respiratory distress syndrome management can include corticosteroids, as they may decrease the time on a ventilator and reduce mortality.[9] Corticosteroids are also administered if there is suspicion of adrenal insufficiency or if they are indicated because of an underlying condition. Currently, the World Health Organization and major critical care and infectious diseases associations advise against routine corticosteroid use in COVID-19 patients, mainly out of concern for slowing viral clearance. However, early reports from China and Europe suggested that corticosteroids are useful in severe COVID-19 and some experts posit that severe cytokine release syndrome seen in some patients warrants the use of corticosteroids or other targeted immunosuppressants.[9–12]

It is interesting to consider that adrenal insufficiency secondary to the vasculopathy described here may contribute to the cytokine storm observed in patients with severe COVID-19. Clinical studies to further assess adrenal function in COVID-19 may help in understanding the pathogenesis of disease in severely affected patients and hopefully lead to therapeutic protocols that may rescue an increased number of patients.

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Creation and Benefits of the "COVID Autopsy Listserve"

To the Editor.—I am writing to commend many members of the autopsy pathology community (including hospital and forensic practitioners) who have come together to help shape and deliver quality postmortem care during the initial wave of the novel coronavirus disease 2019 (COVID-19) pandemic. In March 2020, as new cases were rapidly escalating in New York City and around the world, most autopsy pathologists likely appreciated that decedent management and autopsy practice would have to quickly and adeptly evolve in response to the pandemic. Staff questioned where to put increasing numbers of decedents who were incessantly arriving in morgue spaces. Attending and resident pathologists were concerned about the potential infectivity of COVID-19 at autopsy. I realized I did not have sufficient information with which to effectively navigate the unfamiliar territory into which postmortem care was rapidly transitioning amid the evolving pandemic.

So, on March 20, 2020 I drafted an email to a group of colleagues around the country asking their opinions on managing COVID-19 at autopsy and in the morgue. I also encouraged them to spread the word about this fledgling "COVID Autopsy Listserve (the "listserve"—really just an email distribution list) to anyone involved with postmortem care. That day ended with 55 inaugural participants, and by the end of March more than 100 people from around the United States and some international locations were engaging on the listserve. Today, there are nearly 200 members on the listserve, mostly autopsy pathologists but also some researchers and clinicians. All are welcome, and new people join each week. The goal of the listserve is to disseminate knowledge and experience so we can safely and effectively expand medical knowledge through autopsy, while compassionately caring for decedents and their families.

The members of the listserve have addressed and continue to deal with myriad issues relating to COVID-19 in the postmortem realm. However, one of its most rewarding successes was its empowering pathologists who have appropriate facilities, supplies, and experience to autopsy COVID-19 decedents. I developed and disseminated through the listserve 2 surveys, 1 each at the end of March and April 2020. Around 50 pathologists responded to each survey (51 in March, 49 in April). Interesting perspectives and practice trends documented in these surveys over the initial weeks of the pandemic include the following:

1. Most respondents felt that existing guidelines[1] allow for the safe performance of COVID-19 autopsies (84% March and 92% April);
2. More institutions performed or were preparing to perform COVID-19 autopsies in April (63%) than in March (35%);
3. More respondents had autopsied a COVID-19 decedent in April (51%) than had in March (6%); and
4. Respondents' support for resident involvement in COVID-19 autopsies increased from March (55%) to April (82%).

"Experientia docet" (experience teaches) and through the COVID Autopsy Listserve we continue to educate and reassure each other, collaborate on research, and optimize our

aggregate response to the COVID-19 pandemic. If you are involved with or interested in autopsy and/or decedent management then please join us (email the author at awilliamson@northwell.edu).

Stay safe, and keep fighting the good fight!

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Analysis of COVID-19 Transmission: Low Risk of Presymptomatic Spread?

