Surveillance for invasive pneumococcal disease (IPD) continues with the participation of 78 Hospitals all over Lebanon. Thanks to the hard work of all the physicians, microbiologists, and technicians who have made an effort to contribute to LIPSP. Since our last newsletter in 2009, we have been collecting new samples and sending them for serotyping in Cairo, Egypt. We have collected 144 *Streptococcus Pneumonia* samples from April 2009 to December 2011. The total samples since the beginning of the study in 2005 till the end of 2011 is 257. The results will be presented in detail in this newsletter. To the right is the hospital contribution list for the 257 samples that were handed in since the beginning of this surveillance program. In 2012, we collected 33 new samples from various hospitals that are ready for susceptibility testing and serotyping.

The following changes were performed since our last issue. New sample identification, using the total sample number and a hospital serial number, was adopted in order to keep the data confidential and to abide to the study protocol.

We would like to thank all the hospitals that are contributing to LIPSP. We would also like to extend our thanks to the Ministry of Health for its cooperation and support.

### Demographics

The age distribution of the 257 collected samples are distributed as follows:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percentage</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2y</td>
<td>24.1% (n=62)</td>
<td></td>
</tr>
<tr>
<td>2-5y</td>
<td>15.2% (n=39)</td>
<td></td>
</tr>
<tr>
<td>6-20y</td>
<td>11.3% (n=29)</td>
<td></td>
</tr>
<tr>
<td>21-60y</td>
<td>16.3% (n=42)</td>
<td></td>
</tr>
<tr>
<td>&gt; 60y</td>
<td>33.1% (n=85)</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1: Age Distribution**

Dr Ghassan Dbaibo  
03-310645  
gdbaibo@aub.edu.lb  

Dr. Hiba Chehab  
03-942169  
hc20@aub.edu.lb  

Dr Imane Mahfouz  
03-980802  
im16@aub.edu.lb  

Dr Rima Hanna Wakim  
03-267822  
rh08@aub.edu.lb  

Carelle Tabet RN  
70-840312  
c04@aub.edu.lb
Males constituted 56% of the patients (n=145).

Mortality was 13.4%: highest in adults above 60 years (25%), followed by children younger than 2 years (11%).

Out of the 257 samples, 201 (78.2%) were collected from blood, 35 (13.6%) from CSF, 9 (3.5%) from pleural fluid, and 12 (4.7%) from other sources.

The clinical presentations are summarized in Figure 2.

### Serotype Distribution and Vaccine Coverage

The most prevalent serotypes/serogroups were: 19F, 6, 3, 14, and 19A. Serotype distribution is summarized in Figure 3.

When all age-groups were considered together, vaccine coverage was: 41.4% (n=106) for PCV7, 53.9% (n=138) for PCV10 and 67.2% (n=162) for PCV13.

Vaccine coverage per each age group is represented in Figure 4.

Vaccine coverage for patients 5 years old or younger was: 50.5% for PCV7, 61.4% for PCV10, and 69.3% for PCV13.

### Antimicrobial Susceptibilities

Using the latest CLSI breakpoints which differentiate between meningeal and non-meningeal isolates:

- Susceptibility to penicillin G was 82.6% (n=200).
- Susceptibility to ceftriaxone 86.9% (n=218).
- Susceptibility to erythromycin was 70.7% (n=176).
- Susceptibility was 99.5% to levofloxacin and 100% to vancomycin in the tested isolates.
**Statistics by Age Group**

The clinical presentation in each age group is summarized in Figure 5.

Susceptibility by age group is described in Table 1.

