

Survey on the Use of Noninvasive Ventilation in Public and Private Institutions in Argentina. Getting to know the Reality of its Application

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Abstract

With the purpose of exploring the reality of the application of noninvasive ventilation (NIV) in our country, we carried out an electronic survey among the professionals of the Argentinian Association of Respiratory Medicine and the Society of Internal Medicine of Buenos Aires. The differences in the use of noninvasive ventilation between public and private institutions were determined, and we evaluated the role of the different specialties and areas of care in its indication and monitoring. 443 professionals participated in the survey, and we concluded that the noninvasive ventilation treatment is uniformly developed in private and public entities. Noninvasive mechanical ventilation was mainly indicated by pulmonologists and intensive care physicians, and most frequently managed in the general ward by physiotherapists. It was most frequently applied in centers with residency programs, specifically in pulmonology and respiratory physical therapy. The reasons for which noninvasive ventilation was not applied were mainly the lack of equipment and interfaces, and the lack of information and training of nurses, physicians and physiotherapists. Knowing which resources are available to the professionals of these two societies in the public and private areas will let us apply behaviors to improve our reality and use this very valuable tool of ventilatory support.

Key word: Non invasive ventilation. Interface

Introduction

In cases of hypoxemic respiratory failure, with or without hypercapnia, we have the possibility to offer two options of ventilatory support: invasive ventilation (IV) requiring the placement of an endotracheal tube by oral, nasal or percutaneous route, and noninvasive ventilation (NIV), in which ventilatory support is performed through a mask and it is not necessary to invade the airway.

NIV was widely developed in the last years. One key aspect of NIV is the possibility to avoid tracheal intubation and its potential complications¹. Other important benefits are: greater comfort, the possibility for the patient to communicate, eat, drink and expectorate, the preservation of the upper airway defense mechanisms, and the fact that it is not necessary to provide deep sedation.

The use of NIV dates from the year 1927 with the invention of the iron lung by Drinker and Shaw, used for the first time in 1928 at the Boston Children's Hospital (Massachusetts)². In our country, with the poliomyelitis epidemic of the years 40 and 50, it had a significant development, since it was possible to treat patients with severe respiratory failure for whom ventilatory support was vital. The Hospital María Ferrer in the city of Buenos Aires led the admission and treatment of patients using these "iron lungs". This equipment provided ventilatory assistance, applying negative pressure on the thorax³. In 1981, the first experience with the use of positive pressure through a nasal mask in patients with sleep apnea⁴ was published. From that moment, the experience with the use of NIV at positive pressure as ventilatory support continued to develop, and both equipment and ventilation modalities

were generated, turning this treatment into an assistance element of essential importance for chronic diseases (defects of the chest wall or neuromuscular diseases) and acute conditions (exacerbation of COPD [chronic obstructive pulmonary disease] and heart failure, among others)⁵⁻⁷.

Thanks to its various indications and the large evidence on its effectiveness, the knowledge and application of this ventilatory assistance modality is essential for the therapeutic arsenal that has to be managed by the health-care staff, both during emergencies and follow-up at the general ward.

With the purpose of exploring the reality of the application of this technique in the different institutions of our country, we carried out a survey among professionals of the Argentinian Association of Respiratory Medicine (AAMR, for its acronym in Spanish) and the Society of Internal Medicine of Buenos Aires.

The general purpose was to explore the reality of the application of NIV in different public and private institutions, including all the Argentinian regions. The specific objectives were: to verify the existence of differences between public and private institutions in our country; to determine the role of the different specialties in the indication and monitoring of NIV in the different areas of care and to identify limitations on its use.

Materials and methods

Descriptive study based on an electronic survey on the use of NIV in the institutions where the health professionals involved in the study work. The questions were answered anonymously by entering the link in the AAMR webpage between June and September, 2016. No filters were used for data entry. The analysis was made basing on the description of percentages in order to compare proportions by Square Chi Test, with a significance level of 0.05.

