

COVID-19 and Hip Osteoarthritis Disability-Linkages and Emerging Practice Implications

Ray Marks^{1,*}

¹Department of Health and Behavior Studies, Columbia University, Teachers College New York, New York, USA

Corresponding author:

Ray Marks, Department of Health and Behavior Studies, Columbia University, Teachers College, Box 114, 525W 120 Street, New York. Telephone: +1-212-6783445 Fax: +1-212-6788259

Keywords:

COVID-19, Hip Joint, Intervention, Osteoarthritis, Pain, Prevention, Surgery

Received: Aug 01, 2022

Accepted: Aug 02, 2022

Published: Aug 05, 2022

Abstract

Older adults suffering from chronically painful disabling osteoarthritis of one or more joints such as the hip joint continue to experience multiple health issues, commonly progressive debility, and excess disability. This mini review strove to examine current perspectives in the realm of hip joint osteoarthritis, a widespread disabling disease affecting many older adults in the face of the possible repercussions of the multiple COVID-19 restrictions in response to the SARS-CoV-2 pandemic that emerged in late 2019, along with the persistence of multiple evolving COVID-19 variants that remain lethal to many older adults, especially among the older chronically impaired population. Using multiple data bases, results reveal that very little progress has been made in recent times to mitigate hip osteoarthritis, along with very few innovative treatment approaches when severe, other than surgery and medication. Moreover, a multitude of non-pharmacologic approaches have not reduced numbers of cases requiring surgery to any extent, even when employed. In addition, outcomes of hip joint replacement surgery, and other treatments for ameliorating unrelenting pain remain largely suboptimal, especially where those undergoing surgery may now be more impaired than in pre pandemic times, and where high rates of opioid related deaths prevail in this regard. As such, it is concluded that whether in the community or being treated in hospital, exposure to COVID-19 remains risky especially in cases who are now weaker and frail, plus suffering from excess chronic disease manifestations, thus warranting more attention and protection of this high risk group, plus insightful preventive efforts to avert multiple interacting COVID-19 effects in the realm of osteoarthritis suffering, especially where patients are willing to risk infection by undergoing surgery.

Background

Strong evidence shows older adults, especially those suffering from one or more pre existing chronic health condition, such as osteoarthritis, the most common chronic disabling disease, are more likely than not to not only be disabled functionally to varying degrees, but are also likely to be at increased risk for being infected by the novel corona virus 19 known as COVID-19 that was first noted in Wuhan, China in 2019 [1]. Often perceived to be of equitable risk to common flu symptoms, emergent data clearly show exposure to this virus and variants can prove fatal to the older adult in particular, especially those suffering from chronic health conditions such as osteoarthritis [2]. At the same time, those adults suffering from various forms of pain and progressive osteoarthritis disability may not only have been unable to receive necessary treatments since 2020, despite knowledge that this group suffers considerable attrition of the affected joint cartilage and bone, chronic low grade inflammation, and progressive functional disability [3], and may hence not only be suffering greater degrees of pain than in pre pandemic times, but may be experiencing an exacerbation of multiple health issues that potentially heighten the risk for both COVID-19, as well as osteoarthritis disability, such as cardiovascular disease [4], and obesity [2] even if they remain uninfected by COVID-19 directly. They may also be infected by COVID-19, but are not aware of this as they may be asymptomatic [5].

Indeed, in a disease where modifying drugs are limited, self-care and physical activity as well as regular health consultations are not only highly desirable, but relatively essential, especially requiring carefully tailored exercises among other approaches to delay its progression and allay pain. However, not only was physical activity initially potentially quite markedly restricted at the outset of COVID-19, but many older adults already suffering from hip joint osteoarthritis may have become more impaired than not in the face of mobility restrictive ordinances and others that limited provider access as well as therapeutic resources. As well, they may have

been reluctant to exercise in their homes while isolated due to one or more fears or lack of know-how and access to direct assistance, as well as challenges in using remote rehabilitation resources, and with few modes of pain relief, had to possibly resort to the use of addictive pain medications even if not impaired severely initially. In addition, adults with osteoarthritis who often present with or are highly susceptible to one or more other chronic illnesses, including obesity, a known disease risk factor for osteoarthritis, may have become more impaired than anticipated since 2020 due to a temporary lack of comprehensive care options, travel restrictions, persistent anxiety, energy imbalances, and possible diminished access to outpatient therapy clinics, healthy foods, and face to face counseling services. Those cases that have survived COVID-19 and its acute impact on resource allocation and availability, and who may now be in the 'pipeline' for hip joint replacement surgery may hence be expected to be more numerous than ever, and in addition more impaired than those who required similar forms of surgery in pre pandemic times. They may also be expected to recover more slowly from surgery, while those who had already been exposed to the impact of COVID-19 illness can be expected to use more addictive pain medications than those who remain COVID-free [6].

Surgical stress, infections that may stem from hospital sources, and current burnout of many staff members and nurse shortages add to the possible need to do more in the line of prevention and careful selection of candidates for surgery along with hospital based efforts to maximize surgery than in pre pandemics periods [7]. But what do we know and what have we learned that can be applied to current efforts to limit hip osteoarthritis debility or preventing its spread to other joints.

Aim

This brief aimed to examine the case of hip joint osteoarthritis, a major progressive incurable disabler of older adults, and one where very little innovation has evolved over time in terms of ameliorating this condi-

tion, despite decades of research, and whether any lessons that could be learned in the face of ongoing COVID-19 waves of infection might prove insightful.

Indeed, in light of the immense burden placed on older adults at the onset of the COVID-19 pandemic, as well as some of the challenges that emerged and still persist, those that pertain to many individuals currently suffering from chronic disabling osteoarthritis of one or both hips, especially those community dwelling freely living individuals who may be especially vulnerable in this regard, may need to be specifically protected to reduce the risk for or suffering associated with hip joint osteoarthritis symptoms. This is not only humane and ethical practice in this author's view, but clearly has far-reaching public health ramifications, as chronic osteoarthritis affects the majority of the elderly population, and those who are most vulnerable to the virus are those with the more severe forms, and multiple co-existing health conditions found to parallel this disease, especially those that are poorly managed.

