Circulation: Cardiovascular Quality and Outcomes

CARDIOVASCULAR PERSPECTIVE

Leveraging Remote Physiologic Monitoring in the COVID-19 Pandemic to Improve Care After Cardiovascular Hospitalizations

Pranam Dey, BS
Robert Jarrin, JD
Makoto Mori, MD
Arnar Geirsson, MD
Harlan M. Krumholz, MD, SM

Early in the COVID-19 pandemic, much of in-person clinic visits rapidly shifted to virtual platforms.[1] This wide-scale digital transition made broader use of remote physiologic monitoring (RPM) a tangible possibility. Clinicians may leverage this opportunity to better monitor posthospital recovery, where changes in physiologic parameters could be measured remotely and frequently to better understand patients' recovery courses and possibly intervene. Recent policymaking by the Food and Drug Administration and Centers for Medicare & Medicaid Services (CMS) in response to the COVID-19 pandemic has facilitated the use of RPM and other digital health tools by expanding current uses of existing technologies and increasing reimbursement flexibility.[2] Practices surrounding cardiovascular disease present a unique opportunity for many of the hemodynamic and cardiovascular parameters that can be measured remotely. We explore how services for cardiovascular patients may be reimbursed via RPM and how innovative monitoring may transform current practices.

WHAT IS RPM?

RPM refers to using noninvasive medical monitoring devices—like pulse oximetry devices and ECG—to measure the physiologic data of patients anywhere they may be.[3] RPM automatically uploads patient physiologic data from medical devices, without requiring intermediary steps by patients to self-record and transcribe information. As part of its COVID-19 response, the Food and Drug Administration announced on March 20th a temporary policy change allowing modifications to the indications, claims, functionality, or hardware or software of certain noninvasive remote monitoring devices.[3] The change in policy sought to expand the capability and availability of noninvasive remote monitoring devices, including allowing in-home use for some devices previously marketed for hospital or other health care facility use only, and allowances for cardiac monitors, electrocardiograph, and electrocardiograph software for over-the-counter use. The Food and Drug Administration's guidance allows device modifications to increase monitoring capabilities such as the addition of Bluetooth or wireless capabilities, thus offering further possibilities to minimize direct patient contact even when caring for patients in the hospital. An example where this may augment care is in the postoperative monitoring of cardiac surgery patients, for whom the risk of atrial fibrillation is high, and frequently extends beyond hospital discharge.

CLINICAL REMOTE MONITORING THAT WAS REIMBURSED BEFORE THE COVID-19 PANDEMIC

The regulatory changes to accelerate the growth of RPM related to the pandemic are just a part of a broader move toward a more flexible system that allows patients

The opinions expressed in this article are not necessarily those of the editors or of the American Heart Association.

Key Words ambulatory care ■ cardiovascular diseases ■ hemodynamics ■ hospitals ■ telemedicine

https://www.ahajournals.org/journal/circoutcomes

and their clinicians to use the best available modality. Since 2018, CMS has provided coverage and payment for remote patient monitoring (Current Procedural Terminology [CPT] code 99091) and since 2019, for RPM treatment management services (CPT code 99457) by way of annual additions to the Physician Fee Schedule.[4] In January 2020, the fee schedule built upon CPT code 99457 that covers the first 20 minutes per month of RPM treatment management services (time requiring interactive communication with the patient) by creating the new additional CPT code 99458 that covers a subsequent 20 minutes per month. Both CPT codes 99457 and 99458 are valued at 0.61 work relative value units and require communication between the provider and the patient or caregiver (Table).[5] Therefore, monitoring postoperative data for individual patients by various means could generate up to 0.61 relative value units per month. During the COVID-19 public health emergency, CMS made the important and permanent clarification that providers can furnish CPT code 99457 and 99458 for acute and chronic conditions, meaning monitoring could be reimbursed even during the postacute phase.

