# Assessment of Community care services appropriateness using the Chronic Obstructive Pulmonary Disease inpatient admission rate

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## ABSTRACT

**BACKGROUND:** Assessment of appropriateness is a criterion of increasing relevance for delivering health care services. In Italy, hospital admissions for Chronic Obstructive Pulmonary Disease (COPD) of the elderly is one of the chosen indicators to measure the appropriate use of services. Aim of this study was to assess COPD hospital admission rates as a marker of effectiveness of Community Care services.

**METHODS:** Data on hospital admissions for COPD - DRG 88 during the years 2006 and 2011 were collected from hospital discharge records. Correlations among acute inpatient admission rates by Italy's Regions and provision of Long Term Care (LTC) services have been analyzed through univariate and multivariate linear regression models.

**RESULTS:** The national hospitalization rate for COPD decreased from 2006 to 2011 (-35%). The reduction was over 60% for those under the age of 75 and around 14% for those older than 74 years. The COPD inpatient admission rates showed a weak inverse correlation with the provision of LTC, which, however, was statistically significant only for the 65-74 age-group in 2006. The percentage of DRG 88 hospitalization rate variability among the Italian Regions explained by the model increased with the inclusion in the interpretative model of the beds rate and the General Practitioners (GP) rate.

**CONCLUSION:** The reduction in hospitalizations for COPD in the over-50 is particularly manifest; it seems mainly related to factors other than the availability of outpatient services.

Key words: appropriateness, community care service effectiveness, elderly care

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## INTRODUCTION

The appropriateness of health services, specifically those of hospitals, is in Italy an increasingly guiding principle for the establishment of an integrated system of hospital and community services [1,2,3].

Since the end of the 90s the concept

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of "appropriateness" – measured by means of various methods - has been the central point of reference for policies and regulations regarding the planning and evaluation of health care [4,5,6]. A more precise definition of appropriateness, especially with regards to hospital admissions among the elderly population, is one of the most critical aspects for setting up an effective model of care able to meet the specific conditions of the elderly patients, like frailty and multi-morbidity [7].

Achieving the so-called "Essential Levels of Assistance" (ELA or, in accordance with the Italian acronym, LEA) has played a central role in defining both appropriateness and the measurement of health care outcomes. In the annual report on Hospital care in Italy and in some evaluation systems regarding the outcomes of care [8-11] the in-patient admission rate for Chronic Obstructive Pulmonary Disease (COPD) has been considered since 2009 a "proxy of reduced accessibility and effectiveness of community care".

Aim of this study was to assess the usefulness of COPD hospital admission rates as a marker of efficacy of Community Care services. Therefore, we described, at regional level, the characteristics of hospital admissions for COPD (DRG 88) and evaluated their relationship with other indicators linked to the provision of hospital or community care services [12].

## METHODS

A cross-sectional study based on the integration of information stemming from different sources was carried out.

Data on hospital admissions for COPD in the years 2006 and 2011 were collected from hospital discharge records. Information has been retrieved from the dataset of the Italian Ministry of Health, which is based on "Hospital Discharge Forms", drawn up for each hospital discharge. The proportion of over-64 citizens receiving Long Term Care (both available nursing home beds, and home-care users as a percentage of the over- 64), the number of beds per 1,000 inhabitants, and the General Practitioner (GP) rate were retrieved from data sources provided by the Italian National Institute of Statistics (ISTAT) and by the Italian Ministry of Health.

The hospitalization rates were analyzed in

2006 and 2011 according to three age groups (50-64, 65-74, >74 years). For each age-group a Dispersion Index (DI) was computed, as the ratio between the Standard Deviation (SD) of the mean of COPD inpatients admission rates among the Regions by the mean value itself, in 2006 and 2011. Finally, we performed univariate and multivariate linear regression models to analyze age-specific hospitalization rates by region and their potential determinants.

## RESULTS

In patients older than 50 years, hospitalizations for COPD lasting longer than one day decreased from 83,797 in 2006 to 54,739 in 2011 (-- 35%). The reduction was greater than 60% for those under the age of 75 and around 14% for those over 74 years. From 2006 to 2011 the national hospitalization rate decreased in all age groups: From 100.3 per 100,000 to 36.4 in the 50-64 age group, from 402.6 to 150.2 in the 65-74 age group, and from 980.9 to 748.2 in the over 74 age group (Tab 1).

Between 2006 and 2011 the DI increased in all age groups (53% vs. 89% in the 50-64 age group, 48% vs. 51% in the 65-74 age group, and 29% vs. 58% in those over 74), thus expressing the increasing gap in hospitalization rates among Regions (Fig. 1).

