Bacterial Capsules and the Development of Pneumonia Case Study

From April 3 to April 24, 2001, nine cases of pneumonia occurred in elderly residents (median age of 86 years) living at a long-term care facility in New Jersey. Seven of the nine patients had *Streptococcus pneumoniae* isolated from blood cultures, with capsular serotyping revealing that all isolates were serotype 14 and of the same clonal group. Seven of the nine patients also lived in the same wing of the nursing home. The two patients that were culture negative did contain gram-positive diplococci in their sputum and had chest X-rays consistent with pneumonia. Epidemiological studies of the patients and controls revealed that all who developed pneumonia had no documented record of vaccination with the pneumococcal polysaccharide vaccine (PPV). In contrast, about 50% of the controls were vaccinated with PPV. Even though other risk factors were assessed, the lack of vaccination with PPV was the only one strongly associated with illness. Unfortunately, despite treatment, four of the nine patients with pneumonia died.

Once the outbreak was recognized, PPV was offered to those 55 residents who had not yet been vaccinated: 37 of these were vaccinated, whereas the other 18 were either ineligible or refused the vaccine. Other control measures included refusal to admit patients without a history of PPV vaccine.

* *What special advantage does the capsule confer on the pathogen* Streptococcus pneumoniae?
* *Why are those who have been vaccinated against Streptococcus pneumoniae more resistant to infection by this agent?*