PERTUSSIS INCIDENCE IN OLDER INDIVIDUALS: RESULTS FROM THE FRENCH EPICOQSEN STUDY

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CONFLICT OF INTEREST DISCLOSURE

I have the following potential conflict of interest to report:
- remuneration as member of the scientific committee for EPICOQSEN study (GSK and Sanofi Pasteur-MSD).
BACKGROUND (1/4)  EPIDEMIOLOGY

- Exposure study
- Seroepidemiological study
- Clinical epidemiological study based on symptomatology
- Spontaneous notification by physicians
- Network monitoring: National Reference Center, Renacoq...
- Hospital statistics: cohorts, medicalized information system program (PMSI)...
- Death certificates

Transmission, periodicity, carriage, diagnosis, incidence...
• **RENACOQ - *Bordetella pertussis*: 1996-2012**

Adults aged ≥ 30 years are main contaminators of 0-5-months-old infants

Increasing: 31% in 1996-1998 vs 42% in 2008-2012 ($p=0.015$)
HOSPITALISATION DUE TO PERTUSSIS IN FRANCE

Transmission, periodicity, carriage, diagnosis

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of cases (n)</th>
<th>In-hospital mortality (PMSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months old</td>
<td>2,619 (37.1%)</td>
<td>3 months old (n=2,619)</td>
</tr>
<tr>
<td>50 years old</td>
<td>1,594 (22.5%)</td>
<td>50 years old (n=1,594)</td>
</tr>
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Mortality:
- 3 months old: 22 (0.8%)
- 50 years old: 25 (1.6%)

**Figure 1** Distribution of cases per age group over 2006-2012 period.

**Figure 2** Distribution of total number of cases per year.

*Gaillat et al. J Vaccines Immun. 2015*
People aged 50 years and older can be infected with *Bordetella pertussis* and participate in its persistent circulation.
OBJECTIVE AND METHOD

OBSERVATIONAL EPIDEMIOLOGICAL STUDY

• Objective
  – Estimate the incidence of pertussis in adults aged ≥ 50 years in 3 survey areas that differ by population density: large cities, medium-sized cities, and rural areas.

• Method
  – Observational prospective epidemiological study
  – From June 2013 to August 2014
  – Volunteer General Practitioners (GP) using Axisanté® software
  – Inclusion of all patients aged 50 years and older
    • spontaneously consulting for a 7- to 21-day history of persistent cough
    • who signed an informed consent form
  – Nasopharyngeal swab at GP discretion
Nasopharyngeal swab

Partner central laboratory

*Bordetella* PCR performance

Other central laboratory

National Reference Center for Pertussis and other *Bordetella*

Species determination:
*B. pertussis*, *B. parapertussis*, *B. bronchiseptica*, *B. holmesii*
DEFINITIONS OF PERTUSSIS CASES

- **Biologically confirmed case patient**
  - PCR+ (*Bordetella*)

- **Direct epidemiological case patient**
  - Coughing attacks ≥ 8 days
  - Known contact with a biologically confirmed case patient during the 3 weeks preceding onset
  - PCR-

- **Clinical case patient**
  - Nocturnal cough disturbing sleep ≥ 14 days AND
    - Cough attacks leading to difficult breathing OR whooping cough OR cyanosis or apnoea OR post-cough vomiting OR hyperlymphocytosis ≥ 8 days
  - No fever, no known aetiology
  - PCR-, no known contact with PCR+ patients
RESULTS (1/3)

106 analysed samples
129 included patients
30 pertussis case patients diagnosed

- 42 physicians
- 23 patients discontinued the study
- 38 in large cities
- 57 in medium cities
- 34 in rural areas
- 10 PCR+ case patients
- 2 direct epidemiological case patients
- 18 clinical case patients
CALCULATION OF INCIDENCE FOR EACH AREA

• Crude incidence

\[
\text{Crude incidence} = \frac{\text{Total number of pertussis cases of participating GPs in a given area}}{\text{Sum of } \geq 50\text{-year-old patients in the GPs’ patient registry in a given area}}
\]

• Extrapolated incidence in people aged \( \geq 50 \) years

\[
\text{Extrapolated incidence} = \frac{\text{Sum of positive cases for participating GPs in the area}}{\text{Nb of GPs in the area}} \times \frac{12 \text{ months}}{\text{Duration of the participating GP's practice in months}} \times \frac{\text{French population aged } \geq 50 \text{ years in the area}}{\text{Nb of participating GPs in the area}}
\]
• Crude incidence rate for patients aged 50 and older
• Extrapolated incidence rate in people aged 50 and older
• The French population aged 50 and older:
  – plays a non-negligible role in the circulation of *Bordetella pertussis*
  – may constitute a reservoir
  – should be taken into account for pertussis booster vaccination programs.

• Pertussis booster vaccination for people aged 50 and older could:
  – protect this population against a potentially serious infection (elderly patients)
  – contribute to the protection of unvaccinated infants, in addition to the “coccooning” strategy.
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  – Sanofi Pasteur MSD

  *Starting 1 January 2017, Sanofi Pasteur and MSD will end their vaccines joint venture in Europe, to independently manage their product portfolios and pursue their own vaccine strategies in Europe.*
BACK-UP:
THE DEBATE REMAINS OPEN

• Cocooning Strategy in Australia
  – Comparison of 2 periods, before and after intervention
  – Evaluation: Proportion of pertussis cases < 12 months
  – Results: 6.7% vs. 3.3% ($p=0.0067$)
    • Hospitalisation: younger child during the pre-interventional phase ($p=0.01$)

Overton et al., Internal Med Journal 2017