Results

Of the 443 professionals who participated in the survey, 44 (9.9%) claimed that NIV is not applied in their workplace. The remaining 399 individuals who claimed that NIV is used in the institution where they work constitute the population used for analyzing the modality in which it is applied. The answers were collected from all the regions in which the Argentina is divided (eight), according to the AAMR. 316 of the professionals who participated in the survey (79.2%) were physicians (64.24% pulmonologists) and 83 were physiotherapists (20.8%). 4% of the answers were from AAMR associates in Uruguay. The answers were divided, according to the institution, in Public Institutions (PuIs), with 197 individuals (49.37%) and Private Institutions (PrIs), with 202 individuals (50.63%). **(Figure 1).**

There wasn't a significant difference between PuIs and PrIs when categorized according to the amount of beds. But the systems of medical residency (93 vs. 72%) ($p < 0.0001$), pulmonology residency (44 vs. 16%) ($p < 0.0001$) and physiotherapy residency (37 vs. 17%) ($p < 0.001$) were significantly more frequent in the PuIs than in the PrIs.

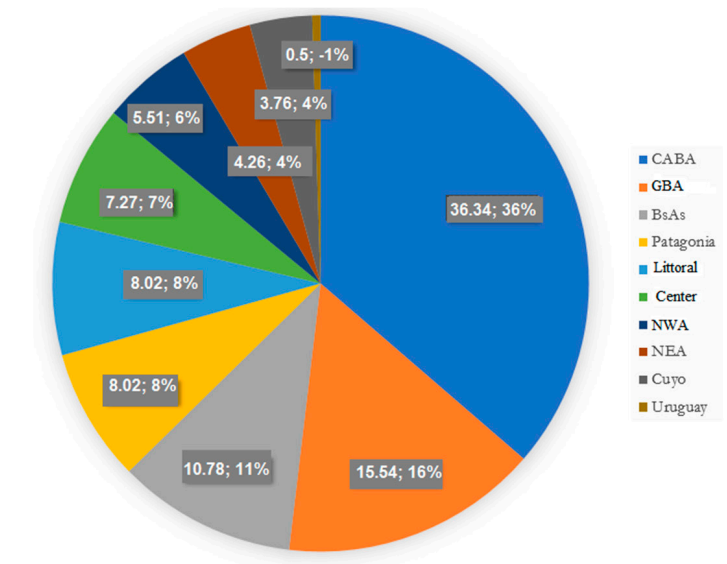
The application of NIV was almost universal in the Intensive Care Unit (ICU) and the Coronary Care Unit (CCU) (94.99%).

In response to the question of who indicated and who managed the NIV, we know that it was mostly indicated by the intensive care physician, alone or together with other professionals (indicated by: intensive care physician, 94.98%; pulmonologist, 46.43%; physiotherapist, 37.73%. Managed by: intensive care physician, 71.24%; physiotherapist, 49.86%; pulmonologist, 13.19%). **(Figure 2).**

48.37% of the surveyed individuals claimed that in the institution where they work NIV is applied in the general ward. Although the pulmonologist is the one who mostly indicates the NIV, alone or with other professionals, the one who manages the equipment is primarily the physiotherapist. (Indicated

Description of the sample where NIV is applied

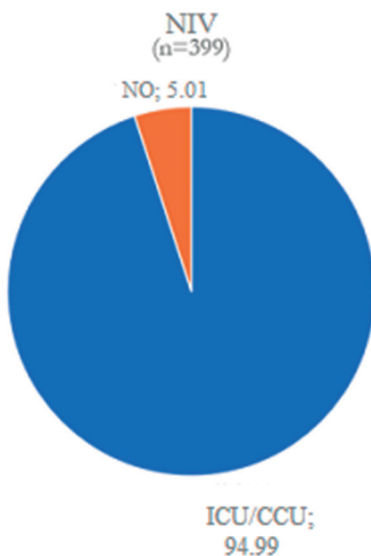
- Surveyed people = 399
 - 79.2% Physicians
 - 20.8% Physiotherapists
 - 50.63% Private Institutions
 - 54.16% More than 50 beds



Abbreviations: CABA: Autonomous City of Buenos Aires; GBA: Greater Buenos Aires; Bs As: Buenos Aires; NWA: northwest area of Argentina; NEA: northeast area of Argentina

Figure 1. Description of the sample where noninvasive ventilation is applied.

