***Results:*** From September 2014 to September 2018, PCV13 vaccine coverage among persons ≥65 years old increased from < 1% to 77%. During the same period, there was a total of 245 IPD cases. For a variety of reasons, we did not have serotype results for 57 (23%) IPD cases, which were excluded from the analysis. There were 61 (25%) PCV13-type IPD cases included in the analysis, of which 33 (14%) were serotype 3. PCV13 VE against PCV13-type serotypes was 68.0% (95% CI: 37.7%, 83.6%; P-value < 0.01), and 53.4% (95% CI: −10.0%, 80.3%; $P = 0.08$) against serotype 3.

***Conclusion:*** During the first 4 years of PCV13 vaccination implementation in adults ≥65 years of age at KPNC, PCV13 provided significant protection against PCV13-type IPD. Further surveillance will allow for more precise estimation of PCV13 VE on overall and serotype 3 IPD over time.

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

**2712. Safety and Immunogenicity of two Doses of ExPEC4V Vaccine Against Extraintestinal Pathogenic *Escherichia coli* Disease in Healthy Adult Participants**

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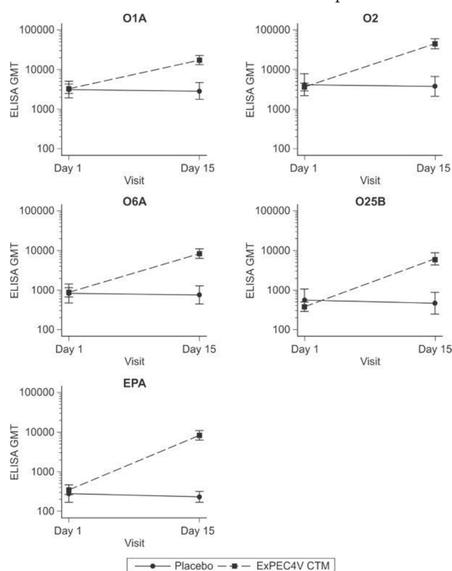
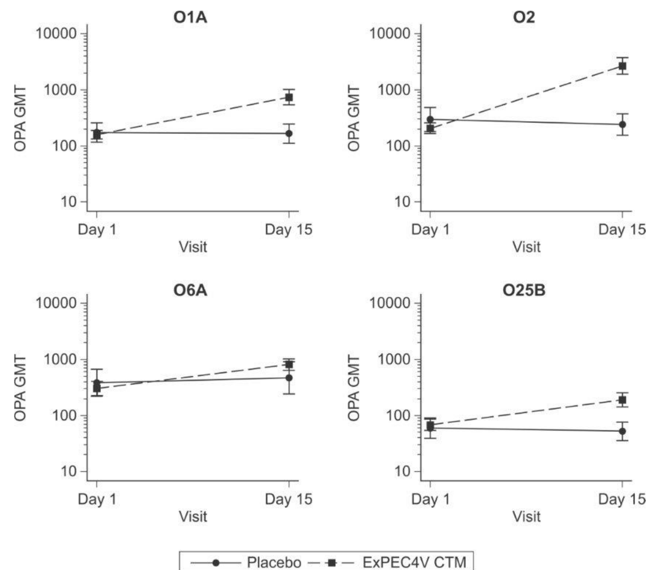
***Background:*** The ExPEC4V vaccine contains 4 *Escherichia coli* O-antigens (O1A, O2, O6A, O25B) conjugated to exotoxin protein A and is being studied for prevention of Invasive Extraintestinal pathogenic *E. coli* (ExPEC) Disease (IED). This phase-2 double-blind study assessed safety and immunogenicity of ExPEC4V Clinical Trial Material (CTM), manufactured via a redesigned process (optimized O1A strain).

