ViiV Healthcare (Employee) **Sterling Wu, PhD**, GlaxoSmithKline (Employee, Shareholder) **Kai S. Hove, MRes**, GSK (Independent Contractor) **E Jane Fricker, BSc. (Hons) Applied Biochemistry**, GSK (Employee, Shareholder) **Parul Patel, PharmD**, ViiV Healthcare (Employee) **David Margolis, MD, MPH**, GlaxoSmithKline (Shareholder)**ViiV Healthcare** (Employee) **David Margolis, MD, MPH**, GlaxoSmithKline (Individual(s) Involved: Self): Shareholder; ViiV Healthcare (Individual(s) Involved: Self): Employee

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LB-9. Development of a SARS-CoV2 vaccine, ChAdOx1 nCoV19: immunogenicity and safety in older adults

Background. The pandemic of SARS-CoV2 has led to a huge impact on population health, resilience of health systems and economies. While social distancing measures have been shown to slow spread, the end of the pandemic will only be achieved with sufficient population immunity in those at greatest risk, and this is most safely achieved through vaccination. We tested safety and immunogenicity of a novel viral vector vaccine in older age groups to consider the potential impact in older adults

Methods. Healthy adults were recruited aged 18–55, 56–69 and ≥70 years and enrolled in the phase II clinical to receive 1 or 2 doses of either ChAdOx1-nCoV19 (AZD1222) or a control vaccine (MenACWY). Safety was monitored using a diary to collect local and systemic solicited symptoms. Blood was drawn at baseline and 14 and 28 days after primary and booster vaccination. Immune responses were evaluated by ELISA, in a neutralizing assay and by interferon-gamma ELISPOT.

Results. Immune responses were demonstrated across all ages, with stronger antibody responses after a second dose of vaccine administered 1 month after the first. Local and systemic reactogenicity was lower at older ages than in younger adults and lower after the second dose then after the first.

Conclusion. ChAdOx1-nCoV19 has an acceptable tolerability profile and is immunogenic in adults above 18 years of age including older adults, with stronger responses after a second dose. Phase III clinical trials for further evaluation are ongoing.

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LB-10. Rapid Assessments of Non-Pharmaceutical Intervention Uptake and Population Mobility Patterns Elucidate SARS-Cov-2 Transmission Dynamics

Amy Wesolowski, PhD[1]; Dustin Gibson, PhD[1]; Smisha Agarwal, PhD, MPH, MBA[1]; Anastasia Lambrou, MSc[1]; Gregory Kirk, MD, PhD, MPH[2]; Alain Labrique, PhD, MHS, MS[1]; Shruti Mehta, PhD, MPH[1]; Sunil Solomon, MD, PhD, MPH[2]; [1]Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland; [2]Johns Hopkins School of Medicine, Baltimore, Maryland

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Background. Current mitigation strategies for SARS-CoV-2 rely on population-wide adoption of non-pharmaceutical interventions (NPIs). Monitoring NPI adoption, mobility patterns and their association with SARS-CoV-2 infection can provide key information for public health agencies and be used to calibrate transmission models.

Methods. We used an online panel to accrue representative samples from Florida, Illinois, and Maryland (n=3,009, approximately 1,000 per state) from July 15–31, 2020 and capture socio-demographically and geographically resolved information about NPI adoption and mobility in the prior 2 weeks. Logistic regression was used to identify correlates of self-reported SARS-CoV-2 infection in the prior 2 weeks.