Rationale

Although often discounted as a major disabler of significant societal and individual importance by many, the collective public health impact, along with the immense suffering experienced by older adults diagnosed as having osteoarthritis of one or both hip joints, cannot be considered trivial. Yet, osteoarthritis, the most prevalent form of arthritis, was not even mentioned in a recent updated rheumatologic guideline document that was put forth in light of the COVID-19 pandemic [8]. At the same time, Quicke et al. [9] report a Global Burden of Disease study reporting a 102% increase in crude incidence rate of osteoarthritis rates in 2017 compared to 1990 showing no progress in efforts to stem the onset and prevalence of this disabling disease in pre pandemic periods, despite years of related research that point to some possible preventable causes, such as obesity.

Furthermore, although frequently cited as a primary disorder with no known cause, the onset of hip osteoarthritis in particular, which is a highly disabling disorder

of global proportions [10, 11], is believed to be strongly influenced by age, as well as certain hormonal, metabolic, biological and immunological factors as well as overall health and weight status that could be expected to have uniquely or collectively worsened in the face of COVID-19 exposure, COVID-19 legal ordinances that involve multiple forms of social restrictions [12], and what is now known as long COVID. In addition to important biomechanically imposed pathological factors such as the presence or exacerbation of excess weight gain or loss, impaired muscle function that may induce or foster aberrant joint loading, trauma and excess cartilage damage, COVID-19 infection as well as its impact on health status, plus one or more of these aforementioned co occurring health situations may well continue to be negatively impacted by COVID-19 interacting factors such as limited face to face provider visits, group and community based therapy opportunities, and especially those that limit participation in physical activity, as well as surgery.

At the same time, current data reveal that a sizeable number of osteoarthritis patients appear to be unaware or hold a belief that COVID-19 is not a serious threat even if they may be exposed to hospital based infections, poorer recovery rates and less optimally desired services thereafter, while being less healthy and robust than desirable as a whole, and hence possibly less satisfied in the long run than anticipated by pre pandemic outcomes [13-15].

Methods

In accord with the aim of this review, the PUBMED, PubMed Central, WEB of SCIENCE CONSOLIDATED, and GOOGLE SCHOLAR electronic databases were used to access those available articles that specifically covered the time periods 2020-2022 and focused on hip joint osteoarthritis and one or more aspects of COVID-19 risk or infection. Using the key words osteoarthritis of the hip, COVID-19, SARS-CoV-2 and corona virus combinations, all reports were considered eligible if they discussed these two topics in some way and articles selected were those that appeared most clinically relevant, along with some

that clearly helped to frame the current topic. Sought specifically were English based full-length articles from any country and those of apparent note were scanned and if salient are highlighted in narrative form.

Excluded were studies on rheumatoid arthritis, knee osteoarthritis, remote-rehabilitation, and physiotherapy, plus those with samples 60 years of age and under and those involving youth or preclinical studies or study proposals.

Results

As of July 24, 2022, even though 22,509 published hip osteoarthritis articles have been put forth since 1900, in accord with findings of Quicke et al. [9] very few articles relatively speaking [that is, only 150 listings] currently discuss the topic of COVID-19 [with 298,2913 postings] relative to osteoarthritis, and especially any aspect of hip joint osteoarthritis [42 articles, with 17 published in 2022], even though all forms of study were deemed acceptable and five data bases listed on the WEB OF SCIENCE CONSOLIDATED were reviewed. As well, even when listed as an article focusing on hip osteoarthritis, not all articles were relevant at all in this regard.

Moreover, even though most hip osteoarthritis sufferers may not require surgery, or surgery may be contra indicated, most currently published articles focused almost exclusively on the impact of COVID-19 on hip joint replacement surgical restrictions, a method of alleviating a high degree of dysfunction in the case of severe hip osteoarthritis pathology [eg., 16], but not all. Others discussed methods and approaches for triaging the awaiting body of hip osteoarthritis surgical cases, areas of influence where the ramifications of the COVID-19 virus might however have had one or more associations of relevance for considering a more nuanced disability maintenance or prevention approach to both mitigate excess hip osteoarthritis pathology, as well as to ensure more robust surgical results during any protracted post pandemic surgical waiting period.

As such, and according to the multi layered socio-

ecological explanatory model often employed to articulate and examine both health as well as behavioral and environmental disease influences, including individual, political, community, health care service, and family associated realms, one or more of these influential levels of influence may warrant more focused or increased attention in this regard [1, 9]. At the same time and as per Quicke et al. [9], as well as Lauwers et al. [17], COVID-19, a viral disease that may never be eradicated, clearly remains a topic of immense worldwide importance to those in public health due to its multiple interactive downstream impacts on multiple levels of society, especially the aging society, as well as on the wellbeing, independence, and life quality of the aging individual. Among the most salient issues in this regard is the impact of COVID on both general health and health behaviors (such as physical activity, dietary intake and healthcare consulting behavior), which in turn, potentially impact suffering, physical impairment, functional independence, deficient energy expenditure, and periods of immense stress, and oftentimes intractable pain.

Indeed, emerging reports from several countries point to a multitude of public policy and organizational changes that have clearly aimed at infection control, but may inadvertently have reduced access to osteoarthritis related healthcare services and green spaces important for wellbeing and physical activity maintenance, and minimizing joint stiffness and swelling, while maximizing muscle strength, endurance, balance, postural control, plus stress control and self-care ability and motivation. Social distancing, and its observed impact on social participation and isolation along with a host of technological substitutes that older adults may be challenged to access and employ, plus a reduced ability to work, may further impact the wellbeing of many older adults suffering from osteoarthritis functional disability, anxiety, stress, and depression, whether or not they have sustained a COVID-19 infection or not [12]. Those older adults recovering from COVID-19 infections, but who may require steroid drugs, may also be at heightened risk for future hip degeneration due to their negative impact on reducing bone blood supply [18], while those undergoing surgery may yet be at heightened risk

for ICU admissions, and preventable post operative complications [19].

