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COVID-19 and the role of chiropractic in the healthcare arena with non-pharmaceutical prevention, early treatment, and care for those with long Covid syndromes:

Part One - Series Introduction, and Prevention

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Abstract: The role of COVID-19 prevention is complex but important for a chiropractor's place in the wellness healthcare community. With patients that have comorbidities and are in high-risk arenas or exhibiting high-risk behaviors, based on the current evidence, the risk of having COVID-19 may clearly outweigh any risk associated with being vaccinated. As more research is gathered over the ensuing years regarding vaccination side effects this will help further influence decision-making.

Indexing Terms: chiropractic; immunity; COVID; prevention' comorbidity

Series introduction

We are in a very complex and confusing time regarding healthcare and decision-making. Due to the information 'explosion' in healthcare related research we are seeing multiple situations where there is quality conflicting information on the same topic. For instance relating to COVID-19 transmission some research is supporting that vaccines prevent transmission (1) and other studies that suggest otherwise. (2) Some research supports the need for vaccines for prevention (3, 4) and others suggest that acquired immunity may be a better option. (5, 6) Even there are studies that show that vaccines are safe, (7) warrant greater investigation, (8) while others determine that there are risks. (9, 10) This is only a sample of the conflicting evidence and the challenges a healthcare practitioner might have in their own personal care as well as answering questions posed by patients.

> *... chiropractic care can play a part in 'reductions in interference and pain cognitions' and 'may help dampen the detrimental consequences of the pandemic on physical and psychological well-being ...'*

If there are challenges for healthcare practitioners who have a familiarity with the research and evidence based arena, imagine how patients feel who are navigating this path relying on conflicting anecdotes and social media

proclamations. As described in a prior exposition (11) one key feature that I find helpful is to consider how our life's experiences and perspective guide us towards an unconscious 'confirmation bias' (12, 13, 14) manner of making decisions and drawing conclusions.

With caution we need to be aware that our gut feelings cause us to seek data that confirms our feelings and filter out data that does not. One clue into whether this phenomenon is happening can be associated with a behavior called '*certitude with an emotional charge*.' (11) This is something we all need to be cautioned against when we are trying to figure out a solution to a problem or develop a balanced evidence-based point of view.

With the complex issues of effectiveness of vaccination, acquired immunity, and risk of vaccines or medications for prevention and/or treatment for COVID-19, it is possible that the chiropractic profession might benefit from looking at their part in the healthcare arena from a wellness care position. Since most chiropractors are not fully trained in immunology, virology, pharmaceutical applications, and vaccines the focus of this article will be more on non-pharmaceutical aspects of health more commonly associated with the chiropractic profession, such as wellness and preventative behaviors. (15, 16)

To Vaccinate or Not to Vaccinate: Can that be a question?

Vaccination is a very challenging and often emotional charged consideration. Many governments and public health officials are calling for mass vaccination as a means to control the serious side effects from COVID-19, with the hope of limiting its far-reaching social impact. However there are factors that are worthy of consideration that investigates the risk benefit ratios of whether to vaccinate or not.

If a patient has a number of comorbidities and is in high risk life situations then much of the research suggests that vaccinations can offer significant protection from serious illness, hospitalization, and death. However, vaccination risks may warrant consideration for a small proportion of individuals with unique life circumstances. If the patient does not have comorbidities, is not in high risk life situations, exercises caution with mask usage and social distancing, and may have had a history of prior COVID-19 infection then vaccination risks may warrant consideration. High-risk life situations refer to situations where an individual may be likely to contract COVID-19, such as:

- Parents of children attending schools
- Teachers in schools in close association with students
- Flight attendants working around passengers with intermittent mask usage
- Waiters in restaurants or other workers in arenas where mask use is not possible
- Healthcare workers in facilities treating patients with COVID-19 or its variants
- Singing in a choir without social distancing and masks are not utilized

The risks associated with contracting COVID-19 or being vaccinating or not may not be 'black and white' but sometimes placed in a 'gray zone.' Beyond personal healthcare determinations we are currently dealing with issues of governmental mandates, conflicting evidence based research, and politicization of vaccination – all of which complicates clear decision making. Since we are still in an evidence based gathering situation with COVID-19 prevention and treatment, when a patient without contraindications feels it is important to be vaccinated, their chiropractor should be supporting the patient's desires unless greater information suggests otherwise.

