



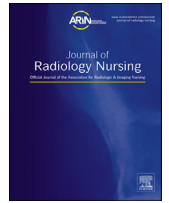
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Featured Article

COVID-19 Related Mortality During Management of a Hepatic Abscess

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A B S T R A C T

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The coronavirus disease (COVID-19) is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which originated in the capital city of the Hubei Province, Wuhan, China, in late 2019. Declared a pandemic by the World Health Organization on March 11th, 2020, COVID-19 has challenged healthcare systems to limit the spread of community and hospital-acquired disease. This article uses a patient case to highlight the importance of infection control during the height of the SARS-CoV-2 surge at a Level I affiliated community hospital in Western New York.

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Introduction

In the United States, nearly two-million individuals are affected annually by hospital-acquired infections, which increase mortality, extend hospital stays, and drive up total costs (Haque et al., 2018; Plowman, 2000). In the setting of an ongoing pandemic caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), healthcare systems have been challenged to limit in-hospital transmission of the virus; a task noted to be incredibly difficult given the suggestion of what appears to be fairly high viral transmissibility (Biggerstaff et al., 2014; Sanche et al., 2020).

In a Western New York community, when faced with evidence of sustained person-to-person community spread, a State of Emergency was first enacted in early March of 2020, resulting in the closure of all schools, daycares, and restaurants. By March 22nd, 2020, the Governor's Executive Order "New York State on Pause" went into effect, requiring all non-essential businesses or gatherings of any size to be canceled or postponed. In the background of this rapidly changing landscape, we present a case of an uninfected

individual who required inpatient medical care during our early experience with the 2019 novel coronavirus (Covid-19) pandemic.

Case presentation

In mid to late March, an independent elderly male without significant prior medical history presented to the hospital emergency department with a 1-week history of abdominal pain and generalized weakness. His outpatient workup had been notable for a WBC 9,800 mm³ [4.5 to 11.0 × 10⁹/L], as well as elevation in liver enzymes with an ALT of 64 U/L [0-50] and AST of 69 U/L [0-50]. The total bilirubin was within normal limits, 0.9 mg/dL. A CT of the abdomen and pelvis was notable for an abscess in the liver adjacent to a dilated and presumably infected gallbladder (Figure 1).

The patient was subsequently admitted to the hospital. At this time of the pandemic, universal testing of asymptomatic individuals requiring hospital admission had yet to be implemented, and the patient was, therefore, not tested for SARS-CoV-2. On the first day of admission, the patient was determined to be a high-risk surgical candidate and was subsequently referred to interventional radiology (IR) for percutaneous drainage. A drainage catheter was placed in a routine fashion using sonographic guidance by interventional radiology, and the fluid aspirate was sent for gram stain, culture, and sensitivities to aid in targeted antibiotic therapy.

The patient was eventually discharged 1 week after initial presentation with a plan to continue intravenous antibiotics and supportive care while at home. A 14-day quarantine was planned for

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Figure 1. Axial CT demonstrates hypodense ill-defined collection (curved arrow) in the liver concerning for an abscess.

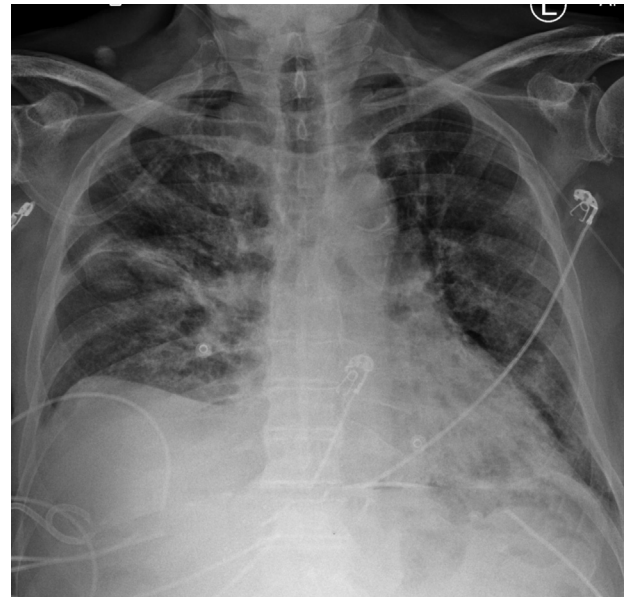


Figure 2. Admission chest X-ray demonstrating bilateral ill defined opacities.

both the patient and his significant other upon discharge home, which followed the recommendations current at that time.

