

Pertussis knowledge, attitude and practices among European health care professionals in charge of adult vaccination

Muriel Hoffait,^{1,*} David Hanlon,² Bernd Benninghoff¹ and Stijn Calcoen¹

¹GlaxoSmithKline Biologicals; Wavre, Belgium; ²Kantar Health; TNS Healthcare; Epsom, UK

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Abbreviations: HCP, health care physician; STIKO, ständige impfkommision

Despite successful infant vaccination program, pertussis remains endemic in many countries. Waning immunity leaves adolescents and adults susceptible to disease and potential reservoirs of infection allowing transmission to vulnerable infants. Misdiagnosis leads to significant underestimation of disease burden and inappropriate treatment. This online survey of 517 European health care professionals (HCP) examined their knowledge, attitudes and practices regarding pertussis and adult vaccination. Compared with other vaccine-preventable diseases, HCPs did not perceive pertussis as a serious disease in adults and there was a low perceived need for adult vaccination; only 17% mentioned pertussis as a disease they would usually vaccinate adults against. Pertussis incidence was considered to be low. Although the majority of HCPs agreed that vaccination is useful to prevent pertussis transmission from adults to susceptible infants, respondents discussed pertussis vaccination with $\leq 5\%$ of patients; 58% respondents had never prescribed a pertussis vaccine to adults. The perceived low incidence of pertussis in adults and the lack of official guidelines/recommendations were cited as key reasons for not administering pertussis boosters. Despite only taking place in four countries, our results suggest that the incidence and burden of adult pertussis is not reflected in the attitudes of European HCPs to the disease. Awareness of adult pertussis, its diagnosis and guidance on pertussis boosters should be raised to protect adults and vulnerable infants and to manage the consequences of waning pertussis immunity.

Introduction

Despite successful infant vaccination program, pertussis is not yet optimally controlled and remains endemic in many countries.¹ It is a major cause of morbidity and mortality worldwide.^{2,3} In the past two decades, it has resurfaced as a public health problem in many countries⁴ and there are public health concerns that there may be a possible re-emergence of the disease.⁵ Countries such as Germany and the US that have successful infant vaccination program and good control of the disease are experiencing more cases of pertussis in older age groups.^{1,6} Indeed, it is also the only vaccine preventable disease that is increasing in the US.⁷

There have been reports that infection- or vaccine-acquired immunity to pertussis can be long lasting, lasting up to 30 years in some cases of infection-acquired immunity.⁵ However, immunity begins to wane after only four years (range 4–20 years for infection-acquired immunity and 4–12 years for vaccination-acquired immunity); this has been cited as a reason for the high reported incidence seen particularly in adolescents, adults and pre-school children.⁴

Pertussis constitutes an important respiratory disease burden in adolescents and adults. In addition, infected adolescents and adults may act as a reservoir of infection and cause severe disease in susceptible children, such as newborns and part-immunized infants.⁷ Extending the use of vaccinations for older children, adults and adolescents should reduce the circulation of *Bordetella pertussis* disease in that age group⁸ and provide continuous protection against pertussis throughout life. Despite this, pertussis booster vaccination coverage across Europe in adults and adolescents varies, but is generally low.⁹ A recent consensus statement recommends regular booster vaccinations against pertussis for the whole population.¹⁰

Routine immunization of adolescents and adults would significantly reduce the overall burden on the population, including in young infants;¹¹ however guidelines on the use of a vaccination in adults against pertussis vary. The US guidelines, the Advisory Committee on Immunization Practices, recommend that all adults younger than 65 years of age, and especially those in contact with infants younger than one year old, should receive a vaccination or a booster vaccination if their last vaccination was over 10 years earlier.¹² The Global Pertussis Initiative recommends

*Correspondence to: Muriel Hoffait; Email: Muriel.hoffait@gskbio.com
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Table 1. Demographics of the respondents