Where might chiropractors fit into the COVID-19 healthcare prevention and treatment arena?

1. Educating patients about their co-morbidities and possible susceptibility to having a serious COVID-19 infection response.
2. Helping patients with co-morbidities to reduce their risk by early treatment of any co-morbidity such as weight reduction for the obese or careful food consumption for those with sugar handling compromise.
3. Reducing pain and improving function "may help dampen the detrimental consequences of the pandemic on physical and psychological well-being" as well as improve immune function. (17, 18)
4. Since those who are vaccinated, previous infected with COVID-19, and those who have never had COVID-19 can all transmit and contract COVID-19, prevention and early non-pharmaceutical interventions may play an important part in a collaborative multidisciplinary approach.

This series of 3 papers provides an introduction into a concept of chiropractic intervention that discusses a non-pharmaceutical approach to COVID-19 prevention, early treatment, and care for long hauler type syndromes. This will not be a comprehensive overview but more of a representative group of ideas and concepts to guide and encourage the reader to perform greater study as indicated. Since much of the research on COVID-19 is being generated on a daily basis any current article will soon become dated, so the idea is for the reader to focus on the general concept and ideas.

It is important to realize with some patients that any signs of a possible COVID-19 infection can be life threatening so the following information is to be used with caution and ideally in co-treatment with an allopathic colleague familiar with COVID-19 treatment, particularly whenever indicated. Since we are finding that the patients who have been vaccinated and/or have had prior COVID-19 infections can still have breakthrough infections the following may be of value as we learn more as time passes.

This series has three sections: (1) COVID-19 Prevention, (2) COVID-19 Early Treatment, and (3) COVID-19 Long Hauler Syndromes.

COVID-19 Prevention

The hallmark of prevention is to be familiar with what patients are the most susceptible and which patient might have the worst prognosis if they become infected with COVID-19. This subset of patients will need to be vigilant in their preventative behaviors and attempt to mitigate any exposure or high-risk social interactions. For the purposes of this article we will use the term 'co-morbidity' to relate to any condition that leads to a worsening of the outcome of being exposed to or contracting COVID-19 or one of its variants. For instance co-morbidity may relate to the patient's presenting condition, their nutritional status, and/or their high-risk lifestyle behaviors.

The most typical patient presentation warranting concern for serious COVID-19 complications involve patients with obesity, diabetes (type 1 or 2), cardiovascular and/or respiratory disease, chronic kidney disease, autoimmune disorders, history of cancer treatment, taking corticosteroids regularly, history of having had a stroke, hemoglobin blood disorders, history of substance abuse (e.g., alcohol, opioid, or cocaine), Down syndrome, compromised mental health, dementia or other neurological conditions, tuberculosis, pregnancy, and history of having solid organ or blood stem cell transplant. (19, 20, 21) While age has been considered a comorbidity recent studies suggest that comorbidities may increase with age but are not necessarily directly associated with age. (20) This means if a patient works to improve their modifiable comorbidities their age may not represent a direct comorbidity factor.

However there are other patient presentations that warrant concern. The following is a list of some other less commonly discussed co-morbidities, though the list will likely be modified as greater information is gathered.

- Patients living with human immunodeficiency virus (HIV) (22)
- Patients with a history of cigarette smoking (23)
- Patients with blood types B and AB and or Rh+ (24, 25, 26)
- A patient's genetics may play a factor in their COVID-19 response (27, 28, 29)
- If a patient experiences low intensity or no bitter taste this may be a factor in COVID-19 disease progression (30)
- Emotional stress disorders may be a factor in COVID-19 somatic presentations (31)
- Patients with a history of anemia may find a decreased immune response to COVID-19 (32)

While some co-morbidities are not modifiable some conditions relating to weight, sugar handling issues, and cardiorespiratory presentations can be affected with life style choices. For instance respiratory and cardiovascular diseases can be helped with exercise and this may improve a patient's immune response to COVID-19. (33) Tarlovskaya et al noted that, '*In the epoch of COVID-19 pandemic, a lower risk of severe course of the coronavirus infection was observed for patients with chronic noninfectious comorbidities highly compliant with the base treatment of the comorbidity.*' (34)

Nutrition, diet, and supplements for prevention of COVID-19

The following is a sampling of research gathered at the time of this article however the reader is cautioned that likely the suggestions will be added, modified, or reconsidered in the near future, so to be responsible it is important to continually stay updated.

