

not to be broadly applicable to other patients with critical illness. However, this study provides some initial experiences regarding the characteristics of COVID-19 in patients with critical illness in the US and emphasizes the need to limit exposure of nursing home residents to SARS-CoV-2.

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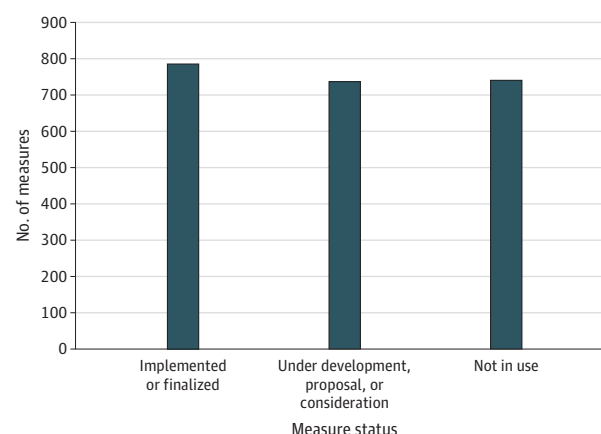
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Quality Measure Development and Associated Spending by the Centers for Medicare & Medicaid Services

In the US, the Centers for Medicare & Medicaid Services (CMS) is increasingly tying reimbursement to the value of care, resulting in the rapid proliferation of quality measures to evaluate clinician and health system performance. Quality measurement can improve patient care, but there is growing concern that many measures may not be meaningful and that

Figure 1. Status of Quality Measures Developed for the Centers for Medicare & Medicaid Services (CMS)



The current status of quality measures was determined based on definitions provided by the CMS Inventory Tool. *Implemented or finalized* indicates measures that are currently used within a CMS incentive, reimbursement, or performance program or finalized per federal rule for use in a CMS program. *Under development, proposal, or consideration* indicates measures that are currently being developed for eventual use in a CMS program, have been introduced in a published proposed rule for potential use in a CMS program if eventually finalized in the federal rulemaking process, or have been submitted to the rulemaking process and accepted for consideration by a CMS program. *Not in use* indicates measures that were introduced in a published proposed rule but were not finalized for use in a CMS program, submitted but not accepted by a CMS program through the rulemaking process, removed from a CMS program via federal rule and are no longer implemented, or are no longer being developed for use in a CMS program or initiative.

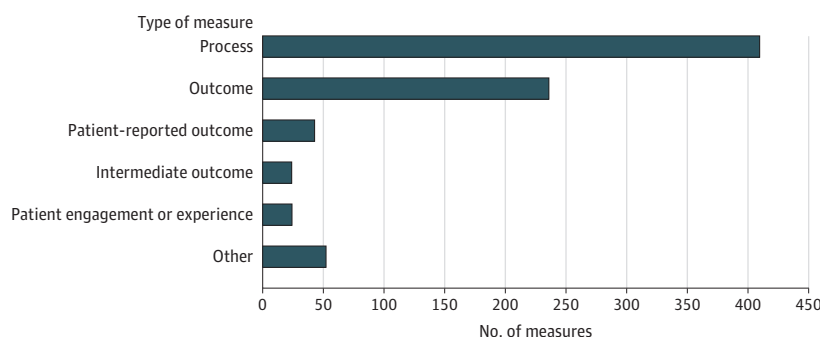
the administrative and financial burden placed on clinicians to report quality measures is substantial.¹⁻³ Less is known about the current landscape of CMS quality measures and the magnitude of spending on measure development. Understanding this landscape is important for efforts that aim to enhance the value of quality measurement and improvement.

Therefore, this study aimed to answer 3 questions. First, how many quality measures are currently available in the inventory of the CMS? Second, how many of these measures are used in CMS programs, are under development or consideration, or are not in use? Third, how much has the CMS invested in the development of quality measures?

Methods | The publicly available CMS Inventory Tool, which includes a compilation of CMS quality measures, was reviewed as of December 2019 to determine the percentage of measures that (1) had been implemented or finalized for use in a CMS program, (2) were under development, proposal, or consideration for use, or (3) were not in use. We also characterized the domains of quality assessed by measures that have been implemented or finalized in CMS programs.

Data from USAspending.gov were used to quantify federal spending on measure development and maintenance. We identified Measure and Instrument Development and Support contracts that were awarded to organizations by the CMS from 2008 to 2018, and estimated total spending in 2018 US dollars by adjusting total contract amounts for inflation.

