Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

shoulder replacements were 92·0% (95% CI 91·0–93·0); 85·5% (83·3–87·7) for humeral hemireplacements; and 94·4% (93·1–95·7) for reverse total shoulder replacement because of osteoarthritis, and 93·6% (91·4–95·8) reverse total shoulder replacement because of rotator cuff arthropathy. Pooled 10-year patient reported outcomes measures showed marked improvements from baseline (standardised mean difference 2·13 [95% CI 1·9–2·3]). On the basis of these data, the authors concluded that more than 90% of shoulder replacements should survive for a minimum 10 years.[5]

As with any study, there are some limitations of this analysis. The authors could not control specific patient factors or disease severity, which could confound implant survivorship and postoperative satisfaction. Additionally, the authors do not discuss before and after operation range of motion changes, which are an essential method to evaluate the results of shoulder replacements. Moreover, the registry analysis only consisted of one data source. Nevertheless, this study is one of the largest and most complete reports on long-term shoulder replacement survivorship that included a large number of each case type evaluated, which also substantiated these findings.

We believe that future studies should build on this work to include the influence of patient and implant specific factors, and should attempt to have patients follow similar post-operative rehabilitation protocols because physical therapy regimens have been reported to play a major part in overall shoulder replacement success.

We commend Evans and colleagues for contributing this needed work to the literature. Their comprehensive assessment of total, hemi, and reverse total shoulder replacement survivorships and patient-reported outcomes allows shoulder surgeons to more definitively answer patients when they asked how long they can expect their implants to last. Of note, the survivorship rates found in this study are similar to those in an analysis of total hip replacement, a much more common procedure. These findings come at a needed time, as the rates of shoulder arthroplasties continue to rise.[6,7] The data from this Article should help reassure patients and surgeons concerning the efficacy and long-term outcomes of these procedures.

We declare no competing interests.

*Nipun Sodhi, *Michael A Mont*
mmont@northwell.edu

Department of Orthopaedic Surgery, Long Island Jewish Medical Center, New York, NY, USA (NS); and Department of Orthopaedic Surgery, Lenox Hill Hospital, New York, NY 10075, USA (MAM)

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COVID-19 in children and young people

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the pathogen that causes COVID-19, the cause of a pandemic that is currently threatening millions of lives globally. Around 10–20% of adult patients with COVID-19, particularly older people and those with comorbidities, develop severe or life-threatening disease characterised by acute respiratory distress syndrome (ARDS) and clinical and laboratory features of a cytokine storm.[1] Despite reports of a probable COVID-19-associated hyperinflammatory syndrome reminiscent of Kawasaki disease in a subset of children and young people, overall younger people develop severe symptoms of COVID-19 less frequently than adults, and are at lower risk for hospitalisation and life-threatening complications, raising questions over whether age-specific variables might be protective.[2]

The association between severe COVID-19 and advanced age is reminiscent of the severe acute respiratory syndrome (SARS) epidemic during 2002 and 2003. Less than 5% of individuals affected were children, of whom less than 1% required ventilatory support. Post-containment seroprevalence studies showed that subclinical SARS and

asymptomatic transmission by children had not occurred. By contrast, unpublished data from South Korea and Germany on SARS-CoV-2 suggest that children and young people do get infected but are underrepresented when diagnostic efforts focus on symptomatic individuals. Indeed, several reports suggest that the paediatric infection risk is similar to adults.[2] Although the frequency of asymptomatic SARS-CoV-2 infections among children and young people is unknown, we assume that the paediatric infection rate and thereby the role of young people as drivers of pathogen transmission is substantial.

Asymptomatic courses of COVID-19 in children and young people are intriguing, as children are susceptible to other respiratory viral illnesses, and are prone to severe presentation. Over 75% of children seroconvert in response to seasonal coronaviruses before their fourth birthday. Seasonal coronavirus antibody titres wane over time, which is most obvious in people older than 60 years. Restricted cross-reactivity of antibodies against seasonal coronaviruses and SARS exists, and a more than 4 times titre increase of seasonal coronavirus antibodies in sera of convalescent patients with SARS reflects immunological recall effects. The relevance of both specificity and titre of antibodies in this context has been shown in other viral illnesses,[3] and this could influence immune pathology. Through Fcγ receptor ligation, antibody-bound virions can enter susceptible cells, such as macrophages, in a process termed antibody-dependent enhancement. Where antibody-dependent enhancement has been described previously, for example in dengue virus infections, virions inhibit type I interferon responses, thereby suppressing antiviral responses while promoting proinflammatory interleukin (IL)-6 and tumour necrosis factor (TNF) expression.[4,5] Furthermore, rapid recall antibody production contributes to immune complex deposition that can promote inflammation and damage, including vasculitis.[3]

Both antibody specificity and antibody titre affect antibody-dependent enhancement. At higher titres, antibodies directed against seasonal coronaviruses in children and young people might confer some protection, whereas waning of partly cross-reactive seasonal coronavirus antibodies in older people might place them at higher risk for antibody-dependent enhancement. Additionally, priming of recall antibody production might facilitate infection of monocytes and macrophages or immune complex associated inflammation.

