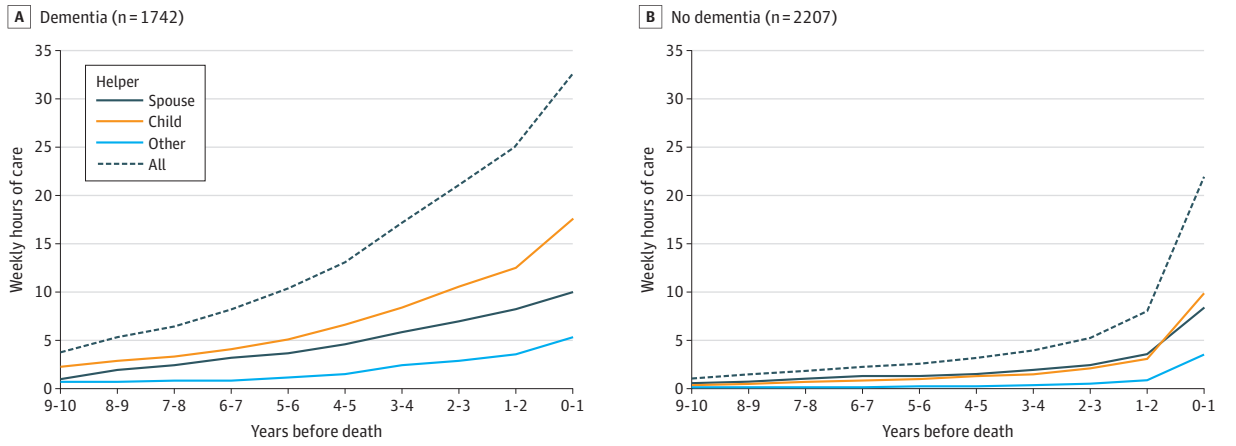
Figure. Weekly Caregiving Hours in the Last 10 Years of Life by Dementia Status and Caregiver Type



Because of the higher prevalence of dementia among those with lower socioeconomic status, the intergenerational effect of caregiving is particularly concerning for those already struggling to achieve equity. Existing programs that provide short-term, episodic support for caregivers (eg, the US Family Medical Leave Act and paid family leave) do not match the long-term, progressive care needs of those with dementia.

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Clinical Outcomes of In-Hospital Cardiac Arrest in COVID-19

Before the outbreak of coronavirus disease 2019 (COVID-19), 25% of patients who underwent in-hospital cardiac arrest (IHCA) survived to discharge, with the initial rhythm being nonshockable in 81% of cases.[1] Despite the outbreak causing many deaths, to our knowledge, information on IHCA among this subset of patients in the US is lacking.

Methods | Between March 15 and April 3, 2020, 1309 patients with a diagnosis of COVID-19 were admitted to Beaumont Health (Royal Oak, Michigan). From this group, we identified patients who underwent cardiopulmonary resuscitation (CPR) for cardiac arrest. The exclusion criteria were an age younger than 18 years, do-not-resuscitate status, and comfort or hospice care enrollment. Primary outcomes aimed to identify the initial cardiac arrest rhythm, time to return of spontaneous circulation (ROSC), and overall survival to discharge. William Beaumont Hospital granted institutional review board approval and waived informed consent because of pandemic conditions.

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Results | Among 1309 patients hospitalized with COVID-19, 60 (4.6%) developed IHCA and underwent CPR. Six patients were excluded for lack of CPR documentation, providing a sample size of 54. The initial rhythm was nonshockable for 52 patients (96.3%), with 44 (81.5%) with pulseless electrical activity and 8 (14.8%) with asystole. Two patients (3.7%) devel-

Table. Patient Demographic Characteristics, Comorbidities, and CPR Characteristics