***Methods:*** Participants (≥18 years) in stable health were randomized (3:1) to receive ExPEC4V dose 4:4:4:8 µg PS/serotype or placebo on Day 1 and second vaccination on Day 181 (6 months after first vaccination). Participants will be followed for safety until end of study at Day 360. Reactogenicity and immunogenicity (by ELISA, opsonophagocytic killing [OPA] assays) were evaluated pre-vaccination, and 15 days after first and second vaccinations (Day 195).

***Results:*** Of 100 participants randomized (mean age 56, 48% males) and vaccinated (ExPEC4V, $n = 75$; placebo, $n = 25$), 97 completed Day 30. Solicited local AEs were higher for ExPEC4V (38.7%) than placebo (20%); most frequent was pain/tenderness (38.7% vs 20%). Solicited systemic AEs were higher in ExPEC4V (49.3%) than placebo (20%); most frequent was fatigue (32% vs. 12%). No serious or grade 3 solicited local AEs were reported. One participant in ExPEC4V experienced a grade 3 solicited systemic fatigue considered vaccine-related by investigator. ExPEC4V demonstrated immune responses against all serotypes at Day 15. Geometric mean titer effective concentration rank by serotypes was O2 > O1A > O6 > O25B (Figures 1 and 2). At Day 15, ≥ 82% of participants in ExPEC4V and none in placebo had ≥2-fold increase from baseline of ELISA titer for all serotypes. In ExPEC4V, ≥47% had ≥2-fold increase from baseline of OPA titer for all serotypes, while 8% in placebo had ≥2-fold increase only for O6A. Good correlation was observed between ELISA and OPA across serotypes ($r \geq 0.76$).

***Conclusion:*** ExPEC4V elicited robust and functional immune responses across all serotypes and was well tolerated with no vaccine safety findings. This study supports the development of future multivalent ExPEC vaccine to prevent IED.

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**2713. Effectiveness of 23-Valent Pneumococcal Polysaccharide Vaccine in Korean National Population Cohort over 65 Years Old**

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***Background:*** Twenty-three valent pneumococcal polysaccharide vaccine (PPSV) has been introduced to the National Immunization Program (NIP) for adults aged 65 years and older in Korea since 2013. We describe the effectiveness evaluation of PPSV among adults against pneumococcal infections including all-cause pneumonia (ACP), pneumococcal pneumonia (PP), and invasive pneumococcal diseases (IPD) using national population cohort.

***Methods:*** Vaccination records of the national population, aged 65 years and older, from NIP registry by Korea Centers for Disease Control and Prevention (KCDC) were matched to their corresponding medical records by National Health Insurance Service (NHIS) for retrospective cohort analysis. Adults vaccinated with 1-dose PPSV between 2013 and 2016 were compared with those non-vaccinated. Primary outcomes were hospitalization due to ACP, PP, and IPD. Vaccine effectiveness (VE) adjusted for high risk and underlying conditions was calculated as one minus hazard rate ratio (HR) using Cox regression.

***Results:*** Records of 6,743,002 cohort members were included. Forty-three percent were male, and median age was 75-years. Among the cohort, 3,425,949 (51%) were vaccinated during the study period. Incidence (per 100,000 person-years) of each disease in vaccinated and unvaccinated, respectively, was 2,184 and 1,584 for ACP, 8.9 and 5.4 for PP, and 1.6 and 1.9 for IPD. VE against IPD was 41.7% (95% CI 28.8–52.3) and against IPD sepsis was 53.5% (95% CI 39.8–64.0). PPSV was also protective against ACP with VE 7.2% (95% CI 6.6–7.8). When stratified by age-group, adults aged 65–74 years were better protected from ACP (VE 16.5% [95% CI 15.6–17.3]) compared with older adults aged 75 years or older (VE –0.4% [95% CI –1.2 to 0.4]), while VE was higher in older adults against IPD (VE 47.6% [95% CI 32.4–59.4]) and IPD sepsis (VE 54.9 [95% CI 38.4–66.9]) than in 65–74 years group (IPD VE 30.4% [95% CI 3.4–49.9]; sepsis VE 49.0% [95% CI 19.7–67.6]).