NIV in ICU/CCU



- Applied NIV in the ICU/CCU = 379
- Indicated by:
 - Intensive care physician: 94.98%
 - Pulmonologists: 46.43%
 - Physiotherapist: 37.73%
- Managed by:
 - Intensive care physician: 71.24%
 - Pulmonologists: 13.19%
 - Physiotherapist: 49.86%

Figure 2. Noninvasive ventilation in the intensive care unit and the coronary care unit

by: pulmonologist, 99.48%; clinician, 81.34%; physiotherapist, 44.04%. Managed by: physiotherapist, 82.90%; pulmonologist, 79.27% and clinician, 46.11%) (**Figure 3**).

40.1% claimed that NIV is applied in the emergency ward. In this regard, significant differences were found between public and private institutions. In PuIs, it is applied in 45.18%, and in the PrIs, in 35.15% (P 0.041) (**Figure 4**).

NIV in the General Ward

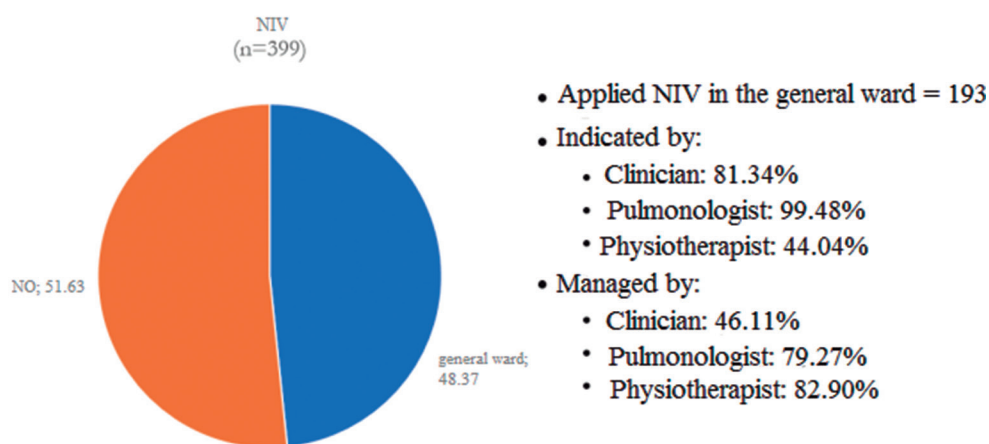


Figure 3. Noninvasive ventilation in the general ward

NIV in the Emergency Ward

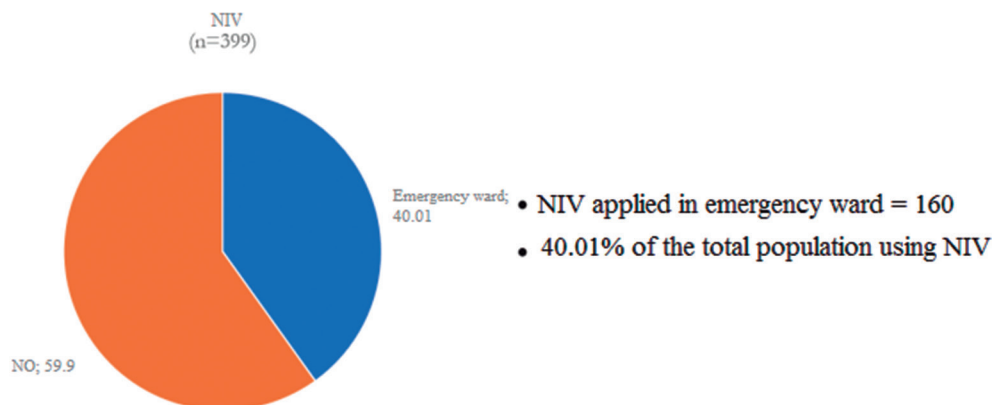


Figure 4. noninvasive ventilation in the emergency ward.