The angiotensin-converting enzyme 2 (ACE2) transmembrane enzyme is the cellular receptor for SARS-CoV-2.[2] Varying ACE2 expression might affect disease susceptibility and progression. ACE2 expression is highest in children and young people and women, decreases with age, and is lowest in people with diabetes and hypertension. Therefore, lower levels of expression of the viral receptor ACE2 are found in those at the highest risk for progression of COVID-19 to a severe disease phenotype.[6] ACE2 is part of the ACE2—angiotensin-(1-7)—Mas system, which counteracts the proinflammatory effects of the ACE—angiotensin-2 axis. ACE2 catalyses angiotensin-2 processing into angiotensin-1-7, which counteracts vasoconstriction, and negatively modulates leukocyte migration, cytokine expression, and fibrogenic pathways.[7] Higher density of ACE2 expression at baseline might be beneficial when virions compete with angiotensin-2 for binding sites, and could enable children and young people to maintain angiotensin-1-7 levels that counteract the proinflammatory actions of angiotensin-2. Variable ACE2 expression might explain why children and young people can be infected with SARS-CoV-2 but be relatively exempt from hyperinflammation and the associated complications.

Live vaccinations appear to protect against infectious pathogens beyond the intended target antigen by priming the innate immune system to mediate non-specific heterologous effects. Examples include a blunted response to yellow fever vaccine, and increased ex vivo production of pro-inflammatory IL-1β and TNF in response to Staphylococcus aureus or Candida spp after BCG vaccination. Infants vaccinated with BCG show significantly reduced infection-related mortality, attributed to epigenetic modulations that affect innate immunity.[8,9]

However, heterologous immune responses to unrelated antigens could have detrimental effects for the host. Adults have memory T cells specific to antigens they were never exposed to. Narrowed memory T-cell repertoires are a feature of immune senescence and are associated with disease progression and T-cell mediated damage in viral hepatitis and infective mononucleosis.[10] Indeed, narrower T-cell repertoires might allow memory T cells directed against cross-reactive epitopes to become dominant. Therefore, the T-cell response to COVID-19 in older people might favour high-affinity clones, potentially contributing to a more prominent inflammatory response.

Therefore, recent vaccinations might protect children from COVID-19, whereas immune senescence and T-cell restriction in older patients might promote severe disease. The effect of BCG vaccination specifically on COVID-19 is being investigated.

A key question is how to treat and monitor patients with autoimmune or inflammatory disease, especially those on immune modulating treatment. Reports on clinical outcomes in children with autoimmune or inflammatory conditions and COVID-19 are sparse. Negative effects on pathogen clearance and survival have not been reported.[2] Indeed, the first registry data suggest that children with autoimmune or inflammatory conditions might be better protected from severe COVID-19.[2] Therefore, it is notable that SARS-CoV and SARS-CoV-2 can escape the immune system by suppressing early type I interferon, IL-1β, IL-6, and TNF expression in response to cytoplasmatic or endosomal RNA sensing.[2] Thus, genetic variants associated with juvenile-onset rheumatic diseases, especially those affecting type I interferon responses (eg, systemic lupus erythematosus, Sjögren's syndrome, or juvenile dermatomyositis), might improve pathogen clearance. However, this hypothesis has not been tested. Furthermore, some treatments could positively affect pathogen clearance (eg, antimalarial drugs) or prevent hyperinflammation (eg, cytokine blockers).[2] Conclusive statements on the risk of infection or complications in children and young people with rheumatic diseases are premature as reliable data have not been collected. Thus, recommendations regarding shielding of children and young people with autoimmune or inflammatory conditions do not vary substantially from adults.

In conclusion, children and young people do contract SARS-CoV-2 but have severe disease less frequently than adults. A possible explanation for the mild disease phenotypes of COVID-19 in the majority of children and young people is higher titres of antibodies directed against seasonal coronaviruses abrogating immune complex deposition and antibody-dependent enhancement. Higher ACE2 expression might facilitate infection while enabling maintenance of a less inflammatory state by maintaining a functioning ACE2–Angiotensin-(1-7)–MAS system. Finally, non-specific protective effects after live vaccination and a more diverse T-cell repertoire in children and young people might contribute to mild presentations. Children with systemic autoimmune or inflammatory conditions might be further protected by overcoming immune evasion mechanisms of SARS-CoV-2, and some treatments might protect from the development of cytokine storm syndrome later in the disease course.

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*Susanna Felsenstein, *Christian M Hedrich*
christian.hedrich@liverpool.ac.uk

Department of Infectious Diseases and Immunology (SF) and Department of Paediatric Rheumatology (CMH), Alder Hey Children's NHS Foundation Trust Hospital, Liverpool L14 5AB, UK; and Department of Women's and Children's Health, Institute of Translational Medicine, University of Liverpool, Liverpool, UK (CMH)

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Advances in treatments for Sjögren's syndrome: the glass is half full

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Sjögren's syndrome is a disabling systemic autoimmune disease characterised by pain, fatigue, and mucosal dryness, with risk of systemic complications (joints, lungs, skin, and peripheral nerves being the most frequently involved) in 30–50% of patients.[1] So far, there is no effective immunomodulatory treatment for disease-related systemic complications because most randomised controlled trials (RCTs) on Sjögren's syndrome done in