Update on pneumococcal serotypes from Lebanon

After the late war on Lebanon, there were problems encountered with transportation. Many of the bridges connecting the various regions in Lebanon were destroyed. As a team, there were difficulties getting samples from distant hospitals. However, Lebanon revived again, bridges were rebuilt, and those samples were obtained in addition to new samples. We were able to have an additional 50 samples sent for serotyping, making a total number of samples of 97. Out of these 97 samples, 52 were serotyped, 15 were either S. viridans or failed to grow on subculture, and 30 are awaiting shipment for serotyping within the next month.

The adjacent table shows the contributions from different hospitals.

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<th>Hospital Contribution List</th>
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Following is a graphical depiction of the data we have so far.

Demographics

- Out of the 97 samples collected so far, 22 were under 2 years of age.
- There were 17 patients between the ages of 2 to 5 years.
- There were 9 patients between the ages of 6 to 20 years.
- There were 13 patients in the age group of 21 to 60 years.
- 36 patients were above 60 years of age.
- Almost 64% of the number of samples collected belonged to male patients.

Therefore, our data is similar to published data worldwide where the peak incidence of IPD is under the age of 2 years and above 60 years.
Demographics (Ctd)

- 72 out of the 97 samples were collected from blood, 12 from CSF, 7 from pleural fluid, 4 from abscess, 1 peritoneal fluid, and 1 from urine.
- This constitutes percentages of 74, 12, 7, 4 and 2 respectively.

- Out of the 97 samples, 75% of the subject’s conditions resolved after treatment. However, 12% died.
- It is worth to note that the deceased ranged from neonates to older subjects. The rest of the patient’s outcomes are unknown.

The majority of patients had pneumonia making up a percentage of 51% out of the collected samples.
- Meningitis accounted for 14%.
- Sepsis accounted for 22% out of the samples collected.

Serotypes

- The most prevalent serotype was 6B which accounted for 9 out of the 52 serotyped samples.
- The second and third most common serotypes were 19F and 14, being found in 7 and 6 samples respectively.

- It is worthwhile to note that serotypes that caused other diseases (corneal abscess, peritonitis), one was caused by serotype 8, and one by serotype 19F respectively.
- Pneumonia and meningitis cases were caused by many serotypes. Therefore, the commercial vaccine would have prevented infection with the three most common serotypes but a substantial number of cases caused by other serotypes would have still occurred.
Sensitivity and Resistance

- There was a 15% resistance to penicillin. Serotype 14 accounted for the majority of those, 35% were sensitive, and the other 50% showed intermediate sensitivity.
- 80% were sensitive to ceftriaxone.
- All strains were sensitive to vancomycin.
- 70% were sensitive to erythromycin.
- 55% were resistant to TMP/SMZ, 35% were sensitive, and other 10% showed intermediate sensitivity.
- As for tetracycline, 65% were sensitive, 27% were resistant, 7% were of intermediate sensitivity, and 1% were unknown.
- 90% of our samples were sensitive to chloramphenicol.

Vaccine coverage

- Commercially available heptavalent vaccine covers for the following serotypes: 4, 9V, 14, 19F, 23F, 18C, and 6B.
- 26 out of the 52 serotyped cases were caused by the serotypes found in the heptavalent vaccine. Therefore, the commercially available vaccine would have potentially prevented 50% of the infections in all age groups, and 57% in patients less than or equal to 2 years of age.
- The 11-valent vaccine under development covers an additional four serotypes: 1, 5, 3, 7F. This would have prevented 60% of infections in all age groups.
- A 13-valent vaccine is now in clinical trials and has been demonstrated to be highly immunogenic. It covers an additional 2 strains: 6A, 19A. In our data, that would have prevented 65% of infections in all age groups.

Conclusion

This pilot data underscores the importance of collecting national data and determining the predominance of specific serotypes and, by extension, the suitability of marketed vaccines. We seem to be positioned in the middle of two extremes when it comes to vaccine coverage. In some Asian countries the heptavalent vaccine coverage was reported to be around 40% whereas in the USA, it was reported to be 85-88%. Our numbers remain small for making firm conclusions but we hope to keep this program ongoing so that a sufficient sample size will be obtained. Importantly, the expanding use of the vaccine in Lebanon is expected to alter the serotype predominance with time. This will be something to watch for in the future.

