SHORT REPORT

Use of non-invasive ventilation in UK emergency departments

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Aim: To describe the current use of non-invasive ventilation in UK emergency departments.

Methods: A structured questionnaire was sent to all UK emergency departments assessing 25,000 new patients annually.

Results: 222 of 233 departments completed the questionnaire. 148 currently use non-invasive ventilation (NIV). Most used NIV for either cardiogenic pulmonary oedema ($n = 128$) or chronic obstructive pulmonary disease ($n = 115$). Only 49 departments have protocols for NIV use and 23 audited practice.

Conclusion: NIV is commonly used in UK emergency departments. Practices vary significantly. One solution would be the development of guidelines on when and how to use NIV in emergency medicine practice.

Non-invasive ventilation (NIV) is the application of ventilatory support via a facemask to a spontaneously breathing patient. The two principal types of NIV are continuous positive airway pressure (CPAP; continuous pressure support throughout the respiratory cycle) and non-invasive positive pressure ventilation (NIPPV; continuous pressure support with additional inspiratory pressure support). There is evidence for the clinical effectiveness of these treatments for patients with acute exacerbations of chronic obstructive pulmonary disease (COPD) and acute cardiogenic pulmonary oedema.^{1–4} The data to support the use of these treatments in other conditions such as pneumonia and asthma are limited.^{5,6} There is continuing debate on the optimal clinical environment in which non-invasive ventilation can be given safely and on the required skills of attending staff. Also unclear is the exact modality of NIV and the type of interfacing mask that may be of most benefit for particular patient groups and clinical settings.

Our aim is to describe the current use of NIV in UK emergency medicine practice, and in particular the number of departments using NIV and when and how it is used.

METHODS

A structured questionnaire was developed and piloted in 10 emergency departments. It was subsequently sent to all emergency departments in the UK, which assess 25 000 patients per annum. Another questionnaire was sent to all departments if the first questionnaire was not returned within 4 weeks. The research team thereafter contacted all the remaining non-responding departments by telephone. The results were then analysed using descriptive statistics.

RESULTS

In all, 222 (95%) of 233 emergency departments completed the questionnaire: 172 (74%) returned the questionnaire by

post and a further 50 (21%) completed it by telephone. Eleven departments did not participate in the survey.

In the UK, 148 (67%) emergency departments currently use NIV. Of the 74 departments not using NIV, 45 plan to introduce it to their service in the future.

Most departments use NIV for cardiogenic pulmonary oedema ($n = 128$, 86%) and acute exacerbations of COPD ($n = 115$, 77%). Seven services stated that they used NIV for other conditions, including pneumonia, asthma and pulmonary contusions. In all, 132 departments used only a full facemask, eight departments used both a full facemask and a nasal mask, three departments used either a full facemask or a full head mask, and two departments exclusively used a nasal mask.

A total of 125 emergency departments used CPAP and 94 departments exclusively used bilevel positive airway pressure (BiPAP). Seventy three departments used both NIV modalities. A variety of different machine types were used. Many different services were charged with providing the NIV service for the emergency department. These included emergency medicine, respiratory medicine, intensive care unit or health disparities unit, general medicine, cardiology and outreach teams. Some services were jointly coordinated between specialties, and in some hospitals this was dependent on the type of NIV—for example, CPAP in emergency medicine or BiPAP in respiratory medicine (table 1).

In all, 49 (33%) services have protocols for NIV use; 23 (16%) departments stated that they audited the use of NIV. Departments were asked to give the number or estimated number of times NIV was used in their department annually.

Table 1 Details of services responsible for the introduction and provision of non-invasive ventilation facility and staff training in the emergency department

	Responsible for NIV service in the ED	Responsible for introduction of NIV in ED	Responsible for ED staff NIV training
Emergency medicine	78	83	69
Respiratory medicine	9	9	12
Multiple specialties	27	23	34
Critical care	21	17	16
General medicine	5	6	7
Physiotherapy	5	4	5
Other	0	0	1
Unknown	0	4	2
Not completed	3	2	2

ED, emergency department; NIV, non-invasive ventilation.

Abbreviations: BiPAP, bilevel positive airway pressure; COPD, chronic obstructive pulmonary disease; CPAP, continuous positive airway pressure; NIPPV, non-invasive positive pressure ventilation; NIV, non-invasive ventilation

One hundred and fourteen departments estimated the use of NIV, with numbers varying from 10 to 20 times to several hundred times annually.

DISCUSSION

This survey clearly describes the current use of NIV in emergency departments in the UK. NIV is readily available and its use, given the survey response, seems likely to continue to increase. This is despite research evidence remaining inconclusive as to the mortality benefit for CPAP or BiPAP in acute cardiogenic pulmonary oedema⁷ and only one small randomised control study of the use of BiPAP for exacerbations of COPD in the emergency department.⁸ All other studies showing benefit have been based in either critical care or ward settings and therefore the results may not be directly extrapolatable to emergency medicine. The use of NIV in emergency medicine in North America and Australia is anecdotally high. Although there are no directly comparable survey data, a recent study from Ontario in Canada suggests that use of NIV in this region is higher than in the UK.⁹

There often seems to be no coordinated system for using NIV in the emergency department, with few departments having protocols and audit systems in place. Many departments rely on other specialties to deliver NIV in the emergency department. This may have both advantages and disadvantages. A single service delivering NIV for a hospital allows the development of expertise in the healthcare professionals providing the service. However, these resources are often not available because of the pressure of work or the lack of a comprehensive rota providing 24-h cover, 7 days a week. In addition, these people act as potential gatekeepers for any service. These services may not be aimed at the acute emergency setting and therefore may not have the equipment—for example, mask and machine type—that is most suitable for the patient in the emergency department. Clearly, the size of the department and the number of patients likely to require NIV on an annual basis will influence how the service is provided in or to the emergency department. In addition, the staffing, roles and functions of the emergency department are diverse in the UK. These factors may probably reduce the likelihood of a single model of practice developing across the UK. There is significant variation in the number of patients given NIV, which is beyond differences in the size of departments and their case mix. Frequency of the data used were in general estimates and therefore may not be accurate. Also, the type of equipment and the department providing the service vary depending on the presenting condition—for example, CPAP for patients with cardiogenic pulmonary oedema and BiPAP for patients with acute exacerbations of

COPD. This may again potentially influence the development and maintenance of the skills necessary to deliver a safe and effective NIV service in an emergency department.

NIV is increasingly being used for patients with cardiogenic pulmonary oedema and acute exacerbations of COPD in emergency departments in the UK. Given the variation in practices described, it would be timely to provide guidelines on when and how NIV should be delivered in emergency departments.

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