

Original article

# Pertussis vaccination coverage among French parents of infants after 10 years of cocoon strategy

## *Statut vaccinal vis-à-vis de la coqueluche des parents de jeunes nourrissons après 10 ans de stratégie du cocooning en France*

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### Abstract

**Objectives.** – The cocoon strategy against pertussis has been recommended in France since 2004 to indirectly protect young infants who are not yet vaccinated. We aimed to measure vaccination coverage among French parents of infants.

**Methods.** – A representative sample of 300 mothers and 200 fathers of infants aged <12 months completed a self-administered online questionnaire. They all provided their own vaccination records.

**Results.** – Overall, 87% of mothers believed vaccination against pertussis to be important; 83% reported being immunized against pertussis but their vaccination records showed that a third of them was wrong (34%). On the basis of our sample, the 2009–2014 vaccination coverage against pertussis among mothers increased from 22 to 61% ( $P < 0.005$ ); over the same period of time, vaccination coverage against diphtheria, tetanus, and polio remained stable (80%). Vaccination coverage against pertussis among fathers increased from 21 to 42% between 2010 and 2013 ( $P = 0.009$ ). In 2013, one couple out of four (26%) was adequately immunized against pertussis.

**Conclusion.** – The cocoon strategy was implemented 10 years ago in France but vaccination coverage remains suboptimal among parents of young infants. Healthcare professionals must recommend vaccination against pertussis to young adults and check that their vaccination status is up to date.

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**Keywords:** Cocooning; Pertussis; Vaccination coverage; Vaccination

### Résumé

**Objectifs.** – La stratégie vaccinale, dite de cocooning, a été instaurée en France en 2004 pour protéger indirectement les nourrissons non encore vaccinés contre la coqueluche. Nos objectifs étaient d'évaluer le taux de couverture vaccinale (CV) coqueluche et son évolution chez les parents de nourrissons.

**Méthode.** – Enquête réalisée sur Internet par questionnaire auto-administré sur un échantillon représentatif de 300 mères et 200 pères de nourrissons de 0 à 12 mois, avec estimation de la CV coqueluche à partir de leur carnet de santé.

**Résultats.** – Au total, 87 % des mères interrogées considéraient qu'il était important d'être protégées contre la coqueluche lors d'un projet de naissance. Elles étaient 83 % à penser être à jour vis-à-vis de la coqueluche, mais après vérification du carnet de santé, un tiers (34 %) d'entre elles

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se trompaient. Entre 2009 et 2014, sur la base de l'échantillon interrogé, la CV coqueluche chez les mères est passée de 22 à 61 % ( $p < 0,005$ ), alors que sur la même période la CV diphtérie, tétanos et poliomyélite est restée stable (80 %). La CV coqueluche chez les pères est passée de 21 % en 2010 à 42 % en 2013 ( $p = 0,009$ ). En 2013, les vaccinations contre la coqueluche étaient à jour chez un couple de parents sur quatre (26 %).

**Conclusion.** – La stratégie de cocooning mise en place en 2004 peine toujours à s'implanter en France. Les professionnels de santé doivent continuer de sensibiliser les jeunes adultes vis-à-vis de cette vaccination et vérifier les carnets de vaccination.

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**Mots clés :** Cocooning ; Coqueluche ; Couverture vaccinale ; Vaccination

## 1. Introduction

Pertussis is a highly contagious bacterial infection of the respiratory tract with a basic reproduction number ( $R_0$ ) of 15 to 17 (an index case may be responsible for up to 17 secondary cases within a non-immunized population) [1]. On the basis of recent data published by the World Health Organization (WHO), the number of pertussis case patients was estimated at 16 million in 2008; 95% of these patients came from developing countries and pertussis was associated with 195,000 pediatric deaths (<5 years of age) [2].

The incidence of pertussis in France significantly decreased with the introduction of the pertussis vaccine in the 1960s. However, disease resurgence was observed in the 1990s, particularly among infants too young to be vaccinated [3]. *Bordetella pertussis* can still be observed as neither the disease nor the vaccine offers long-term protection against pertussis [4]. In France, the epidemiological monitoring of pertussis among children falls under the responsibility of the National Institute for Public Health Surveillance (French acronym InVS) via the Hospital surveillance network for pertussis (Renacoq). The network is able to monitor approximately 30% of all pediatric patients hospitalized for pertussis [5]. Overall, 3318 confirmed cases of pertussis among infants aged <6 months were reported to the network between 1996 and 2012. Of the 2227 hospitalized case patients for whom the pediatric information sheet had been completed, 68% were aged <3 months, 18% were admitted to the intensive care unit (ICU), and 37 died (including 33 infants aged <3 months) [5]. The results of a French study conducted in 32 pediatric ICUs between 1999 and 2000 revealed that pertussis was the first cause of death due to community-acquired bacterial infections among infants aged <2 months (13 deceased patients out of 30) [6].

Infants are frequently infected by surrounding adults. On the basis of the Renacoq data and only when the source of infection was identified, parents were responsible for the infection in half of pertussis case patients [5]. This data is consistent with international data [7,8]. Mothers are most likely to transmit pertussis to their newborn [9].

Protecting infants against pertussis as soon as they are born (before being able to receive the vaccine) is indirectly possible with the cocoon strategy. The strategy aims at immunizing close contacts of the child. It has been recommended in France since 2004 and is regularly updated. It is recommended in adults planning on having a child, during pregnancy for children, husbands, and any individual likely to be in close contact with the future

newborn during the first six months of his life, and right after giving birth for mothers [10,11]. The cocoon strategy was first updated in 2013 and then in 2014 by the High Council for Public Health (French acronym HCSP) with the introduction of a booster for all adults at the age of 25 and with a catch-up dose until 39 years old for individuals who did not receive the booster dose [12].

There is currently no French data collection system for adult vaccinations in routine practice. Data is only obtained via the vaccination parts of large-scale population-based surveys. Vaccination coverage (VC) evolution thus cannot be studied and VC data on pertussis is scarce [13]. The Vaccinoscopie® study consists in an annual survey performed by the French IDM/Institut des Mamans and funded by GSK company. Each year the survey measures the VC among parents of infants using their vaccination records. The most recent data published by the Vaccinoscopie® study on pertussis revealed an insufficient VC: only 37% of mothers and 40% of fathers of infants were adequately immunized in 2011 [14]. We aimed to measure the evolution of the pertussis VC among parents 10 years after the introduction of the cocoon strategy in France.

## 2. Material and methods

The Vaccinoscopie® study aims at studying the VC evolution for various infections and at gathering data on mothers' perception and behavior towards their own vaccination as well as that of their children. The survey is carried out every year between September and December. One section is dedicated to pediatric vaccination since 2008 (methodology previously described [15]) and a second section is dedicated to the parents' vaccination since 2009 to measure the VC of mothers of infants or that of mothers and fathers.

Two representative samples of mothers of infants (<12 months) living in metropolitan France and selected from the IDM panel are interviewed each year via a self-administered online questionnaire as follows:

- the first sample includes 1000 mothers and aims at measuring the proportion of mothers with an accurate proof of vaccines received so far;
- the second sample includes 300 mothers with their own vaccination dates written on their health record, and who sent a photocopy to IDM. The aim is to measure the pertussis VC and

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