As per Lauwer et al. [17] who discussed recent COVID associated trends, while these accommodations and problems have clearly shifted from dealing with the acute effects of this virus towards the management of its long-term morbidity manifestations, it can be deduced that a fair number of older hip osteoarthritis cases may well be expected to enter surgery, if this is desirable, either with a COVID diagnosis, a deterioration in their pre pandemic symptoms, more fatigue and mental health symptoms, and pain, and may yet acquire this illness on returning home, especially if they are in the older age ranges and have one or more chronic illnesses [20]. Moreover, even if no such illness prevails, it can be hypothesized that the COVID-19 virus or its emerging vaccine resistant novel variants can still contribute to age-related perturbations in those endothelial and adipose tissue elements known to characterize the early aging process, and that underlies osteoarthritis susceptibility, in addition to its well established adverse respiratory effects, even when due precautions are taken [21]. Huzum et al. [22] have proposed that oxidative stress, metabolism, and even antibiotic resistance might be influenced by either orthopedic conditions such as osteoarthritis or COVID-19 with resulting adverse implications for the sufferers wellbeing that has not been duly investigated to any degree. According to Lauwer et al. [17], this would explain the long-lasting symptoms of COVID-19 that now prevail among some, especially as far as adipose tissue and musculoskeletal tissue are concerned and that may clearly underlie some manifestations of osteoarthritis pathology as well as aging, as well as the joint pain, bone attrition, myalgia, and fatigue accompanying long-COVID [23]. As well, compounding this is a possible lack of sunlight exposure, as well as vitamin D access leading to a deficient presence of vitamin D that can increase bone fragility, and calcium deficiency, while fostering joint and muscle pain, as well as COVID-19 risk respectively [24]. It also appears that neuronal function may undergo similar perturbations at a molecular level along with the onset and perpetuation of

dysfunction and inflammation in response to COVID-19 [25, 26].

Battista et al. [27] who examined the experience of the COVID-19 pandemic as lived by adults with hip and knee osteoarthritis in Italy using a qualitative study approach based on semi-structured interviews showed four predominant themes. (1) *Being Stressed due to the Limited Social Interactions and for Family Members at High Risk of Infection.* (2) *The Need for Recurring Strategies to Cope with the Pandemic.* (3) *Being Limited in the Possibility of Undergoing Complementary Treatments and Other Routine Medical Visits.* (4) *Being Unaware of the Importance of Physical Activity as First-Line Interventions.* As such it was concluded that the COVID-19 pandemic and related restrictions had clearly impacted the quality of life and the care of individuals with hip and knee osteoarthritis quite markedly and significantly, and in the realm of multiple health behavioral and outcome pathways of influence, especially in the social sphere. However, even though the interviewees tended to develop a 'good' level of acceptance in the context of dealing with the pandemic associated restrictions and fears of infection, when it came to their care, they not only faced a delay in their routine medical visits, as well as opportunities for complementary treatments for the osteoarthritis (eg, physical therapies), as well as surgery. As such, it was concluded that more carefully construed policy directives and their implementation, if needed in the future appear imperative, as patients themselves may be passive, rather than active, health care seekers. Moreover, results of surgery, even when carried out, may yet be less profound in fostering physical activity recovery in the post COVID period than anticipated [28]. At the same time, as discussed by Folenza et al. [29], postoperative COVID-19 infection remains an important surgical consideration in its own right, and is one associated with higher possible rates of cardiopulmonary complications, renal injury, and urinary tract infections in older cases undergoing hip and/or knee joint replacement. COVID-19 infection earlier in the postoperative period is also associated with a higher risk of ensuing health complications.

Endstrasser et al. [30] who sought to evaluate pain, functional impairment, mental health, and daily activity in patients with end-stage hip and knee osteoarthritis during the COVID-19 lockdown concluded that these lockdowns did appear to have had a significant negative impact on pain, joint function, physical function, and physical activity in patients with end-stage hip and knee osteoarthritis. This study, which included 63 hip or knee osteoarthritis cases scheduled for arthroplasty that was postponed because of COVID-19 showed pain and functional impairment scores tended to increase significantly during the lockdown, while physical activity levels decreased significantly. At the final evaluation, the researchers found the persistent presence of pain and limited physical activity, but surprisingly no mental health symptoms, even though many were anxious to undergo surgery as soon as possible.

Yet, as pointed out by Fahy et al. [15], up to 86% of the osteoarthritis cases they interviewed felt that they were at little to no risk of COVID-19 infection, even though they may have been infected or susceptible to hospital based viral infection [5]. Indeed, the majority of patients were happy to proceed with surgery at the current level of COVID-19 risk related threats. Patients with higher levels of perceived health were more likely to postpone their operation than those with lower health perceptions in this regard. Unsurprisingly, the researchers found the cohort had low patient reported outcomes, possibly indicating the significant burden of hip osteoarthritis on both physical and mental health, as well as added COVID-19 restrictions and their actual cumulative possible long lasting health impact. For example, as discussed by Largi et al. [31] the COVID-19 emergency not only resulted in a complete suspension and consequent delay of common planned surgery such total hip replacement in older adults affected by osteoarthritis, but the issue of the quarantine imposed changes to the normal lifestyle of these patients was largely negative in other important self-care spheres. As such and after examining 14 osteoarthritis cases it was concluded that the exceptional COVID-19 pandemic had not only profoundly changed the patients' lifestyle, but had impacted their normal daily activities as well as regu-

lar surgical oriented activity. However, interestingly, the authors found the lifestyle changes imposed by the situation led some adults to show improvements of their clinical scores, rather than any deterioration. Thus, even though fewer hip joint replacement surgeries were performed at the height of COVID-19 restrictions, as discussed by Magnussan et al [32] and Dell'Isola et al. [33] in the context of hip joint injuries, perhaps, some who were scheduled perceived they were more able than they had expected or anticipated functionally.