Country	Finland N (n%)	Germany N (n%)	Poland N (n%)	Spain N (n%)
Specialty:				
GP	51	156	101	95
Occupational Health Doctor	54	-	-	30
Preventative Medicine Doctor	-	-	-	30
Total	105	156	101	155
Mean number of years in practice	14	15	12	16
SE 95%	0.67	0.44	0.66	0.51
Mean number of patients treated per month	282	656	504	611
SE 95%	14.2	26.2	27.6	31.4
Mean number of adult patients* seen per month	244	531	388	503
SE 95%	11.7	22.7	23.5	27.4
Mean number of adult patients personally vaccinated or recommended vaccination per month	20	78	26	52
	(8% [§])	(15% [§])	(7% [§])	(10% [§])
SE 95%	1.6	4.7	2.6	7.2

*Adults aged 18 years or over; [§]Proportion of adults seen per month who were vaccinated. Figures show Means and Standard Errors at the 95% level.

that existing vaccination strategies should be expanded to include selective vaccination of adults who are in close contact with infants, but the feasibility of universal adult vaccination is questioned.¹³ Until recently, German guidelines (German Standing Vaccination Committee; Ständige Impfkommision, STIKO) recommended vaccination for adults in close contact with infants,¹⁴ but the update in 2009 expanded the recommendation to cover all adults.¹⁵ The Finnish and Spanish recommendations both recommend vaccination for adults in close contact with children. Adolescent pertussis boosters are also administered in Finland, but not in Spain. In Germany, the STIKO guidelines are implemented by law.¹⁶ There are no guidelines regarding pertussis vaccinations in Poland to date.

This paper describes the results of a detailed online survey of over 500 participants that examined the knowledge, attitude and practices of health care professionals (HCPs) in four countries across Europe with regard to pertussis disease and vaccination in adults.

Results

A total of 517 HCPs from Germany, Finland, Poland and Spain took part in the survey (Table 1).

Compared with other diseases in adults that can be prevented by the use of vaccines, such as diphtheria or influenza, HCPs did not view pertussis as a serious disease (Fig. 1). When asked which diseases they usually vaccinate adults against, only 17% spontaneously mentioned pertussis, compared to tetanus, which was the most common disease vaccinated against, being mentioned by 81% of HCPs. When broken down by country, more HCPs in Germany and Finland mentioned pertussis (38% and 20% respectively), compared to Poland and Spain (3% and 2% respectively).

There was, therefore, a low perceived need to vaccinate against pertussis in the adult population in comparison to other infections (43% of respondents). Tetanus and hepatitis B were considered to be the most important diseases to be vaccinated against

(89% and 78% respectively; Fig. 1). However, in Poland, HCPs consider that vaccination against pertussis should be on par with pneumonia and greater than hepatitis A.

In terms of diagnosing pertussis in adults (Table 2), key symptoms and signs that were cited were a persistent, dry cough resistant to treatment, accompanied by coughing fits and a characteristic sound. However, there were discrepancies in responses concerning the severity of the cough, with 33% of HCPs answering that the frequency and severity of the cough aids in the diagnosis of pertussis. There were also discrepancies in the responses regarding the use of other symptoms to diagnose pertussis, with 26% of HCPs citing fever, 17% the presence of breathing difficulties and 11% cough leading to vomiting.

The incidence of pertussis in adults was considered to be low; only 50% of the respondents reported seeing pertussis in adults, with an average of eight cases per year (three in Spain). HCPs in Finland and Germany were more likely to have seen cases than their counterparts in Poland and Spain. Adult pertussis did not appear to affect one age group in particular, occurring in 18–55-year-olds. The perceived low incidence of pertussis in adults was cited as a reason why adult vaccination is not considered useful.

The majority of HCPs agreed that vaccination of adults is useful to prevent transmission of pertussis to susceptible children. However, 58% of HCPs have never prescribed or recommended a pertussis vaccine to adults. HCPs in Poland are least likely to have prescribed the vaccine, whereas those in Germany were most likely (Fig. 2). However, 43% of those who have not prescribed a vaccination for pertussis previously claim that they are likely to do so in the future. Adults who are in close contact with children are most likely to have been recommended or prescribed the vaccination against pertussis; 47% of HCPs who had previously recommended or prescribed the vaccine had targeted this group. In Finland, adults in contact with children are more likely to be prescribed or recommended the vaccination against pertussis (65%), whereas in Spain there is little consistency in which subject types are likely to be vaccinated.