CARE AND PROVIDER TYPES THAT COULD BE REIMBURSED

Additionally, for the duration of the public health emergency, CMS allows both new and existing patients annual consent, and if providers so choose, they may waive or reduce cost-sharing obligations thanks to nonenforcement of administrative sanctions.[6] Perhaps most importantly, already permitted CMS reimbursement under general supervision allows for the provision of RPM by an auxiliary care team member under the overall direction and control of the physician or other qualified health care professional whose presence is not required during the performance of the service. For example, a nurse practitioner could file a claim for 99457 for spending >20 minutes a month monitoring the ECG, oxygen saturation, and blood pressure transmitted from wearable devices of a posthospital patient, modifying the recovery treatment plan accordingly, and discussing the data and treatment plan with patients and caregivers.

In short, claiming relative value units for CPT codes 99457 and 99458 requires a physician, qualified health care professional, or supervised clinical staff member, such as nurses, to review and interpret remotely transmitted patient data and modify the treatment plan using interactive communication with patients or caregivers as necessary, for a combined 40 minutes, per patient, per month. CPT code 99091 requires a physician or qualified health care professional (not clinical staff members) to spend 30 minutes per patient per month collecting and interpreting physiologic data, without requiring communication with the patient. Remote posthospital monitoring remains underused, but the greater regulatory flexibility and increased Medicare reimbursement from CPT codes 99457/99458 and 99091 and the clinical safety imperatives of the pandemic make it both easier and more important than ever to achieve the potential of RPM.

FLEXIBLE PLATFORM REQUIREMENTS

An important additional flexibility enabling the rapid adoption of remote communications was the Department of Health and Human Services Office of Civil Rights exercise of enforcement discretion to not impose penalties for Health Insurance Portability and Accountability Act violations when physicians use popular voice and video technologies during the COVID-19 national emergency.[7] This allows physicians to use programs including Apple FaceTime, Facebook Messenger video chat, Google Hangouts video, Zoom, or Skype to communicate with patients. This flexibility to use widespread platforms without compliance issues may

Table. Relevant CPT Codes[5]

CPT codes	Description	Medical device required	Work RVUs	Total facility RVUs
99453	Remote monitoring of physiologic parameters, initial setup and patient education on how to use equipment. Physician work not required.	Yes	0.00	
99454	Remote monitoring of physiologic parameters; reimbursement for supplying device(s) with daily recording or programmed alert transmission, each 30 d. Examples of devices include but are not limited to monitors for ECG, blood glucose, heart rate, Spo_2, and blood pressure.	Yes	0.00	
99457	(Base code) RPM treatment management services, clinical staff/physician/other qualified health care professional time in a calendar month requiring interactive communication with the patient/caregiver during the month; initial 20 min (prefatory language instructs device used must be a device as defined by the FDA).	Yes	0.61	0.91
99458	Identical to 99457; additional 20 min in a calendar month.	Yes	0.61	0.91
99091	Collection and interpretation of physiologic data (eg, ECG, blood pressure, and glucose monitoring) digitally stored and transmitted by the patient or caregiver to the physician or other qualified health care professional, qualified by education, training, licensure/regulation (when applicable) requiring a minimum of 30 min of time, each 30 d.	No	1.10	1.64

CPT indicates Current Procedural Terminology; FDA, Food and Drug Administration; RPM, remote physiologic monitoring; and RVU, relative value unit.

facilitate the growth of RPM by decreasing the barriers to entry, as CPT codes 99457 and 99458 require interactive communication with patients or caregivers. Maintaining COVID-era platform flexibilities in the long term has the potential to streamline RPM adoption and implementation, even as we wait for more commercial platforms to attain Health Insurance Portability and Accountability Act compliance.

CLINICAL IMPLICATIONS OF POSTHOSPITAL MONITORING

Recovery after hospital discharge had not been monitored routinely outside of occasional clinic visits. The combination of increased regulatory flexibility and reimbursement for RPM radically expands how much of the posthospital recovery process physicians can remotely monitor and manage. Limited evidence suggests the use of digital health technologies offering frequent monitoring may improve patients' recovery.[8] Evidence from postoperative monitoring of heart failure patients with implanted cardioverter-defibrillators suggests RPM can safely replace some in-person postoperative visits.[9] Before the COVID-19 pandemic, implementation challenges due to infrastructural (such as integration with electronic health record technologies) and financial barriers impeded adoption of RPM.[10] With newly expanded RPM use and reimbursement rules, cardiovascular care providers have a unique window of opportunity during the COVID-19 pandemic to leverage RPM both to meet the pandemic's social distancing imperatives by providing safer, at-home care and to use the vast amounts of real-time data from home monitoring devices as fuel for the learning health system of the future.