Moallemian Isfahani et al have determined that '*Nutrition can strongly influence infection trajectories by either boosting or suppressing the immune system. During the recently emerged pandemic of coronavirus disease 2019 (COVID-19), individuals who possess diets high in fat, refined carbohydrates, and sugars have shown to be highly prone to the disease and associated adverse outcomes.*' (35) '*People with poor nutritional status (lower body mass index and albumin) have a higher risk of developing severe disease after infection with SARS-CoV-2. In the clinical treatment of COVID-19, individualized nutritional support is very important for the rehabilitation of patients.*' (36) Of significance Zhou et al found that *'COVID-19 patients with good nutritional status showed a small chance to have adverse outcomes.*' (37)

Aside from general nutrition and diet, vitamin, and mineral supplements have been found to help with both prevention and minimizing the effects of COVID-19 infections. Du Laing et al concluded that trace elements Selenium and Zinc might help stratify COVID-19 patients since there is some indication that these minerals might help prevent or mitigate the seriousness of an infection. (38) Hawryłkowicz et al noted that in a '*patients' diet, it is crucial to ensure an adequate intake of micronutrients, such as omega-3 fatty acids (at 2-4 g/d), selenium (300-450 µg/d) and zinc (30-50 mg/d), and vitamins A (900-700 µg/d), E (135 mg/d), D (20,000-50,000 IU), C (1-2 g/d), B6, and B12.*' (39)

Akhtar et al found that '*Deficiencies of micronutrients, especially vitamins A, B complex, C, and D, zinc, iron, and selenium, are common among vulnerable populations in general and among COVID-19 patients in particular and could plausibly increase the risk of mortality.*' (40) Studies working to improve immune function have shown that micronutrients such as vitamins D, E, B, C, and A as well as minerals Zn, Cu, Mg, I, and Se and bioactive peptides, each can have positive and significant effects on strengthening the immune system and general health in humans. (41) Similarly a '*balanced diet including vitamin A, B, C, D, E, and K, and some micronutrients such as*

zinc, sodium, potassium, calcium, chloride, and phosphorus may be beneficial in various infectious diseases.' (42)

Another study investigating the affects of nutrition on oxygen saturation in COVID-19 patients receiving a '*multi-component nutritional formula (containing 1200 mg of potassium nitrate, 200 mg of magnesium, 50 mg of zinc, and 1000 mg of citric acid) every 4 hours during the 48-hour monitoring period*' had an immediate improvement in oxygen saturation after administration of the nutritional formula. (43)

Other supplements not associated with vitamins such as omega three oils (44) (EPA portion for secondary vascular inflammation and DHA portion for secondary nervous system disorders), carnosine, (45) and polyphenols (46) have been found to help in the prevention of COVID-19 and its serious sequelae. Herbal supplementation has also been found to help patients with prevention and treatment of COVID-19. Herbs such as olive leaf extract, (47, 48) grapefruit seed extract, (49) bee propollis, (50, 51) and others have been found to help with viral presentations. Various cannabis derived substances have also been found helpful to treat inflammation and infection secondary to COVID-19. (52, 53)

Supporting the gastrointestinal microbiome may be an important aspect of prevention to help decrease COVID-19 disease severity. '*Associations between gut microbiota composition, levels of cytokines and inflammatory markers in patients with COVID-19 suggest that the gut microbiome is involved in the magnitude of COVID-19 severity possibly via modulating host immune responses.*' (54) '*Colorful vegetables supply fermentable prebiotics and anti-inflammatory, antioxidant phytonutrients. Fermented foods and beverages support intestinal microbiota. In sensitive individuals, the avoidance of the high immunoreactive food antigens contributes to antiviral immunity.*' This ultimately suggest '*associations between airway and intestinal microbiota, antiviral host immunity, and the influences of dietary, nutritional, and lifestyle interventions to prevent the clinical course toward severe COVID-19.*' (55)