Yet, even if rates of surgery appear to have returned to normal in the post COVID pandemic period [33], another study has shown that of an excess number of hip osteoarthritis cases awaiting joint replacement surgery a third tended to exhibit features 'deemed worse than death' or a deterioration in health [34] when compared to what occurred in pre pandemic periods for comparable lesion manifestations. In addition, those suffering markedly exhibited a lower quality of life than desirable [35]. According to Farrow et al. [6] this might explain, as well as predict, the potential, as well as the prevailing evidence of an emerging opioid problem associated with the influence of COVID-19 on elective arthroplasty services that needs to be acknowledged. This includes, but is not limited to, moderate decreases in health, plus higher than desirable hospital costs [3], as well as overall decreases in physical activity participation [36] and mental health status, physical fitness, and stiffness [37].

Discussion

While it is evident that features of aging that impact health, as well as multiple co occurring health issues found in adults with hip osteoarthritis may increase COVID-19 susceptibility and impacts, where they occur, as well as a variety of secondary infections that have been linked to an array of medications commonly used by this group [38], this topic is very poorly addressed at present. In addition, the fact that COVID-19 not only impacts the respiratory system, even when deemed mild to moderate, but also the musculoskeletal system causing excessive signs of fatigue, myalgia, arthralgia, muscle weakness and skeletal muscle damage is not well documented, despite

its relevance. Indeed, one or more of these symptoms, which can persist for months, while decreasing the quality of life of numerous individuals [39] are also comparable to those found in the context of osteoarthritis in its own right.

At the same time, COVID disease, as in most cases of osteoarthritis as experienced by the older adult, can be associated with varying degrees of pain, including muscle and joint pain plus pain mechanisms associated with inflammatory pathways also noted in the context of arthritis [40, 41]. Consequently, even though some may feel COVID-19 is not a serious condition, that surgery can proceed with some due precautions at pre pandemic levels and with prepandemic expectations, the serious nature of both COVID-19 infection risk as well as the presence of hip joint osteoarthritis as these arise in the older population more readily than younger groups, must surely warrant careful attention in the context of efforts to avoid excess debility and possible undesirable hospitalizations or institutionalization.

To this end, and even in the absence of related research, in accord with recommended efforts to avert the suffering and excess debility older community dwelling adults with hip joint osteoarthritis that may have duly increased in severity since 2019, as well as exposure to COVID-19 illness and its multiple adverse health impacts [42], strategies to offset any predictable preventable decline in overall health that could have multiple negative impacts among non hospitalized older adults awaiting surgery are clearly indicated [43]. These include possible rescheduling of elective surgery based on the patient's symptoms. In addition, a multidisciplinary and patient-centered approach to rescheduling patients is recommended [43], while Jin et al. [44] noted that for patients with currently confirmed or highly suspected COVID-19, the operation should be carried out only if deemed essential.

While further study is needed to validate these predictions and imperatives and others, and to carefully examine the impact of novel COVID-19 variants and vac-

ination on timeframes for rescheduling surgery [43], efforts to examine how to maximize older adults overall health in the face of the COVID threat and others, whether they are scheduled for surgery or not, or returning home post surgery, may yet prove of high relevance and utility, and drawing on past and present literature might include efforts known to be advantageous in general that could yet be delivered in some format by the use of carefully tailored periodic communications by practitioners and others that encourage their clients, while explaining the importance of:

- Sound nutrition practices
- Salient joint protection, COVID-19 mitigation and protection strategies
- Non addictive pain control approaches
- The pursuit of a healthy weight
- The pursuit of moderate physical activity practices
- Minimization of stress, anxiety, depression, and fears

They can do this by considering the use of periodic telephone/online discussions/check-ins, plus encouraging emails that reinforce favorable self-efficacy beliefs and expectations, while fostering socially supportive health care needs, and counseling provisions [12, 45-50].

In this regard, research is showing that intervention is sorely needed here because, COVID-19, which represents an unprecedented health crisis of global proportions, clearly added an additional burden of risk for older adults as regards the extent and progression of any prevailing osteoarthritis pathology due to its negative influence on physical activity and dietary behaviors, along with an increased likelihood of muscle loss, chronic disease exacerbation and risk, plus persistent COVID-19 infection risk [46, 50]. Narici et al. [51] clearly show that legal constraints that place collective limitations on the pursuit of physical activity practices, are clearly crucial to overcome in adults with or prone to osteoarthritis because muscle wasting not only occurs rapidly, being detectable within two days of inactivity, but this loss of muscle mass is associated with fiber denervation, neuromuscular junction

damage and upregulation of muscle protein breakdown, with a consequent loss of joint of joint protection.

Inactivity also affects glucose homeostasis, reduces insulin sensitivity, principally in muscle, as well as aerobic capacity than can have a strong bearing on the physiology of the cardiovascular system, including the functions of peripheral circulation, skeletal muscle oxidative function and energy balance associated with fat deposition and systemic inflammation [51].

In addition, even if we dismiss any endemic COVID-19 impact in the future, osteoarthritis of the hip, currently a major public health problem, is estimated to possibly affect 41.1 million Americans alone by 2030, along with a predicted increased need for total hip replacement surgery that exceed current rates, especially if no advancements are made in preventing its likely occurrence and disabling impacts in the face of COVID-19 issues if these remain unabated. At the same time, revision surgery, also expected to double, may be expected to increase if current surgeries remain delayed and candidates remain in poor health [48]. As such, Ezzat et al. [52] propose that in the time it will take to address the backlog of total joint arthroplasty surgery procedures in Ontario alone for example, evidence-based nonsurgical care of hip and knee osteoarthritis enacted by physical therapists and others can be expected to markedly reduce pain and improve function and quality of life for those with the disease awaiting surgery and others, rather than exacerbating social, economic, and emotional hardships [53]. As argued by Mak et al. [54] the spill-over impact of COVID-19 on patients with non infectious comorbid diseases is just beginning to unravel, and extra efforts must be taken for planning the resumption of efforts to combat this probable post-pandemic unanticipated outcome. In the meantime, to alleviate hip osteoarthritis symptoms, and COVID-19 risk among vulnerable older adults, the approaches cited above and others applied thoughtfully and consistently might yet prove helpful for countering both conditions and any possible cross talk between these whether surgery is scheduled or not.

