

## Short-Stay Respiratory Unit: A New Option for Inpatient Care

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**OBJECTIVE:** The current pressure on conventional inpatient care units represents a very serious problem for respiratory medicine departments. The aim of this study was to analyze the impact of a new instrument—a short-stay respiratory unit—on the quality of care delivered by the respiratory medicine department of a tertiary care hospital.

**MATERIAL AND METHODS:** The short-stay respiratory unit consisted of 4 conventional hospital beds managed by a pulmonologist. The beds were only used to treat patients diagnosed with exacerbation of chronic obstructive pulmonary disease or bronchial asthma, community-acquired pneumonia, or suspected lung cancer, and stays were intended to only last for less than 4 days. Analyzing a range of healthcare quality variables, we compared the quality of care delivered during the first 6 months the unit was in operation (October 2005 to March 2006) to that delivered in the same period 12 months earlier.

**RESULTS:** The study included 147 patients admitted to the short-stay unit. The mean (SD) age of the patients was 64 (17) years and 79% were men. The mean length of stay was 3.3 (1.6) days—only 1.4% of patients stayed for longer than 4 days—and the readmission rate was 2.7%. There were no deaths. The existence of the short-stay respiratory unit led to a 30% decrease in the overall mean length of stay in the respiratory medicine department (11.8 [4.6] vs 8.3 [2.6] days;  $P < .001$ ), and the readmission rate fell from 21% to 15% ( $P < .05$ ). While there were no differences in mortality between the 2 periods, the complexity of diseases treated by the respiratory medicine department showed an increase of 9.2% ( $P < .001$ ).

**CONCLUSIONS:** A short-stay respiratory unit can improve the efficiency of care delivered by a respiratory medicine department by reducing both the mean duration of hospitalization and the readmission rate, without a reduction in the complexity of diseases treated or a need for additional resources.

**Key words:** Hospitalization. Mean stay. Readmissions. COPD. Asthma. Specialization.

Unidad neumológica de estancia corta: un nuevo dispositivo asistencial de hospitalización

**OBJETIVO:** La presión asistencial sobre la hospitalización convencional es un problema acuciante en los servicios de neumología. El propósito del estudio ha sido analizar el impacto de un nuevo dispositivo, la unidad neumológica de estancia corta (UNEC), sobre la calidad de la atención en el servicio de neumología de un hospital terciario.

**MATERIAL Y MÉTODOS:** La UNEC se dotó de 4 camas de hospitalización convencional, gestionadas por un neumólogo especializado. En ella ingresaron sólo pacientes con diagnósticos de exacerbación de enfermedad pulmonar obstructiva crónica (EPOC) o asma bronquial, neumonía extrahospitalaria o sospecha de cáncer de pulmón, y previsión de estancia inferior a 4 días. Se analizó el período de puesta en funcionamiento de la unidad (6 meses, de octubre a marzo) frente al mismo período del año anterior, valorándose los distintos índices de calidad asistencial.

**RESULTADOS:** Se incluyó a 147 pacientes (79% varones), con una media  $\pm$  desviación estándar de edad de  $64 \pm 17$  años. La estancia media en la UNEC fue de  $3,3 \pm 1,6$  días—sólo un 1,4% de los pacientes superó los 4 días— y la tasa de reingresos, del 2,7%. No hubo mortalidad. Con la UNEC, la estancia media global en el servicio disminuyó un 30% (de  $11,8 \pm 4,6$  a  $8,3 \pm 2,6$  días;  $p < 0,001$ ), al igual que los reingresos (del 21 al 15%;  $p < 0,05$ ), sin cambios en la mortalidad. Sin embargo, la complejidad de las enfermedades ingresadas en neumología aumentó un 9,2% ( $p < 0,001$ ).

**CONCLUSIONES:** La UNEC puede mejorar la eficiencia de la atención neumológica al disminuir la estancia media hospitalaria y la tasa de reingresos, sin reducir la complejidad de las enfermedades atendidas ni precisar recursos adicionales específicos.

