compared with those with CS BSIs. This highlights the need for better and more preventive and therapeutic strategies aimed at combating GN CR.

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682. The Changing Epidemiology of Bacterial Meningitis During 2015–2017 in Turkey: A Hospital-Based Prospective Surveillance Study

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Background. The etiology of bacterial meningitis in Turkey has been changed after the implementation of conjugated vaccines against *Streptococcus pneumonia* and *Haemophilus influenzae* type b (Hib) in Turkish national immunization schedule.

Methods. This prospective study was conducted in 25 hospitals located seven regions of Turkey (representing 30% of Turkey population) and children aged between 1 month and 18 years with suspected meningitis and hospitalized were included. Cerebrospinal fluid samples were collected and bacterial identification was made according to the multiplex PCR assay results.

Results. During the study period, 927 children were hospitalized for suspected meningitis and Hib (*n*:1), *S. pneumonia* (*n*:17) and *Neisseria meningitidis* (*n*:59) were detected in 77 samples (Figure 1, Table 1). During 2015–2016, *N. meningitidis* serogroup W, B, A, Y, X frequencies were as 5 (13.9%), 16 (44.4%), 1 (2.8%), 1 (2.8%), 1 (2.8%), respectively. There were 12 nongroupable *N. meningitidis* samples and serogroup C was not detected. In 2017, of meningococcal meningitis serogroup B, W, A, Y and X were identified in two (8.7%), 15 (65.2%), two (8.7%), 1 (4.3%) and 1 (4.3%) cases, respectively (Figure 2). There were four deaths in this study period, all of them were caused by *N. meningitidis* serogroup B and three of them were under 1 year old.

Conclusion. The epidemiology of meningococcal diseases has been varied in time with or without any apparent reasons. Hajj is a well-known cause for serogroup W epidemics and serogorup W was the most common cause of meningitis in Turkey during 2009–2014 as in other Middle East countries. After the impact of serogroup W epidemics related to Hajj seen in 2010's was diminished, serogroup B has been leading cause of childhood meningitis since 2015. In countries affected from Hajj like Turkey, vaccination of children with serogroup B meningococcal vaccine as well as quadrivalentconjugated vaccine seems to be very important. It should be kept in mind that meningococcal epidemiology is dynamic and needed to be closely monitored to detect changes in years

Figure 1. Distribution of causative agents of bacterial meningitis in Turkey during 2005–2017.

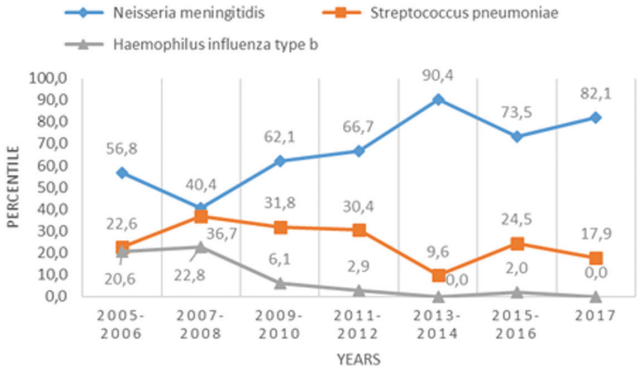
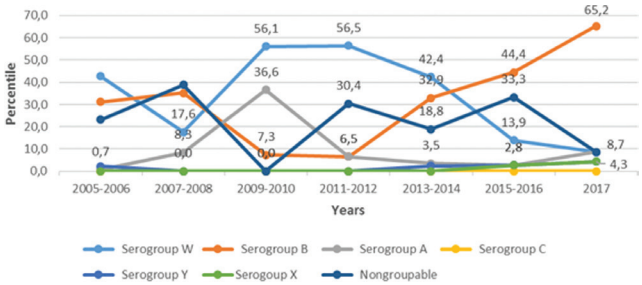


Figure 2. Distribution of meningococcal serogroups of meningococcal meningitis in Turkey during 2015–2017 and comparison with results belonging to previous years.



Disclosures. **All authors:** No reported disclosures.

683. Cost Calculator for Mass Vaccination Response to a US College Campus Outbreak of Serogroup B Meningococcal Disease

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Background. US college students are at increased risk for serogroup B meningococcal disease (MenB). MenB caused ~57% of meningococcal disease cases among 16- to 23-year-olds in 2016, and was responsible for 10 US college outbreaks from 2011–2017 involving 41 cases and an at-risk population of ~182,000 enrolled undergraduates. Outbreaks cause disruptive anxiety among university communities and implementing a mass vaccination response imposes an often unforeseen financial burden. This study aimed to enumerate costs incurred during a points-of-dispensing, mass vaccination response to a US campus MenB outbreak.