In particular, because the presence of any SARS-CoV-2 infection could potentiate or accelerate a possible pre-existing systemic inflammatory state among those infected individuals suffering from obesity, special efforts to avoid weight gain and promote weight loss are likely to be more helpful than not [2]. In this regard the added value of techniques such as meditation related practices, guided imagery, joining an online support group, mild to moderate activity participation practices, healthy eating, social distancing, hand washing and optimal sleep routines may prove helpful as well [2, 6, 8].

Unfortunately, not only are possible other emergent consequences of COVID-19 unknown, but in light of the failure to eradicate this virus, and its persistent and emerging COVID-19 variants, predicted to be less susceptible to vaccines, but more potent as novel mutations of the virus emerge, what we do know must surely imply a concerted need for ongoing vigilance, as well as insightful efforts by both practitioners as well as their older vulnerable clients to foster and secure optimal health safety and health behaviors for the older adult, as well as their families. In addition, education to engender salient motivational and cognitive attributes, rather than reactive fear-based health beliefs, including erroneous vaccine as well as surgical beliefs, may be more helpful than not. At the same time, political efforts to aid providers and public health organizations to deliver or make available resources that may be needed, such as healthy foods and safe medication, plus exercise opportunities, may not only help minimize the onset or exacerbation of comorbidities such as cardiovascular disease, obesity, bone attrition, chronic inflammation, and muscle weakness, but the immense public and social health costs of failing to do this.

In short, until the backlog of surgery wanes, and the COVID virus is less virulent and prevalent, clinicians can perhaps look towards the provision of understandable actionable science based periodic communications as a powerful means of enabling the older adult with hip osteoarthritis to make more careful health decisions, rather than those current decisions of an apparent sizeable proportion of cases awaiting hip joint surgery who appear willing to basically overlook any COVID threat [55], even

though some cases awaiting elective surgery have been found to improve [15], while others have fared less successful than in pre-pandemic times [51]. They can help access resources needed, reduce stresses, and foster confidence and hope, and may find prioritizing those older hip osteoarthritis cases with unremitting pain, those who suffer from obesity and diabetes, and who are increasingly susceptible to substance use disorders including opioids, alcohol, as well as prescription and illegal drugs to quell pain and depression who live alone very important to assist. Those who have already been scheduled for surgery, but placed on a waiting list, or those presenting with active COVID-19 disease might also benefit from priority care efforts [44].

To support clinicians and policy makers and the probable need to continue to alleviate and avert further potentially adverse COVID-19 undesirable outcomes in the future, more carefully designed and focused research to tease out facts from fears or fiction in the context of case studies of representative older adults that can be conducted safely might be helpful, especially in absence of any large scale controlled ventures that may be very challenging to conduct in a post pandemic climate of health care restraint and personnel shortages, plus high transportation costs, among other barriers. Studies on COVID-19 and rheumatoid arthritis that often results in osteoarthritis joint damage at the hip, as well those that examine COVID-19 and its role in aging, immunity and osteoarthritis linkages, including pain, muscle wasting, osteoporosis, and depression and which home based approaches appear 'best' may also prove highly beneficial [56-59].

In the meantime, a concerted effort to currently examine what we know about hip joint osteoarthritis and its linkages to the novel corona virus 19 shows:

- Hip joint osteoarthritis clearly remains, and is projected to persist, as one of the foremost chronic health conditions facing aging adults.
- The multiple COVID-19 changes in health delivery and resource availability and its diverse downstream impacts on the magnitude of potentially preventable suffering among the older adult in the context of hip

joint osteoarthritis is likely to be continue relatively unabated for some time in the absence of comprehensive public health efforts

- Continually compounded in this regard will be the presence and persistence of poor health, including the future risk of exposure to the infectious disease known as COVID-19, as well as in the absence of any past or future infection.
- In turn, the hip osteoarthritis surgical candidate as well as those who are not scheduled are likely to be impacted directly as well as indirectly if personalized appropriately tailored timely steps are not taken to ameliorate and if possible prevent the immense suffering, fears, stresses, and inaccurate belief perceptions that have emerged since the onset of the global COVID-19 pandemic.

Conclusion

This present report reveals that in addition to the need for more insightful broad ranging public health strategies and policies, that until more insights concerning what health protection efforts are not only needed but are essential at all socio-ecological levels to secure post COVID optimal hip osteoarthritis outcomes among older adults, it should be assumed more rather than less distress will accompany the hip joint osteoarthritis disease state, and that more cases with greater impairment will emerge across time.

As well, the rate at which hip osteoarthritis progresses, and numbers who succumb to this disease will be likely to exceed current estimates if more enhanced current self-management and community based practices and resources are not encouraged and amplified considerably, even if surgery is contemplated, available, and forthcoming. In this respect, the interaction and apparent emerging presence of comparable features of pain, fatigue, and muscle weakness, plus inflammation of long standing COVID-19 symptoms, older age, and various degrees of hip osteoarthritis pathology should be borne in mind, and provisions made without delay to counter any unanticipated and economically overwhelming costly outcomes of the

SARS-CoV-2 global pandemic.

In this regard, and to secure public health resources and foster healthy lives for all, it remains imperative researchers are enabled to ascertain empirically what are the best future preventive and intervention practices and whether non operative or operative or both that appear desirable, so that scarce health care resources can be carefully triaged and delivered accordingly.

In the meantime, to avert a possible major and severe life quality decline as well as excess mortality impact on many older adults, emergent post COVID-19 data strongly support a concerted need for more provider education in efforts to counter painful hip joint osteoarthritis disease progression through mindful dietary, lifestyle, cognitive, counseling, and activity approaches. As well, the importance of being in one's 'best' health should be stressed, and the provision of health affirming tools, plus socially supportive approaches including information and instrumental support should proceed and be forthcoming without delay or prejudice to all who could benefit, even if it is believed that sufficient symptom reduction cannot be achieved without surgical care for a substantial number of knee osteoarthritis patients [60]. In this regard, more emphasis on the shared responsibility of the patient to do all they can to raise their health profile, and avoid unsafe behaviors, whether they undergo surgery or not appears strongly indicated as well.

