Increased detection of *Mycoplasma pneumoniae* infection in children, Lyon, France, 2010 to 2011

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Recent reports from several northern European countries indicate an increase in detection of *Mycoplasma pneumoniae* infection in the past two years, notably in children aged 5–15 years. Analysis of our laboratory database showed a similar pattern, with a higher proportion of respiratory samples positive for *M. pneumoniae* by real-time PCR in paediatric patients aged 5–15 years. Our data indicate that in 2010 and 2011, France experienced the first epidemic peak of *M. pneumoniae* infection since 2005.

An increased number of cases of *Mycoplasma pneumoniae* infections have recently been reported in northern Europe, including Denmark, Norway, Finland, Sweden, the Netherlands and England [1-6]. Till now, there were no available surveillance data on the current situation in France or any other country in southern Europe. The Lyon Laboratory of Virology serves the university hospitals in the metropolitan area of Lyon, with an estimated catchment area of 2.1 million people. We investigated our laboratory database in order to determine if a similar increase in the number of *M. pneumoniae* infections could be observed during the past nine years. Our study shows a striking similar pattern as that seen in Norway [3] and also confirms a current outbreak of *M. pneumoniae* infection in children.

M. pneumoniae is known to cause respiratory tract infections. It is contracted through droplets and affects primarily children aged between 5 and 15 years, with an estimated 20% of asymptomatic infections occurring in this age group [7,8]. It is the most common pathogen detected in paediatric community-acquired pneumonia [7].

Analysis of laboratory data

Laboratory diagnosis for *M. pneumoniae* has been historically based on a fourfold rise of antibody titres in a serological assay, with more sensitive methods, such as PCR, the gold standard, being used in *Mycoplasma* diagnostics in some laboratories during recent years [9].

As infections with *M. pneumoniae* are not notifiable in France, we analysed all *M. pneumoniae*-positive reports in the Lyon Laboratory of Virology during the study period of January 2003 to December 2011. Until September 2011, we used an in-house real-time PCR based on Hardegger et al. [10], which was then replaced by the *Chlamydia pneumoniae*/*M. pneumoniae* Respiratory Multi Well System r-gene, a real-time PCR kit (bioMérieux-Argène, France).

During the study period, the *M. pneumoniae* PCR was performed on a total of 11,302 respiratory samples, with a mean of 1,280 respiratory samples per year. The samples had been mainly taken from paediatric patients, with 53.4% of the patients aged under 16 years. These paediatric samples came from the following hospital departments: paediatric emergency department (29.3%), intensive care units (14.5%) and various inpatient departments, mainly pneumology and haematology departments (56.2%). The samples from adults (aged over 15 years) were received from various inpatient departments (65.8%) and intensive care units (34.2%).

We detected a 15.1% increase in the number of respiratory samples sent to the laboratory for *M. pneumoniae* PCR from 2009 (n=819) to 2010 (n=943) and another 30.3% increase to the year 2011 (n=1,229). The main reason for this was the increased number of samples sent for testing from the paediatric emergency department, where the number of respiratory samples rose by 53.9% from the number in 2009 (n=191) to 2010 (n=294); comparison with 2009 alone showed an increase of 185.3% in 2011 (n=545). During the same time period (2009–2011), the number of samples sent

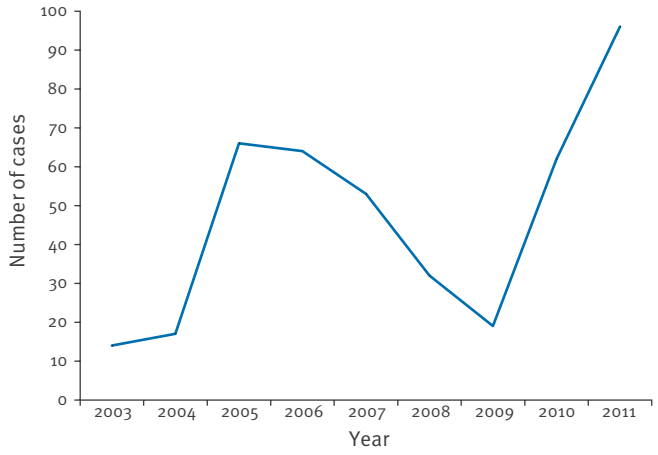
for the detection of *M. pneumoniae* from paediatric intensive care units and the adult hospital departments remained at the same level.

Coincident with the increase in the number of respiratory samples received in 2010 and 2011, we observed an increase in the number of laboratory-confirmed cases of *M. pneumoniae* infection when compared with the number in 2009 (Figure). Considering the overall pattern in the past nine years, two main epidemic periods for the detection of *M. pneumoniae* can be identified. The first occurred in 2005, followed by a slow decrease in numbers until 2009. In 2010, the number of *M. pneumoniae* started to rise again – resulting in a second epidemic period – and continued to rise until the end of the study period, December 2011 (Figure). To date, the epidemic seems to be ongoing.