To the Editor.—More than 6 million confirmed cases of coronavirus disease 2019 (COVID-19) have been identified worldwide, and a number of case reports[1–5] have indicated that COVID-19 has the potential to be transmitted prior to disease onset. Studies have also shown that infectious virus can be isolated from presymptomatic COVID-19 cases,[6] and although it is unknown what level of infectious virus is needed to confer efficient transmission potential, detection of infectious virus in the upper respiratory tract indicates that presymptomatic transmission of COVID-19 is plausible. Fear of asymptomatic and presymptomatic transmission of COVID-19 has led to considerable concern among public health policymakers, frontline health care workers, and the public in general. In response, many city, state, and federal leaders have asked for increased testing via reverse transcriptase–polymerase chain reaction and serologic assays in order to identify asymptomatic cases and potential spreaders. Individual case studies are important for bringing attention to this topic, but they do not provide information regarding the overall proportion of transmission events that occur before or after symptom onset. A better understanding of COVID-19 transmission is needed to control this pandemic, and although some recent studies have provided new insight, others have fueled increased concerns.

Recent modeling of 77 transmission pairs indicated that 34 instances of COVID-19 transmission (44%) occurred before symptom onset, with peak transmission at 0.7 days before symptom onset.[7] This is an unusual outcome because most respiratory viruses, including influenza or severe acute respiratory syndrome coronavirus (SARS-CoV), spread most efficiently at or after symptom onset and not before. There are also several limitations to this study. The model was not based on direct contact tracing but instead relied upon publicly available data sources and news media reports for determining presymptomatic versus postsymptomatic exposures and transmission intervals. The authors noted that they used a previously published estimate of the COVID-19 incubation period that, if overestimated, had the potential to inflate the proportion of presymptomatic transmission. Sensitivity analysis of different incubation periods is currently underway (M.K.S. and L. Gao, unpublished data, June 1, 2020). Regardless of the study, clinical data based on personal recollection may be subject to recall bias. This may be particularly important for COVID-19 transmission models if people are reluctant to admit they were traveling or not following proper precautions while symptomatic because of pandemic-associated societal pressure and fear of condemnation for their actions. Although it is unclear how these various factors may have impacted this particular study, review of other COVID-19 and SARS transmission studies provides an interesting counterpoint.

In contrast to He et al,[7] a study examining 468 confirmed COVID-19 cases in China indicated that only 59 case reports (12.6%) resulted from presymptomatic transmission.[8] Although this study was also based on secondary data sources, they obtained reliable information from confirmed cases in online reports from 18 provincial centers for disease control and prevention. Perhaps the most convincing study on presymptomatic transmission of COVID-19 was performed in Singapore.[9] Direct contact tracing of 157 locally acquired cases indicated that just 10 of the cases (6.4%) occurred through presymptomatic transmission. Together these studies indicate COVID-19 transmission is 10- to 20-fold more efficient after symptom onset.

Asymptomatic transmission raises similar concerns for contact tracing/isolation procedures, but a study of 24 asymptomatic cases of COVID-19 found that only 1 asymptomatic carrier transmitted the virus to another person.[10] Bearing in mind that COVID-19 has a reproductive number (R_0) = 2 to 3 (meaning on average, 1 infected person transmits to 2–3 other people), the spread of virus by asymptomatic carriers appears very inefficient and may have an $R_0 < 0.1$ if this preliminary study is representative of asymptomatic cases among other groups. Similar results were observed with SARS. Of 669 close contacts to symptomatic SARS patients, 101 (15.1%) developed symptoms, whereas when 363 others had close contact to SARS patients during the incubation period (ie, presymptomatic), none developed symptoms.[11] Interestingly, most people are not effective at spreading COVID-19. A recent study found that the distribution of individual R_0 values was highly overdispersed, with 80% of infections being caused by ~9% of cases.[12] There are many factors that may impact transmission efficiency, including duration of exposure, type of exposure/environment (indoor versus outdoor, home versus hospital, public transportation, etc), role and timing of social distancing interventions, and age/health status of the infector as well as the infectee. Nevertheless, the various coronavirus studies described here indicate that if we focus on one parameter of transmission (presymptom versus postsymptom onset exposure), we find that although presymptomatic transmission of COVID-19 is possible, it appears inefficient compared with transmission after symptom onset.

A common issue with analysis of COVID-19 transmission rates is the lack of consistent data collection and