**Palabras clave:** Hospitalización. Estancia media. Reingresos. EPOC. Asma. Especialización.

### Introduction

Inappropriate use of hospitals results in considerable waste of resources.<sup>1</sup> In an attempt to overcome this problem,

hospital departments are striving to minimize inappropriate resource use by adopting new strategies and tools or by optimizing existing ones. Limited bed availability and the need to contain rising health costs have intensified the search for alternatives to conventional hospitalization. Examples of solutions to date include day hospitals,<sup>2</sup> home hospitalization,<sup>3</sup> and observation or short-stay units.<sup>4-6</sup> Short-stay units are designed to provide suitable care to patients who do not require complex procedures. The success of such units hinges on both efficient administration

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 Manuscript received February 26, 2007. Accepted for publication December 5, 2007.

and management and the active involvement of physicians and nursing staff in the goal of improving the quality of care. Short-stay units also increase the efficiency of the departments they support.<sup>5-7</sup> They are particularly effective in hospitals with complex organizational structures, overburdened by patients with high comorbidity and highly prevalent diseases such as chronic obstructive pulmonary disease (COPD) and asthma. Because quality of care improves when short-stay units are managed by specialists,<sup>8-10</sup> a short-stay respiratory medicine unit should ideally be managed by pulmonologists and aim to satisfy the specific needs of patients with respiratory problems. Although additional staff and facilities may be allocated to such a unit, the most effective solution is to appoint specialized physicians and nurses already on staff and to make use of existing beds under the department's supervision. The aim of the present study was to analyze the short-term impact of a short-stay respiratory medicine unit on the quality of health care provided, with a particular emphasis on mean length of stay and readmission rates.

## Materials and Methods

We conducted a prospective study over the first 6 months following the creation of the short-stay unit (October 2005 through March 2006) and compared our findings to those from the same period 12 months earlier. The unit was allocated 4 beds previously used by the respiratory medicine department (reallocation), and it operated 7 days a week, meaning that patients could be admitted and discharged on a continual basis. The beds were supervised at all times by a respiratory medicine specialist from the hospital staff, except on holidays, when it was run by the on-call specialist. Only patients with an initial estimated stay of less than 4 days were admitted to the unit. To ensure the consistent application of suitable admission criteria, a clinical protocol describing general and disease-specific inclusion and exclusion criteria was drawn up (Table 1).<sup>11-15</sup> The unit was designed to cater for patients with COPD, asthma, community-acquired pneumonia, and suspected lung cancer.

### Quality Indicators

The quality indicators analyzed were mean length of stay, number of hospitalizations, occupancy rate, disease complexity (weighted mean number of diagnoses), prolonged stays, readmission rates, and mortality.

### Statistical Analysis

Data were expressed as means (SD). Where appropriate, absolute values were calculated as percentages of totals. The Wilcoxon test for paired data was used to compare nonnormally distributed quantitative variables from before and after the creation of the short-stay unit, and statistical significance was set at a value of  $P < .05$ .

## Results

The study included 147 patients admitted to the short-stay respiratory medicine unit. The general characteristics of these patients, who were fairly but not very elderly and mostly men, are shown in Table 2 together with results for the quality indicators analyzed for the short-stay unit. The occupancy rate of the unit was 67%, a relatively low

TABLE 1  
Admission Criteria for Short-Stay Respiratory  
Medicine Unit

1. General exclusion criteria (high risk of readmission)
Member of a dysfunctional family
Dependency or age >80 y
Absence of diagnosis
≥4 serious concomitant diseases
Associated psychiatric condition
2. Disease-specific admission criteria
2.1. Chronic obstructive pulmonary disease
Inclusion criteria
FEV <sub>1</sub> >35% predicted
Exacerbation without severe symptoms such as pneumonia, cor pulmonale, arrhythmia, respiratory acidosis (pH <7.35), marked tachypnea (>35 breaths/min)
Exclusion criteria
Chronic respiratory failure treated with home ventilation
Cachexia
≥2 admissions in past year
Colonization by multidrug-resistant bacteria
2.2. Asthma
Inclusion criteria
Unstable clinical condition after 12 h of intensive treatment
Respiratory failure
Peak expiratory flow <300 mL/min
Exclusion criteria
Near-fatal asthma
History of orotracheal intubation
Corticosteroid dependency
2.3. Pneumonia
Inclusion criteria
Pneumonia severity index II-IIIa
Exclusion criteria
Human immunodeficiency virus positivity
Decompensated chronic disease
Associated pleural effusion
2.4. Lung cancer
Inclusion criteria
Clinical suspicion of lung cancer
Exclusion criteria
Pneumothorax or massive hemoptysis

Abbreviation: FEV<sub>1</sub>, forced expiratory volume in 1 second.

