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Michaela Veronika Gonfiantini[a], Alberto Villani[a], Francesco Gesualdo[a], Elisabetta Pandolfi[a], Eleonora Agricola[a], Elena Bozzola[a], Raffaele Arigliani[b] & Alberto Eugenio Tozzi[a]
[a] Bambino Gesù Children's Hospital; IRCCS; Rome, Italy
[b] Italian Medical Research; Benevento, Italy
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SHORT REPORT

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Attitude of Italian physicians toward pertussis diagnosis

Michaela Veronika Gonfiantini,[1,*] Alberto Villani,[1] Francesco Gesualdo,[1] Elisabetta Pandolfi,[1] Eleonora Agricola,[1] Elena Bozzola,[1] Raffaele Arigliani[2] and Alberto Eugenio Tozzi[1]

[1]Bambino Gesù Children's Hospital; IRCCS; Rome, Italy; [2]Italian Medical Research; Benevento, Italy

Keywords: pertussis, chronic cough, under-notification, general practitioners, pediatricians

Abbreviations: GPs, general practitioners

Resurgence of pertussis has been observed in several countries whereas Italy continues to be a low incidence country. We hypothesize that the low reported incidence of pertussis in Italy could be biased by the attitude of physicians to suspect and diagnose pertussis in different age groups. We investigated the attitude of Italian physicians toward pertussis diagnosis through clinical scenarios. A cross-sectional study was conducted in June 2012 sending online questionnaires to pediatricians and general practitioners (GPs) involved in ambulatory primary care. The questionnaire included five clinical scenarios of patients of different ages (45 d, 5 y, 11 y, 24 y, 58 y) with prolonged cough of at least 2 weeks. Respondents were asked to choose a diagnosis among a list of 14. We observed a decreasing trend of suspected pertussis diagnosis with increasing age of the patient (from 46% at 45 d to 0 at 58 y). In Italy pertussis is seldom suspected in the differential diagnosis of cough particularly in adults. This may cause a significant under-notification of pertussis, with a higher impact in older age groups. Educational programs should be reinforced to consider the differential diagnosis of pertussis in individuals with atypical presentation and in older age groups.

Since the introduction of childhood immunization for pertussis, the observed decline of pertussis in young children has been followed in the past decade by a resurgence of this disease in European countries, with an increase in older age groups.[1] Adolescents and adults immunized for pertussis during childhood return susceptible to the disease because of waning immunity after vaccination.[2,3] The clinical presentation of pertussis in these individuals may be milder or atypical compared with children and unvaccinated persons,[4,5] preventing physicians to suspect, diagnose and report the disease.

Italy has a low reported incidence of pertussis, and there has not been an increase in reported pertussis cases in adults as observed in other European countries.[6-8] In Italy pertussis surveillance is mandatory. Despite the availability of real-time PCR and serology for diagnosis confirmation in earlier and later stages of the disease, almost all notified cases of pertussis rely on a clinical case definition.[6,7] Pertussis cases beyond infancy are mostly managed out of hospital unless they present with complications. Primary care in Italy is delivered free of charge by nearly 47,000 general practitioners (GPs) and 8,000 family pediatricians; approximately 95% of them have an electronic health record system.

It is likely that the epidemiology of pertussis according to routine surveillance is affected by the attitude of physicians to suspect the disease in patients of different age groups, particularly in those with mild symptoms as a chronic cough.[9] We therefore investigated the attitude of Italian physicians toward suspecting pertussis in the differential diagnosis of prolonged cough and prescribing appropriate laboratory tests for confirmation in different age groups.

A cross sectional study was conducted among primary care physicians in June 2012 through an online questionnaire reporting clinical scenarios. Five clinical scenarios of patients of different ages with a history of cough of at least 2 weeks were designed by 5 primary care physicians according to common situations observed during clinical practice (**Table 1**).

For each scenario, respondents had to choose one diagnostic hypothesis out of 14 presented choices, and to indicate one to three diagnostic tests for diagnosis confirmation among a list of 14 (**Table 2**). Diagnostic hypotheses included acute and chronic respiratory diseases, and diagnostic tests included blood tests, serology and PCR for pertussis and other diagnostic procedures.

We set a sample size of at least 100 respondents assuming an expected frequency of the items included in the questionnaire of 50%, a precision of +/–10% and a confidence level of 95%.

