

# Impact of Coronavirus Pandemic on Sustaining Early Life: Health and Well-Being of People and Pets

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## Mini Review

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## ABSTRACT

The global societal and public health landscape became forever altered since late 2019 and early 2020 by the appearance of a novel coronavirus, SARS-CoV-2, that resulted in the pandemic of COVID-19 disease. Scientific research and clinical understanding of the role and impact of this virus and its evolving mutant strains is ongoing along with the rapid availability of the initial and subsequent vaccines that afford protection with minimal side effects. For the coronaviruses of companion animals, livestock, poultry, and wildlife, which do not directly affect humans, their prevalence cause clinical respiratory and enteric diseases of the very young and an economic hardship for the livestock, and poultry industries. Importantly, more accurate and transparent reporting of knowledge is needed here to offset misinformation, public panic and even fraud.

## INTRODUCTION

The worldview changed dramatically with the scientific and clinical emergence of the current highly infectious and pathogenic Coronaviruses [1-9]. This began in 2002-2003 with the zoonotic SARS-CoV, then MERS in 2012, followed by the SARS-CoV-2 and its evolving mutants that cause the global outbreaks of COVID-19 disease [2,6,7]. The pandemic that began in late 2019 and early 2020 in the Wuhan area of northern China has resulted in major changes in population lifestyle mandates to protect the safety of humans, other animals and pet companions and

the public health [1-3]. Perhaps, not surprisingly, this has caused significant chaos and misunderstanding within the medical, regulatory, and lay public communities [10-16].

People are now emerging from social lockdown and distancing and are more aware of the needs and well-being of their families, friends, and pets that share their lives. Now that many are returning to the workplace or still prefer to work remotely from home, this has led to other worries, anger, anxiety, depression and stress [7,15,16]. During the lockdown phase of this pandemic, people saw much more of their families, including children, and pets, which gave them an expanded perspective of their daily needs for food, social interaction, bonding and exercise [6,16].

Fortunately, the development and licensing of several effective SARS-CoV-2 human vaccines (e.g. mRNA, Ad 26, BNT, AVS) has literally saved millions of lives. But, this also has fostered misunderstandings, fraudulent science, and profiteering, as well as worthless treatments promoted by unscrupulous people and companies. The resultant backlash by vocal 'anti-vaxxer' groups has and remains challenging [11,16]. Their primary concerns are the history of allergic reactions to the earlier adult vaccines and parental concern of the lack of data from their use in pediatric individuals. The rapid vaccine development also promoted vaccine hesitancy. On the other hand, supporters of SARS-CoV-2 vaccines cite their facilitation of herd immunity, protection of vulnerable patients, and favorable safety profile [11,16-18].

## LITERATURE REVIEW

### Current issues and understanding

Many people believe that these pathogenic coronaviruses were transmitted to humans by infected animals such as the horseshoe and other bats, scaly anteater (pangolin), civet cat, dromedary camel, golden hamster, ferret, mink, as well as domestic and other wild and captive felines [2-5,9,10,15-20]. With respect to mink, SARS-CoV-2 has been shown to be transmitted on mink farms between humans and mink and back to humans [17-20]. The question posed is whether these mustelids may become a reservoir for SARS-CoV-2 [19]. This led to widespread destruction of mink on farms in the Netherlands and Denmark [20]. Coronavirus-resistant species include the duck, chicken, and pig. In Malaysia [11], a canine-feline recombinant alpha-coronavirus has been isolated from two patients with pneumonia. Dogs have low susceptibility and non-human primates, particularly monkey species, are susceptible but exhibit only mild disease [10].

Unfortunately, some frightened pet caregivers surrendered their domestic pets to pounds and shelters for euthanasia. Veterinarians also were being confronted by anxious and angry pet owners demanding that their healthy pet be euthanized [1,3,10,15,16]. The media bears some responsibility for disseminating incorrect information and causing undue alarm, as the lay public is unable to discern fact from fiction, hype, and fraud [16].