There are differences in the frequency of application of NIV between the general ward and the emergency ward, when comparing the institution’s number of beds (more or less than 50 beds): p 0.034 in the general ward and p 0.02 in the emergency ward. (Table 1).

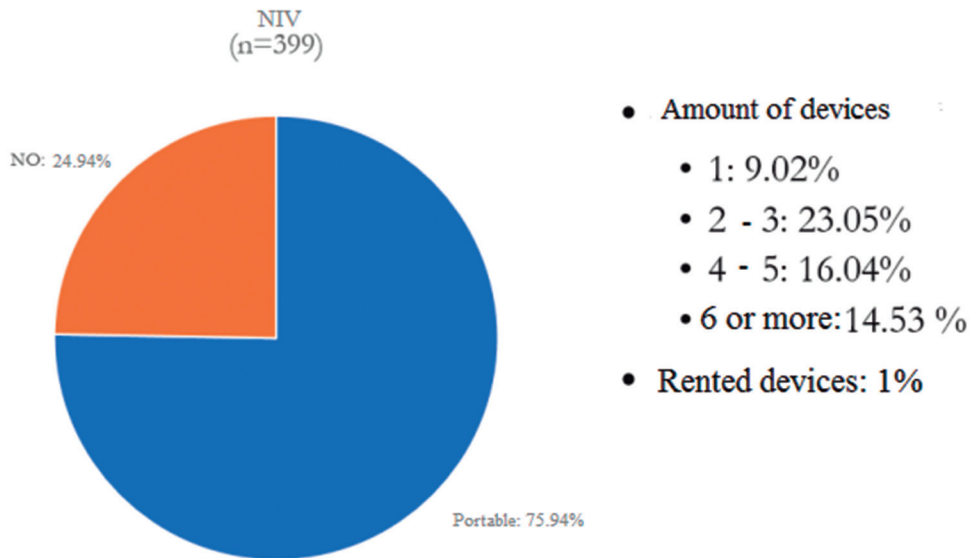
TABLE 1. Comparison according to the institutions number of beds

Place where NIV is applied	Up to 50 beds (n = 183)	More than 50 beds (n = 216)	P
ICU/CCU	92.90%	96.76%	0.078
General ward	42.62%	53.24%	0.034
Emergency ward	33.88%	45.37%	0.02

Abbreviation: NIV: noninvasive ventilation; ICU: intensive care unit; CCU: coronary care unit

As regards the analysis of the type and availability of the equipment and accessories, we observed that the amount of available devices per institution varied between 1 and more than 6, and 1% were rented (Figure 5). 75.94% of the institutions had portable equipment. The availability of such equipment and of the interfaces was significantly greater in the PrIs (p < 0.001) than in the PuIs. (Figure 6).

Portable Equipment



Abbreviation: NIV: noninvasive ventilation

Figure 5. Amount and types of available devices.

Comparison between private/public institutions Limitations

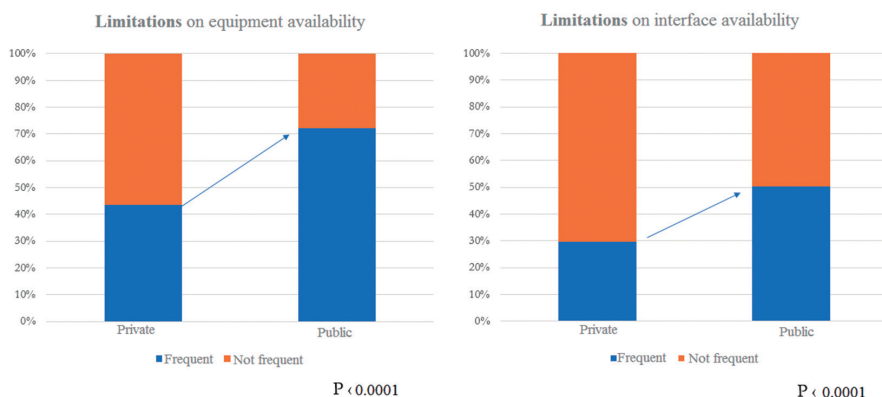


Figure 6. Comparison of the limitations on equipment/interface availability between public and private institutions.