Questionnaires were published online to reach a network of Italian family pediatricians and GPs and administered using Computer Assisted Web Interviewing (CAWI) within the Health Monitor program of CompuGroup Medical (CGM) Italia, a company providing electronic health records to nearly

*Correspondence to: Michaela Veronika Gonfiantini; Email: michaela.gonfiantini@gmail.com
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Table 1. Description of five clinical scenarios proposed to general practitioners (GPs) and family pediatricians to evaluate the attitude to suspect and diagnose pertussis in the differential diagnosis of prolonged cough

Age	Type of cough	Duration of cough	Vomiting	Immunization against pertussis	Other information
45 d	Coughing spells	2 weeks	Yes	No	Apnea
5 y	Dry cough	4 weeks	No	3 doses in the first year of life	No other signs. Family history of allergic disease
11 y	Dry cough, especially at night	3 weeks	Yes	3 doses in the first year of life and 1 dose at 5 y	History of wheezing
24 y	Coughing spells	3 weeks	Yes	3 doses in the first year of life and 1 dose at 5 y	No
58 y	Dry or catharral cough, often at night	4 weeks	No	None	No

Table 2. Proposed diagnoses and diagnostic tests in the five clinical scenarios

Proposed diagnoses (1 choice)	Acute bronchitis
	Acute nasopharyngitis
	Asthmatic bronchitis
	Bronchiolitis
	Chronic obstructive pulmonary disease
	Food allergy
	Gastroesophageal reflux
	Laryngotracheitis
	Lung cancer
	Pertussis
	Pneumonia
	Pulmonary edema
	Sinusitis
	Tonsillitis
Diagnostic tests for diagnosis confirmation (3 choices)	Chest X-ray
	Complete blood count and CRP
	ECG
	Laryngoscopy
	No diagnostic test
	PCR for pertussis
	PCR for respiratory viruses on nasopharyngeal aspirate
	PCR test for Adenovirus on blood specimen
	Pharyngeal swab
	pH-metry
	Serology for pertussis
	Skin Prick Testing
	Skull X-ray
	Total and specific IgE testing

40% of physicians involved in primary care. Questionnaires were electronically collected and analyzed to describe the proportion of practitioners suspecting pertussis in each clinical scenario and the proportion of them who would prescribe a serology or a PCR test for pertussis, with 95% confidence intervals. To be consistent with the Italian health care setting, in the analysis of the suspected diagnosis we considered responses by pediatricians for scenarios in 0–14-y olds, and by GPs for scenarios in adults. For the analysis of prescribed laboratory tests for diagnosis confirmation we considered responses by all physicians (pediatricians and GPs) who suspected pertussis. Missing data were excluded from the analysis.

We received 815 questionnaires of whom 187 were from pediatricians (22.9%) and 628 from GPs (77.1%), representing 2.4% and 1.3% of the Italian family pediatricians and GPs, respectively. Most respondents answered to all items; the highest percentage of non-response varied from 2.2% to 13.9% for each scenario. The scenario with the highest percentage of non-response was the one describing a 24-y-old woman.

The pattern of responses for a suspected diagnosis of pertussis by age is shown in **Figure 1**. Considering scenarios in pediatric patients, pertussis was indicated as the most likely diagnosis in the infant and in the pre-adolescent (11 y of age), by 46.0% (95% CI 38.1–54.0) (74/161) and 25.1% (95% CI 19.1–32.0) (47/187) of pediatricians respectively. In the preschool scenario, only 6.0% (95% CI 2.9–10.7) (10/167) of pediatricians suspected pertussis. Suspicion of pertussis was infrequent among GPs. Pertussis was suspected only by 8.5% (95% CI 6.4–11.0) (52/614) of the GPs in the scenario describing a 24-y-old woman and by none (95% CI 0.0–0.6) (0/628) in the scenario describing a 58-y-old patient.

Proportion of physicians who would prescribe a PCR or a serology test for confirmation was high, independently of patient's age: 90.5% (95% CI 85.7–94.1) (191/211) in infants, 92.1% (95% CI 82.4–97.4) (58/63) in the preschool child, 79.5% (95% CI 72.9–85.0) (147/185) in the pre-adolescent, 88.9% (95% CI 80.5–94.5) (80/90) in the 24-y-old woman and 100% (95% CI 47.8–100) (5/5) in the 58-y-old man. No evident difference by age group was detected in the attitude of physicians to prescribe a serology test or a PCR test.

The low attitude of Italian physicians to suspect pertussis in the differential diagnosis of prolonged cough is likely to affect the epidemiology of the disease according to routine surveillance.