It appears that the '*treatment of gut dysbiosis involving an adequate intake of prebiotic dietary fiber and probiotics could turn out to be an immensely helpful instrument for immuno-modulation, both in COVID-19 patients and prophylactically in individuals with no history of infection.*' (39)

The role of COVID-19 prevention is complex but important for a chiropractor's place in the wellness healthcare community. With patients that have comorbidities and are in high-risk arenas or exhibiting high-risk behaviors, based on the current evidence, the risk of having COVID-19 may clearly outweigh any risk associated with being vaccinated. As more research is gathered over the ensuing years regarding vaccination side effects this will help further influence decision-making.

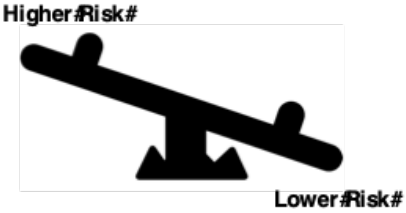
However patients with co-morbidities (vaccinated or not) should do whatever possible to reduce any modifiable co-morbidities conditions, reduce or eliminate high-risk social situations or behaviors, and wear masks in social situations. (56, 57) Ideally the public health mantra should be followed which is use a mask, maintain social distancing whenever possible, and wash your hands (even though COVID-19 appears to be mainly an air transmittable virus). For individuals who may be in high risk social situations and have comorbidities they may even want to enhance their mask protection with nasal sprays (58) and personal air purifiers. (59)

As mentioned in the introduction, chiropractic care can play a part in '*reductions in interference and pain cognitions*' and '*may help dampen the detrimental consequences of the pandemic on physical and psychological well-being.*' (17) Also since pain reduction, improved function, and relaxation are effective tools to boost immune function this is another place where regular chiropractic care may contribute to COVID-19 prevention. (18) Even with all our preventative efforts patients (vaccinated or not) may still have COVID-19 (breakthrough) infections, so being aware of the COVID-19 symptoms can guide early interventions that might mitigate progression of this illness and prevent serious outcomes. It is important to be aware that

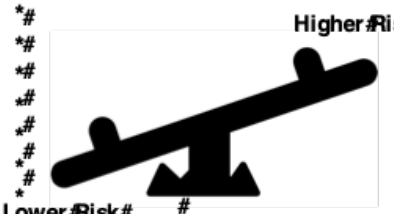
some presentations are completely asymptomatic so at this time we can never be completely confident with our diagnosis.

Considering Risks of Not Getting Vaccinated and Having Serious Covid-19 Infection

- Have Comorbidities
- Immunocompromised
- High Risk Social Activities
- High Risk Occupation
- Limited Ability for Mask Usage and to Social Distance



Considering Risks of Vaccine Side Effects Compared to Having Serious Covid-19 Infection



- Does not Have Comorbidities
- Sensitivity to Prior mRNA COVID-19 Vaccinations
- Have Already Contracted Covid-19
- In Patient Subset Susceptible for Blood Clots, Myocarditis, or Guillain-Barré
- Allergic Reaction to Polysorbate

Considering Risk that Contracting Covid-19 will lead to a Serious Illness

- Have Comorbidities
- Immunocompromised
- High Stress Levels
- Poor Nutritional Intake
- Blood Types B/AB and RH+
- Bitter Foods don't Taste Bitter
- Reduced Zn and Se Levels
- Anemia
- Sedentary Lifestyle Behaviors
- History of Cigarette Smoking

- Limited to no Comorbidities
- Prior Vaccination or Covid Infection
- Low Stress Levels
- Good Nutritional Intake
- Blood Types A/O and RH-
- Bitter Foods Taste Bitter
- Good Zn and Se Levels
- Good Omega Three Levels
- Good Vitamin D Levels
- Active Lifestyle Behaviors

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