The most commonly used interface both in the intensive care unit and the general ward were the oronasal masks, followed by the full face masks in the intensive care unit. Nasal masks were used 13.3% in the ICU/CCU and 24% in the general ward, and the choice of interfaces in PuIs versus PrIs was not significant. Higher limitations were reported regarding equipment/interface availability for applying NIV in PuIs ($p < 0.0001$).

Another very important factor for the use and adjustment of the NIV equipment is the information provided to the patient for him/her to understand and cooperate with the procedure. In this regard, 77.18% of the patients considered the information as good, very good or excellent, and 21.29% considered the information as null or insufficient.

A group of surveyed individuals claimed that NIV is not applied in the institutions where they work. This accounts for 10% of the surveys. This subgroup was analyzed per region, showing that in some regions the amount of institutions where NIV is not applied is greater than those where it is applied (Northwest, Patagonia and Littoral) (**Figure 7**).

Comparison of the use of NIV per region

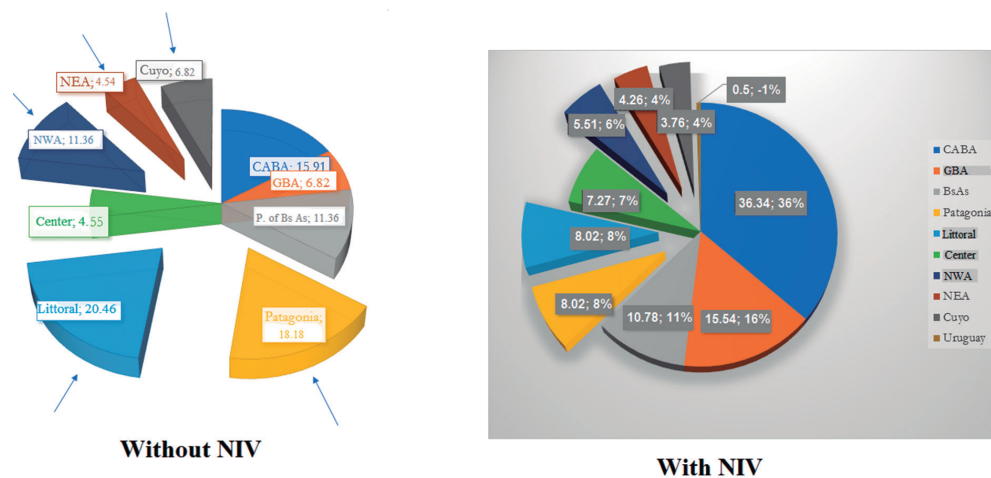


Figure 7. Differences between regions that use NIV and regions that do not use NIV. Abbreviations: NEA: northeast of Argentina; NWA: northwest of Argentina; CABA: Autonomous City of Buenos Aires; GBA: Greater Buenos Aires; Bs As: Province of Buenos Aires; NIV: noninvasive ventilation

Within the group of individuals who answered that NIV is not used in their institution, 45.45% have a residency system. 15.91% of that residency system belongs to pulmonologists. 23.73% were institutions with more than 50 beds. (Table 2). In 65.91% of the cases, the answer was that NIV is not applied due to lack of information and training of physiotherapists and of the medical and nursing staff. In the rest of the cases, the answer regarding the cause of the deficit, both in PuIs and PrIs, was Don't know/No reply (Figure 8).