In no region the percentage of reduction in hospitalization rates among the over-74 seems to be associated with the proportion of elderly people who are in Long Term Care (LTC). Emilia Romagna and Friuli Venezia Giulia, which have the highest rates of over 64s in LTC (over 10%) show low percentages of reduction in hospitalization rates for DRG 88 (around 5%); conversely Puglia and Sicily, which do not have high percentages of elderly people receiving LTC services (around 5%), have the highest reductions in hospitalization rates (over 40%) (Fig. 2 Tab. 2). Both univariate and multivariate analyses show an inverse association between the number of LTC users and the age-specific admission rates of the over 65 age group, even though the correlation is weak and non-statistically significant, except, in 2006, for patients aged 65-74 (Tab. 3).

For the year 2006, we observed in the over 74 a marginal significance for the relationship between hospitalization rates and LTC (p=0.054). The inclusion in the interpretative
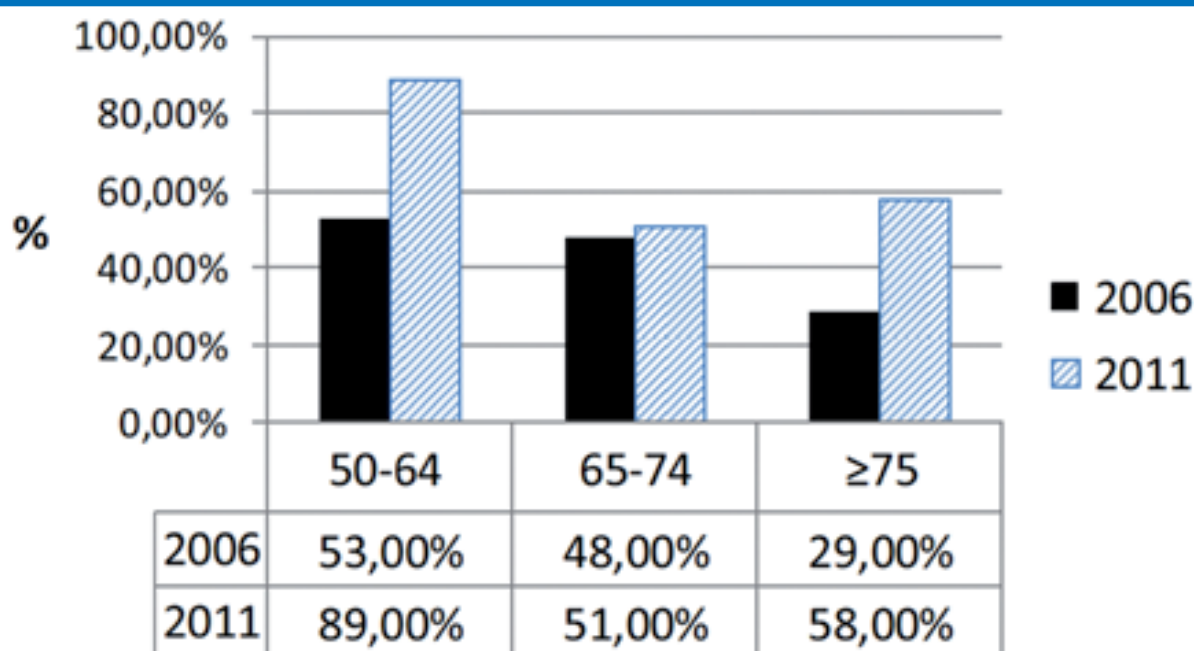
## ORIGINAL ARTICLES

**TABLE 1**

| NATIONAL HOSPITALIZATION RATES (PER 100,000) FOR COPD IN THE THREE AGE GROUPS IN 2006 AND 2011 | | | |
|---|---|---|---|
| | 2006 | 2011 | Δ% |
| 50-64 | 100.3 | 36.4 | 63.7 |
| 65-74 | 402.6 | 150.2 | 62.7 |
| ›74 | 980.9 | 748.2 | 23,7 |

**FIGURE 1**

DISPERSION INDEX BY YEAR AND AGE



| | 50-64 | 65-74 | ≥75 |
|---|---|---|---|
| 2006 | 53,00% | 48,00% | 29,00% |
| 2011 | 89,00% | 51,00% | 58,00% |

model of variables such as beds rate in 2009 [13], its variation over time (2002-2009), and GP rate (in 2007) [14], improves the percentage of DRG 88 hospitalization rate variability between Regions explained by the model. In particular, the percentage of admissions of the elderly in the 65-74 age group increased in 2006 from 31.6 to 45% ($R^2$ increase).

