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IM - COMMENTARY

Persistent asthma hospitalisations and deaths require a national asthma prevention plan

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While asthma prevalence has been reported to be increasing in most countries, asthma hospitalisations and mortality have progressively declined in the last 30 years in almost all countries [1]. These contrasting trends have been attributed in large part to improved diagnosis and management of asthma [2], particularly with corticosteroids [3, 4] and more accurate certification of causes of hospitalisation and death [5].

Finland has been considered the pioneer country in the fight against asthma, both in the original asthma plan that demonstrated a progressive increase of the number of asthmatics properly treated associated with a dramatic reduction of the number of hospitalisations and deaths (Fig. 1, of Ref. [6]), and in the subsequent Finnish Allergy programme from the years 2008 to 2018 [6].

The studies on asthma death have continued in the last decade, particularly after the observation of the persistence of a significant number of asthma death in the UK [5], overall stable over 2001–2018 (with the exception of the elderly, [7]), and associated with potentially preventable factors in the majority of the medical records of cases scrutinised. The presence of preventable risk factors has called for urgent interventions in different area [5, 8, 9].

In contrast with the growing number of studies on asthma death, very few studies have been conducted in the important area of hospitalisations that indeed represent an important burden in asthma [10]. The only laudable exceptions are regional studies, e.g. in Ecuador [11], confirming a continuous decrease of asthma hospitalisations and deaths consistent with the worldwide trends [10].

The study by Para et al. on behalf of the Epidemiology Working Group of the Federazione delle Associazioni dei Dirigenti Ospedalieri Internisti (FADOI) [12] describes the hospitalisations and related deaths in the years 2013 and 2014. The study is timely and important not only because of the clinical and public health implications, but also because it comes from a group of hospitalists working in Departments of Internal Medicine, where the large majority of patients with severe acute exacerbations of respiratory diseases, and particularly asthma, are admitted to.

The authors of the paper examined the hospital discharge database provided by the Italian Ministry of Health limiting the analysis to patients > 15 years of age with the International Classification of Disease (ICD) discharge code 493.02, i.e. acute exacerbation of asthma with allergic rhinitis, recorded between January 1, 2012 and December 31, 2014 (The ICD 493.02 code changed to ICD-10-CM J45.21).

They found that in 2013 and 2014, 20,056 patients with asthma acute exacerbation were hospitalized (0.2% of all national hospitalisations), with 7.9 days median length of hospitalisation, 3.8% requiring mechanical ventilation (767 patients) and an in-hospital mortality of 0.8% (159 patients). They found that old age, comorbidities, low hospital discharge volume, and winter season were risk factors associated with increased hospitalisation, and the same plus the use of invasive and non-invasive mechanical ventilation were also significantly associated with increased in-hospital mortality. In contrast with previous reports, history of hospitalisations in the previous year, pneumonia, and female sex were not significant risk factors, possibly because the study focuses only on hospitalized patients and/or different codes used for pneumonia. In fact, particularly regarding sex, both

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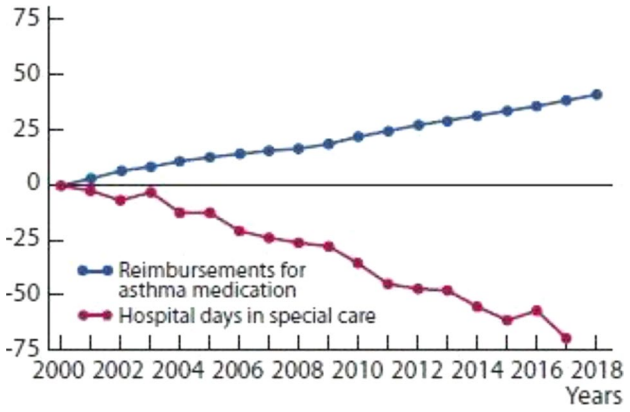

Fig. 1 Decrease in the hospital day in special care obtained with the Finnish Allergy Programme 2008–2018. (Adapted from Fig. 1, Ref [6].)

adult asthma prevalence, hospitalisations and deaths have been reported to be consistently increased in females [10].

Older age is a major risk factor for both hospitalisations and mortality in general, and thus data on hospitalisations/mortality associated with exacerbations of asthma are not surprisingly larger in the elderly (> 35% in patients > 65), but still much less than in COPD (> 90% in patients > 65). Age remains an important risk factor for asthma, but older age (e.g. > 65) [13] is also a major area of overlap between asthma and COPD making difficult the identification of asthma as cause of hospitalisation or death. The main reasons are (1) asthma in the elderly is almost invariably associate with airflow limitation, a characteristic feature of COPD [14], and (2) the coexistence of asthma and COPD is frequent in the elderly [15] and is associated with an increased mortality [16, 17].