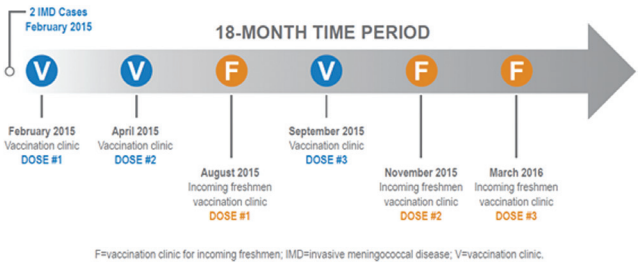
Methods. The 2015 MenB outbreak at Providence College was used as a case study to develop an Excel-based (Microsoft, Redmond, WA) cost calculator to capture costs and resources associated with a MenB outbreak response. The calculator has user-modifiable inputs related to the vaccine-eligible population, accounts for each vaccination event and vaccine dose (Figure 1), and estimates direct costs (2016 USD) during 18 months post-outbreak. Potential/expected costs computed (assuming 100% vaccine coverage) were compared with estimated actual costs incurred during the outbreak, using a micro-costing approach.

Results. The estimated total cost for full vaccination of 4,795 eligible individuals was $1,798,399 ($375.06/person); based on actual vaccinations received, the cost calculator computed $1,350,963 in aggregate direct costs ($636.05/person fully vaccinated) (Table 1). In both analyses, medical supplies were the majority of costs (88–89%), followed by labor resources (7–9%).

Conclusion. This cost calculator quantifies the direct cost of a mass vaccination response to one campus MenB outbreak. Although the cost estimates herein are higher

than previously reported, the calculator does not account for follow-up costs or productivity losses and therefore underestimates the true economic burden of a campus MenB outbreak. This outbreak response cost calculator can be used to aid in response planning and highlights the need to shift the public health response from outbreak control to prevention by proactive, pre-emptive vaccination using available licensed meningococcal vaccines.

Figure 1. Timeline of vaccination clinics



F=vaccination clinic for incoming freshmen; IMD=invasive meningococcal disease; V=vaccination clinic.

Table 1. Actual vs Potential/Expected Direct Costs by Resource Category for Providence College

Outcome	Actual	Potential/ Expected
Coverage outcomes		
People vaccinated with any doses, n	4,418	4,795
People vaccinated with all 3 doses, n	2,124	4,795
Completed full course, % of target population	44.3	100.0
Cost outcomes (college/university paid), $		
Labor resource costs	91,418	153,702
Nonlabor resource costs	845,642	1,621,905
Cost outcomes (other entities paid), $		
Medical supplies (CDC covered vaccine costs)	391,600	0*
Case identification (local/state health departments paid)	21,158	21,158
Vaccine-related adverse events	1,145	1,635
Total costs, $	**1,350,963**	**1,798,399**
College/university paid	937,060	1,775,607
Other entities paid	413,903	22,793
Total costs per person ever vaccinated†	305.79	375.06
Total costs per person fully vaccinated‡	636.05	375.06

Disclosures. **E. M. La**, RTI Health Solutions (RTI-HS): Employee and RTI-HS is an independent scientific research organization which was retained pursuant to a contract with Pfizer to conduct the research services which are the subject of this presentation/abstract., Salary and The RTI-HS employees who worked on this project did not receive compensation from Pfizer or any other organization, other than RTI-HS salaries.. **S. E. Talbird**, RTI Health Solutions (RTI-HS): Employee and RTI-HS is an independent scientific research organization which was retained pursuant to a contract with Pfizer to conduct the research services which are the subject of this presentation/abstract., Salary and The RTI-HS employees who worked on this project did not receive compensation from Pfizer or any other organization, other than RTI-HS salaries.. **J. Fain**, Pfizer Inc.: Employee at time of Study and Employee, Salary. **L. Huang**, Pfizer: Employee and Shareholder, Salary and Stocks. **A. Srivastava**, Pfizer: Employee and Shareholder, Salary and Stocks.