With the exception of Germany, HCPs generally discuss pertussis vaccination with fewer than 5% of patients. Half of all discussions about pertussis vaccination are initiated by HCPs, while a third of HCPs have not discussed this issue with patients. In Germany, however, such discussions are more common, and are initiated mostly by the HCP.

A lack of official guidelines or recommendations was given as a key reason for not administering pertussis boosters. Respondents stated that the publication of official guidelines or recommendations and a higher perception of clinical need in adults would encourage prescribing both in non-prescribers and also current prescribers. Upon presentation of guideline text, 70% of non-prescribers indicated they would be likely to recommend the vaccination in the future. Almost all of the HCPs interviewed (98%) felt that actions could be taken to encourage prescription of the vaccine.

Discussion

Despite successful infant vaccination programmes, pertussis is not yet optimally controlled. Waning immunity leaves adolescents and adults susceptible to disease and they may act as a reservoir of infection allowing transmission to vulnerable infants.¹

There are concerns that there may be a possible re-emergence of the disease.⁵ Pertussis also constitutes an important respiratory disease burden in adolescents and adults. Although there are some vaccination programs in place, booster vaccination coverage is generally low and varies between countries. This survey of over 500 HCP from four different European countries, examined the knowledge, attitudes and practices of HCPs regarding pertussis disease and vaccination in adults.

The survey was limited to only four countries, but the results suggest that the observed increasing incidence and burden of adult pertussis has not influenced the attitudes of European HCPs to the disease. Pertussis is considered less serious than other infectious diseases and is perceived to be relatively uncommon in adults. Consequently, most HCPs do not consider pertussis as a disease against which adults should be vaccinated. A survey amongst adult travelers, a group of individuals who would have received booster vaccinations for other infectious diseases, showed that knowledge about pertussis was poor, and although the illness was viewed as serious, almost no one had received a booster vaccine.¹⁷

The current survey found differences between physicians in the symptoms that are considered diagnostic of pertussis. Although there is no means by which to confirm the number of pertussis cases actually seen by the responding HCPs, these inconsistencies in diagnostic criteria may indicate a degree of under- or misdiagnosis. Indeed, despite increasing prevalence, only half the HCPs surveyed said they have seen pertussis in adults, with an average of eight cases per year. Awareness of the disease needs to be raised in HCPs to avoid these problems in diagnosis and to highlight the potential severity and infection risk of the disease in adults. This underreporting and misdiagnosis of pertussis may lead to significant underestimation of the burden and the use of inappropriate treatment.

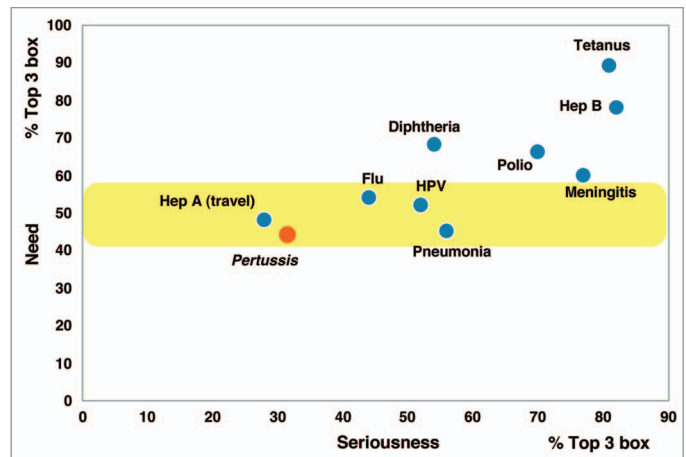


Figure 1. Perception of severity of pertussis compared with other vaccine-preventable diseases. Seriousness of the vaccine-preventable disease (x-axis) vs. the perceived need to vaccinate (y-axis). Top 2 box equals - summation of scores of 8, 9, and 10 on a ten point scale.

