HOME MECHANICAL VENTILATION FOR PATIENTS WITH NEUROMUSCULAR DISEASES:

a comparative analysis of epidemiological and ventilatory support profile between 2015 and 2017

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Introduction

Patients with neuromuscular diseases (NMDs) experience respiratory muscle weakness with impaired cough efficacy and frequently progress to chronic respiratory failure, with an increased risk of respiratory infections and hospitalizations; indeed, this is the leading cause of mortality in this patient population.[1] The use of home mechanical ventilation (HMV) in NMDs can prolong survival and improve quality of life in these patients by preventing hospitalizations. It can be performed invasively (IMV), via a tracheostomy, or noninvasively through a face or nasal mask (NIMV).[2]

Some studies have encouraged the adoption of NIMV as the preferred form of HMV, as this modality can postpone or even avert the need for tracheostomy, even in the subgroup of patients who are ventilator-dependent around the clock. Purported advantages of NIMV over IMV include improved communication, greater comfort, and reduced production of respiratory secretions due to the absence of an invasive tracheal device.[2,3]

Objective

To evaluate the prevalence of NIMV and IMV in patients with NMDs under the care of a private home health care operator in Brazil; and compare data obtained in 2015 with data from 2017.

Methods

Clinical and ventilation-related data for patients diagnosed with NMDs were obtained from the IW® electronic medical records system in October 2015 and October 2017. Variables are presented as absolute and relative frequencies (%). Comparisons and statistical analysis were performed using the chi-square test and Fisher's exact test, as appropriate. The significance level was set at 95%.

Results

In 2015, Home Doctor provided HMV care services to 30 patients diagnosed with NMDs, 63% of whom were male. Adults were the most prevalent age group (46%), followed by pediatric (33%) and elderly patients (20%). By 2017, the number of patients with NMDs on HMV had grown to 44. There was still a male predominance in the sample (54%), and the distribution of age groups remained similar, with adults accounting for 47% of cases.

The diagnosis of amyotrophic lateral sclerosis (ALS) became more prevalent over time, accounting for 13 cases in 2015 (43%) and 25 cases in 2017 (57%). Among pediatric patients, the leading diagnosis was spinal muscular atrophy (SMA) type I in both years (Figure 1).

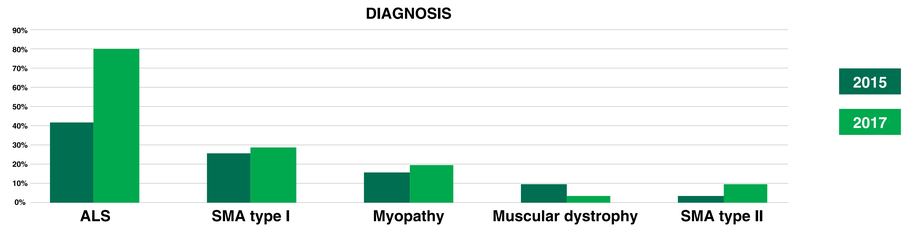

Figure 1 – Most prevalent diagnoses in 2015 and 2017.

Use of mechanical insufflation-exsufflation (MIE) had grown significantly in 2017 as compared to 2015. In 2015, only 20% of patients were being treated with this technique, versus 41% in 2017 (p = 0.059). (Table 1, Figure 2)

MIE	No	Yes	Total	p
2015	80.00%	20.00%	100.00%	0.059
2017	59.09%	40.91%	100.00%	
Total	**67.57%**	**32.43%**	**100.00%**	

Table 1 – Use of mechanical insufflation-exsufflation in 2015 and 2017.

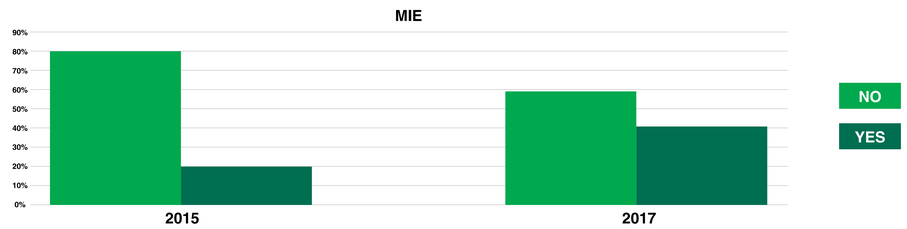

Figure 2 – Use of MIE in 2015 and 2017.

Regarding HMV modalities, use of NIMV had also grown in 2017 as compared to 2015 (23% versus 13% of patients, respectively; Table 2, Figure 3). There was no significant change in daily duration of HMV. In both periods of analysis, 80% of patients were receiving continuous (around-the-clock) HMV (Table 3).

Home Ventilation	NIMV	IMV	Total	p
2015	13.33%	86.67%	100.00%	0.31
2017	22.73%	77.27%	100.00%	
Total	**18.92%**	**81.08%**	**100.00%**	

Table 2 – HMV modalities used in 2015 and 2017.

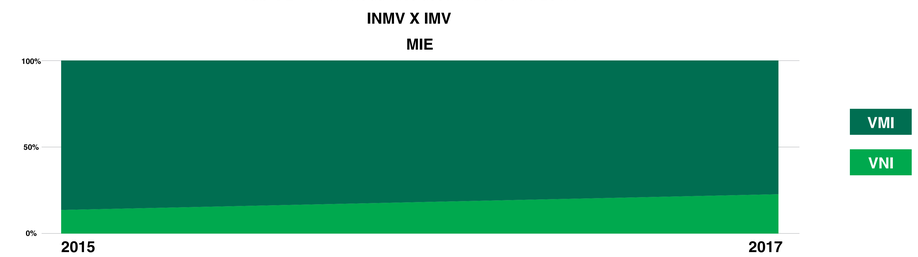

Figure 3 – HMV modalities used in 2015 and 2017. NIMV use increased in 2017.

Daily HMV duration	Intermittent	Continuous	Total	p
2015	20.00%	80.00%	100.00%	0.96
2017	20.45%	79.55%	100.00%	
Total	**20.27%**	**79.73%**	**100.00%**	

Table 3 – Comparison of daily HMV duration in 2015 versus 2017.

Discussion

- Muscle weakness affects both the inspiratory and expiratory muscles leading to ventilatory issues and impairment of cough efficacy. Both mechanisms expose the patient to a buildup of pulmonary secretions, respiratory distress, and frequent hospitalizations, often leading to premature death.[1]
- Positive airway pressure ventilation can relieve symptoms by promoting improvement of pulmonary ventilation, normalization of blood gases, excretion of excess bicarbonate, and regularization of respiratory drive.[2]
- Several studies have highlighted the benefits of NIMV for patients with NMDs, with advantages over IMV such as higher quality of life, better speech prognosis, fewer lung infections, maintained respiratory drive, and, ultimately, increased survival.[2-4]
- We found that, despite a persistently high prevalence of IMV, the number of patients on NIMV is increasing gradually. Although on a smaller scale, this is consistent with current trends in developed countries.
- Specific insufflation/exsufflation techniques devices are available to facilitate these maneuvers and promote improved clearance of secretions.[2,5,6] The high cost of these devices was a longstanding barrier to their adoption in Brazil. However, the progressive increase in their use over a short period of time in our sample (20% in 2015 versus 41% in 2017) suggests their use and indication will grow even further in the coming years.

Conclusion

In developing countries, tracheostomy is still the most prevalent route for delivery of HMV. However, in recent years, we have observed an increase in the use of non-invasive ventilation and mechanical insufflation-exsufflation in this group of patients.

References

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