**Figure 5: Clinical Presentation by Age Group**

**Table 1: Susceptibilities by Age Group**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Penicillin Non-Susceptibility</th>
<th>Ceftriaxone Non-Susceptibility</th>
<th>Erythromycin Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2 years</td>
<td>29.1% (16)</td>
<td>18.3% (11)</td>
<td>40.7% (24)</td>
</tr>
<tr>
<td>2-5 years</td>
<td>13.2% (5)</td>
<td>12.8% (5)</td>
<td>30.8% (12)</td>
</tr>
<tr>
<td>6-20 years</td>
<td>3.4% (1)</td>
<td>3.4% (1)</td>
<td>24.1% (7)</td>
</tr>
<tr>
<td>21-60 years</td>
<td>23.7% (9)</td>
<td>12.8% (5)</td>
<td>21.1% (8)</td>
</tr>
<tr>
<td>&gt;60 years</td>
<td>13.4% (11)</td>
<td>13.1% (11)</td>
<td>26.2% (22)</td>
</tr>
</tbody>
</table>

The most common serotypes in each age group were:

- **<2 years**: serotypes 14 (n=12), 19F (n=9), and 6 (n=7)
- **2-5 years**: serotypes 5 (n=6), 14 (n=5), 6 (n=4), and 19F (n=4)
- **6-20 years**: serotypes 1 (n=4), 19F (n=4), and 6 (n=3)
- **21-60 years**: serotypes 19F (n=7), 1 (n=4), 6 (n=4), and 19A (n=4)
- **>60 years**: serotypes 3 (n=13), 9V/A (n=9), 19F (n=7), and 19A (n=6)

**Conclusions**

Pneumococcal disease continues to be major cause of morbidity and mortality for both children and adults worldwide. The WHO estimated that, worldwide, 1.6 million deaths are attributed to pneumococcal disease annually [1].

The development of pneumococcal conjugate vaccines has significantly impacted the burden of disease in countries in which they were introduced [2]. However, none of these vaccines is currently part of Extended Program of Immunization (EPI) schedule in Lebanon.

Data about invasive pneumococcal disease in Lebanon is largely lacking. Thus was the aim of this surveillance study: to provide data about the epidemiologic characteristics, serotypes, and antibiotic susceptibilities of S. pneumoniae isolates causing invasive pneumococcal disease (IPD) in Lebanon.

This data will be useful in helping health authorities make decisions about the importance of vaccination and changes in antibiotic treatment regimens in order to decrease the disease burden at the national level.
The most prevalent invasive serotypes in our study are those found in the commercially available conjugated pneumococcal vaccines. This may be a consequence of the low number of vaccinated children in Lebanon, which in turn emphasizes the importance of implementing the conjugated pneumococcal vaccines in the routine immunization schedule on the national level.

The higher rates of antimicrobial resistance described in our study, in comparison to developed countries, are probably due to the unrestricted over-the-counter use of antibiotics in Lebanon, necessitating more control over antibiotic intake.

Continuing the current surveillance study would help assess the on-going changes in epidemiology of IPD, serotype prevalence, and antibiotic resistance in Lebanon.

References


**Our Future Plans**

*Streptococcus pneumoniae* is the most prevalent cause of community-acquired pneumonia (CAP) leading to hospitalization.

The use of conventional blood cultures for diagnosis may give false negative results (low sensitivity) attributable to the low prevalence of bacteremia in pneumococcal CAP, and to the prior use of antibiotics.

We are starting a research protocol using Real Time-Polymerase Chain Reaction molecular diagnostic approach on blood samples taken from patients with symptoms and clinical workup suggestive of community-acquired pneumonia to prospectively assess the sensitivity of Real Time-PCR in detecting CAP and to determine by Multiplex PCR Serotype Deduction the pneumococcal serotypes that are responsible for pneumococcal CAP and are circulating in Lebanon.

Data generated from this study will allow us to improve our molecular diagnostic testing and provide in the future a more rapid identification of bacteremic pneumonia, thus enhancing the diagnosis and optimizing the antimicrobial choice.

---

**Thank you**

To the generous grants from PneumoADIP and Wyeth-Pfizer to support LIPSP

**Acknowledgements**

Thanks are due to Dr. Bernard Beall, Centers for Disease Control and Prevention (CDC), Atlanta, Georgia, for provision of the Multiplex PCR serotyping procedure and control *S. pneumoniae* strains.

Thanks to Ms. Caline Balaa for her aid in the statistical analysis.