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Degree, Timing and Factors Observed in COVID-19 Post-Vaccination Humoral Antibody Development

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Study Objective: The focus of this study was to document the timing of humoral antibody (IgM, IgG) development following SARS-CoV-2 mRNA vaccinations and assess factors influencing antibody (Ab) production.

Methods: Ranging in age 23-100 years, 77 persons living or working in an assisted living facility were tested for IgG and IgM just prior to receiving their 1st dose of the Pfizer-BioNTech mRNA vaccine on 01/17/2021. Re-retesting occurred on Day 14, Day 21 (before dose 2), Day 28 and Day 42 (7 days and 21 days after dose 2). Medical histories, including underlying conditions and medications, were collected confidentially. Testing involved point-of-care lateral flow chromatography devices (under emergency use authorization as reported in our previous research on PCR+ humoral Ab persons) using fingerstick samples. The lateral flow assay antigens included a recombinant nucleocapsid protein and a spike protein (S1) conjugated with colloidal gold. Readings were recorded 15 min. after obtaining blood samples.

Results: On the day of dose 1, one person had a faint IgM reading (and a known past history of COVID-19) and 3 others demonstrating detectable Ab were asymptomatic and had no known prior illness. None of these four persons were PCR+ at the time of assay and their Ab profiles all further evolved following vaccination. Consistent with the original Pfizer clinical trial, on Day 14, 27% (23/89) of the 39 persons <70 years old (yo) already were demonstrating a degree of new Ab production while 84% of the 38 persons >70 had no detectable Ab. However, by Day 21, just prior to receiving the second dose of vaccine, 100% of persons <60 yo had detectable Ab except for two persons taking immunosuppressants. In each successive decade of age, a progressively smaller % of persons showed Ab production, eg, among those >90 yo, 80% tested Ab negative. Seven days after the second dose, however, 100% of persons <80 yo had become Ab positive (except 2 taking immunosuppressants). Whereas only 89% of those in their 80s (n=18) and 78% of those in their 90s had IgG detected seven days after their second dose, by day 42, only two persons remained Ab negative (one taking immunosuppressants and the other was a 95 yo). Semi-quantitative results indicated strong Ab responses for 100% of those <80 yo on Day 42. Also, as previously demonstrated, the point of care chromatography device used for the assays had reproducible results and there was persistent Ab detection in all persons once they had turned positive.

Conclusions: Age and immunosuppressant conditions impact the timing and degree of Ab production following mRNA vaccination. Contrasted with our prior Ab study findings regarding native COVID-19 disease in which some persons < 50 yo manifesting milder disease do not generate IgG/IgM, the current study did demonstrate that younger persons uniformly have a rapid onset of strong IgG development after mRNA vaccination, even before their second dose. While very elderly persons and those taking immunosuppressants generally had undetectable IgG production after the first dose of vaccine, almost everyone developed strong responses, regardless of age, within a week following dose two. Antibody development became even more evident and robust 21 days after the second dose of the vaccine.

COVID-19 Vaccine Hesitancy Among Emergency Department Patients and Caregivers in New York City

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Study Objective: Many studies to date have looked at reasons for patient hesitancy or refusal to vaccinate. Demographic and socioeconomic factors, safety concerns, and beliefs about vaccines impact a patient or parent’s willingness to vaccinate. The speed of vaccine development and approval, divisive political climate surrounding COVID-19, underlying suspicion or lack of education about the virus, and effects of social media are factors that may make a COVID-19 vaccine uniquely contentious compared to other vaccines. Several studies have recently looked at vaccine hesitancy specifically related to COVID-19, exploring factors such as personal experience with COVID-19, personal knowledge about the virus, perception of virus severity, general confidence in vaccines, and trust in biomedical science and health care professionals. Recently, surveys and studies have shown the disparities of vaccine uptake among various demographic groups: only 33% of Black adults have taken a vaccine dose while the rate for Hispanic adults is 4%; 50% for white adults, and 70% for Asian adults. We believe the emergency department provides the opportunity to investigate and close these gaps by addressing hesitancy and offering the vaccine in the emergency department.