Characteristic	No. (%)
Sex	
Male	33/54 (61.1)
Female	21/54 (38.9)
Ethnicity	
African American	36/54 (66.7)
White	11/54 (20.3)
Asian	2/54 (3.7)
Other	5/54 (9.3)
Age, median (IQR), y	61.5 (50-68)
Comorbidities	
Hypertension	42/54 (77.8)
Diabetes	50/54 (55.6)
Hyperlipidemia	27/54 (50.0)
BMI, median (IQR), No.	33 (28-40)
CPR initial rhythm	
Pulseless electrical activity	44/54 (81.5)
Asystole	8/54 (14.8)
Pulseless ventricular tachycardia	2/54 (3.7)
Ventricular fibrillation	0/54 (0.0)
Achieved ROSC	
Overall	29/54 (53.7)
Pulseless electrical activity	24/44 (54.6)
Asystole	5/8 (62.5)
Pulseless ventricular tachycardia	0/2 (0.0)
Ventricular fibrillation	0/0 (0.0)
Time to ROSC, median (IQR), min, No.	8 (4-10)
No.	26
Duration of CPR, median (IQR), min, No.	10 (7-20)
No.	47
Survival to discharge	0/54 (0.0)

Abbreviations: BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); CPR, cardiopulmonary resuscitation; ROSC, return of spontaneous circulation.

oped pulseless ventricular tachycardia, and none developed ventricular fibrillation. Return of spontaneous circulation was achieved in 29 patients (53.7%). The median time to achieve ROSC was 8 minutes (interquartile range [IQR], 4-10 minutes). Fifteen of 29 patients (51.7%) who achieved ROSC had their code status changed to do not resuscitate, while 14 patients (48.3%) were recoded, received additional CPR, and died. The median time to cardiac arrest from admission was 8 days (IQR, 4-12 days). The overall median duration of CPR was 10 minutes (IQR, 7-20 minutes). The survival to discharge was 0 of 54 (95% CI, 0-6.6).

The median age was 61.5 years and most patients were African American. Many patients had obesity, hypertension, or diabetes. At the time of cardiac arrest, 43 patients (79%) were receiving mechanical ventilation, 18 (33%) kidney replacement therapy, and 25 (46.3%) vasopressor support. Patient demographic characteristics, comorbidities, and CPR characteristics are summarized in the **Table**.

Discussion | There are limited data on the characteristics and outcomes of cardiac arrest in patients hospitalized with COVID-19 in the US. In our study of 54 patients with COVID-19, there was a 100% mortality rate following CPR. The initial rhythm was nonshockable for 52 patients (96.3%), with pulseless electrical activity being the most common (44 [81.5%]). Despite 29 patients (53.7%) achieving ROSC, none survived to discharge.

The high mortality following CPR is likely multifactorial. The overall survival to discharge before the outbreak was 25%, with it being 11% in patients with a nonshockable rhythm.[1,2] Given that most of the patients in this study developed a nonshockable rhythm, the outcome was likely to be poor. Additionally, at the time of cardiac arrest, many patients were either receiving mechanical ventilation, kidney replacement therapy, or vasopressor support, all factors previously shown to be associated with a poor outcome following IHCA.[1] This poor outcome is similar to that reported by Shao et al,[3] in which the 30-day survival rate was only 2.9%.[3] While most of the patients in that study also had a nonshockable rhythm (94.1%), only 13% achieved ROSC.[3]

These outcomes warrant further investigation into the risks and benefits of performing prolonged CPR in this subset of patients, especially because the resuscitation process generates aerosols that may place health care personnel at a higher risk of contracting the virus. The transmission of severe acute respiratory syndrome coronavirus 1 to health care personnel during CPR has been previously documented.[4] Exposure may be further compounded by the limited supply of personal protective equipment nationwide. Further studies in this area would be beneficial and potentially aid in informing CPR guidelines for this patient population.