When looking at the ages of patients with *M. pneumoniae* infection, we observed a general rise in the number of infections in all age groups in 2010 and 2011. The largest rise and the highest percentage of positive samples were found in patients aged 5–15 years, with 14.8% of all samples being positive for *M. pneumoniae* in both years; in 2009, the percentage of positive samples was only 7.1%. Among patients aged 0–4 years, the percentage increased from 0.6% in 2009 to 4.0% in 2010 and 5.5% in 2011. In patients aged over 15 years, the percentage of *M. pneumoniae*-positive samples was lower, but still rose from 0.9% in 2009 to 2.8% in 2011. In the nine years, no shift in the age distribution of patients with *M. pneumoniae* infection was observed (Table).

Figure

Annual number of laboratory-confirmed cases of *Mycoplasma pneumoniae* infection, detected by real-time PCR in the Laboratory of Virology, Lyon, France, 2003–2011 (n=423)



Discussion

The proportion of *M. pneumoniae*-positive tests in our study correlates well with findings of the PCR-based study in Denmark, where approximately 3% of PCRs for *M. pneumoniae* in 2007 were positive, increasing to 15% during 2010 [11]. Surveillance data from Finland, based mainly on serology results, gave similar proportions, with 8–17% of tests positive for *M. pneumoniae* in 2010 and 2011 [2]. The detection rate of *M. pneumoniae* by PCR was highest in Sweden, at 23% in both 2006 and 2011 [6], which is as high as the percentage we observed during the peak in 2005 in the age group 5–15 years. In our study, the substantial increase in the number of samples originating from the paediatric emergency department clearly underlines the importance of *M. pneumoniae* as a community-acquired pathogen, primarily spreading in childcare facilities or schools. There was no increase in the number of samples sent for *M. pneumoniae* detection from inpatient departments. A nosocomial spread of the infection is therefore not expected.

The proportion of *M. pneumoniae*-positive PCRs among children aged 5-15 years has risen from 7.1% in 2009 to 14.8% in both 2010 and 2011. Such a high percentage has not been seen since the 2005–2007 period. A similar increase was seen, but to a lesser extent, in children aged 0–4 years (0.6% in 2009 to 4.0% and 5.5% in 2010 and 2011, respectively) and in the adult population (0.9 in 2009 to 3.3% and 2.8% in 2010 and 2011, respectively). Nevertheless, children of school age are the group mainly affected by *M. pneumoniae* infection.

Table

Annual percentage of *Mycoplasma pneumoniae*-positive samples by patient age group, detected by real-time PCR in the Laboratory of Virology, Lyon, France, 2003–2011

Patient age group in years	Percentage of positive samples (95% confidence interval)								
	2003	2004	2005	2006	2007	2008	2009	2010	2011
0–4	1.2 (0.0–1.5)	2.0 (0.5–5.0)	6.4 (3.9–9.8)	3.5 (2.1–5.6)	3.2 (1.9–5.2)	3.8 (2.2–6.4)	0.6 (0.1–2.2)	4.0 (2.4–6.4)	5.5 (3.9–7.5)
5–15	8.9 (4.7–15.0)	7.3 (3.2–13.8)	25.0 (18.9–32.0)	18.1 (13.5–23.7)	13.0 (8.9–18.0)	7.7 (4.6–12.1)	7.1 (4.1–11.3)	14.8 (10.8–19.5)	14.8 (11.4–18.9)
>15	0.2 (0.0–0.5)	0.5 (0.2–1.1)	0.6 (0.2–1.6)	1.3 (0.7–2.5)	1.1 (0.5–2.3)	0.4 (0.1–1.4)	0.9 (0.1–3.0)	3.3 (1.4–6.5)	2.8 (0.9–6.3)
Total	**1.2 (0.7–2.0)**	**1.2 (0.7–2.0)**	**5.5 (4.3–6.9)**	**4.7 (3.7–6.0)**	**3.7 (2.9–4.9)**	**2.9 (2.0–4.0)**	**2.4 (1.5–3.8)**	**7.0 (5.5–8.9)**	**7.9 (6.5–9.6)**

The two epidemic periods, 2005–2007 and since 2010, correspond to the distribution of cases of *M. pneumoniae* infection in other European countries, such as Sweden, Finland and Norway [2,3,6]. Epidemic periods, occurring after a four-year interval and lasting for approximately 18 months, have also been reported from England [12].

A general surveillance system for *M. pneumoniae* as in other European countries, including typing of a single or different strains in outbreak situations [13,5], would simplify the detection of the strains responsible for the reoccurring epidemics in France.

Data on macrolide resistance of the circulating *M. pneumoniae* isolates in France are currently not available, but this issue needs to be assessed in the near future.

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