Acknowledgements

None

Conflicts Interest

None

Funding

None

Abbreviation

- COVID-19, Corona virus disease 2019
- SARS-CoV-2, Corona virus type 2 pandemic

References

1. Rizkalla JM, Gladnick BP, Bhimani AA, Wood DS, Kitziger KJ, et al. (2020) Triaging total hip arthroplasty during the COVID-19 pandemic. *Curr Rev Musculoskelet Med.* 13(4):416-424. doi: 10.1007/s12178-020-09642-y.
2. López-Reyes A, Martínez-Armenta C, Espinosa-Velázquez R, Vázquez-Cárdenas P, Cruz-Ramos M, et al. (2020) NLRP3 Inflammasome: The Stormy Link Between Obesity and COVID-19. *Front Immunol.* 11:570251. doi: 10.3389/fimmu.2020.570251.
3. Schatz C, Leidl R, Plötz W, Bredow K, Buschner P. (2022) Preoperative patients' health decrease moderately, while hospital costs increase for hip and knee replacement due to the first COVID-19 lockdown in Germany. *Knee Surg Sports Traumatol Arthrosc.* 1–7. doi: 10.1007/s00167-022-06904-9.
4. Castro da Rocha FA, Melo LDP, Berenbaum F. (2021) Tackling osteoarthritis during COVID-19 pandemic. *Ann Rheum Dis.* 80(2):151-153. doi: 10.1136/annrheumdis-2020-218372.
5. Nakai T, Iwasaki H, Nishikawa T, Higuchi R, Sakata K, et al. (2022) Challenges and responses of elective orthopaedic surgery during the second wave of COVID-19. *J Orthop Sci.* 27(3):713-716.
6. Farrow L, Gardner WT, Tang CC, Low R, Forget P, et al. (2021) Impact of COVID-19 on opioid use in those awaiting hip and knee arthroplasty: a retrospective cohort study. *BMJ Quality & Safety.* Sep 12.
7. Wainwright TW. (2021) Enhanced recovery after surgery (ERAS) for hip and knee replacement—why and how it should be implemented following the COVID-19 pandemic. *Medicina.* 57(1):81.
8. Alhassan E, Siaton BC, Hochberg MC. (2022) Did COVID-19 impact osteoarthritis - clinical perspective? *Curr Opin Rheumatol.* 34(1):68-72. doi: 10.1097/BOR.0000000000000851.
9. Quicke JG, Conaghan PG, Corp N, Peat G. (2022) Osteoarthritis year in review 2021: Epidemiology & thera-

- py. *Osteoarthritis Cartilage*. 30(2):196-206. doi: 10.1016/j.joca.2021.10.003.
10. Fu M, Zhou H, Li Y, Jin H, Liu X. (2022) Global, regional, and national burdens of hip osteoarthritis from 1990 to 2019: Estimates from the 2019 Global Burden of Disease Study. *Arthritis Res & Ther*. 24(1):1-1.
 11. Long H, Liu Q, Yin H, Wang K, Diao N, et al. (2019) Prevalence trends of site-specific osteoarthritis from 1990 to 2019: Findings from the Global Burden of Disease Study 2019. *Arthritis & Rheum*. Mar 1.
 12. Smith TO, Belderson P, Dainty JR, Birt L, Durrant K, et al. (2021) Impact of COVID-19 pandemic social restriction measures on people with rheumatic and musculoskeletal diseases in the UK: a mixed-methods study. *BMJ Open*. 11(6):e048772. doi: 10.1136/bmjopen-2021-048772.
 13. Murphy NJ, Eyles JP, Hunter DJ. (2016) Hip osteoarthritis: Etiopathogenesis and implications for management. *Adv Ther*. 33(11):1921-1946. doi: 10.1007/s12325-016-0409-3.
 14. Courties A, Berenbaum F. (2020) Is hip osteoarthritis preventable? *Joint Bone Spine*. 87(5):371-375. doi: 10.1016/j.jbspin.2019.11.010.
 15. Fahy S, Moore J, Kelly M, Irwin S, Kenny P. (2020). Assessing the attitudes, awareness, and behavioral alterations of patients awaiting total hip arthroplasty during the COVID-19 crisis. *Geriatr Orthop Surg & Rehabil*. 11:2151459320969377.
 16. Lee LS, Chan PK, Fung WC, Cheung A, Chan VWK, et al. (2021). Lessons learnt from the impact of COVID-19 on arthroplasty services in Hong Kong: How to prepare for the next pandemic? *Arthroplasty*. 3(1):36. doi: 10.1186/s42836-021-00093-5.
 17. Lauwers M, Au M, Yuan S, Wen C. (2022) COVID-19 in joint ageing and osteoarthritis: Current status and perspectives. *Int J Mol Sci*. 23(2):720. doi: 10.3390/ijms23020720.
 18. Snowden GT, Clement ND, Zhang S, Xue Q, Simpson AHRW. (2022) Orthopaedic long COVID - the unknown unknowns: Are we facing a pandemic of avascular necrosis following COVID-19? *Bone Joint Res*. 11(1):10-11. doi: 10.1302/2046-3758.111.BJR-2021-0505.
 19. Mohammadpour M, Yazdi H, Bagherifard A, Jabalameli M, Moghtadaei M, et al. (2022) Evaluation of early complications, outcome, and mortality in Coronavirus Disease 2019 (COVID-19) infection in patients who underwent orthopedic surgery. *BMC Musculoskelet Disord*. 23(1):64. doi: 10.1186/s12891-022-05010-8.
 20. Chuntamongkol R, Meen R, Nash S, Ohly NE, Clarke J, et al. (2021) Resuming elective orthopaedic services during the COVID-19 pandemic: Our experience. *Bone Jt Open*.;2(11):951-957. doi: 10.1302/2633-1462.211.BJO-2021-0080.R1.
 21. Sheikhabaei E, Mirghaderi SP, Moharrami A, Habibi D, Motifard M, et al. (2022) Incidence of symptomatic COVID-19 in unvaccinated patients within one month after elective total joint arthroplasty: A multi-center study. *Arthroplast Today*. 14:110-115. doi: 10.1016/j.artd.2022.01.024.
 22. Huzum B, Curpan AS, Puha B, Serban DN, Veliceasa B, et al. (2022) Connections between orthopedic conditions and oxidative stress: Current perspective and the possible relevance of other factors, such as metabolic implications, Antibiotic resistance, and COVID-19. *Medicina (Kaunas)*. 58(3):439. doi: 10.3390/medicina58030439.
 23. Karaarslan F, Güneri FD, Kardeş S. (2022) Long COVID: Rheumatologic/musculoskeletal symptoms in hospitalized COVID-19 survivors at 3 and 6 months. *Clin Rheumatol*. 41(1):289-296. doi: 10.1007/s10067-021-05942-x.
 24. Chiodini I, Gatti D, Soranna D, Merlotti D, Mingiano C, et al. (2021) Vitamin D status and SARS-CoV-2 infection and COVID-19 clinical outcomes. *Front Public Health*. 9:736665. doi: 10.3389/fpubh.2021.736665.
 25. Korompoki E, Gavriatopoulou M, Hicklen RS, Ntanasis-Stathopoulos I, Kastritis E, et al. (2021) Epidemiology and organ specific sequelae of post-acute COVID19: A narrative review. *J Infect*. 83(1):1-16. doi: 10.1016/