## DISCUSSION

In the over-50 we observed a reduction in hospitalizations due to COPD, particularly in patients aged 50-74. The decrease seems not to be related to a wider offer of LTC; it is more likely due to several interacting parameters, like beds rate and GP rate.

The association between increased hospital admission rates and inadequacy of out-of-hospital care is usually based on the argument that the more these services are developed the less COPD hospitalizations will be needed [12]. This hypothesis appears to be confirmed by the present analysis, but only for the year 2006 and for the elderly aged between 65 and 74. Contrariwise, in 2001, even if the Long Term Care offer did not change, the association between COPD hospitalization rates and percentage of LTC users was weaker and not statistically significant [15]. In addition, the reduction of hospital admission rates over time was less evident among the over 74, i.e., those patients who suffer from a larger degree of comorbidity and frailty [15]. The DI increase, especially among the over-74 patients, shows an increase in differences of hospitalization rates among Regions.

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**FIGURE 2**

**IN-PATIENT ADMISSION RATES › 1 DAY FOR COPD, FOR THE AGE GROUP ›74 BY REGION (PER 100,000)**
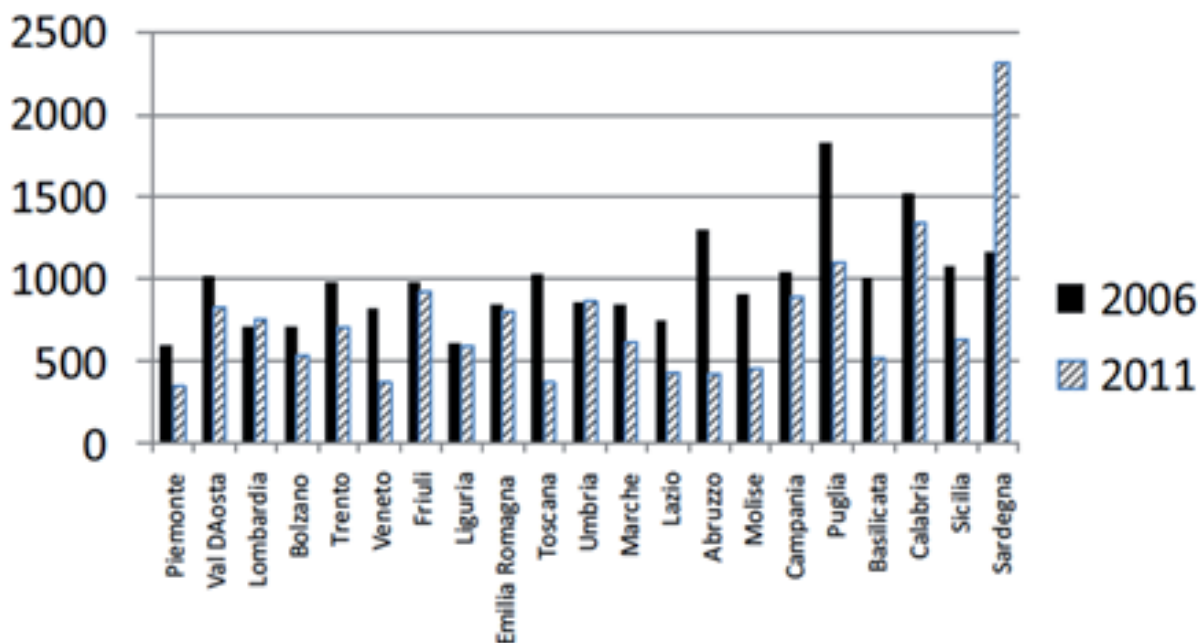


**TABLE 2**

| LONG TERM CARE 2011 (% OF OVER-64 CITIZENS) | |
|---|---|
| Piemonte | 7.0 |
| Valle d'Aosta | 11.9 |
| Lombardia | 9.5 |
| Trentino-Alto Adige | 6.3 |
| Veneto | 10.4 |
| Friuli Venezia Giulia | 12.1 |
| Liguria | 7.9 |
| Emilia Romagna | 15.3 |
| Toscana | 5.2 |
| Umbria | 8.8 |
| Marche | 6.6 |
| Lazio | 7.4 |
| Abruzzo | 8.2 |
| Molise | 8.2 |
| Campania | 4.8 |
| Puglia | 4.4 |
| Basilicata | 8.6 |
| Calabria | 5.4 |
| Sicilia | 5.6 |
| Sardegna | 7.9 |
| **Italia** | **8.0** |

Our findings point out the need to develop a more comprehensive definition of the factors leading to hospitalizations for COPD. Several factors might influence hospitalization rates for COPD in the over-74 population. As a matter of fact, it is known that multi-morbidity clinical manifestations are more severe than those observed at younger ages. These observations refer also to the topic of the care of elderly patients suffering from chronic diseases with occasional reactivations, like COPD. In these situations, outpatient services can be difficult to be dealt by the families, if they are not adequately supported.