<sup>a</sup>According to criteria proposed by Fine et al.<sup>15</sup>

percentage of patients had a prolonged stay (1.4%), and very few admissions were inappropriate. The readmission rate was also very low and there were no deaths. Patients whose stay exceeded 4 days were transferred to the conventional respiratory medicine ward. The main reason for both prolonged stays and inappropriate admissions was a dysfunctional family situation. The most common diagnoses were COPD (54%), asthma exacerbation (22%), suspected lung cancer (requiring tests) (17%), and pneumonia (7%).

Table 2 also shows how the short-stay unit affected the quality indicators of the respiratory medicine department as a whole. While no significant differences were observed in the total number of hospital admissions or patients treated, readmission rates nevertheless fell by 6% following creation of the unit. A quarter of all readmissions registered during the study period were managed by the short-stay

TABLE 2  
Description of the Impact of the Short-Stay Respiratory Medicine Unit on the Respiratory Medicine Department as a Whole<sup>a</sup>

	Before Opening the Short-Stay Respiratory Medicine Unit	After Opening the Unit <sup>b</sup>	P
Hospital admissions, no.	547	531	
Age, mean (SD), y	74 (12)	76 (12) <i>64 (17)<sup>b</sup></i>	NS
Hospital stay, d	6471	4419 <i>483 (11)<sup>b</sup></i>	<.001
Length of stay, mean (SD), d	11.8 (4.6)	8.3 (2.6) <i>3.3 (1.6)</i>	<.001
Occupancy rate, %	120.4	82.2 <i>67.1</i>	<.001
Disease complexity	1.0473	1.1443 <i>0.8608</i>	<.001
Readmissions, %	21	15 <i>2.7</i>	<.05
Mortality, %	3.0	3.1 <i>0</i>	NS

Abbreviation: NS, not significant.

<sup>a</sup>Data are means (SD) or number (%) unless otherwise indicated.

<sup>b</sup>Figures for the short-stay respiratory medicine unit are given in italics.

unit and a third of these occurred within 30 days of discharge. The mean length of stay for the department as a whole also decreased (by 30%) following creation of the short-stay respiratory unit, as did, consequently, the overall occupancy rate. Disease complexity, in contrast, increased by 9.2% and there were no variations in overall mortality or direct costs with respect to the same period 12 months earlier.

## Discussion

The present study demonstrates that a short-stay respiratory medicine unit set up within the context of a tertiary care hospital can be effective in improving indicators of health care quality, in particular through a reduction in the mean length of stay and the readmission rate, even when disease complexity increases and without increasing direct personnel costs.

Our short-stay respiratory medicine unit was created in order to better respond to the specific needs of a large proportion of respiratory medicine patients by improving the quality of care and reducing the length of stay. Many of the precursors of short-stay units—mostly units supporting emergency or internal medicine departments—were set up with a similar aim.<sup>4,5,16-19</sup> In our analysis of the literature, we found no mention of short-stay respiratory medicine units managed by pulmonologists. The concept of short-stay units was first introduced in the 1970s<sup>20</sup> and the earliest models were designed to meet the special needs of pediatric and surgical patients. Subsequent models targeted general medical patients<sup>16-19,21</sup> and critically ill patients.<sup>22</sup> The oldest documented short-stay unit in Spain is probably the general medical unit at Hospital Juan Canalejo in Galicia.<sup>17,23</sup>

Our findings demonstrate that the short-stay respiratory medicine unit set up in our hospital met its objectives. Mean length of stay—generally accepted as the most reliable indicator of efficiency and quality for such units—remained within the predefined limits, readmissions were

few, and there were no deaths. Several meta-analyses have shown that short-stay general medical units can also improve quality of care, measured by increased patient satisfaction levels and a shorter mean length of stay.<sup>5,6,16,17</sup>

The main differences between our short-stay respiratory medicine unit and general medical short-stay units in our setting are related to mortality and, above all, readmission rates, which have been seen to be as high as 30% in the latter.<sup>16,21,23</sup> Another difference is that a considerable number of patients admitted to short-stay general medical units need to complete their treatment on conventional hospital wards.<sup>17,24</sup> It is difficult to compare prognostic factors for inappropriate stay in this study with those reported by other authors as only a few analyzed social factors. We believe that appropriate triage is essential.<sup>16</sup> The fact that a pulmonologist supervised the admission of patients in our case may have contributed to the success of the unit as it is known that health care is more efficient when managed by a specialist.<sup>9,10</sup>