Although the majority of HCPs participating in the survey agreed that vaccination is useful in adults to prevent transmission of pertussis to susceptible children, only two out of five HCPs interviewed had prescribed or recommended a pertussis vaccine to adults. The HCPs who currently prescribe or recommend the vaccine, tend to do so in adults who are close to young children, such as healthcare workers who care for babies or those who work in nurseries and elementary schools, as well as future parents and grandparents. Discussions regarding the pertussis vaccination are very infrequent and are mainly initiated by HCPs. These observations could be due to lack of knowledge; another survey of healthcare workers showed that knowledge of occupational vaccines, especially pertussis, was low.¹⁸

Although routine immunization of adolescents and adults would significantly reduce the overall burden on the population, including in young infants, global and country specific guidelines only recommend vaccination of adults who are in close contact with infants, and question the feasibility of universal adult vaccination against pertussis.¹³ Nevertheless, in Germany, the STIKO guidelines are well known and implemented by law.¹⁶ They recommend vaccination against pertussis for all adults.¹⁵ Consequently, only 31% of the German HCPs interviewed had not prescribed a pertussis vaccination compared to much higher proportions in other countries whose guidelines are not so well known or where there are no country specific guidelines. Further information and guidance on the diagnosis and prevention of pertussis, together with a higher perception of clinical need for the vaccination in adults are required to encourage prescribing of the vaccine in order to manage the consequences of waning pertussis immunity and transmission to vulnerable infants.

Despite only taking place in four countries, the results from the survey suggest that the rising incidence and burden of adult pertussis has not influenced in the attitudes of European HCPs to the disease. Awareness of adult pertussis, its diagnosis and

Table 2. Most important symptoms to diagnose pertussis in adults (cited by over 12% of HCPs participating in the survey)

	Total % (n = 517)	Finland % (n = 105)	Germany % (n = 156)	Poland % (n = 101)	Spain % (n = 155)
Cough (any type)	91	86	88	94	94
Persistent/troublesome/treatment resistant cough	50	57	59	46	39
Frequency/severity of cough	33	38	40	46	13
Dry/irritative cough	16	12	26	16	8
Cough with a characteristic sound	13	10	17	19	7
Fever	26	12	17	25	45
Breathing difficulties	17	12	12	33	16
Generally unwell	15	5	17	15	21
Results of examination	13	13	17	18	6