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Invited Commentary

Outcomes of Cardiopulmonary Resuscitation in Patients With COVID-19—Limited Data, but Further Reason for Action

Cardiopulmonary resuscitation (CPR) for in-hospital cardiac arrest (IHCA) in patients with coronavirus disease 2019 (COVID-19) presents unique challenges. Cardiopulmonary resuscitation may be delayed because of isolation procedures, and advanced life support resources may be limited. Additionally, CPR for patients with COVID-19 exposes health care workers to increased risk of viral transmission. Improving our understanding of the likelihood of successful outcomes after CPR is crucial to informing goals-of-care discussions, determining the appropriateness of resuscitative efforts, and guiding policy. To date, to our knowledge, there is limited evidence on outcomes for IHCA among patients with COVID-19. A single-center study of 136 patients with IHCA in Wuhan, China, reported poor outcomes but was limited by cardiac arrests occurring during shortages of advanced life support resources.[1] Nonetheless, this study found only 18 patients (13%) achieved return of spontaneous circulation, 4 (3%) survived to 30 days, and only 1 (<1%) achieved a favorable neurological outcome by 30 days. In this issue of *JAMA Internal Medicine*, Thapa et al[2] report what to our knowledge are the first US data on outcomes for IHCA among patients with COVID-19. In their case series of 54 patients, 52 (96%) had a nonshockable initial rhythm, 29 (54%) achieved return of spontaneous circulation, and 0 survived to hospital discharge (95% CI, 0%-6.6%). This very low hospital survival is likely driven by several factors, including critical illness in most patients at the time of arrest and the many patients with nonshockable initial rhythms. Additionally, presumed respiratory etiology of arrest for most patients, lack of therapies to effectively treat the underlying disease, and potential delays in response time for donning of personal protective equipment may have contributed to poor outcomes.

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These small case series reporting hospital survival after IHCA among patients with COVID-19 must be interpreted with caution, as only 1 or 2 additional survivors would make important differences in the observed estimates. Outcomes in the setting of COVID-19 may not actually differ from pre-COVID-19 outcomes of IHCA for patients with nonshockable rhythms, for whom hospital survival is often less than 15%.[3] Nonetheless, this article[2] represents important early evidence suggesting outcomes for IHCA in patients with COVID-19 pneumonia are likely poor, particularly among patients with respiratory failure. Improving outcomes for patients with severe illness with COVID-19 and IHCA will be challenging, as few of the likely drivers of poor outcomes (eg, nonshockable rhythms, respiratory etiologies of arrest, and underlying critical illness) are modifiable. While these early results should not warrant universal do-not-attempt-resuscitation (DNAR) orders for patients with COVID-19, they highlight the importance of conducting goals-of-care discussions early during the course of COVID-19 and revisiting those discussions with changes in clinical status (worsening or improvement). Moreover, the existing data may warrant clinician recommendations for DNAR, particularly in patients with severe respiratory failure who are at high risk of IHCA. An informed assent approach, in which the patient or family is invited to allow the clinician to assume responsibility for the DNAR decision, may be appropriate in select patients to help alleviate the psychological burden of decision-making on patients and families during this stressful time.[4] Like traditional informed consent, this approach places substantial responsibility on clinicians to have open, respectful, and thoughtful communication with patients and families.

Although this study was not designed to examine racial disparities, it is notable that two-thirds of the patients were Black.[2] Previous studies have reported that a larger minority of Black patients request CPR in the context of poor prognoses.[5] Black patients also have lower rates of advance care planning documentation and report poorer quality communication during serious illness and greater mistrust in the health system that are associated with long-standing and ongoing disparities in health care.[5] Finding ways to respect differences in preferences and eliminate disparities in high-quality communication during serious illness is critically important. Building trust with patients is crucial to effective communication, and clinician recommendations made without trust have potential for harm. In the context of COVID-19, Black persons and persons of color are more likely to contract COVID-19 or develop serious illness requiring hospitalization; this association is most likely because of disparities.[6] As such, the urgency of eliminating racial disparities in health care has never been clearer.

The long-standing need to improve the conduct and timeliness of high-quality goals-of-care discussions for patients with serious illness has become even more important in the time of COVID-19. Promotion of early goals-of-care discussions should be a priority for patients, families, clinicians, health systems, and policy makers. Such a shared focus offers substantial opportunity for health system and public health interventions. Established programs, such as The Conversation Project (Institute for Healthcare Improvement; http://www.theconversationproject.org) and PREPARE For Your Care (The Regents of the University of California; http://www.prepareforyourcare.org), both of which offer new COVID-19–specific guidance, are important resources to help prepare patients and their families for in-the-moment decision-making should they be hospitalized with COVID-19. For selected patients with chronic life-limiting illness and preferences for limitations on life-sustaining treatments, completing the Physician Orders for Life-Sustaining Treatment may reduce unwanted

high-intensity care near the end of life.[7] Although there are important limitations on current data regarding outcomes of IHCA for patients with COVID-19, we have enough data to conclude that it is important to implement programs to promote conversations about values and goals in the community and early goals-of-care discussions for patients hospitalized with COVID-19.