***Conclusion:*** Single-dose PPSV strategy for adults in general population is protective against PCV, IPD, and IPD sepsis.

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

**2714. *Streptococcus pneumoniae* Nasopharyngeal Carriage in Canadian Adults Hospitalized with Community-Acquired Pneumonia from 2010 to 2017**

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***Background:*** *Streptococcus pneumoniae* can colonizes the human nasopharynx, and can cause life-threatening infections like community-acquired pneumonia (CAP) and invasive pneumococcal diseases (IPD). In Canada, the 13-valent conjugate vaccine (PCV13) was introduced in childhood immunization since 2010, with hopes that it would not only protect the vaccinated, but also confer indirect protection to adults through herd immunity. Given data on *S. pneumoniae* nasopharyngeal (NP) carriage in adults is scarce, this study reports on *S. pneumoniae*-positivity and serotype distribution in adult carriage from years 2010 to 2017.

***Methods:*** Active surveillance was performed in adults hospitalized with for CAP or IPD from December 2010 to 2017. For assessment of *S. pneumoniae* carriage, NP swabs were tested using *lytA* and *cpsA* real-time PCR. *S. pneumoniae*-positive NPs were subjected to serotyping using conventional and real-time multiplex PCRs.

***Results:*** Overall, 6472 NP swabs were tested, and Spn was identified in 366 (5.7%). Of the 366 *S. pneumoniae*-positive NP swabs, a serotype was assigned in 355 (97.0%). From years 2010 to 2017, the proportion of *S. pneumoniae*-positive NP swabs declined from 8.9% to 4.3%. This was also reflected in the proportion of serotypeable results attributed to PCV13 serotypes, which also declined from 76.9% to 42.2%. The decline was primarily attributed to PCV13 serotypes 7F and 19A. PCV13 serotype 3 remained predominant throughout the study, as did non-PCV13 serotypes like 22F, 33F, and 11A. On the other hand, a proportional rise over time was noted for non-vaccine serotypes (from 15.4% to 31.1%). This was primarily attributed to serotypes 23A, 15A, and 35B.

***Conclusion:*** Monitoring serotype trends is important to assess the impact of pneumococcal vaccines. While herd immunity from PCV13 childhood immunization was anticipated, few studies have assessed its impact on adult carriage. This study described Spn serotype distribution in adults over years 2010 to 2017, demonstrating not only a reduction of PCV13 serotypes over time, but a proportional rise in non-vaccine serotypes. These emerging serotypes may represent the emergence of serotype replacement. Ongoing serotype surveillance will be needed to compare *S. pneumoniae* carriage to serotypes associated with pneumococcal CAP and IPD.

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### 2715. Pneumococcal Community-Acquired Pneumonia Attributed to PCV13 Serotypes in Hospitalized Adults: Comparison of the 50–64 and 65+ Age Groups

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***Background:*** In healthy adults aged ≥65 years, direct immunization with the 13-valent pneumococcal conjugate vaccine (PCV13) was shown effective at preventing vaccine-type pneumococcal community-acquired pneumonia (pCAP) and invasive pneumococcal disease (IPD). Although PCV13 was licensed for use in Canadian adults aged >50 years, it was recommended for immunocompromised individuals who are at highest risk of IPD. In 2016, a recommendation was issued for use of PCV13 in immunocompetent adults aged ≥65 years, for the prevention of pCAP and IPD. This study aimed to compare pCAP cases attributed to PCV13 serotypes in adults aged 50–64 and ≥65 years.

***Methods:*** Active surveillance for CAP and IPD was performed from 2010 to 2015 in adult hospitals across five Canadian provinces. To identify pCAP, blood culture, sputum culture, or a PCV13 serotype-specific urine antigen detection (ssUAD) were used. Serotype was assigned using Quellung reaction, PCR, or ssUAD. All pCAP cases were categorized by serotype and age groups. Patient demographics and outcome data were collected.