Methods: We developed a questionnaire to evaluate patients’ and caregivers’ attitudes and knowledge of COVID-19 vaccine and investigate the reasons for the vaccine hesitancy amongst patients in the emergency department. Adult patients and caregivers of children 0-17 years were asked to complete this survey voluntarily using a QR code and a link to the questionnaire.

Results: To date, 66 respondents accessed and completed the survey (34 adults and 32 caregivers). Though 64% of adult patients and 81% of caregivers thought that the COVID vaccine would be beneficial to their community, many were unsure or reported they would not take the vaccine. 56% of adult patients and 59% of caregivers were hesitant to receive the vaccine for themselves and 48% of caregivers were hesitant to give the COVID-19 vaccine to their children. The most commonly cited reasons being concern about safety of the vaccine and its side effects and poor understanding of the vaccine. 90% of the adult patients and 83% of caregivers stated they would take the vaccine for themselves in the emergency department if offered, and 85% of caregivers stated they would offer their children. Many reported hesitancy based on race, age, and demographic factors of color (Black: 16-36%, Hispanic: 73-82%), where vaccine uptake was the least.

Conclusion: The emergency department can address patients’ vaccine hesitancy and alleviate the disparities by making vaccines available in the emergency department.

Correlations Between Community COVID-19 Prevalence, Vaccine Availability and Emergency Department Non-COVID-19 Utilization

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Study Objectives: The coronavirus disease 2019 pandemic has resulted in decreased ED volumes across the country. Our objective was to better characterize how the impact of COVID-19 prevalence in the community affected public utilization of ED resources for non-COVID-19 encounters during the pandemic.

Methods: This was a retrospective cross-sectional study performed at a single urban quaternary-care academic medical center with 95,000 annual visits in Los Angeles County (LAC). Weekly ED COVID-19 and non-COVID-19 (NC) volumes were abstracted from May 2, 2019 through April 24, 2021; other data parameters obtained included age (<18, 18-64, 65+), arrival mode (walk-in, ambulance), Emergency Severity Index (ESI), and ED disposition (discharge, admit/transmit, psych transfer, death). COVID-19 encounters were queried by any ED diagnosis of “COVID” or “coronavirus.” SARS-CoV-2 testing and vaccination data were obtained from LAC from March 10, 2020 through May 1, 2021. We calculated LAC SARS-CoV-2 testing positivity rates and cumulative vaccination rates per week and examined daily ED NC volumes in relation to LAC testing positivity rates and vaccination rates. Paired t-tests were conducted to compare ED NC volumes before and after the start of the pandemic. Pearson correlation coefficients were used to compare ED NC volumes to LAC testing positivity and vaccination rates.

Results: ED NC volumes reduced by an average of 29% one year prior to and after March 2020 when the COVID-19 pandemic began; there was a significant difference in volume before (M = 1803, SD 35) and after (M=1284, SD 214), t(51)=2.01, P<.001. The week of April 3 had the largest relative volume decrease of 61% with state of emergency and stay-at-home orders issued in the preceding two weeks. NC volumes regained pre-pandemic levels by the week of April 10, 2021 and sustained through May 2021. On April 10, 2021 67% of the eligible population age 16 and over in LAC had received at least 1 COVID-19 vaccination dose. Figure 1 represents trend lines of ED NC volume over time in relation to LAC COVID test positivity rate and vaccination percentage. The age breakdown showed pediatric <18 NC volumes had the highest relative reduction, but this volume only accounted for 5% of ED NC visits in our study period. Age groups 18-64 and 65+ had NC relative reductions of 20% and 22% respectively. The ESI levels 1-5 breakdown showed similar distributions pre and post pandemic; ESI-4 had the largest relative decrease of 37% with ESI-2 and ESI-3 decreasing by 27% and 15% respectively. The arrival method of patients was largely unchanged with walk-ins accounting for 80% and 79% pre and post pandemic. ED NC admission rates increased from 38% to 43% with corresponding decrease in discharges; psychiatric transfers and deaths were unchanged. ED NC volume and LAC COVID test positivity rates were found to have a very strong negative correlation (r(13) = -0.88, p<.001). Conversely ED NC volumes and cumulative LAC 16+ vaccination rates had a very strong positive correlation (r(13) = 0.94, p<.001).