We observed a different attitude of pediatricians and GPs toward suspecting pertussis in patients of different age groups presenting with a prolonged cough, with a decreasing trend of suspected pertussis diagnosis as the age of the patient increased. The age groups in which the respondents suspected pertussis more frequently are those with a higher reported incidence of

pertussis in Italy, according to routine surveillance.[8] The highest incidence is in children < 1 y of age, followed by children aged 10–14. Incidence in adults approaches zero.

Several factors may explain our results. Pertussis is not perceived as a frequent disease in Italy since immunization coverage increased in the late nineties. After 1998 no epidemics have been observed and pertussis incidence has continued to decrease, in particular in the adult population. No deaths associated with pertussis have been reported since 2002, even in infants.[6] Although this observation does not support the under-recognition of pertussis circulation, infant deaths associated with respiratory diseases may be misclassified, as observed elsewhere.[10] On the other hand, it is likely that pertussis cases with a mild presentation, especially in vaccinated individuals or in older children and adults, may be disregarded and therefore not reported to routine surveillance. Respondents in our survey frequently indicated other potential diagnoses: bronchiolitis in infants, allergic diseases in the preschool child, upper respiratory tract infections and gastroesophageal reflux in the pre-adolescent, upper respiratory tract infections and allergic diseases in the 24-y-old woman, chronic obstructive pulmonary disease in the 58-y-old man.

In our survey a high proportion of respondents would prescribe a serology or a PCR test to confirm the diagnosis of pertussis. Nevertheless, in Italy, although serology and real-time PCR are available, notification of pertussis cases mainly relies on the clinical case definition.[6] Other authors have previously reported a gap between knowledge of pertussis management and actual adherence to guidelines.[11]

Similar results regarding a low perception of pertussis as a disease of concern for adults have been shown by other online surveys involving GPs in Europe.[11-13] Pertussis was seldom diagnosed in adults and GPs did not perceive pertussis as a serious disease for adult patients.[12,13] Consequently there was a low perception of the need to vaccinate adults against pertussis.[13]

Despite the results of our survey are limited by testing the clinical scenarios in a convenience sample of physicians, we likely selected physicians with greater interest and attention to diagnostic processes. Therefore, we speculate that the attitude to suspect and diagnose pertussis in the general population might be even lower than that measured in our study.

These results were obtained in the Italian setting, a country with a high immunization coverage and a low reported incidence of pertussis. Generalizability of these observations to other countries remains to be shown.

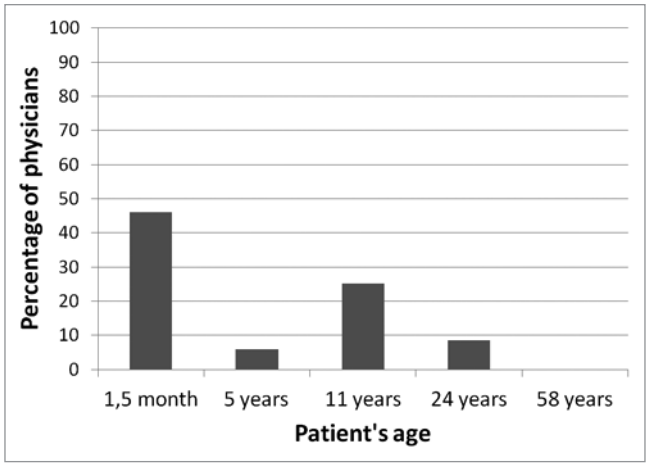

Figure 1. Percentage of physicians suspecting a diagnosis of pertussis by age of the patient of the clinical scenario.

Waning immunity after vaccination does not allow to efficaciously control pertussis even in countries with a high immunization coverage. Immunization strategies in older age groups may be important to prevent outbreaks.[1] Under-recognition of pertussis cases may limit the ability of the public health system to guide its actions based on the epidemiology of the disease. Educational programs should be reinforced to consider the differential diagnosis of pertussis in individuals with atypical presentation and in older age groups.

Disclosure of Potential Conflicts of Interest

A.E.T. has received grants for clinical studies by Wyeth/Pfizer (conjugate pneumococcal vaccine), Glaxo SmithKline (measles-mumps-rubella-varicella vaccine) and Sanofi Pasteur MSD (diphtheria-tetanus-polio-HBV-Hib-pertussis vaccine). R.A. has acted as consultant for Glaxo SmithKline for counseling on Rotavirus vaccine.

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