Social conditions can also affect hospitalization rates: the percentage of people who live alone at home was higher among the over 74 compared to the other age groups [16]. Possibly, the lower hospitalization rate among those between 65 and 74 could be linked to the presence of family members, rather than to a lack of home care services [17].

In any case, it has already been shown that the strongest determinant of the elderly hospitalization rates is the acute bed rate and its variations over time [18]. Moreover, since 2009, COPD hospitalization rates have been included among the indicators of inappropriate hospital care [12]. As a consequence, it is likely that the reduction in admission rates responds also to

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**TABLE 3**

| RELATIONSHIP BETWEEN REGIONAL HOSPITALIZATION RATES FOR DRG 88 AND PERCENTAGE OF ELDERLY (>64) IN LONG TERM CARE (YEARS 2006 AND 2011) LINEAR REGRESSION MODEL. DEPENDENT VARIABLE: DRG-88 ADMISSION RATE; 20 OBSERVATIONS AS THE NUMBER OF ITALIAN REGIONS | | | |
|---|---|---|---|
| **UNIVARIATE REGRESSION*** | | | |
| | $R^2$ | B | SIG. |
| 65-74, 2006 | 0.562 | -32.455 | 0.015 |
| >74, 2006 | 0.461 | -41.128 | 0.054 |
| 65-74, 2011 | 0.371 | -8.845 | 0.130 |
| >74, 2011 | 0.235 | -31.899 | 0.348 |

| **MULTIVARIATE REGRESSION *** | | | |
|---|---|---|---|
| | $R^2$ | B | SIG. |
| 65-74, 2006 | 0.671 | -31.617 | 0.042 |
| >74, 2006 | 0.669 | -43.518 | 0.066 |
| 65-74, 2011 | 0.570 | -7.188 | 0.283 |
| >74, 2011 | 0.311 | -35.884 | 0.411 |

* The multivariate model includes the rate of beds per 1,000 inhabitants in 2009, the change in the absolute number of beds between 2002 and 2009, and the rate of general practitioners (GPs) per 1,000 inhabitants.

the need to limit the number of inappropriate hospital admissions.

The main limitation of this study is the intrinsic weakness of the diagnosis. As already pointed out, the use of COPD as proxy of inappropriate hospital activity could have led to an inhomogeneous behavior of the health personnel among the different regions and health structures. At the same time, also data about LTC are affected by uncertainty because of lacking information about the intensity of provided care and the age of the users. Both these limitations can in part affect the reliability of the presented results.

## CONCLUSION

The association of COPD hospitalization rates and LTC effectiveness among the elderly population appears to be questionable. The over-64 population represents an inhomogeneous group. The over-74 have different characteristics from the 65-74 group, and hospitalization rates are probably affected by several factors beyond the availability of LTC.

To use of hospital care indicators as a proxy of LTC effectiveness highlights a plain cultural lack, as well as a lack in the quantitative and qualitative descriptive statistics of local care services. This calls for the need to identify and adopt quantitative indicators related to ongoing care assistance, such as home care yearly hours per patient, types of provided services, or waiting time before receiving the requested care.

To understand the multifactorial matrix of the elderly care needs, different factors should be routinely assessed. In fact, one of these factors, individual frailty at community level, is a consequence of social and health factors rather than of specific diseases [19-20].

Such an approach would facilitate the measurement of assets actually related to community care so as to ensure a realistic picture of the relationship between demand and the care supply.

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## References

[1] Ministero della Salute. Programma Operativo Appropriatezza. Febbraio 2011. Available from: http://www.salute.gov.it/imgs/C_17_pubblicazioni_1492_allegato.pdf. (Accessed September 10, 2014)

[2] Ministero della Salute. Manuale di formazione per il governo clinico: appropriatezza. Luglio 2012. Available from: http://www.salute.gov.it/imgs/C_17_pubblicazioni_1826_allegato.pdf (Accessed Septmber 10, 2014)

[3] Mastrilli F. Il governo tecnico dell'ospedale. Edizioni Panorama Sanità, Roma 2010 p.947

[4] Liotta, G., Gilardi, F., Marazzi, M., Mancinelli, S., Scarcella, P. (2011). L'assistenza ospedaliera per la popolazione anziana in Italia: un confronto tra 2001 e 2006. Ann Ig, 23(5), 375-385.

