

## In the Limelight: December 2020



This month's feature highlights 5 articles, 3 of which focus on COVID-19, that appear in the current print and online issue of *Mayo Clinic Proceedings*. These articles are also featured on the *Mayo Clinic Proceedings*' YouTube Channel (<https://youtu.be/MT3ZFDAOKYU>).

### THE COVID-19 CRISIS AND CARDIAC ARREST IN THE EMERGENCY DEPARTMENT

The emergency department (ED) is faced with special challenges during the COVID-19 pandemic. As a major hub in the health care network, the ED ramifies widely within the network, and through its patients and personnel may spread the virus; the ED is a fast-paced environment that deals with life and death situations where the likelihood of droplet and airborne viral spread and viral spread by personal contact is relatively high; and the ED involves individuals with diverse expertise and disciplines, all coming together in a relatively contained space in the provision of patient care. Since the start of the COVID-19 pandemic, EDs have experienced an increase in the number of patients either experiencing a cardiac arrest or presenting in the early post-arrest phase after an out-of-hospital cardiac arrest. There are pathophysiologic reasons accounting for such increased occurrence of cardiac arrest during the pandemic. COVID-19 predisposes to cardiovascular diseases (such as acute myocardial infarction, cardiac arrhythmias, myocarditis, and heart failure) and non-cardiac diseases (such as acute respiratory failure, acute pulmonary emboli, and shock), all of which may culminate in cardiac arrest. In the present issue of *Mayo Clinic Proceedings*, Heaton et al discuss management of cardiac arrest in the ED and guidelines for best practice. Their recommendations are founded on 4 central considerations, which are modified depending upon where the cardiac arrest occurred, namely, in the ED or prior to admission to the ED, and whether cardiac arrest involved an adult or pediatric

patient. The first principle seeks to minimize the risk to the health care team. As cardiorespiratory resuscitation and intubation are generally considered aerosol-generating procedures (AGPs), personal protective equipment (PPE) is essential, as is the entire exchange of the ambient air of the procedure room prior to the discontinuation of modified and airborne precaution PPE. The authors emphasize the use of a mechanical CPR device (if the latter is available), not bringing the resuscitation cart into the patient's room, and the creation of a dedicated COVID-19 resuscitation medication kit. The second principle seeks to limit the number of AGPs. One way to achieve this is by attempting to re-establish an effective systemic circulation as expeditiously as possible; in this regard, shockable, and thus potentially responsive, arrhythmias should be targeted with a defibrillator attachment. Recommendations are provided regarding the transport of the patient from the ambulance bay of Emergency Medical Services, if the arrest occurred outside the ED, and the transport of the resuscitated patient to hospital. The authors discuss airway management including endotracheal intubation (ETT) and when to exchange a supraglottic airway to an ETT. The third principle recommends limiting the number of personnel to those essential for the resuscitation team, and that ancillary responders should only enter the resuscitation room if specifically indicated by the team leader. Drawing upon the evidence that resuscitative efforts for cardiac arrest in patients with COVID-19 extending beyond 10 minutes are quite unlikely to achieve patient survival to discharge, as well as other considerations, the fourth principle reflects on the duration of resuscitative efforts and when such efforts should be terminated. As concluded by Heaton et al, these 4 guiding principles inform a best practice model that guides the management of patients with cardiac arrest in the ED and is attentive to, among other



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issues, the safety of health care personnel, the prevention of viral spread, and relevant ethical issues.

Heaton HA, Luke A, Clements CM, Sztajnkrzyer MD, Gallo De Moraes A, Raukar NP. Best practices in managing cardiac arrest in the emergency department during the COVID-19 pandemic. *Mayo Clin Proc.* 2020;95(12):2704-2708.

### ADAPTING TO THE CHALLENGES OF COVID-19

Addressing and adapting to challenges such as the myriad ones posed by the COVID-19 pandemic commonly lead to new approaches and/or reappraisals of existing ones. In the present issue of *Mayo Clinic Proceedings*, the article by Oesterle et al on telehealth and substance use disorders exemplifies the former, and reflecting the latter is the article by Dobler et al on the role of noninvasive positive pressure ventilation (NIPPV) for respiratory failure. Substance abuse disorders are managed by multiple modalities, and for some forms of these disorders a critical approach involves group therapy. Such therapy is curtailed by the constraints imposed by the COVID-19 pandemic, thereby necessitating alternate approaches. Oesterle et al review the role of telehealth in providing such therapeutic approaches and covers the spectrum of relevant modalities: computerized assessments, telephone-based recovery support and therapy, video-based therapy, texting, smartphone apps, and virtual reality interventions. The authors provide specific recommendations regarding best practices for telehealth visits as applied to both the provider and patient; the conduct of an addiction-focused telehealth visit; and the conduct of a telehealth medication assisted treatment visit for opioid use disorders in general and for buprenorphine home induction in particular. While telehealth is a relatively novel and burgeoning approach in medical practice, NIPPV, comprising continuous positive airway pressure (CPAP) and bilevel positive airway pressure (BiPAP), is a well-established therapy in respiratory failure. However, as pointed out by Dobler et al,