### Vaccination issues

Vaccination for children under 5 years of age for SARS-CoV-2 has only recently been approved by governmental agencies in North America, the UK and Europe [16,21,22]. Impressionable and frightened people may be generally unaware that vaccination of the young infant, child, or pet animal poses some reaction risk, especially in those from families genetically predisposed to adverse immunological events or exposures, along with lifestyle issues [21-27]. The immature nature of the innate and adaptive immune responses and the involution of the thymus gland in newborns also play a role [23,24].

The variety of coronavirus vaccines developed over the years for animals do not afford protection against human Coronaviruses, but, their use provides valuable information about the benefits and risks involved [22]. Animal Coronavirus vaccines convey relatively short-lived protective immunity, and the killed inactivated vaccines do not

prevent infection and mucosal surface viral shedding. The common Feline Enteric Coronavirus (FEV) produces mild self-limiting disease of young kittens while its small highly pathogenic subspecies of Feline Infectious Peritonitis (FIP) can cause the so-called 'cytokine storm' and lethal immune-mediated disease [22]. Additionally, the American Academy of Feline Practitioners (AAFP) does not recommend use of MLV intranasal feline coronavirus vaccine as viral shedding still occurs [21].

Some companion animal breeders and fanciers, who can obtain and give their own animals vaccines except for rabies vaccine, have recently begun to give Modified-Live Virus (MLV) vaccines as young as 4 weeks of age [21,22,27-29]. In their misguided view, early vaccination will ensure protection from highly virulent viral diseases caused by Canine Distemper Virus (CDV), Canine Parvovirus (CPV), and Feline Panleukopenia Virus (FPV). This is unwise and unsafe; the product inserts for MLV CDV vaccines indicate that they should not be given before 6 weeks of age as the vaccine can induce symptoms of canine distemper in the very young [21,22,27,29].

Similarly, for the zoonotic leptospirosis bacteria, only about seven strains of the 200+ serovars, produce clinically important disease in people and pets [21,27]. However, the currently available canine leptospirosis vaccines only contain four antigenic serovars; protection requires two initial doses given 3-4 weeks apart and annual boosters, unlike the more sustained duration of immunity from MLV CDV, CPV, FPV and the inactivated and adjuvanted canine, equine, and livestock rabies vaccines [21,22,27]. [Fortunately for cats, there is a non-adjuvanted feline rabies vaccine]. The downside of giving leptospirosis vaccines is that after rabies vaccine, they are the second most likely animal vaccine to produce serious hypersensitivity reactions [21,22,27-30].

While the recently developed and distributed coronavirus vaccines for humans are still undergoing evaluation and refinement to improve their duration and degree of immunity, animal coronaviruses have been widely used for years in companion animals, cattle, pigs and poultry [6,22].

## DISCUSSION

### Protection in early life from prevalent infectious diseases

#### Vaccines:

##### 1. Humans

The majority of countries worldwide are recommending immunizations for SARS-CoV-2 and prevalent infectious diseases in their communities, not only for adults but also for children and adolescents [16,23,24]. Specifically, for children that have had COVID-19 and recovered, they still need to get vaccinated with the current SARS-CoV-2 vaccines; Pfizer's BNT was first approved for this age group in November 2021 with Moderna's mRNA vaccine approved for them in March 2022 [16]. The advice, however, for these recovered children is to wait eight weeks after the start of symptoms or a positive test result before giving boosters. The intent is to protect them from becoming infected with a new mutant variant [16,23,24].

In North America, both the US (CDC) and Canada (NACI) encourage vaccinating parents and young children with a vaccine approved for the young age group. For example, those six months to five years of age should receive 1/3-1/4 of the adult dose of Moderna's SpikeVax. Two doses are required given four weeks apart, although some infectious disease experts suggest eight weeks apart for those that are moderately to severely immunocompromised.