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Characteristics and Reporting of Number Needed to Treat, Number Needed to Harm, and Absolute Risk Reduction in Controlled Clinical Trials, 2001-2019

Controlled clinical trials, which are used to guide the decisions made by patients, clinicians, and policy makers, often only report measures of relative effect.[1,2] However, absolute measures, such as the absolute risk reduction (ARR), the number needed to treat (NNT), and the number needed to harm (NNH), which measure the difference in the observed risk of an event between 2 interventions and the number of patients who need to be treated to achieve 1 additional favorable or adverse outcome, respectively, can be easier to interpret, more clinically meaningful, and less likely to exaggerate differences when outcome risk is low.[3] In part because only 5% of trials published in highly cited journals before 1998 reported NNT and/or ARR,[4] the Consolidated Standards of Reporting Trials (CONSORT) statement recommended that trials with binary outcomes report both relative and absolute measures.[5] We assessed the recent trends and characteristics of absolute measure reporting in highly cited medical journals to determine if there have been improvements over time.

Methods | We identified the 6 most-cited medical journals according to InCites Journal Citation Reports (Clarivate Analytics 2019) (**Table 1**). For each journal, we reviewed all issues published in 2001, 2007, 2013, and 2019 to identify all controlled clinical trials that reported analyses testing superiority of the intervention to control and abstract-level binary outcomes, including hazard ratios. For eligible trials, we identified key study characteristics and recorded whether at least 1 abstract-level positive ($P < .05$) binary efficacy and/or safety outcome was reported. Next, we determined whether any NNT, NNH, and/or ARR was reported in the abstract and/or full text. For each NNT/NNH, we recorded if reporting was for primary or secondary end points and whether 95% CIs, *P* values, and corresponding effect estimates were provided. Fisher exact and Mann-Whitney *U* tests were conducted in R, version 3.4.0 (R Foundation for Statistical Computing) (2-sided $P < .05$). Because publicly available data were used, this study did not require ethics approval or patient consent.

Results | We identified 875 controlled trials meeting the aforementioned criteria , of which 76 (8.7%) reported at least 1 NNT, 8 (0.9%) reported at least 1 NNH, and 249 (28.5%) reported at least 1 ARR (Table 1). In total, 292 trials (33.4%) reported at least 1 NNT, NNH, and/or ARR. A total of 80 (9.1%) reported at least 1 NNT and/or NNH, which remained relatively constant between 2001 and 2019; ARR reporting increased from 26 of 140 (18.6%) to 105 of 282 (37.2%; $P < .001$).

Trials in the therapeutic area of oncology had the lowest rates of reporting NNT, NNH, and/or ARR, but there were no differences by intervention tested, patient follow-up, enrollment, or funding sources (**Table 2**). Trials with at least 1 statistically significant end point were more likely to report an NNT/NNH than those without (75 of 624 [12.0%] vs 5 of 251 [2.0%]; $P < .001$).

Among all 197 NNT/NNH reports, 95 (48.2%) were for primary end points and 76 (38.6%) had a 95% CI and/or *P* value. There were 114 NNT/NNH reports with a corresponding effect estimate reported anywhere in the text, of which 88 (77.2%) were statistically significant; 55 (48.2%) only had corresponding relative measures.

Discussion | Among 875 controlled trials with binary outcomes and/or hazard ratios published in highly cited general medical journals, fewer than one-tenth reported at least 1 NNT or NNH, but more than one-quarter reported at least 1 ARR. The majority of NNT/NNH reports were presented for statistically significant end points but without 95% CIs or *P* values. These findings raise concerns about persistent