there is a spectrum of recommendations by various societies and organizations regarding the use of NIPPV: such use is either not even considered, supported in certain circumstances, or entirely opposed. Dobler et al begin their discussion by underscoring 3 salient considerations: concerns (ventilator-induced lung injury) surrounding invasive ventilation (via endotracheal tube or tracheostomy); acute respiratory distress syndrome (ARDS) due to COVID-19 may differ from classic ARDS (conventionally treated by invasive mechanical ventilation), as ARDS in COVID-19 usually exhibits prominent ventilation-perfusion mismatch with preservation of lung compliance; and the relative roles of CPAP in alleviating hypoxia and that of BiPAP in mitigating hypercapnia. The authors review the available literature regarding the benefit and adverse consequences of NIPPV as compared with early intubation in COVID-19; the benefit and adverse consequences of NIPPV as compared with oxygen administration and high flow nasal cannula (HFNC) in patients with acute hypoxemic respiratory failure due to COVID-19; and the risks of viral transmission to personnel with NIPPV and HFNC. The authors conclude their discussion with a call for randomized clinical trials, and they speculate that until such evidence is available a case may be made for the consideration of NIPPV as an alternate strategy to early intubation in patients with COVID-19. As reflected by these two articles, novel modalities and/or reconsideration of established ones both have a place in the current crisis.

Oesterle TS, Kolla B, Risma CJ, et al. Substance use disorders and telehealth in the COVID-19 pandemic era: A new outlook. *Mayo Clin Proc.* 2020;95(12):2709-2718.

Dobler CC, Murad MH, Wilson ME. Noninvasive positive pressure ventilation in patients with COVID-19. *Mayo Clin Proc.* 2020;95(12):2594-2601.

### TAVR UPDATE: OUTCOMES, RESOURCE UTILIZATION, COSTS, AND APPLICATION

Achieving the same clinical objective while minimizing risks and adverse outcomes is a

general principle that both underpins medical practice and sustains a steady stream of biomedical innovation. In this regard the introduction and the continued refinement of transcatheter aortic valve replacement (TAVR) represent a major advance in the management of patients with aortic valve stenosis. In patients with severe aortic stenosis in whom the surgical risks are prohibitive or high, TAVR affords the possibility of a new functional aortic valve placed at a vastly reduced risk that is otherwise imposed by surgical aortic valve replacement (SAVR). Introduced as a feasible therapeutic option less than 20 years ago, TAVR for severe aortic stenosis is now approved by the US Food and Drug Administration for application in patients with lesser risk, including those with even low risk. TAVR is thus a remarkable example of how targeted innovation can transform the practice of medicine, including in ways never anticipated when such innovation was initially introduced. In the present issue of *Mayo Clinic Proceedings*, 2 articles provide important contributions to the TAVR literature. Recognizing the evolving nature of this field and the need for more recent information on outcomes and cost, Kawsara et al analyzed information in the National Readmission Database pertaining to patients who underwent TAVR between 2012 to 2017. In a population of more than 89,000 patients, analyses over this time frame demonstrated a decrease in the following outcomes: in-hospital mortality (from 5.3% to 1.6%); length of stay (from 7 days to 2 days); non-home discharges (from 32.2% to 15.5%); and cost of TAVR hospitalization (from \$56,022 to \$46,101). Rehospitalizations at 30, 90, and 180 days were all decreased over this time frame as was the need for dialysis, mechanical ventilation, or blood transfusion, or the occurrence of vascular complications; however, the need for pacemaker implantation and the occurrence of strokes were unchanged. With an increasing number of patients

receiving this procedure from 2012 to 2017, the in-hospital costs related to TAVR increased 5-fold. The accompanying paper by Alharbi et al assessed outcomes regarding the use of TAVR as an off-label procedure for patients with pure aortic insufficiency (PAI), who were at high risk for SAVR, the preferred and standard treatment. Using the National Inpatient Sample database, Alharbi et al analyzed outcomes in more than 14,000 patients with PAI who underwent valve replacement, 93.8% by SAVR and 6.2% by TAVR. While considerably older, the patients who underwent TAVR showed comparable in-hospital mortality as compared with those who underwent SAVR. After propensity score-matching, patients undergoing TAVR exhibited less acute kidney injury, cardiogenic shock, and respiratory complications; a shorter hospital stay; and were more likely to be discharged home. They also exhibited a marginally diminished cost of hospitalization, but a greater need for a permanent pacemaker. Based on these encouraging retrospective findings, the authors conclude by emphasizing the need for randomized clinical trials that evaluate TAVR and SAVR for PAI. These two studies are timely, important, and complementary, the one by Kawsara et al documenting the steady improvement in outcomes and reduction in costs, the other by Alharbi et al raising the possibility of new avenues of approved use of TAVR.

Kawsara A, Sulaiman S, Linderbaum J, et al. Temporal trends in the resource utilization, cost, and outcomes of transcatheter aortic valve replacement in the United States. *Mayo Clin Proc.* 2020;95(12):2665-2673.

Alharbi AA, Khan MZ, Osman M, et al. Transcatheter aortic valve replacement versus surgical replacement in patients with pure aortic insufficiency. *Mayo Clin Proc.* 2020;95(12):2655-2664.

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