

Pneumococcal Meningitis in Adults after Introduction of PCV7 and PCV13, Israel, July 2009–June 2015

Technical Appendix

Technical Appendix Table 1. Nonmeningitis and meningitis IPD cases and incidence, by year, age, and VT, Israel, July 1, 2009–June 30, 2015*

| Category | July 1, 2009–June 30, 2010 | July 1, 2010–June 30, 2011 | July 1, 2011–June 30, 2012 | July 1, 2012–June 30, 2013 | July 1, 2013–June 30, 2014 | July 1, 2014–June 30, 2015 | IRR (95% CI) |
|---|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|-------------------|
| IPD incidence, no. (cases/100,000 population)† | 460 (9.15) | 520 (10.16) | 449 (8.61) | 382 (7.19) | 379 (7.01) | 389 (7.07) | 0.773 (0.68–0.88) |
| No. IPD cases with full data | 417 | 470 | 412 | 343 | 344 | 359 | |
| Nonmeningitis IPD incidence, no. (cases/100,000 population) | 387 (8.49) | 436 (9.42) | 376 (7.85) | 304 (6.37) | 305 (6.22) | 316 (6.22) | 0.733 (0.63–0.85) |
| Meningitis IPD incidence, no. (cases/100,000 population) | 30 (0.66) | 34 (0.73) | 36 (0.75) | 39 (0.82) | 39 (0.79) | 43 (0.85) | 1.286 (0.81–2.05) |
| No. meningitis IPD cases with serotype data | 29 | 34 | 36 | 38 | 39 | 42 | |
| Meningitis IPD cases | | | | | | | |
| % VT7 | 34.5 | 8.8 | 22.2 | 7.9 | 20.5 | 0 | |
| % VT13 – VT7† | 17.2 | 44.1 | 33.3 | 13.2 | 18.0 | 11.9 | |
| % non-VT13 | 48.3 | 47.1 | 44.4 | 79.0 | 61.5 | 88.1 | |
| Meningitis IPD incidence by age, no. (cases/100,000 population) | | | | | | | |
| 18–49 y | 10 (0.346) | 10 (0.339) | 17 (0.574) | 13 (0.429) | 8 (0.257) | 14 (0.425) | |
| 50–64 y | 7 (0.725) | 8 (0.798) | 11 (1.074) | 14 (1.388) | 16 (1.485) | 12 (1.146) | |
| ≥65 y | 13 (1.965) | 16 (2.395) | 8 (1.101) | 12 (1.646) | 15 (1.988) | 17 (2.103) | |

*IPD, invasive pneumococcal disease; IRR, incidence rate ratio; VT, vaccine type.

†Refers to serotypes included in the VT13 vaccine but not in the VT7 vaccine.

Technical Appendix Table 2. Serotype distribution among meningitis and nonmeningitis IPD patients, Israel, July 1, 2009–June 30, 2015*

| Serotype | Meningitis IPD, | | OR (95% CI) |
|----------|-----------------|---------------------------------------|-------------------|
| | N = 217, no. | Nonmeningitis IPD, N = 2,055, no. (%) | |
| 19A | 12 (5.5) | 147 (7.2) | NS |
| 24F | 9 (4.2) | 43 (2.1) | NS |
| 15B/C | 9 (4.2) | 40 (2.0) | 2.17 (1.04–4.53) |
| 19F | 7 (3.2) | 44 (2.1) | NS |
| 23F | 9 (4.2) | 45 (2.2) | NS |
| 23A | 6 (2.8) | 14 (0.7) | 4.13 (1.57–10.85) |
| 16F | 7 (3.2) | 94 (4.6) | NS |
| 6C | 7 (3.2) | 33 (1.6) | NS |
| 23B | 8 (3.7) | 17 (0.8) | 4.59 (1.96–10.76) |
| 8 | 7 (3.2) | 116 (5.6) | NS |
| 35B | 6 (2.8) | 28 (1.4) | NS |
| 14 | 4 (1.8) | 86 (4.2) | NS |
| 1 | 2 (0.9) | 160 (7.8) | 0.11 (0.03–0.45) |
| 5 | 1 (0.5) | 112 (5.5) | 0.08 (0.01–0.58) |
| 9V | 1 (0.5) | 55 (2.7) | 0.17 (0.02–1.22) |
| 3 | 18 (8.3) | 152 (7.4) | NS |
| 12F | 17 (7.8) | 139 (6.8) | NS |
| 7F | 10 (4.6) | 81 (3.9) | NS |
| 6A | 6 (2.8) | 41 (2.0) | NS |
| 4 | 5 (2.3) | 31 (1.5) | NS |
| 22F | 5 (2.3) | 62 (3.0) | NS |
| 15A | 5 (2.3) | 69 (3.4) | NS |
| 9N | 5 (2.3) | 31 (1.5) | NS |

*IPD, invasive pneumococcal disease; NS, not significant; OR, odds ratio. Serotypes presented are those that consisted of >3% of all isolates in all years.