Changing Epidemiology of Invasive Pneumococcal Disease Among Older Adults in the Era of Pediatric Pneumococcal Conjugate Vaccine

In 2000, a conjugate vaccine targeting 7 pneumococcal serotypes was licensed for young children. The purpose of the study is to determine the incidence of invasive pneumococcal disease, disease characteristics and the spectrum of patients acquiring these illnesses in adults aged 50 years or older. Results showed that in this category of subjects, incidence of disease caused by the 7 conjugate vaccine serotypes declined 55%, did not change for the serotypes present only in the polysaccharide vaccine, whereas for the serotypes not present in either vaccines, it increased somewhat. The use of the 7 valent vaccine in children has substantially benefited older adults. (Catherine A. Lexau, Ruth Lynfield et al. JAMA 2005;294:2043-2051)
Save Lives with Pneumococcal Vaccine !!!

GAVI (Global Alliance for Vaccines and Immunization) is a public-private partnership focused on increasing children’s access to vaccines in poor countries. Partners include the GAVI Fund, national governments, UNICEF, WHO, The World Bank, the Bill & Melinda Gates Foundation, the vaccine industry, public health institutions and nongovernmental organizations (NGOs).

In late March, GAVI sent letters to all 72 GAVI eligible countries (the 72 poorest countries in the world) asking if they would be interested in introducing pneumococcal conjugate vaccine, beginning with the 7-valent vaccine, between 2008 and 2010. The vaccine will be provided at a very low cost, around 30-50 cents per dose.

By the end of May, 30 of the 72 GAVI eligible countries expressed interest, a non-binding commitment in introducing the vaccines by 2010. Responses came mainly from countries where >33% of all the childhood pneumococcal deaths occurs worldwide.

Millions of lives could be saved through earlier and faster access to pneumococcal vaccines.

WHO, UNICEF and others will play critical roles in supporting countries to make the vaccine available. (June 18th, 2007 Pneumo Alert)

New Advances in Pneumococcal Vaccination

A retrospective study published in October 2006 showed that people over 60 years of age vaccinated by the Pneumococcal vaccine (Pneumovax PV) have reduced risk of both pneumonia and influenza-related diseases. Moreover, Pneumococcal vaccine reduced the morbidity of influenza-related diseases more than the influenza vaccine itself. This could have a major impact by reducing the economic burden on medical care providers. (A. Blay, H. Bessler, A. Lahad, et al. Vaccine, 25(2007) 1071-1075).

Two types of vaccines are currently available in the market: Pneumovax, the 23 valent polysaccharide vaccine, and Prevenar, the 7-valent conjugate vaccine. Both of these vaccines have their limitations; they cover only a certain number of strains. To overcome this problem, new ideas for vaccination are currently under investigation:

Q&A2

A 2-month-old was mistakenly given PPV instead of PCV. What should be done?

PPV is not effective in children less than 24 months of age. PPV given at this age should not be considered to be part of the pneumococcal vaccination series. PCV should be administered as soon as the error is discovered.

Q&A3

When should a child undergoing splenectomy receive pneumococcal vaccine(s)?

It is preferable that the child have antibody to pneumococcus at the time of the procedure, so administer the appropriate vaccine prior to splenectomy if possible:

- Children 2-59 months of age should receive one or more doses of PCV if not up to date already for this vaccination.
- Children ≥ 2 years of age should receive PPV regardless of whether they also received PCV.
- Children ≥ 5 years will generally receive only PPV.

Doses of PCV and PPV given at age 2-5 years should be separated by an interval of at least 8 weeks.

WHO

We were approached by the WHO during the month of June 2007 to provide them with our data. They were precisely interested in data from children younger than 5 years of age. We have provided this data and also submitted an application for funding for the next two years. It is currently being reviewed.

Acknowledgment:

Last but not least, we would like to extend our gratitude to all those who contributed samples and helped in making this work possible.