[5] Ministero della Salute. Progetto Mattoni SSN. Misura dell'Appropriatezza. Analisi appropriatezza organizzativa. Valutazione comparativa dei sistemi classificazione iso-gravità. Ottobre 2006. Available from: http://www.salute.gov.it/imgs/C_22_AttivitaMattoni_12_documenti_documento_2_fileAll egato.pdf (Accessed September 20, 2014)

[6] Ministero della Salute. Il sistema di valutazione della pe formance dei sistemi sanitari regionali. Primi indicatori ministeriali. Anno 2008. A cura del Laboratorio Management e Sanità Scuola Superiore Sant'Anna di Pisa. Available from: https://www.salute.gov.it/imgs/C_17_pubblicazioni_1239_allegato.pdf (Accessed September 10, 2014)

[7] Banerjee S. Multimorbidity–older adults need health care that can count past one. Lancet 2014; published online Nov 6. http://dx.doi.org/10.1016/S0140-6736(14)61596-8.

[8] Ministero della Salute. Sistema nazionale di Verifica e controllo sull'Assistenza Sanitaria. http://www.salute.gov.it/portale/temi/p2_4.jsp?lingua=italiano&area=siveas

[9] Regione Lazio. Programma Regionale Valutazione Esiti (P.Re.Val.E.) http://www.epidemiologia.lazio.it/prevale13/

[10] Ministero della Salute. Programma Nazionale Valutazione Esiti. http://www.salute.gov.it/portale/temi/p2_6.jsp?lingua=italiano&id=2905&area=programmazioneSanitariaLea&menu=vuoto. http://151.1.149.72/pne11_new/

[11] Ministero della Salute. Indicatori di appropriatezza organizzativa. Patto per la Salute 2010-2012. Ottobre 2010. Available from: http://www.salute.gov.it/imgs/C_17_pubblicazioni_1421_allegato.pdf (Accessed September 10, 2014)

[12] Ministero della Salute Direzione Generale della Programmazione Sanitaria. Adempimento "mantenimento dell'erogazione dei LEA" attraverso gli indicatori della Griglia Lea. Metodologia e risultati dell'anno 2012. Maggio 2014. Available from: https://www.salute.gov.it/imgs/C_17_pubblicazioni_2154_allegato.pdf. (Accessed September 10, 2014)

[13] ISTAT. Noi Italia, 100 statistiche per capire il paese in cui viviamo: sanità e salute – offerta ospedaliera per regione. Ed 2013. Available from: http://www.istat.it/it/archivio/111872 (Accessed September 5, 2014)

[14] ISTAT. Noi Italia, 100 statistiche per capire il paese in cui viviamo: sanità e salute – medici per abitante. Ed 2010. Available from: http://noiitalia.istat.it/fileadmin/user_upload/allegati/35.pdf (Accessed September 5, 2014)

[15] Network Non Autosufficienza, IRCCS-INRCA. L'assistenza agli anziani non autosufficienti in Italia. 4° Rapporto.Tra crisi e ripartenza. Maggioli Editore 2013

[16] ISTAT. Indagine Multiscopo "Condizioni di salute e ricorso ai servizi sanitari. Anno 2007. Available from: http://www3.istat.it/salastampa/comunicati/non_calendario/20070302_00/ (Accessed September 10, 2014)

[17] Università Cattolica del Sacro Cuore di Roma. Istituto di Igiene. Osservatorio nazionale sulla Salute nelle regioni italiane. Libro bianco 2012. La salute dell'anziano e l'invecchiamento in buona salute. Stato di salute opportunità e Qualità dell'assistenza nelle regioni italiane. Available from: http://www.aies.org/Invecchiamento_in_buona_salute_libro_bianco_2012.pdf (Accessed September 13, 2014)

[18] Liotta G., Mancinelli, S., Scarcella, P., & Emberti Gialloreti, L. (2012). Determinants of acute hospital care use by elderly patients in Italy from 1996 to 2006. Archives of gerontology and geriatrics, 54(3), 364-369

[19] Regione Toscana. Consiglio Sanitario Regionale. La fragilità dell'anziano. Linea Guida. SNLG Regioni 21. 2013

[20] Scarcella P, Liotta G, Marazzi MC, Carbini R, Palombi L. Analysis of survival in a sample of elderly patients from Ragusa, Italy on the basis of a primary care level multidimensional evaluation. Arch Gerotol Geriatr. 2005 Mar-Apr;40(2): 147-56.

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