Figure 2. Types of Quality Measures Implemented or Finalized for Use in Centers for Medicare & Medicaid Services (CMS) Programs



The number of quality measures that are used or finalized for use in CMS programs according to the domain of quality that they assess, as listed in the CMS Inventory Tool. *Process* measures are defined as an action or intervention that reflects guidelines, standards of care, or practice parameters performed during the delivery of patient care (eg, aspirin on arrival for acute myocardial infarction). *Outcome* measures are defined as changes in health or quality of life that result from care (eg, 30-day mortality). *Patient-reported outcome* measures are defined as indicators of functional status reported by a patient to their health care clinician (eg, change in functional status following total knee replacement). *Intermediate outcome* measures are defined as a factor or

short-term result that contributes to an ultimate outcome (eg, controlling high blood pressure or hemoglobin A_{1c}). *Patient engagement or experience* measures are defined as patients' experience and satisfaction with their health care clinicians, the health care system, or both. *Other* includes all remaining measure categories, including access (eg, call center foreign language availability), communication and care coordination (eg, medication reconciliation for patients receiving care at dialysis facilities), composite (eg, patient safety indicator), cost or resource (eg, payment associated with a 30-day episode of care for heart failure), efficiency (eg, mammography follow-up rates), and structure (eg, use of an electronic health record).

Results | There were 2266 quality measures in the CMS Inventory Tool, of which 788 (34.8%) have been implemented or finalized for use in a CMS program and 738 (32.6%) are being developed for eventual use, have been proposed for possible use, or have been accepted for consideration by a CMS initiative (Figure 1). The remaining 740 quality measures (32.7%) had not been implemented or finalized for use, had been removed from or not accepted by a CMS program, or were no longer being developed. The 788 implemented or finalized quality measures spanned 34 CMS programs, and were most commonly process (n = 409) or outcome (n = 236) measures (Figure 2).

The total inflation-adjusted amount of money awarded by the CMS between 2008 and 2018 to develop and maintain quality measures was \$1 313 500 000. Thirty-five organizations received award contracts, and the top 5 organizations were awarded \$872.9 million.

Discussion | Between 2008 and 2018, the CMS has invested more than \$1.3 billion in quality measure development. Approximately 2300 measures have been developed, of which 788 are being used in CMS quality, reporting, and payment programs. A recent appraisal of one of these initiatives, the Quality Payment Program, revealed that only 37% of its ambulatory medicine measures were valid, highlighting the need to examine the validity of other quality measures used in CMS programs.²

In addition, the CMS currently lacks a strategy to systematically evaluate whether their quality measures improve the delivery of care and health outcomes.⁴ Recent evidence suggests that tying some quality measures to payment incentives may have led to unintended consequences.^{5,6} Therefore, the CMS should couple the implementation of measures with independent evaluations of their effects to ensure that the CMS is achieving its strategic objectives.⁴

Although some quality measures might not be implemented and others may be removed as clinical practice changes, the high rate at which this occurs suggests an opportunity to improve the development process. The federal government has allocated most of the \$1.3 billion in funding to 5 organizations; increasing the diversity of organizations that receive award contracts could promote competition to improve the quality of developed measures.

This study likely underestimated total spending because contract information was not available for 11 organizations that received award contracts and other costs associated with measure development (eg, technology, management, or administration) may not have been captured.

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COMMENT & RESPONSE

Premature Menopause and Risk for Cardiovascular Disease

To the Editor Venous thromboembolism (VTE) is a global health concern because of its significant morbidity and mortality. To our knowledge, few studies have investigated the associations of reproductive life characteristics with VTE risk in women.¹ Analysis of UK Biobank data by Dr Honigberg and colleagues² highlights the role of premature natural or surgical menopause in increasing both atherosclerotic and nonatherosclerotic cardiovascular risk, including VTE risk.

The analysis failed to show the well-established increased VTE risk in relation to menopausal hormone therapy (eTable 13 in Supplement 2 in the article²). Menopausal

hormone use was ascertained only at the baseline study visit and was not updated during follow-up. Because previous studies have found that the increase in VTE risk is restricted to current users at the time of a clinical event,³ incomplete capture of exposed cases may have occurred in this study, resulting in underestimating VTE risk. Also, it is unclear whether only the first VTE event was considered as a clinical outcome. Inclusion of recurrent VTE could have also introduced a bias in estimating VTE risk. Details of the definition and validation criteria of VTE events would be of great interest.

Premature menopause appears to be a new VTE risk factor, which could improve risk stratification and disease prevention among postmenopausal women. Women with premature menopause often consider menopausal hormone therapy. Such women should avoid oral estrogen. The most recent clinical guides recommend transdermal estrogen combined with progesterone for women who need menopausal hormone therapy and are at high VTE risk.⁴

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To the Editor The cohort study by Dr Honigberg and colleagues¹ found that natural and surgical premature menopause were associated with increased risks of cardiovascular diseases among postmenopausal women. Some important issues were not addressed.

First, a limitation of this study is that cancer history was not incorporated into the adjusted models. Cancer is tightly linked with cardiovascular diseases.² In the fully adjusted models in Table 3 and eTable 5 of Supplement 2 in the article,¹ in the surgical premature menopause group, 5 cardiovascular outcomes had significant *P* values when patients with cancer were retained, while only 2 cardiovascular outcomes were significant when all patients with cancer were removed. Thus, the variable of cancer history should be included in the fully adjusted models.

Second, other factors, such as chronic kidney disease, hysterectomy, and alcohol consumption, are closely correlated with cardiovascular diseases.^{3,4} Because these covariates were unbalanced in the 3 groups, we suggest the authors adjust for these covariates in their multivariable models.