Results. Overall, 96% reported traveling outside their home in the prior 2 weeks, the most common reason being to visit a grocery store/pharmacy (92%), followed by visiting friends/family (61%), and visiting a place of worship (23%); 22% reporting public transportation use. In total, 44% of respondents reported always practicing social distancing and 40% reported always using a mask indoors and outdoors. Overall, 74 (2.5%) reported testing positive for SARS-CoV-2 in the prior 2 weeks, with strong dose-response relationships between several forms of movement frequency and SARS-CoV-2 positivity. Variables capturing mobility were all highly correlated with one another, suggesting there are clusters of individuals who engage in multiple activities (Figure); 41% of positive cases engaged in all forms of mobility captured compared to 1% of those who did not test positive within the prior 2 weeks. Patterns of mobility and NPI uptake did not significantly differ by state; however, there were significant relationships with age, race/ethnicity, and gender. In multivariable models including adjustment for NPIs, significant relationships remained with public transportation, visiting a place of worship, and participating in outdoor group fitness activities.

Figure. Heatmap depicting pairwise Spearman correlation coefficients between survey responses. Pairwise correlation coefficients are displayed in the boxes at intersection of any two variables. Questions were asked with respect activities in the prior 2 weeks.

Conclusion. NPI adoption and mobility did not vary across these three states with variable policies and SARS-CoV-2 positivity rates. Rather, associations with recent positivity appear to be driven largely by mobility patterns and engagement in activities where NPI use may be challenging or inconsistent.

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LB-11. Comparison of Viral Loads in Individuals With or Without Symptoms At Time of COVID-19 Testing Among 32,480 Residents and Staff of Nursing Homes and Assisted Living Facilities in Massachusetts

Niall J. Lennon, PhD[1]; Michael Mina, MD, PhD[2]; Heidi L. Rehm, PhD[3]; Deborah T. Hung, MD, PhD[4]; Sandra Smole, PhD[5]; Ann E. Woolley, MD, MPH[6]; Eric Lander, PhD[1]; Stacey Gabriel, PhD[1]; [1]Broad Institute, Cambridge, Massachusetts; [2]Harvard School of Public Health, Boston, Massachusetts; [3]Massachusetts General Hospital, Boston, Massachusetts; [4]Harvard Medical School, Boston, Massachusetts; [5]Massachusetts State Public Health Laboratory, Boston, Massachusetts; [6]Brigham and Women's Hospital, Boston, MA

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Background. Transmission of COVID-19 from people without symptoms confounds public health containment strategies. Comprehensive cross-sectional screening enables assessment of viral load independent of symptoms, informing transmission risks. We quantified SARS-CoV-2 burden by RT-qPCR from comprehensive screening of nursing homes and assisted living facilities in Massachusetts to inform our ability to detect SARS-CoV-2 in individuals with or without symptoms.

Methods. From 4/9/20 to 6/9/20, we tested nasopharyngeal (NP) swabs from 32,480 unique individuals comprising staff and residents of the majority of nursing homes and assisted living facilities in Massachusetts. Symptomatology at the time of sampling and demographic information were provided by each facility. NP swabs were collected, RNA extracted, and SARS-CoV-2 testing performed by RT-qPCR. We compared cycle thresholds (Ct) with a standard curve to quantify viral loads.

Results. The nursing home and assisted living facilities resident cohort (N = 16,966) was 65% female with mean age 82. The staff cohort (N = 15,514) was 76% female with mean age 45. In all, 2654 residents (15.5%) and 624 staff (4.1%) tested positive for SARS-CoV-2, including 12.7% of residents and 3.7% of staff without symptoms, compared to 53.1% of residents and 18.2% of staff with symptoms. The Ct distributions for viral probes were very similar between populations with and without symptoms (Fig 1), with a statistically but not meaningfully different mean (ΔCt 0.71 cycles, p = 0.006) and a similar range (12–38 cycles). This similarity persisted across all sub-categories examined (age, race, ethnicity, sex, resident/staff).
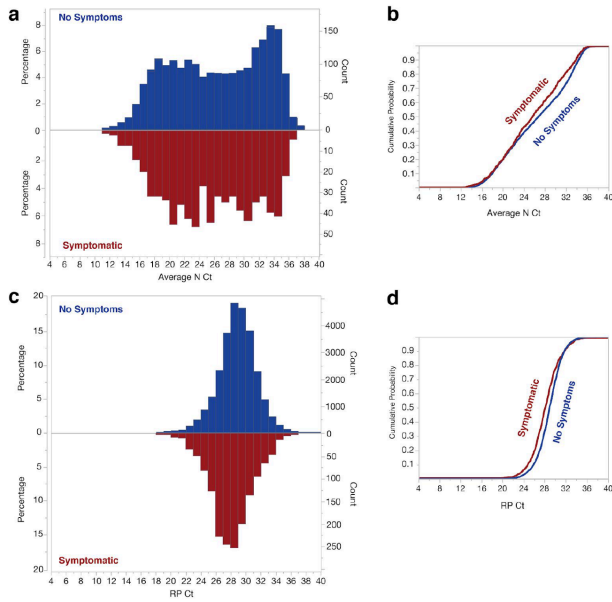
Figure 1