Three days after being discharged, the patient had a fall while at home, requiring an emergency medical service (EMS) response. Upon arrival at the emergency department, the patient endorsed having a cough for the previous 2 days and was noted to be dyspneic. The patient's general immunity was likely vulnerable, as a result of the bacterial hepatic abscess for which he had been treated. A nasopharyngeal swab was positive for Covid-19. His chest radiograph on admission demonstrated ill-defined interstitial opacities suggestive of an evolving infectious process (Figure 2). The patient developed severe hypoxia, eventually requiring intubation to support oxygen exchange. The disease process rapidly progressed in the form of severe acute respiratory distress syndrome, which was complicated by multiorgan failure and severe sepsis. A chest radiograph obtained 48 hours after readmission demonstrated worsening bilateral alveolar airspace opacities with a peripheral predominance (Figure 3A). The patient died on the third day of hospital readmission. A coronal reformat from a chest CT in a different patient with a similar chest radiograph is included illustrating the peripheral distribution of the ground glass opacities that is considered characteristic of COVID-19 infection (Figure 3B).

Discussion

In brief, SARS-CoV-2 transmission-based prevention includes droplet precautions in the form of universal surgical masking and face-shielding with both contact precautions (in the form of gowns) and airborne precautions (in the form of N95 respirators) used in cases of known positivity or persons under investigation (Centers for Disease Control and Prevention, 2020; Chia et al., 2020; van Doremalen et al., 2020; World Health Organization, 2020). For background, the need for universal masking is driven by what appears to be a feature of Covid-19 such that asymptomatic or paucisymptomatic individuals appear to be able to harbor significant viral loads. This unique characteristic complicates the ability to provide case-based or symptom-based disease control (Furukawa et al., 2020; He et al., 2020; Huang et al., 2020; Varia et al., 2003).

In the preceding case report we described a patient death that was the result of SARS-CoV-2 infection. We feel the source of the

patient's exposure to SARS-CoV-2 is difficult to determine, given that the patient likely had some degree of low general immunity related to hepatic disease, which may have affected symptom presentation. For example, for most individuals, symptom onset after exposure ranges from 4 to 7 days; however, the 95% confidence interval for symptom onset is broad, spanning 2 to 15 days (Lauer et al., 2020). In this case, exposure to SARS-CoV-2 could have, therefore, occurred at home in the setting of increasing community spread in a susceptible individual or from a hospital source. We feel this scenario is not uncommon throughout this pandemic event and helps illustrate the importance of universal disease precaution.

Based on this case, and what likely are many shared experiences, we question what changes can be made to reduce the risk of similar events occurring as we navigate a pandemic healthcare environment. We also realize the unique risks we take on in the IR suite, particularly with the aerosol-generating procedure (AGP). We wonder if we should collectively be more prudent in our use of personal protective equipment in the future. While not a focus of this review, we underscore the responsibility all healthcare workers have in maintaining high-quality infection control practices (Dawson, 2003; Miyachi et al., 2007).

At our institution, universal masking of providers, visitors, and able patients began at the end of March 2020, which we would note as predicated guidance from both the Centers for Disease Control and Joint Commission (The Joint Commission, 2020). We fully support this intervention and would assert that at the time of this writing, to our knowledge, universal masking with eye protection represents the single-most effective intervention in mitigating the person-to-person spread of Covid-19 (Lyu & Wehby, 2020; Zhang et al., 2020; Wang et al., 2020).

Assuming that at some point, universal masking mandates ease, we wonder about ways to streamline decision making such that healthcare systems can quickly transition back to universal masking should it be needed. We note that there indeed were signals of increasing local disease in hindsight, which predated our late March masking mandate; perhaps as a region, we could have been nimbler. For example, our regional rolling 7-day test positivity rate initially passed 5% on March 13, 2020—eventually peaking at 16% by April 4, 2020 (Monroe County COVID-19 Updates Archive, 2020). In the future, universal in-hospital masking triggers based on rising

