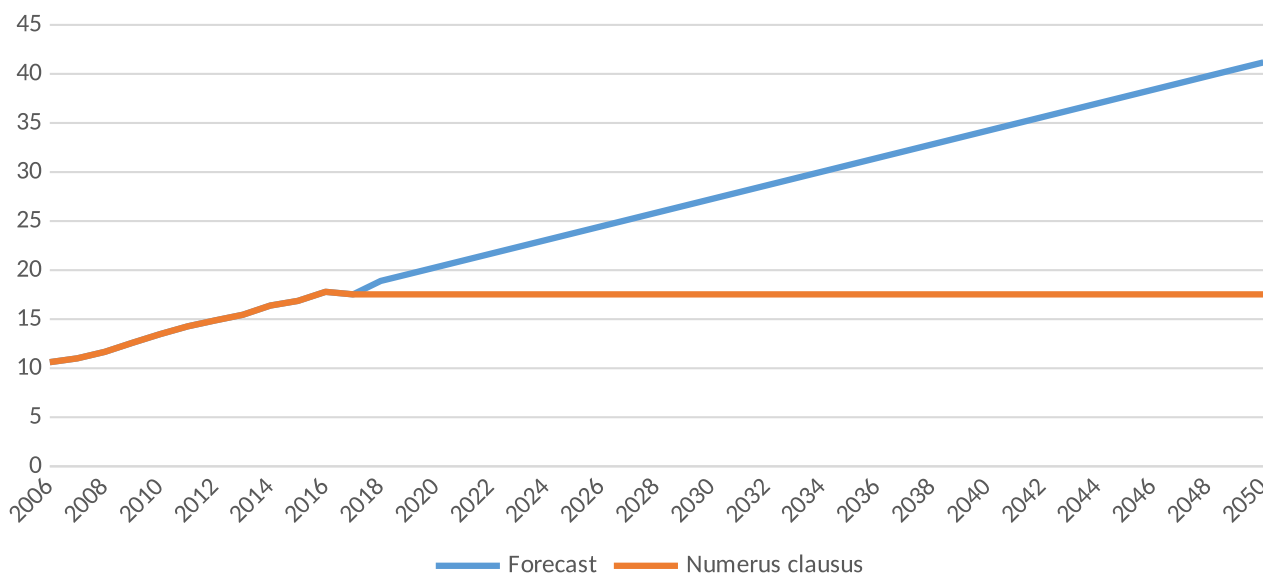
**Figure 2** Forecast of the number of pharmacies per governorate in Lebanon. [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

pharmacy as a profession by the other healthcare professionals.<sup>[21]</sup> While the last two points have to be tackled by professional organizations, education and training should be addressed by the academic institutions. Academic education should follow the shift in professional role and be based on national needs.<sup>[22]</sup> Through successful integration of communication skills, critical thinking and problem-solving techniques, future pharmacy executives will be better prepared to effectively position their organizations and the profession for the challenges that lie ahead.<sup>[23]</sup> The schools of pharmacy should take this

into account in their teaching activities. Furthermore, graduating specialized pharmacists with competencies in specific fields would be expected to alleviate the potential mismatch between graduates' number and market needs. Re-professionalization and collaborative activities with professional organizations,<sup>[24]</sup> among which the Lebanese Order of Pharmacists, are a must to maintain pharmaceutical service quality in various fields of pharmacy practice. Retaining pharmacy roles that are useful to the system and satisfying to pharmacists will require a continuation of current proactive measures by the profession.<sup>[25]</sup>



**Figure 3** Forecast of the total number of pharmacists registered to the Lebanese Order of Pharmacists. [Color figure can be viewed at wileyonlinelibrary.com]



**Figure 4** Comparison of the total number of pharmacists: actual situation versus application of a numerus clausus law. [Color figure can be viewed at wileyonlinelibrary.com]

**Limitations**

Forecasting the number of active pharmacists is not an easy task for various reasons: (1) after graduation, certain pharmacists do not become occupationally active; (2) there are many types of pharmaceutical occupations, a pharmacist may leave an occupation for another or enter an occupation long time after graduation; (3) the dynamics governing retirement, mortality and other occupation leaving processes are not always observed and analyzed.<sup>[26]</sup>

**Conclusion**

Our study shows that the dramatic increase in pharmacy graduates will worsen with time. To curb it, it is important

to vote and apply new laws and initiate a collaborative work between academia, professional associations, and employers from all sectors to find innovative solutions. This is expected to result in tangible outcomes in terms of decreasing oversupply while enhancing graduates’ qualifications and skills, optimize pharmacists’ competencies in various fields of practice, and improve the pharmaceutical services quality and patients’ health-related outcomes.

**Declarations**

**Conflicts of interest**

The Author(s) declare(s) that they have no conflicts of interest to disclose.

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## Ethical aspect

This work did not need an ethical approval since no patients were enrolled.

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