Figure 1. SARS-CoV-2 viral load distributions are very similar independent of symptom status at the time of testing. Ct distributions using probes targeting the SARS-CoV-2 N gene (a-b) or the control human RP gene (c-d) from patients without (blue) or with (red) symptoms at the time of testing are shown as binned histograms in (a) and (c) and cumulative distributions in (b) and (d).

Conclusion. In a large cohort of individuals screened for SARS-CoV-2 by RT-qPCR, we found strikingly similar viral load distributions in patients with or without symptoms at the time of testing. The size of the study population, including both staff and residents spanning a wide range of ages, provides a comprehensive cross-sectional point prevalence measurement of viral burden. Because the distributions of viral loads are very similar regardless of symptoms, existing testing modalities validated for detection of SARS-CoV-2 RNA in symptomatic patients should perform similarly well in individuals without symptoms at the time of testing.

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LB-12. SARS-CoV-2 RNA and Antibodies among People Experiencing Homelessness and Staying in Shelters or Outdoor Encampments in Denver, Colorado, May-July 2020

David McCormick, MD[1]; Tracy Scott, MSW[2]; Jesse Chavez, BA[2]; Kay Wilcox, BS[1]; Grace E. Marx, MD, MPH[1]; Sarah A. Stella, MD[3]; Karen Wendel, MD[2]; William Burman, MD[2]; [1]Centers for Disease Control and Prevention, Fort Collins, Colorado; [2]Denver Public Health, Denver, Colorado; [3]Denver Health and Hospital Authority, Denver, Colorado

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Background. The COVID-19 pandemic has disproportionately affected people experiencing homelessness (PEH) residing in shelters. Initial and regular testing of PEH in communities with moderate or substantial SARS-CoV-2 transmission may limit spread in shelters. We analyzed factors associated with positive SARS-CoV-2 RNA and antibody tests for PEH staying in shelters or encampments in Denver, Colorado.

Methods. In May 2020, Denver Public Health collaborated with local leaders to identify 4 homeless shelters and 3 outdoor encampments for voluntary, universal SARS-CoV-2 testing. At each testing event, a short questionnaire including sociodemographic factors and symptoms was administered to PEH who consented to testing. SARS-CoV-2 RNA testing by reverse transcription polymerase chain reaction (RT-PCR) was performed on nasopharyngeal swabs; antibody testing was performed on venous blood samples. PEH reporting a prior positive RT-PCR test were not retested but were eligible for antibody testing. Statistical calculations were performed with an α of 0.05; all tests were two-sided.

Results. From June 2–July 28, 2020, 931 PEH were approached. A total of 863 RT-PCR tests were performed at 14 testing events, and 334 antibody tests were performed at 5 testing events. Overall, 604 and 259 RT-PCR tests were conducted in 4 shelters and 3 encampments, respectively; 189 and 145 antibody tests were

conducted in 3 shelters and 2 encampments, respectively. PEH tested in shelters were older, more often men, less often Native American, and less likely to report COVID-19 symptoms than those tested at encampments (Table 1). Overall, 9% of PEH tested in shelters tested positive for SARS-CoV-2 compared to 3% of PEH tested in encampments (p=0.002); 8% of men had positive RT-PCR results compared to 2% of women (p=0.03) (Table 2). PEH tested at shelters had a higher percentage of detectable SARS-CoV-2 antibodies than those tested in encampments (24% vs 8%, p=0.0002; Table 3). Neither RT-PCR nor antibody test results differed significantly by race or ethnicity.

