COVID-19 Evidence Digest 12/1/20

Clinical Outcomes of a COVID-19 Vaccine: Implementation over Efficacy (Health Affairs)

Bottom Line: In this study modeling various scenarios of COVID-19 vaccination, implementation factors were significantly related to the success of a vaccination program; in particular, manufacturing delays, vaccine hesitancy, and greater outbreak severity reduced even highly effective vaccine benefits significantly.

Details: Multiple factors shape whether a vaccination program will be successful, including vaccine efficacy (demonstrated through clinical trials), manufacturing capacity and speed, efficient distribution, effective public health messaging, and consistent use of complementary prevention strategies to reduce virus transmission. This study used a mathematical model to estimate population benefits of a vaccine against COVID-19 under various scenarios (e.g., a vaccine with varying preventive and disease modifying benefits, pace of manufacturing and distribution, extent of vaccine coverage), and changes in levels of SARS-CoV-2 transmission (epidemic severity as measured by the reproduction number, or R_t). Outcomes of interest were total infections, deaths, and peak hospital/ICU utilization. Findings demonstrate that the benefits of a COVID-19 vaccination program, regardless of whether the vaccine is moderately or highly efficacious, depends in part on manufacturing speed, coverage (including doses required to achieve efficacy), and lower R_t when it is introduced. For example, when R_t is relatively low (1.5), indicating effective control through non-pharmaceutical interventions, low efficacy vaccines (25%) produce larger reductions in cases and deaths than higher efficacy vaccines (75%) introduced when R_t is higher (2.1). The authors note that even the success of a highly effective vaccine (90%) depends on a lower R_t at deployment based on the model. Significant reductions in cases and deaths can be achieved if the vaccine is delivered to a large proportion of the population very quickly, even at higher R_t, whereas low vaccination coverage or slow rollout significantly reduces the benefits of even high efficacy vaccines.

Key Takeaways:

- Findings underscore the importance of various factors other than clinical efficacy, including vaccine manufacturing, distribution, and coverage, epidemic severity, and vaccine hesitancy, on the impact of vaccines against COVID-19 on cases and deaths.
- Even high efficacy vaccines may be less effective if introduced when the reproduction number (R_t) is higher, if coverage rates are low, or if the rollout pace is slow, underscoring the importance of maintaining non-pharmaceutical interventions to control transmission, addressing vaccine hesitancy and increasing the public's trust in vaccination programs, and focusing on manufacturing, distribution, infrastructure, and other related logistical considerations of vaccine delivery.

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No Evidence for Increased Transmissibility from Recurrent Mutations in SARS-CoV-2 (Nature Communications)

Bottom Line: This analysis of over 46,000 SARS-CoV-2 genomes did not identify any recurring mutations that would lead to greater transmissibility of the virus.

Details: Given the recent introduction of SARS-CoV-2 in human populations, it has been speculated that the virus may mutate into a more transmissible or harmful form. This study analyzed viral genomic data from 46,723 SARS-CoV-2 samples around the world to look at evolutionary development and variation of the virus, including the frequency and recurrence of mutations. Of the samples analyzed, 12,706 mutations were identified, and 398 mutations recurred independently. Of those, 185 independently occurred at least 3 times since the start of the pandemic; further analyses explored whether these mutations were significantly associated with increased transmissibility. These common mutations (including D614G, which relates to a change in the virus' spike protein), were found to be neutral (likely brought about by the human immune system), rather than adaptive, and there was no evidence that they have increased the transmissibility of SARS-CoV-2.

Key Takeaway:

- Findings do not suggest that any recurring mutations are significantly increasing SARS-CoV-2 transmissibility, and underscore the limited genomic diversity of SARS-CoV-2 in human populations to date.

Symptoms Associated with a Positive Result for a Swab for SARS-CoV-2 Infection among Children in Alberta (CMAJ)

Bottom Line: In a community-based study in Canada, about 2/3 of children with a positive SARS-CoV-2 swab presented with symptoms, which were most commonly loss of smell and taste, nausea/vomiting, headache, and fever.

Details: This observational study from Alberta, Canada examined the symptoms most associated with having a positive SARS-CoV-2 swab among children who presented in the community, not to an emergency room. Swabs from 2,463 children were analyzed; of those, 1,987 were positive and 476 were negative for SARS-CoV-2. 36% of the children who tested positive were asymptomatic. While the most common symptoms experienced by children who received SARS-CoV-2 tests were cough, runny nose, and fever, of these, only fever was associated with having a positive result. Other symptoms associated with having a positive SARS-CoV-2 test were: loss of taste/smell, headache, and nausea/vomiting; children with a combination of all of these symptoms were over 65 times more likely to test positive than to test negative for SARS-CoV-2.

Key Takeaways:

- Certain symptoms may be useful for predicting the likelihood of a positive SARS-CoV-2 test in children; these symptoms include fever, headache, nausea/vomiting, and especially loss of taste and smell.

- Symptoms of cough, sore throat, and runny nose were as common, or more common, in children who tested negative for SARS-CoV-2.
- The authors suggest possibly adapting screening questionnaires for COVID-19 in children to focus on the symptoms most strongly associated with positive test results.