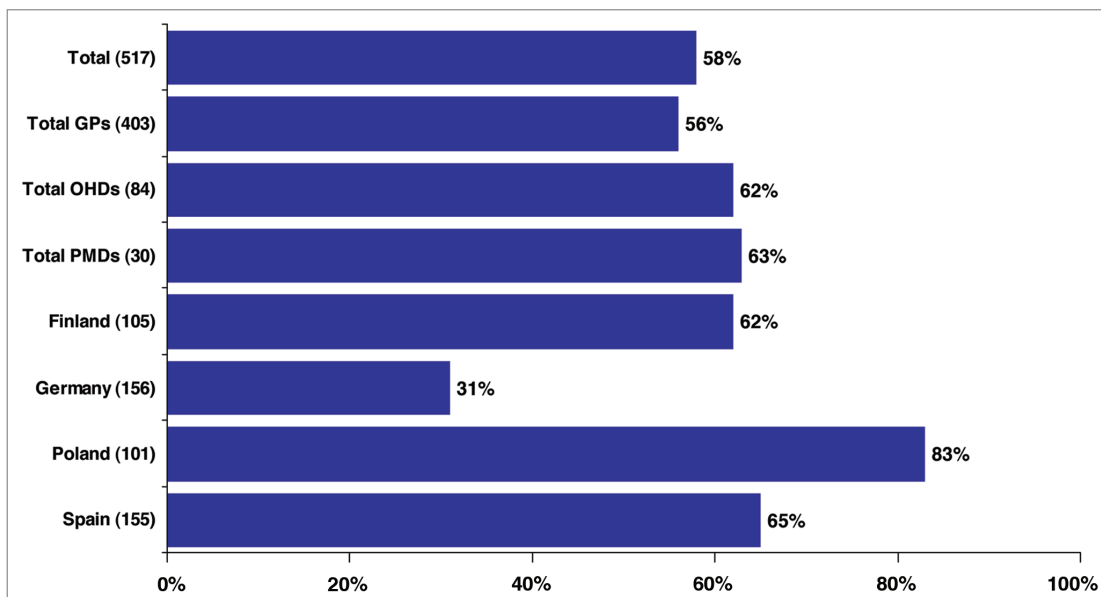


Figure 2. The percentage of HCPs who have never prescribed or recommended a pertussis-containing vaccine to adults aged 18 years or over. GP, General Practitioner; OHD, Occupational Health Doctor; PMD, Preventative Medicine Doctor.

guidance on prevention needs to be raised in order to prevent mis-diagnosis and manage the consequences of waning pertussis immunity and transmission to vulnerable infants.

Methods

This research comprised Internet-based interviews between July 11 and August 18, 2008. HCPs responsible for adult vaccination, in Germany, Finland, Poland and Spain were invited to take part. Germany has a decentralized healthcare system in which most primary care is provided by private physicians. Finland has a decentralized system with primary care mainly provided by municipal health centers, and some private practices. In Poland, compulsory health insurance allows free medical care from state service providers. Non-subsidized healthcare through private practitioners is also available. In Spain, most healthcare is provided through a decentralized public system.

Recruitment. The research was conducted using a questionnaire administered over the Internet. Physicians were either sent a direct internet link inviting them to participate, or were recruited by telephone and then sent Internet links, depending on the country. The physicians were recruited from a proprietary list of physicians who have agreed to participate in market research and who have no affiliation to pharmaceutical companies or PR/advertising agencies who work in the pharmaceutical industry. The research and recruitment to the physician list follows the codes of conduct for market research in the Pharmaceutical industry (regulated by EphMRA/ESOMAR/ABPI) ensuring that the respondents are covered by data protection laws in each country and are aware of the purpose of the study. The lists cover at least 20% of the practicing physician population. Respondents were recruited at random from the lists. Within the random design, quotas were set within broad regions in each country (based on actual proportions of

physicians in each region) to ensure a representative geographical spread across each country.

Screening and questionnaire. Knowledge, attitude and practices with regard to pertussis disease and vaccination in adults were assessed in general practitioners (all countries), occupational health doctors working in hospitals (Finland and Spain only), preventative medicine doctors (Spain only) and occupational health doctors working in a company, university or college (Finland only).

All HCPs in Finland, Poland and Spain were screened to ensure that they treated adult patients (aged 18 years and over) and were vaccinating, or recommending vaccination to, at least 10 adult subjects per month for any condition, in addition to standard recruitment criteria. HCPs in Germany were screened to ensure that they were vaccinating, or recommending vaccination to, at least 30 adult subjects per month for any condition.

The on-line questionnaire asked questions about the physicians' knowledge of pertussis disease, their attitude to vaccination of adults against pertussis, their pertussis caseload, their usual practices in terms of recommending and prescribing pertussis

vaccination, and their awareness of national pertussis booster recommendations. The questionnaire is available as an appendix to this paper (appendix found in Sup.).

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Conflict of Interest

This study was funded by GlaxoSmithKline Biologicals. M. Hoffait, B. Benninghoff and S. Calcoen are employees of GlaxoSmithKline Biologicals. D. Hanlon;² is an employee of Kantar Health who undertook the market research.

All authors participated in the design or implementation, analysis and interpretation of the study, and the decision to submit the manuscript for publication.

Note

Supplementary materials can be found at:
www.landesbioscience.com/journals/vaccines/article/13918/

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