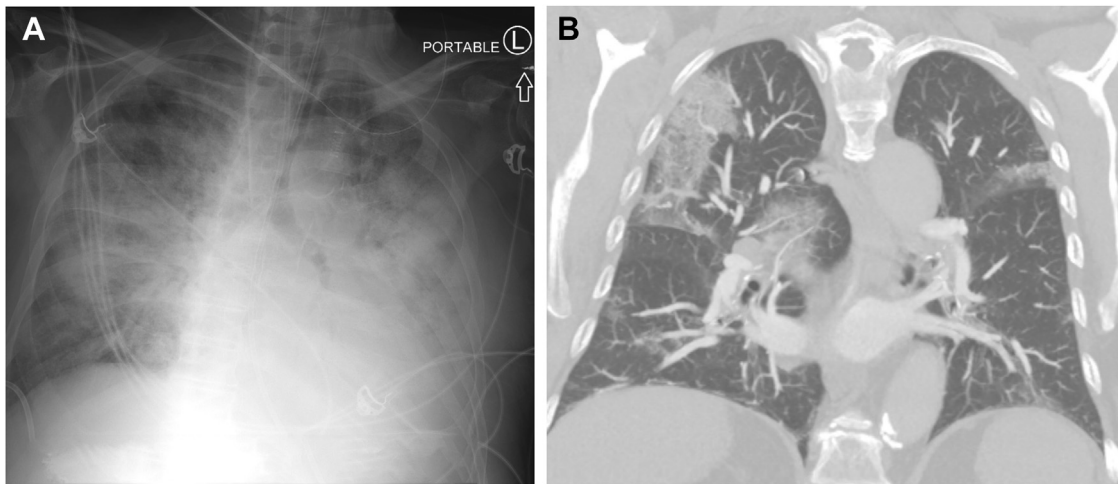


Figure 3. (A) Chest X-ray 48 hours post admission demonstrating marked interval worsening of bilateral alveolar consolidations predominantly along the peripheral lung fields. (B) A corollary CT chest in a patient with covid-19 demonstrating peripheral ground glass opacities.

regional disease activity might represent a fairly straightforward safeguard to implement.

We wonder if our experience navigating the Covid-19 pandemic might be translatable to other respiratory infections, such as seasonal influenza. While there is conflicting evidence on the extent of asymptomatic/paucisymptomatic spread of influenza (Ip et al., 2020; Patrozou & Mermel, 2020), it would seem reasonable that there may be a benefit to short-interval universal masking during the height of the flu season. As an example, during the 2019–2020 influenza season, the pooled community positivity rate across the United States surpassed 5% for about 4 months from November 25 through March 16, 2020, cresting just above 30% in per-test positivity in mid-January (Centers for Disease Control, 2020). Might universal masking during this time of highest disease activity confer a survival advantage? We feel this may be a reasonable area of future investigation.

As a final point, we note that the case we have presented was not categorized as an aerosol-generating procedure (AGP). We prefer the reasonably strict definition of AGP put forth by the Society of Interventional Radiology, defined as any procedure likely to induce coughing; most commonly pleural interventions and gastrostomy tube placements, with the recommendation being to use N95 respirators (in addition to other precautions) if the individual is positive for Covid-19 and there is no option to delay the procedure (Society for Interventional Radiology, 2020). We would question if, in the future, we should be more cognizant of the increased risk we take on during these procedures. Perhaps we should consider using N95 respirators when we perform AGP-type IR cases on individuals with known respiratory illnesses not limited to Covid-19, commonly influenza in adults or parainfluenza or respiratory syncytial viruses in children.

Conclusions

We presented the case of a patient's death from SARS-CoV-2 infection before the implementation of universal masking. We have made an argument that universal measures to mitigate the spread of Covid-19 are necessary, and among these, universal masking and eye protection are paramount. Should mandates related to in-hospital universal masking eventually ease, we hope that safeguards are in place such that our healthcare systems can quickly reintegrate universal masking; one option we put forth might be to follow disease activity in the region such that when

some arbitrary threshold is passed, we return to universal hospital masking. In addition, now having lived this experience with universal masking, we question (Plowman, 2000): if there might be a survival advantage to short-interval masking during the height of seasonal influenza activity and (Haque et al., 2018) if there may be a benefit to expanded use of N95 respirators in the IR suite during AGP-type interventions performed on individuals presenting with respiratory infections not limited to Covid-19.

While unfortunately, not uncommon, with each disaster the world faces, those affected go forward with the experience they have earned. Ideally, we use this experience to build and improve future disaster management plans (Grossman, 2020). In the coming months and years, we hope this case study and some of the ideas presented to inform future leaders among us as we attempt to satisfy our profession's calling to continually seek to provide the highest quality care for those in need of it.

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