were caused by meningitis and Hib (according to the multiplex PCR assay results. Cerebrospinal fluid samples were collected and bacterial identification was made after the implementation of conjugated vaccines against

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The etiology of bacterial meningitis in Turkey has been changed during 2015–2017 in Public Health: Epidemiology and Outbreaks. Department of Pediatric Infectious Diseases, Dokuz Eylul University Faculty of Medicine, İzmir, Turkey, Department of Pediatric Emergency Care, Dokuz Eylul University Faculty of Medicine, İzmir, Turkey, Department of Pediatric Infectious Diseases, Univesity Faculty of Medicine, Ankara, Turkey, and Children's Training and Research Hospital, Ankara, Turkey, Department of Pediatric Infectious Diseases, Ege University Faculty of Medicine, İzmir, Turkey, Department of Microbiology, Dr. Sami Ulus Maternity and Children's Training and Research Hospital, Ankara, Turkey, Department of Pediatric Infectious Diseases, Ege University Faculty of Medicine, İzmir, Turkey, Department of Pediatric Infectious Diseases, Ankara University Faculty of Medicine, Ankara, Turkey, Department of Pediatric Infectious Diseases, Dr. Sami Ulus Maternity and Children's Training and Research Hospital, Ankara, Turkey, Department of Pediatrics, Dr. Sami Ulus Maternity and Children's Training and Research Hospital, Ankara, Turkey, Department of Pediatric Infectious Diseases, Dokuz Eylul University Faculty of Medicine, İzmir, Turkey, Department of Pediatric Intensive Care and Infectious Disease Unit, Eskişehir Osmangazi University Faculty of Medicine, Eskişehir, Turkey, Department of Pediatric Infectious Diseases, Çukurova University Faculty of Medicine, Adana, Turkey, Department of Pediatric Infectious Diseases, Bakırsaray Sadi Konuk Training and Research Hospital, Istanbul, Turkey, Department of Pediatric Infectious Diseases, Uludağ University Faculty of Medicine, Bursa, Turkey, Department of Pediatric Infectious Diseases, Çukurova University Faculty of Medicine, Adana, Turkey, Department of Pediatric Infectious Diseases, Cukurova University Faculty of Medicine, Adana, Turkey, Department of Pediatric Infectious Diseases, Cukurova University Faculty of Medicine, Adana, Turkey.

Session: 66. Public Health: Epidemiology and Outbreaks Thursday, October 4, 2018: 12:30 PM Background. The etiology of bacterial meningitis in Turkey has been changed during the implementation of conjugated vaccines against Streptococcus pneumoniae and Haemophilus influenzae b (Hib) in Turkish vaccination schedule.

Methods. This prospective study was conducted in 25 hospitals located seven regions of Turkey (representing 30% of Turkey's 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. pneumoniae (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%), and 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 non-identifiable cases (8.7%), 1 (65.2%), 1 (4.3%) and 1 (4.3%) were 1 (4.3%) and 1 (4.3%) of meningococcal meningitis 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 serogroup 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, vaccine of children with serogroup B meningococcal vaccine as well as quadriva-

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.

683. Cost Calculator for Mass Vaccination Response to a US College Campus Outbreak of Serogroup B Meningococcal Disease Elizabeth M. La, PhD1; Sandra E. Talbird, MSPH1; Karen V. Kanadanian, MSc, CEM1; Joel Fain, PhD2; Liping Huang, MD, MPH1 and Amii Srivastava, PhD1; RTI Health Solutions, Research Triangle Park, North Carolina, Providence, Rhode Island, Pfizer Vaccines, Collegeville, Pennsylvania, 2011 Outcomes and Evidence, Pfizer Inc., Collegeville, Pennsylvania

Session: 66. Public Health: Epidemiology and Outbreaks Thursday, October 4, 2018: 12:30 PM 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 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 with 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 efficacy) were $1,798,399 ($375.06/person); based on actual vaccinations received, the cost calculator was 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 individual- was $1,798,399 ($375.06/person); based on actual vaccinations received, the cost calculator was compared with estimated actual costs incurred during the outbreak, using a micro-costing approach. 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 was compared with estimated actual costs incurred during the outbreak, using a micro-costing approach.
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 Meningococcal 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 protractive, pre-emptive vaccination using available licensed meningococcal vaccines.

Figure 1. Timeline of vaccination clinics

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   | 4,705              |
| 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), $ | 91,418  | 153,702            |
| Labor resource costs                   | 845,642 | 1,621,905          |
| Cost outcomes (other entities paid), $  | 391,600 | 1,798,399          |
| Medical supplies (CDC covered vaccine costs) | 21,158  | 21,158             |
| Case identification (local/state health departments paid) | 1,145 | 1,635 |
| Vaccines:elated adverse events         | 1,145   | 1,635              |
| Total costs, $                         | 1,350,963 | 1,798,399       |
| College/university paid                | 957,069 | 1,775,007          |
| Other entities paid                    | 343,903 | 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.

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 χ² = 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.