TABLE 2. Characteristics of the institutions where NIV is not applied

Characteristics of the institution	Porcentaje
Public institution	54.45%
Institution with more than 50 beds	22.73%
Institution with some residency	45.45%
With pulmonology residency	15.91%
With physiotherapy residency	6.81%
With internal medicine residency	31.81%

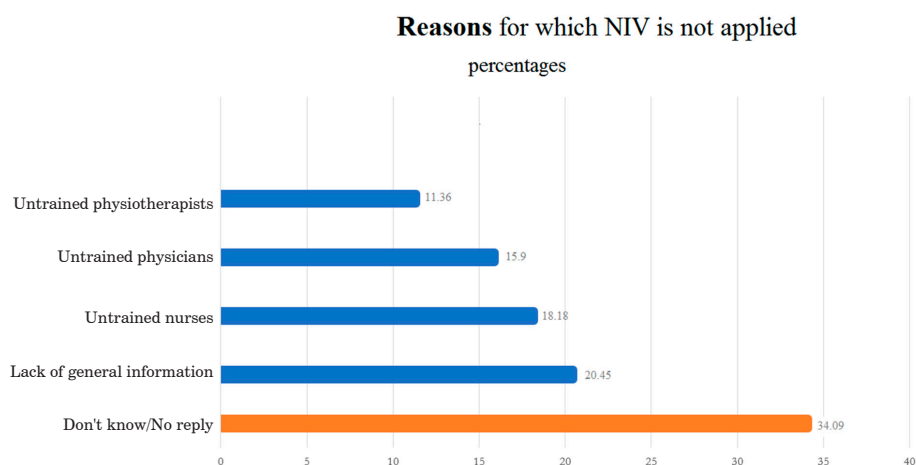


Figure 8. Causes for which NIV is not applied

Discussion

NIV is a cost-effective therapeutic assistance method that should be taken into account to be applied, if necessary, in all the areas of medical assistance^{8,9}. In our survey, NIV is widely used in the ICU and the CCU, and less frequently in the general or emergency ward. We have detected that in those areas, institutions with a higher amount of beds are the ones that apply NIV the most. In the ICU and CCU, the intensive care physician is mainly in charge of the indication and management of NIV, whereas in the general ward, the pulmonologist and clinician are in charge of the indication, and mostly the physiotherapist is in charge of the management.

The availability of equipment and interfaces seems to be greater in private institutions; and the information provided to the patients regarding the treatment (an essential element of every medical action, especially important in the case of NIV) is considered to be generally satisfactory both in private and public institutions.

In this study, we find that despite the time it takes to apply this therapeutic resource and its proven benefits, 10% of the surveyed professionals claim that NIV is not used in their workplace, assuming it is due to the lack of training and information of the staff involved in the procedure. This situation is especially remarkable in some regions, such as NWA, the Littoral and the Patagonia.

Limitations: we consider as limits to this study, the number of answers, within a much larger potential population of respondents, and the fact that there could be a greater tendency to answer the electronic survey among professionals who are more familiarized with this tool and those who are more interested in this topic.

On the other hand, it is important to highlight that the unit of analysis in this survey was the surveyed individual in his/her workplace, and not each institution itself, thus many surveys could refer to the practice in the same institution.

Summary of results

- In our country, the NIV treatment was uniformly developed both in public and private institutions.
- The professionals who most commonly indicate NIV are intensive care physicians and pulmonologists.
- The management of NIV in the general ward is most significantly handled by physiotherapists.
- The use of NIV was significantly greater in centers with residency programs, specifically in the pulmonology and respiratory physical therapy areas.
- In the regions of Cuyo, NEA, NWA and Patagonia, the centers that do NOT apply NIV predominate over the ones that use it.
- The main reasons for which NIV is NOT used, in decreasing order of frequency, were: equipment availability, untrained nurses, untrained physicians, interface availability, lack of information and untrained physiotherapists.

Conclusion

Regardless of the mentioned limitations, nowadays we consider this study as a valid starting point to get to know about the application of NIV in our area. We believe it is necessary to have greater dissemination and training on this assistance technique that at first glance appears to be essential for the exercise of contemporary medicine.

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