Technical Appendix Table 3. Univariate analysis of characteristics associated with meningitis IPD among IPD patients not at risk for IPD, Israel, July 1, 2009–June 30, 2015*

| Characteristic or risk factor | Meningitis IPD, N = 83, no. (%) | Nonmeningitis IPD, N = 629, no. (%) | p value† |
|--|---------------------------------|-------------------------------------|-------------------|
| Age, y | | | |
| Mean ± SD | 57.9 | 56.1 | 0.014 |
| Median | 61.5 | 56.4 | |
| <50 | 29 (34.9) | 283 (45.0) | |
| 50–64 | 28 (33.7) | 125 (19.9) | |
| ≥65 | 26 (31.3) | 221 (35.1) | |
| Healthy | 27 (32.5) | 152 (24.2) | 0.099 |
| Smoker | 10 (12.1) | 132 (21.0) | 0.056 |
| Concurrent medical condition | | | |
| Malignancies | 4 (4.8) | 66 (10.5) | 0.103 |
| Dementia | 1 (1.2) | 54 (8.6) | 0.018 |
| Trauma | 4 (4.8) | 5 (0.8) | 0.002 |
| Debilitated | 0 | 5 (0.8) | 0.415 |
| Neurologic disease | 8 (9.6) | 44 (7.0) | 0.384 |
| CVA | 1 (1.2) | 18 (2.9) | 0.379 |
| IHD | 1 (1.2) | 16 (2.5) | 0.453 |
| Lipid disorder | 10 (12.1) | 36 (5.7) | 0.028 |
| Chronic or recurrent infectious disease‡ | 8 (9.6) | 6 (1.0) | <0.0001 |
| Pneumococcal isolate serotype | | | |
| VT7 | 9 (10.8) | 71 (11.6) | 0.839 |
| 23F | 4 (4.8) | 10 (1.6) | 0.049 |
| 19F | 1 (1.2) | 9 (1.5) | 0.858 |
| 14 | 1 (1.2) | 21 (3.4) | 0.283 |
| 4 | 1 (1.2) | 10 (1.6) | 0.778 |
| 18C | 1 (1.2) | 4 (0.7) | 0.569 |
| 9V | 1 (1.2) | 11 (1.8) | 0.706 |
| 6B | 0 | 6 (1.0) | 0.368 |
| VT13 – VT7§ | 26 (31.3) | 286 (46.7) | 0.008 |
| 3 | 10 (12.0) | 44 (7.2) | 0.112 |
| 19A | 7 (8.4) | 36 (5.9) | 0.349 |
| 7F | 6 (7.2) | 42 (6.9) | 0.879 |
| 1 | 1 (1.2) | 92 (15.0) | <0.001 |
| 5 | 1 (1.2) | 61 (10.0) | 0.009 |
| 6A | 1 (1.2) | 11 (1.8) | 0.706 |
| Non-VT13 | 48 (57.8) | 255 (41.7) | 0.005 |
| 12F | 9 (10.8) | 49 (8.0) | 0.362 |
| 15B/C | 6 (7.2) | 3 (0.5) | <0.001 |
| 24F | 4 (4.8) | 8 (1.3) | 0.020 |
| 8 | 4 (4.8) | 57 (9.3) | 0.175 |
| 16F | 3 (3.6) | 18 (2.9) | 0.722 |
| 6C | 3 (3.6) | 7 (1.1) | 0.073 |
| 23A | 2 (2.4) | 3 (0.5) | 0.052 |
| 23B | 2 (2.4) | 3 (0.5) | 0.050 |

*Patients not at risk for IPD were defined as those without a concurrent medical condition known to put them at risk for IPD. CVA, cerebrovascular accident; IHD, ischemic heart disease; IPD, invasive pneumococcal disease; VT, vaccine type.

†Significant p values are in boldface.

‡Includes patients with recurrent cellulitis, chronic sinusitis, chronic or recurrent otitis media, chronic osteomyelitis, and history of tuberculosis.

§List includes serotypes in the VT13 vaccine but not in the VT7 vaccine.