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Asthma diagnosis vs analysis of anti-asthmatic prescriptions to identify asthma in children.

Anti-asthmatics, with antipyretics and antibiotics, are the most frequently prescribed drugs in paediatrics. The prevalence rate of anti-asthmatic use in children ranges between 5% and 26%, depending on a few methodological aspects such as setting, patient's age, year of the study period, and drugs considered [1]. For asthma, an analysis of drug prescriptions as a reliable proxy of chronic disease prevalence is therefore a matter of debate [2]. Furthermore, the control over asthma disease changes over time and drug therapy must then also be modified. However, although there are established standardised questionnaires, several studies have criticized the use of self-reported asthma as an accurate measure of asthma prevalence [3]. Since several countries have health care databases on prescriptions, strategies for estimating the prevalence of asthma, based on the analysis of anti-asthmatic drug prescriptions, were developed and proposed [2, 4-6] as alternative methods of assessing asthma prevalence in a population. A published attempt to validate estimations, based on drug prescription, confronting them with the paediatricians' diagnoses [7] is here replicated in a different setting and with different methodological criteria. According to a previously described approach [4], all paediatric prescriptions reimbursed by the National Health Service (NHS) and dispensed by the retail pharmacies of one of the 15 Local Health Units (LHU) in the Lombardy Region during 2008 for 5,733 children and adolescents 6-17 years old were considered. Subjects receiving at least one package of inhalatory short-acting β -agonists (SABA), non-SABA, or oral formulation of steroids were defined as potential asthmatics (PA). 294 PA patients (5.1%) were identified. A simple questionnaire was prepared and sent to twelve out of 138 family paediatricians working in one randomly selected LHU, who were in charge of a total of 294 of 2,378 patients identified as PA.

Paediatricians provided information on 243 asthmatic 6-17 old subjects and the matching we performed allowed us to calculate false positive and false negative subjects. In 67% of the case the diagnosis was made by the paediatrician only and in 33% of cases it was also confirmed by the allergologist or pneumologist. The ratio boys/girls was 2.4.

The overall prevalence of PA was slightly higher than the diagnosis made by the doctors (5.1 % versus 4.2 %) and the agreement between the diagnosis provided by the paediatrician and that estimated based on drug prescriptions was 73.2% ($p < 0.001$), ranging between 37.5 and 100.0%

(Table 1). The sensitivity (a patient identified as PA by the analysis of prescriptions received, but assigned a non-asthma diagnosis by the paediatrician) was 90.6 % (66.7-100.0), whereas specificity (a patient identified as non-PA by the analysis of prescriptions received, but assigned an asthma diagnosis by the paediatrician) was 98.0% (95.8-99.8). A specificity of 86 % and a sensitivity of 63% in identifying PA were reported in a study in which similar criteria were used [5].

In conclusion, some studies have found prescription data to be a reliable and valid source of chronic disease prevalence [8]. However, limitations of these data do exist. The main limit, in Italy, of these studies utilizing drug prescriptions, is the absence of details on prescriptions (i.e. diagnosis and dose of medication). However, anti-asthmatic drugs are all reimbursed by the Italian NHS, so, unlike other studies, we were able to exclude underestimations due to lower income children. Furthermore, the rate of children treated by private doctors, and who were therefore excluded in our data, is very low. Therefore, these findings will support the use of this strategy in future studies on paediatric population-based drug use surveillance and research and analysis of adherence to international guidelines in treatment choices.

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Table 1. Comparison between diagnosed asthmatic patients and those identified by drug prescriptions

| Paediatrician | Subjects with asthma diagnosis | Estimated PA subjets | Agreement (%) | Kappa (95% CI) | Sensitivity (%) | Specificity (%) | False positive (%) | False negative (%) |
|---------------|--------------------------------|----------------------|---------------|-----------------------------------|-----------------|-----------------|--------------------|--------------------|
| 1 | 21 | 23 | 91.3 | 0.91 (0.81-0.99) | 95.2 | 99.5 | 13.0 | 4.8 |
| 2 | 29 | 25 | 86.2 | 0.88 (0.79-0.98) | 82.8 | 99.8 | 4.0 | 17.2 |
| 3 | 9 | 24 | 37.5 | 0.52 (0.30-0.75) | 90.9 | 96.4 | 66.7 | 11.1 |
| 4 | 22 | 29 | 75.9 | 0.78 (0.66-0.89) | 89.3 | 97.7 | 34.5 | 13.6 |
| 5 | 13 | 9 | 69.2 | 0.76 (0.54-0.97) | 66.7 | 99.8 | 11.1 | 30.8 |
| 6 | 13 | 22 | 59.1 | 0.73 (0.56-0.91) | 100.0 | 98.2 | 40.9 | 0.0 |
| 7 | 15 | 23 | 65.2 | 0.72 (0.56-0.89) | 93.3 | 97.7 | 39.1 | 6.7 |
| 8 | 18 | 24 | 75.0 | 0.85 (0.73-0.97) | 100.0 | 98.9 | 25.0 | 0.0 |
| 9 | 10 | 22 | 45.5 | 0.61 (0.39-0.82) | 100.0 | 95.8 | 54.5 | 0.0 |
| 10 | 48 | 48 | 100.0 | 0.86 (0.78-0.94) | 87.5 | 98.6 | 12.5 | 12.5 |
| 11 | 14 | 16 | 87.5 | 0.86 (0.73-0.99) | 92.9 | 99.3 | 18.8 | 7.1 |
| 12 | 25 | 29 | 86.2 | 0.80 (0.68-0.92) | 88.0 | 93.7 | 24.1 | 12.0 |
| Total | 243 | 294 | 73.2 | 0.79 (0.75-0.83) | 90.6 | 98.0 | 28.7 | 9.7 |