Postoperative fever in the time of COVID-19

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SUMMARY

Postoperative fever is common following orthopedic trauma surgery. As the prevalence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection increases in the community, migration into the acute care hospital setting intensifies, creating confusion when fever develops postoperatively. The transmission dynamics of SARS-CoV-2 make it difficult to adequately gauge and pinpoint risk groups with questionnaires at the time of hospital admission. This is particularly problematic when asymptomatic or presymptomatic patients infected with SARS-CoV-2 require urgent surgery and cannot be screened effectively. One approach is to treat every patient as though they were SARS-CoV-2-positive in preparation for surgery, but doing so could exacerbate shortages of personal protective equipment and staffing limitations. Uncertainty regarding the etiology of postoperative fever could be significantly reduced by universal SARS-CoV-2 testing of all surgical patients at the time of hospital admission in addition to routine screening, but testing capacity and a rapid turnaround time would be required.

Coronavirus disease 2019 (COVID-19) is caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Clinical manifestations of COVID-19 primarily involve the upper and lower respiratory tract, but also the liver, gastrointestinal tract and brain. Viral transmission occurs by way of respiratory droplet or fomite spread, remaining viable on some environmental surfaces for up to 3 days.¹ There is growing evidence of both asymptomatic and presymptomatic viral transmission, with important implications for the control of SARS-CoV-2 infection, in the acute care hospital setting.^{1,2} Asymptomatic infection is thought to represent 5% of community-acquired infections in individuals without identifiable risk factors for COVID-19.² Virologic studies indicate that the risk of presymptomatic viral transmission is greatest in the 3 days preceding symptom onset.³ These individuals may not be rapidly identified by current hospital admission screening protocols, and new strategies are urgently needed as the prevalence of SARS-CoV-2 infection increases in the community.

Many health care systems have postponed elective surgeries to prepare for the expected pandemic surge of COVID-19 cases. However, trauma services continue to operate at high volumes. Postoperative fever is common in the first 24 to 72 hours following surgery. The possibility of presymptomatic SARS-CoV-2 infection has led to diagnostic uncertainty, reflexive SARS-CoV-2 testing, patient isolation and mandatory self-quarantine of health care workers. Presymptomatic trauma patients may evade admission screening protocols owing to the nature of their injuries, risking transmission of SARS-CoV-2 in the acute care setting and amplification of the adverse downstream consequences.

Postoperative fever is infrequently associated with infection.⁴ Fluctuations in temperature are strongly influenced by the body's transient adjustment to

the anesthetic, the subsequent local and systemic release of endogenous pyrogens and the surgery itself.⁴ In orthopedic trauma patients, diagnostic evaluation has been shown to have a low-positive yield, particularly in the early postoperative period.⁵ The potential for COVID-19 to manifest during this period has important infection prevention and control implications, given that SARS-CoV-2 peak viral loads in respiratory secretions occur at, or just before, the onset of symptoms.³

At our institution, orthopedic trauma patients with postoperative fever are assumed to have COVID-19 until proven otherwise. Droplet and contact precautions, testing and contact tracing of health care workers are required pending resolution. This creates critical disruptions in staffing and resource utilization.

While the early health care system response to SARS-CoV-2 is necessarily directed toward public health mitigation and suppression strategies (aggressive testing, contact tracing and social distancing), infection eventually migrates from the community into the acute care hospital setting, requiring application of the same principles. We propose universal SARS-CoV-2 testing of all trauma patients at the time of hospital admission, in addition to routine screening protocols. The success of such an approach depends critically on access to laboratory testing capacity with a rapid turnaround time. Otherwise, the adverse downstream effects of unrecognized SARS-CoV-2 infection would not be mitigated.

A high priority is to preserve the proper functioning of our health care systems; otherwise, subsequent COVID-19-related mortality will increase significantly. Our governments and health care systems have taken unprecedented measures in an attempt to mitigate the spread of COVID-19 and subsequent deaths. Strategies have been developed to reduce risk to health care workers through the use of appropriate personal protective equipment (PPE) and testing of targeted high-risk groups. Unaddressed are the risks associated with asymptomatic and presymptomatic transmission of SARS-CoV-2. The magnitude of these risks are unknown and likely vary with community prevalence rates.

The optimal approach to SARS-CoV-2 screening in the acute care setting has not been defined. Screening questionnaires focused on symptoms, travel history and contact with a known COVID-19 patient may not identify asymptomatic or presymptomatic disease. Presently, the reference standard for diagnosing COVID-19 is reverse transcription polymerase chain reaction (RT-PCR) testing with nasopharyngeal or throat swabs. Worldwide shortages of swabs, extraction reagents, testing platforms and testing kits will necessitate that microbiology laboratories acquire high-throughput testing platforms (with built-in diversification and redundancy) with rapid turnaround times in order to support the needs of acute care hospitals.

In the interest of protecting patients and safeguarding health care workers, and in the context of growing PPE shortages, we must acknowledge there are risks associated with admitting an asymptomatic or presymptomatic patient infected with SARS-CoV-2 to hospital for surgery. Given an average incubation period of approximately 5 (range 1–14) days and a potential period of presymptomatic transmission lasting 1–3 days, the risk of creating new acute care clusters of infection is not negligible. We argue that all trauma patients undergo routine screening and be admitted under contact and droplet precautions until SARS-CoV-2 testing is completed. If negative, isolation precautions could be lifted as long as the patient remains symptom-free.

Because many SARS-CoV-2 testing platforms are new, novel, or laboratory-developed, the risk of a false-negative result is not fully appreciated. Regardless of the testing platform used, as the prevalence of COVID-19 increases in the community, the positive predictive value would be expected to increase, even as the negative predictive value decreases. Thus, patients who screen negative for SARS-CoV-2 by RT-PCR at admission would need to continue to be assessed for symptoms of COVID-19 and be placed on contact and droplet precautions if clinically indicated.

CONCLUSION

We believe universal SARS-CoV-2 screening will mitigate the negative impact of unrecognized SARS-CoV-2 infection on health care teams and reinforce current efforts to limit disease transmission.

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