684. Risk Stacking for Pneumococcal Disease in Costa Rica

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Background. The value of nontraditional high-risk factor stacking is not known in the Costa Rican population. We aim to describe risk factor stacking for pneumococcal disease (PD) in patients seeking care at Social Security Hospitals in Costa Rica

Methods. Descriptive study of adult patients with microbiological culture-positive *Streptococcus pneumoniae* disease seeking care at two tertiary hospitals in Costa Rica between years 2014 and 2016. Information on underlying comorbidities (nontraditional) and other risk factors for PD was analyzed and stalked for each age group (G1: <50, G2: 50–64, and G3: ≥65 y/o).

Results. We included 181 culture-positive patients. We found that patients in G1 predominantly stacked ≥2 risk factors (63%), the proportion of patients with ≥2 risk factor was similar to high-risk patients in G2 (33% vs. 38%). In G3, 18% didn't stacked any other risk factor and 46% was on high-risk. Most frequent risk factors in G1/G2 were smoking and alcoholism, and in G3 chronic pulmonary and heart diseases.

Conclusion. We conclude that risk factor stacking is more relevant than high-risk conditions and PD also occurs in persons <50 y/o. We recommend that risk factor stacking should be considered in prevention strategies for PD.

Figure 1. Pneumococcal disease by age group

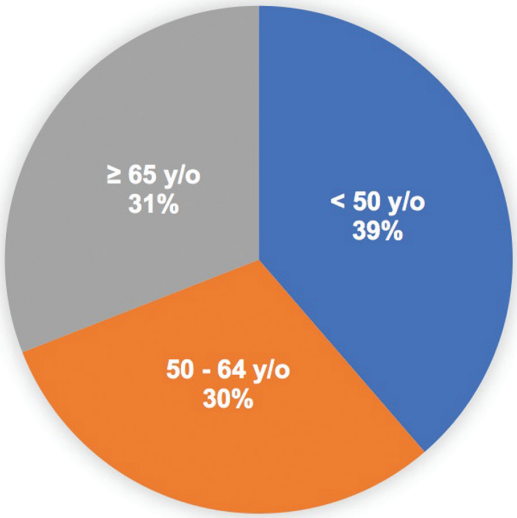
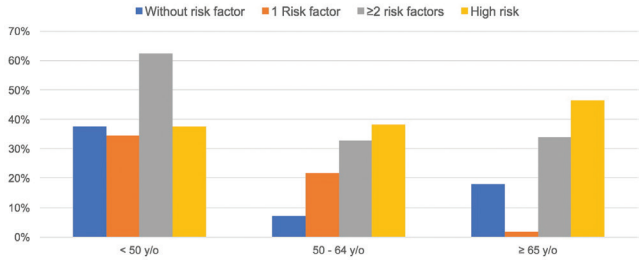


Figure 2. Risk Factor Stacking By Age Group



Disclosures. **All authors:** No reported disclosures.

685. Correlation Between Hospitalized Influenza and Group A Streptococcus Infections in Minnesota, 2010–2016

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Background. Outbreaks of influenza can result in significant morbidity, including secondary bacterial infections. Invasive group A streptococcal (iGAS) infections are associated with a 12% case fatality rate. We used surveillance data to examine if there was a correlation between hospitalized influenza and GAS cases.

Methods. Minnesota Department of Health conducts population-based surveillance for hospitalized lab-confirmed influenza and iGAS (sterile site isolation) cases in the Minneapolis–St. Paul area as part of the CDC Emerging Infections Program. Cases were categorized by week during October–April of each year for 2010–2016, based on specimen collection date. Using STATA (v15), the correlation between the number of influenza (N = 11,768), and overall iGAS (N = 687), iGAS septic shock (n = 104), and iGAS pneumonia cases (n = 59) was assessed in weekly time periods using the Granger causality test.

Results. The number of hospitalized influenza cases was associated with an increase in the overall number of iGAS cases (Wald χ^2 = 10.22, P = 0.04). Hospitalized influenza cases were associated with an increase in iGAS septic shock cases; every 1,000 increase in case counts were associated with one case of iGAS septic shock 1 week later (P = 0.02). Similarly, every 1,000 increase in hospitalized influenza cases were associated with one case of iGAS pneumonia 1 week later (P < 0.01). While the effect of Granger causality is cumulative when describing the causal relationship between hospitalized influenza and total iGAS, the correlation between influenza and the iGAS subgroups is best described with a 1-week lag.