A considerable proportion of patients in short-stay general medical units have COPD, asthma, and pneumonia.<sup>16,21,23</sup> Patients with suspected lung cancer, however, are not generally admitted to such units, probably because they are considered to be more suitable for respiratory medicine departments. COPD, the most common disease treated in the majority of general short-stay units,<sup>21,25</sup> accounts for 50% of admission in some units,<sup>16</sup> probably because this disease represents a high health care burden but one that can often be brought under control quickly. While short-stay general medical units have proven to be an effective means of shortening lengths of stay and achieving acceptable mortality rates in COPD, the readmission rates remain relatively high (7%-10%).<sup>16,25</sup> Managing patients with asthma in short-stay general medical units can also help to improve the quality of care provided by increasing patient satisfaction levels<sup>26,27</sup> and reducing the mean length of stay (by 15%-30%).<sup>28,29</sup> As with COPD, however, high readmission rates have been reported.<sup>30</sup> Finally, although the mean length of stay for patients with uncomplicated community-acquired pneumonia is generally appropriate for short-stay units, the associated risk of death is considerable. The results of 1 recent study seemed to indicate, however, that the increased efficiency of a short-stay unit was not associated with increased mortality.<sup>31</sup> We were unfortunately unable to compare our findings with those of other studies as there were few patients with pneumonia in our series.

Another interesting aspect of short-stay units is the impact they have on the indicators used to assess the quality of care provided by the departments they support, in our case, the respiratory medicine department. In the present study, these indicators improved following the creation of the short-stay respiratory medicine unit. It has been seen that short-stay general medical units have a similar effect, albeit to a lesser extent, but they have certain limitations such as high rates of readmission and prolonged stays.<sup>17,25</sup>

The increase in the complexity of the diseases treated by the respiratory medicine department in our hospital following the creation of the short-stay unit deserves a brief mention. Although only a hypothesis, it may be that the greater availability of health care resources attracted

patients with more complex diseases who would otherwise have been referred to other hospitals.

Finally, it is important to mention that the short-stay unit did not require extra staff as existing staff (physicians, nurses, and administrative personnel) were simply assigned new responsibilities. Neither was it necessary to increase the number of beds as 4 beds in the conventional respiratory medicine department were reassigned to the short-stay unit.

The present study had certain limitations. The most common way of analyzing the impact of short-stay units is to compare results from similar periods in consecutive years. Results of that type of study, however, can be influenced by numerous factors such as changes in clinical protocols, disease complexity, or the number of beds available.<sup>5</sup> It is unlikely that these factors exerted an influence in our case as there were no changes in either protocols or bed availability. Disease complexity did increase but this, in theory, would have militated against the improvements observed following the creation of the short-stay unit. Moreover, the alternative to the study design we used is a controlled randomized trial but this has the disadvantage that the test intervention would only be implemented in the study group.<sup>5</sup> Because the period we studied was relatively short, our results must be interpreted with caution and corroborated by longer studies. Nevertheless, we believe that, because this is the first study of a short-stay respiratory medicine unit, our findings are of special interest and might stimulate the creation of similar units.

It should be borne in mind that short-stay units are not the only viable alternative for achieving the clinical management objectives mentioned in this study. Other options include day hospitals, home hospitalization, and early discharge with home support. The boundaries between the spheres of action of each of these approaches are still unclear and are indeed beyond the scope of this study, but they probably depend on the particular situation of each hospital.

One especially interesting finding to emerge from this study was the fact that opening the short-stay respiratory medicine unit led to a reduction in overall occupancy in the department, which had previously sent a large proportion of patients to beds in other wards. Assigning patients to other departments almost certainly lengthens hospital stays.<sup>32</sup> It could also be argued, however, that reducing the pressure on conventional hospital resources might have indirectly led to a dramatic reduction in the number of patients admitted to other departments. A similar effect has been seen with short-stay general medical units.<sup>17</sup>

In conclusion, reorganizing patient admission protocols through the creation of a short-stay specialty unit in a respiratory medicine department can help hospitals to better satisfy the needs of a considerable proportion of patients (particularly those with COPD and asthma) and improve general health care quality indicators.

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