***Results:*** Over years 2010–2015, 6687 CAP cases were tested. 835 pCAP cases were identified, of which 418 (50%) caused by a PCV13 serotype. The majority (74%) of PCV13-associated pCAP occurred in the adults aged ≥50 years, whereas only 41.4% (173/418) were in adults ≥65 years. PCV13 pCAP cases declined over the years, likely through herd immunity from childhood immunization. The yearly proportion of pCAP attributed to PCV13 serotypes for ages ≥50 remained high (67.5 to 80.6%), compared those occurring in the ≥65 age groups (35.1 to 49.4%). Compared with test-negative controls, pCAP cases in both age groups were more likely to be admitted to ICU, require mechanical ventilation, and had higher mortality. Of pCAP deaths, 61.4% and 82.3% were in the ≥65 and ≥50 age cohorts, respectively.

***Conclusion:*** From year 2010 to 2015, adults hospitalized with PCV13 pCAP in the ≥65 age cohort accounted for less than half of the cases, whereas including the 50–64 age cohort increased the proportion to 74%. Similarly, the proportion of PCV13 pCAP deaths that occurred in adults aged ≥50 years was 82%, compared with 61% in the ≥65 age cohort. Expansion of PCV13 recommendations to include adults 50–64 years of age should be considered.

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

### 2716. Persistence of 13-Valent Pneumococcal Conjugate Vaccine (PCV13) Serotypes in Invasive Pneumococcal Disease in Adults in Southern Ontario Canada Despite Routine Pediatric Vaccination

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***Background:*** In Ontario, Canada, PCV13 is covered for immunocompromised (IC) adults over 50y. PCV13 programs are thought not to be cost-effective in other adults because it is assumed that herd immunity from pediatric vaccination programs (PCV7 since 2005; PCV13 since 2010) will reduce PCV13 disease burden dramatically in adults. We analyzed data from the Toronto Invasive Bacterial Diseases Network (TIBDN) to ask whether PCV13-type invasive pneumococcal disease (IPD) in adults persists in our population.

***Methods:*** TIBDN performs population-based surveillance for IPD in Toronto+Peel Region, Ontario (pop4.1M). All microbiology laboratories receiving specimens from residents report cases of IPD and submit isolates to a central study lab for serotyping; annual audits are conducted. Demographic, medical and vaccination information are obtained from patients, families and physicians. Population data are from Statistics Canada.

***Results:*** Since 1995, 10,365 episodes of IPD have been identified; detailed medical information was available for 9,801 (95%) and serotyping for 9411 (91%). Among 8658 adult cases, 4,273 (49%) were in those aged 15–64 years, and 4,285 (51%) in those aged >645 years. The most common diagnoses were pneumonia (5,978/8,025, 74%) and bacteremia without focus (1,030, 13%); 470 (4.6%) cases had meningitis; the case fatality rate (CFR) was 21%. The incidence of disease due to STs in PCV13 in adults declined from 7.0/100,000/year 2001 to 2.9/100,000/year in 2015–2018 and was stable from 2015–2018 (Figure 1). The incidence was > 5/100,000/year in non-IC patients over 65 years, and younger patients with cancer and kidney disease (Figure 2). In IPD from 2015 to 2018, adult patients with PCV13 ST disease were younger (median age 64 years vs. 67 years, P = .03) than other patients; there was no significant difference in the proportion with at least one underlying chronic condition (253, 69% PCV13ST, vs. 541,74% other ST, $P = 0.08$), or in CFR (59, 16% PCV13 vs. 145, 20% other, $P = 0.13$). The ST distribution of cases due to PCV13 STs is shown in Figure 3.

***Conclusion:*** A significant burden of IPD due to PCV13 serotypes persists in adults in our population despite 8 years of routine pediatric PCV13 vaccination. This burden needs to be considered in assessing the value and cost-effectiveness of PCV programs for adults.

Figure 2 : Average annual incidence of IPD due to PCV13, 2013-2017