- j.jinf.2021.05.004.
26. Colatutto D, Sonaglia A, Zabotti A, Cereser L, Girometti R, et al. (2021) Post-COVID-19 arthritis and sacroiliitis: Natural history with longitudinal magnetic resonance imaging study in two cases and review of the literature. *Viruses*. 13(8):1558. doi: 10.3390/v13081558.
 27. Battista S, Dell'Isola A, Manoni M, Englund M, Palese A, et al. (2021) Experience of the COVID-19 pandemic as lived by patients with hip and knee osteoarthritis: An Italian qualitative study. *BMJ Open*. 11(10):e053194. doi: 10.1136/bmjopen-2021-053194.
 28. Ulivi M, Orlandini L, Meroni V, D'Errico M, Fontana A, et al. (2021) Remote management of patients after total joint arthroplasty via a web-based registry during the COVID-19 pandemic. *Healthcare (Basel)*. 9(10):1296. doi: 10.3390/healthcare9101296.
 29. Forlenza EM, Higgins JDD, Burnett RA, Serino J, Della Valle CJ. (2022) COVID-19 infection after total joint arthroplasty is associated with increased complications. *J Arthroplasty*. 37(7S):S457-S464. doi: 10.1016/j.arth.2021.10.023.
 30. Endstrasser F, Braito M, Linser M, Spicher A, Wagner M, et al. (2020) The negative impact of the COVID-19 lockdown on pain and physical function in patients with end-stage hip or knee osteoarthritis. *Knee Surg Sports Traumatol Arthrosc*. 28(8):2435-2443. doi: 10.1007/s00167-020-0610
 31. Larghi MM, Grassi M, Luca F, Placenza E, Rampulla C, et al. (2020) Clinical outcome before and after COVID-19 quarantine in patients affect of knee and hip osteoarthritis. *Acta Biomed*. 91(4):e2020150. doi: 10.23750/abm.v91i4.10275.
 32. Magnusson K, Helgeland J, Grøslund M, Telle K. (2021) Impact of the COVID-19 pandemic on emergency and elective hip surgeries in Norway. *Acta Orthop*. 92(4):376-380. doi: 10.1080/17453674.2021.1898782.
 33. Dell'Isola A, Kiadaliri A, Turkiewicz A, Hughes V, Magnusson K, et al. (2021) The impact of first and second wave of COVID-19 on knee and hip surgeries in Sweden. *J Exp Orthop*. 8(1):60. doi: 10.1186/s40634-021-00382-7.
 34. Pietrzak JRT, Maharaj Z, Erasmus M, Sikhauli N, Cacic JN, et al. (2021) Pain and function deteriorate in patients awaiting total joint arthroplasty that has been postponed due to the COVID-19 pandemic. *World J Orthop*. 12(3):152-168. doi: 10.5312/wjo.v12.i3.152.
 35. Clement ND, Scott CE, Murray JR, Howie CR, Deehan DJ, IMPACT-Restart Collaboration. (2021) The number of patients "worse than death" while waiting for a hip or knee arthroplasty has nearly doubled during the COVID-19 pandemic: A UK nationwide survey. *The Bone & Joint J*. 103(4):672-680.
 36. de Boer DR, Hoekstra F, Huetink KIM, Hoekstra T, Kroes LA, et al. (2021) Physical activity, sedentary behavior and well-being of adults with physical disabilities and/or chronic diseases during the first wave of the COVID-19 pandemic: A rapid review. *Int J Environ Res Publ Hlth*. 18(12):6342. doi: 10.3390/ijerph18126342.
 37. Nimitha KJ, Singh B, Srivastava RN, Kumar R. (2022) SYMPOSIUM: Health related quality of life and depression in older adults with knee osteoarthritis pain-cross-sectional telephonic survey in COVID 19 pandemic. *Indian J Psychiatr*. 64(Suppl 3):S634.
 38. Ragni E, Mangiavini L, Viganò M, Brini AT, Peretti GM, et al. (2020) Management of osteoarthritis during the COVID-19 pandemic. *Clin Pharmacol Ther*. 108(4):719-729. doi: 10.1002/cpt.1910.
 39. Dos Santos PK, Sigoli E, Bragança LJG, Cornachione AS. (2022) The musculoskeletal involvement after mild to moderate COVID-19 infection. *Front Physiol*. 13:813924. doi: 10.3389/fphys.2022.813924.
 40. Weng LM, Su X, Wang XQ. (2021) Pain Symptoms in patients with coronavirus disease (COVID-19): A literature review. *J Pain Res*. 14:147-159. doi: JPR.S269206.
 41. Rani M, Uniyal A, Akhilesh, Tiwari V. (2022) Decrypting the cellular and molecular intricacies associated with COVID-19-induced chronic pain. *Metab Brain Dis*.