Table 1. Demographics of participants residing in encampments compared with shelters in Denver, Colorado, May-July 2020 (n=931)

Table 1. Demographics of participants residing in encampments compared with shelters in Denver, Colorado, May-July 2020 (n=931).

	Encampment (N = 281)	Shelter (N = 650)	*p*-value
Age (median, IQR)	41, 31–51	48, 39–57	<0.0001*
Gender			
Women (n, %)	62, 22%	84, 12%	0.0006**
Men (n, %)	219, 77%	566, 87%	
Race/Ethnicity			
White, non-Hispanic (n, %)	130, 48%	275, 43%	
Black, non-Hispanic (n, %)	43, 15%	149, 23%	
American Indian/Alaska Native, non-Hispanic (n, %)	20, 7%	20, 3%	0.006**
Hispanic (n, %)	63, 23%	149, 25%	
Other (n, %)***	14, 5%	40, 6%	
Symptoms			
Asymptomatic (n, %)	198, 78%	577, 89%	<0.0001**
Symptomatic (n, %)	55, 21%	65, 10%	
SARS-CoV-2 Test Type			
RNA/RT-PCR Test††	259 (92%)	604 (92%)	NA
Antibody Test	145 (51%)	189 (29%)	

IQR=Interquartile range; * Calculated using Mann-Whitney U test; ** Calculated using Chi-squared test; † Calculated using Fisher Exact Test as expected cell count <5. *** Includes Asian, Hawaiian/Other Pacific Islander, persons who identified as "Other", and persons who identified as non-Hispanic and did not respond when asked to self-identify race. †† RNA=Ribonucleic Acid; RT-PCR=Reverse Transcription-Polymerase Chain Reaction

Table 2. Comparison of participants testing positive or negative for SARS-CoV-2 RT-PCR* by location and demographics, in Denver, Colorado, May-July 2020

Table 2. Comparison of participants testing positive or negative for SARS-CoV-2 RT-PCR* by location and demographics, in Denver, Colorado, May-July 2020. Ten participants residing in shelters and five participants residing in encampments had equivocal RNA results; these were excluded from the analysis.

	SARS-CoV-2 RNA Positive (N = 61)	SARS-CoV-2 RNA Negative (N = 787)	*p*-value
Age (median, IQR)	47, 36–56	47, 40–55	0.83†
Type			
Shelter (n, %)	54, 9%	540, 91%	0.002**
Encampment (n, %)	7, 3%	247, 97%	
Gender			
Women (n, %)	2, 2%	107, 98%	0.03**
Men (n, %)	59, 8%	670, 92%	
Race/Ethnicity			
White, non-Hispanic (n, %)	23, 6%	345, 94%	
Black, non-Hispanic (n, %)	13, 8%	157, 92%	
American Indian/Alaska Native, non-Hispanic (n, %)	4, 11%	32, 89%	0.38**
Hispanic (n, %)	13, 7%	181, 93%	
Other (n, %)††	6, 13%	40, 87%	
Symptoms			
Asymptomatic (n, %)	50, 7%	647, 93%	0.47**
Symptomatic (n, %)	11, 10%	104, 90%	
SARS-CoV-2 Antibody Result			
Positive (n, %)	9, 24%	28, 76%	<0.0001**
Negative (n, %)	4, 2%	197, 98%	

* Reverse transcription polymerase chain reaction
** Calculated using Chi-squared test
†Calculated using Mann Whitney U test
†† Includes Asian, Hawaiian/Other Pacific Islander, persons who identified as "Other", and persons who identified as non-Hispanic and did not respond when asked to self-identify race.