While the vaccine has demonstrated 50% efficacy against COVID-19 including the Omicron strain in young children, efficacy is much higher in preventing severe illness [16]. The side effects noted are mild, and include sore arms, redness and swelling at the injection site, low-grade fever and fatigue. Over 10 million Pfizer vaccine doses have

been given in North America to children of ages 5-11 years, with no side effects like the earlier, albeit rare, adult cases of myocarditis and pericarditis [16].

With respect to game animals, a recent study from China [9] involving 1,941 wild animals representing 18 species and five mammalian orders, identified 102 mammalian-infecting viruses, 65 of which were described for the first time. Civet cats had 21 viruses from bats that were potentially of high exposure risk for humans and animals. These viruses are believed to be able to jump cross-species from bats to hedgehogs, birds to porcupines, and dogs to racoon dogs [9].

Cats, unlike dogs, can be infected by two main coronaviruses- the very common FEC and the less common but serious FIP, as well as SARS-CoV-2, Transmissible Gastroenteritis virus (TGE) of swine, canine coronavirus, and the human common cold viruses [21,22].

Avian Infectious Bronchitis Virus (IBV) affects chickens, and related viruses occur in turkeys and pheasants. Mutations continually arise, necessitating development of new vaccines. Commercial poultry flocks are usually vaccinated against IBV with either MLV or inactivated vaccines. While the inactivated vaccines are generally safer, their immunity is weak and short-lived. The MLV IBV vaccines generate better protection but the risk of reversion to virulence is a concern [22].

Other approaches for disease control include the potential use of a potent universal beta-coronavirus therapy with Spike S2 human neutralizing monoclonal antibody [31].

## **2. Companion animals and livestock**

Vaccination of companion animals (primarily dogs, cats and horses) should follow the product label instructions, and any guidelines provided by veterinary professional organizations, especially with respect to the recommended ages for their use. It is scientifically well-recognized, for example, that MLV CDV vaccines should not be given before six weeks of age as the vaccine viral strain can cause canine distemper-like clinical signs. Similarly, for CPV and FPV vaccines, recommendations are to begin at six weeks, although during epidemics or with orphaned newborns, a single dose at four weeks of age may help offset viral replication in spite of the vaccine neutralization caused by their residual maternal immunity [27]. Vaccination of very young companion animals against coronaviruses is ineffective against the mild enteric disease and does not prevent infection and viral shedding [22].

For rabies vaccine, the initial dose should not be administered before 12 weeks of age and preferably not before 16 weeks, because of the potent heavy metal adjuvants used in most products; should be given apart from other vaccines by 7-14 days; and should be thimerosal (mercury)-free [26-30]. These metals are also not recommended before one year of age for childhood rabies vaccinations [26].

The USA and Canada follow the AAEP (American Association of Equine Practitioners) recommendations for vaccinating foals. Livestock associations offer parallel advice for domestic farm animals. The coronaviruses of pigs and cattle cause significant illness and pathology as well as economic losses despite the availability of effective vaccines [22].

## **3. Mechanical barriers and hygiene**

Standard infectious disease protocols should always be maintained with attention to providing mechanical barriers and distancing, hygiene control of work places, gardens, lawns, pastures, vermin and pest controls, and especially food storage and preparation areas. Regular monitoring of these areas for appropriate use of fertilizers, herbicides, pesticides, anti-coagulants and hygiene is necessary. Whenever possible, natural plant, water and soil-based products are preferred over chemicals wherever people and animals frequent [21,32,33].

## CONCLUSION

The world experience and literature on the role and impact of the novel emerging coronaviruses of humans, non-human primates, companion animals, livestock, and birds will no doubt continue to rapidly expand as we face the resulting public health and economic threat during this period of climate change from global warming. Providing for sustainable agriculture, control of deforestation, reducing decimation of the ecosystems of rivers, lakes and seas, plus the introduction of alternate protein sources from reusable waste, insects and seaweed is essential to our survival as a population and planet. Vaccination against disease in all species is another critical component of this global commitment.

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