- 1-14. doi: 10.1007/s11011-022-01048-8.
42. Hughes SE, Haroon S, Subramanian A, McMullan C, Aiyegbusi OL, et al. (2022) Development and validation of the symptom burden questionnaire for long COVID (SBQ-LC): Rasch analysis. *BMJ*. 377:e070230. doi: 10.1136/bmj-2022-070230.
43. Khan IA, Zaid MB, Gold PA, Austin MS, Parvizi J, et al, AAHKS EBM Committee. (2022) Making a joint decision regarding the timing of surgery for elective arthroplasty surgery after being infected with COVID-19: A systematic review. *J Arthroplasty*. May 6.
44. Jin X, Chen M, Wang J, Yang S, Xu W, et al. (2021) Clinical characteristics and early prognosis of patients with SARS-CoV-2 infection undergoing joint arthroplasty during the COVID-19 pandemic. *Medicine (Baltimore)*. 100(33): e26760. doi: 10.1097/MD.00000000000026760.
45. Chen P, Mao L, Nassis GP, Harmer P, Ainsworth BE, Li F. (2020) Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions. *J Sport Health Sci*. 9(2):103-104. doi: 10.1016/j.jshs.2020.02.001.
46. Schuch FB, Bulzing RA, Meyer J, López-Sánchez GF, Grabovac I, et al. (2022) Moderate to vigorous physical activity and sedentary behavior changes in self-isolating adults during the COVID-19 pandemic in Brazil: A cross-sectional survey exploring correlates. *Sport Sciences for Health*. 18(1):155-163.
47. Corso M, Cancelliere C, Mior S, Salmi LR, Cedraschi C, et al. (2022) Are nonpharmacologic interventions delivered through synchronous telehealth as effective and safe as in-person interventions for the management of patients with nonacute musculoskeletal conditions? A systematic rapid review. *Arch Phys Med Rehabil*. 103(1):145-154.e11. doi: 10.1016/j.apmr.2021.09.007.
48. Rees HW. (2020) Management of osteoarthritis of the hip. *J Am Acad Orthop Surg*. 28(7):e288-e291. doi: 10.5435/JAAOS-D-19-00416.
49. Wall C, Johnson T, de Steiger R. (2020) Symptom management for patients awaiting joint replacement surgery. *Aust J Gen Pract*. 49(7):444-446. doi: 10.31128/AJGP-03-20-5286.
50. Kirwan R, McCullough D, Butler T, Perez de Heredia F, Davies IG, et al. (2020). Sarcopenia during COVID-19 lockdown restrictions: long-term health effects of short-term muscle loss. *Geroscience*. 42(6): 1547-1578. doi: 10.1007/s11357-020-00272-3.
51. Narici M, Vito G, Franchi M, Paoli A, Moro T, et al. (2021) Impact of sedentarism due to the COVID-19 home confinement on neuromuscular, cardiovascular and metabolic health: Physiological and pathophysiological implications and recommendations for physical and nutritional countermeasures. *Eur J Sport Sci*. 21(4):614-635. doi: 10.1080/17461391.2020.1761076.
52. Ezzat AM, McCracken R, Wong ST. (2020) A team-based approach in primary care can alleviate the burden created by the COVID-19 surgical backlog for people with hip and knee osteoarthritis. *CMAJ*. 192(46):E1471.
53. Jack K, Evans C, Bramley L, Cooper J, Keane T, et al. (2022) Identifying and understanding the non-clinical impacts of delayed or cancelled surgery in order to inform prioritisation processes: A scoping review. *Int J Environ Res Publ Hlth*. 19(9):5542. doi: 10.3390/ijerph19095542.
54. Mak IL, Wan EYF, Wong TKT, Lee WWJ, Chan EWY, et al. (2022) The spill-over impact of the novel coronavirus-19 pandemic on medical care and disease outcomes in non-communicable diseases: A narrative review. *Public Hlth Rev*. 43:1604121. doi: 10.3389/phrs.2022.1604121.
55. Madanipour S, Al-Obaedi O, Ayub A, Iranpour F, Subramanian P. (2021) Resuming elective hip and knee arthroplasty in the COVID-19 era: A unique insight into patient risk aversion and sentiment. *Ann R Coll Surg Engl*. 103(2):104-109. doi: 10.1308/rcsann.2020.7012.
56. Dewanjee S, Kandimalla R, Kalra RS, Valupadas C, Val-

- lamkondur J, al. (2021) COVID-19 and rheumatoid arthritis crosstalk: Emerging association, therapeutic options and challenges. *Cells*. 10(12):3291. doi: 10.3390/cells10123291.
57. Govil G, Tomar L, Dhawan P. (2022) Arthritis with osteoporosis crippled the elderly during Covid-19 pandemic: A silent killer? *Int J Orthopaedic Rheumatol*. 8(1):38-40.
58. Cisternas AF, Ramachandran R, Yaksh TL, Nahama A. (2020) Unintended consequences of COVID-19 safety measures on patients with chronic knee pain forced to defer joint replacement surgery. *Pain Rep*. 5(6):e855. doi: 10.1097/PR9.0000000000000855.
59. Knebel C, Ertl M, Lenze U, Suren C, Dinkel A, et al. (2021) COVID-19-related cancellation of elective orthopaedic surgery caused increased pain and psychosocial distress levels. *Knee Surg Sports Traumatol Arthrosc*. 29(8):2379-85.
60. Kienzle A, Biedermann L, Babeyko E, Kirschbaum S, Duda G, et al. (2021) Public interest in knee pain and knee replacement during the SARS-CoV-2 pandemic in Western Europe. *J Clin Med*. 10(5):1067. doi: 10.3390/jcm10051067.