Interestingly, however, some of the authors of this paper [12] have recently published a paper using an almost identical protocol on hospitalisations and deaths in patients with COPD [13], identified with the discharge ICD codes 491.21 and 491.22. They found that during the same observation period (2013–2014), there were 170,684 hospitalisations (4.1% of all hospitalisations) due to exacerbations of COPD (ECOPD), with longer length (9.95 ± 8.69 days), and with higher prevalence of mechanical ventilation (7.8%), and in-hospital mortality (9045, i.e. 5.30%). The comparison of the two studies clearly suggests the accuracy of the present study being representative of asthma, and highlights the sharp epidemiological differences between the two diseases, with asthma being associated with much less incidence of hospitalizations and in-hospital mortality compared to COPD.

Interestingly old age, male gender, low discharge volume, previous hospitalisation for COPD exacerbation, mechanical ventilation and comorbidities were the main risk factors significantly associated, even with different weight, with higher hospitalisations and in-hospital mortality, thus with some similarities but also differences (particularly sex and history of previous exacerbations/hospitalisations but not pneumonia) between COPD and asthma hospitalisations.

The identification in the present 2 year study of 20,000 hospitalisations with a mean duration of hospital stay of almost 8 days, and of almost 80 in-hospital deaths per year caused by asthma should be seriously taken into consideration for a carefully analysis of individual medical records aimed to identifying areas of preventive interventions, maybe taking as a model the work of the task force of the Royal College of Physicians on asthma deaths [5] and the recommendations coming from Finland [6, 8]. The first obvious question to address is whether asthma had been properly diagnosed and treated before the hospitalisation, particularly focusing for the probable large proportion of patients without adequate control, as proven by the fact that they were hospitalized [2, 3].

The results of the study of Para et al. [12] suggest the inefficiency of the Italian health system in addressing the small but still important problem of uncontrolled asthma, considering that previous international asthma and allergy programmes have resulted in dramatic reductions of hospitalisations and deaths, e.g. in Finland [6, 8] (Fig. 1). Even if the finnish data need to be corrected for the population of Finland (about 5.5 millions) as compared to Italy (about 59 millions), they suggest that hospitalisation due to asthma exacerbations should be considered rare exceptions, and asthma death should no longer occur in any country and considered an accident.

Apart from age, the other two major risk factors of asthma mortality, i.e. ventilation, and comorbidities, appear all to be modifiable and potentially preventable and/or treatable. Unfortunately, the study of Para et al. was based on ICD codes, thus it could not explore the role of clinical conditions of the patients before hospitalisation such as smoking history, pollution, adherence to treatment and level of control, abuse of salbutamol, all risk factors frequently associated with asthma hospitalizations and deaths [5, 18].

Considering the risk factors identified in the present study, specific recommendations can be made: (1) Multiple chronic conditions associated with asthma that should be carefully searched, and properly diagnosed and treated [2]; (2) Albeit the low hospital discharge may reflect mainly differences in criteria for hospitalisation, it might also suggests poor skills in handling asthma patients in small hospitals, that might be corrected by creating regional asthma reference centres either for consultation and/or for admission and management, and/or for mechanical ventilation of asthmatics, in which specific skills are required [19, 20]; (3) Winter season is a risk factor for most chronic diseases, particularly in the elderly, and is mainly linked to increased risk of infection. Vaccinations, accurate etiological diagnosis,

particularly of viral infections, and targeted early treatment should be considered [2, 21].

The most important and urgent intervention remains a proper management plan for asthma in the outpatient setting to achieve early diagnosis and assessment of severity, and proper management to put asthma under control and thus prevent exacerbations, hospitalisations, and deaths. However, once the patient is admitted to the hospital, specialized clinical asthma centres might represent the ideal clinical setting with the multidisciplinary competences and resources necessary to take care of hospitalized asthmatics, with the aim to provide state of the art treatment, including mechanical ventilation, to shorten hospital stay and, more importantly, to prevent in-hospital asthma deaths. However, this remains to be confirmed with properly designed and powered studies.

Declarations

Conflict of Interest Not Applicable.

Research invloving human and animals This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent For this type of study formal consent is not required.

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