It will be important to continue to generate data to support practice and to be aware of potential unintended consequences—more frequent monitoring via RPM may contribute to patient anxiety or overdiagnosis resulting in excess health care utilization. CMS seems concerned enough to have recently clarified that RPM services associated with all medical devices for a single patient can be billed by only 1 practitioner, only once per patient per a 30-day period, when at least 16 days of data have been collected. However, it is the adaptability of RPM that makes it attractive for existing posthospital care programs to monitor rehabilitation intensity and recovery. Managing this new deluge of RPM-generated data will require effective filters to relay only high-yield information to physicians.

CONCLUSIONS

The COVID-19 pandemic heralded the beginning of the digital health era. Regulatory changes from CMS, the Food and Drug Administration, and the Department of Health and Human Services Office of Civil Rights have dramatically accelerated the growth of digital health of all kinds, including RPM. For the first time, hospitals have the regulatory leniency and financial reimbursement frameworks to scale-up RPM adoption. As there is enormous potential in improving postoperative recovery monitoring by the effective use of RPM and telehealth technologies, cardiologists and cardiac surgeons should consider the potential benefits of adopting these technologies in daily practice. With the development of new CPT codes and large-scale adoption of technology as a byproduct of the pandemic, now is the time to start tapping into this opportunity that had been underutilized for so long.

ARTICLE INFORMATION

Correspondence

Harlan M. Krumholz, MD, SM, Yale New Haven Hospital, 1 Church St, Suite 200, New Haven, CT 06510. Email harlan.krumholz@yale.edu

Affiliations

Center for Outcomes Research and Evaluation, Yale New Haven Hospital, New Haven, CT (P.D., M.M., H.M.K.). Division of Cardiac Surgery (P.D., M.M., A.G.) and Section of Cardiovascular Medicine, Department of Internal Medicine (H.M.K.), Yale School of Medicine, New Haven, CT. Department of Emergency Medicine, George Washington University, Washington, DC (R.J.). Department of Biochemistry and Molecular & Cellular Biology, Georgetown University Medical Center, Washington, DC (R.J.). Department of Health Policy and Management, Yale School of Public Health, New Haven, CT (H.M.K.).

Sources of Funding

None.

Disclosures

R. Jarrin serves as an Advisor to the American Medical Association Digital Medical Payment Advisory Group, the Connected Health Initiative, United Spinal Association, Personal Connected Health Alliance, ResMed, Inc, Consumer Technology Association, Validic, Inc, Optum Services, Inc (Vivify Health), Intel Corporation, AliveCor, Inc, VeruStat, Inc, Omron Healthcare, Inc, Life365, Inc, Qualcomm Incorporated, Strive Orthopedics, Pillsy/Optimize Health, Reemo Health, Care Innovations, and Constant Therapy. In the past 3 years, Dr Krumholz has received expenses and personal fees from UnitedHealth, IBM Watson Health, Element Science, Aetna, Facebook, the Siegfried and Jensen Law Firm, Arnold and Porter Law Firm, Martin/Baughman Law Firm, F-Prime, and the National Center for Cardiovascular Diseases in Beijing. He is an owner of Refactor Health and HugoHealth and had grants and contracts from the Centers for Medicare & Medicaid Services, Medtronic, the US Food and Drug Administration, Johnson & Johnson, and the Shenzhen Center for Health Information. The other authors report no conflicts.

REFERENCES

1. Mehrotra A, Chernew M, Linetsky D, Hatch H, Cutler D. The Impact of the COVID-19 Pandemic on Outpatient Visits: A Rebound Emerges. *To the Point (blog), Commonwealth Fund*. 2020. Accessed February 24, 2021. https://www.commonwealthfund.org/publications/2020/apr/impact-covid-19-outpatient-visits
2. Mehrotra A, Ray K, Brockmeyer Diane M, Barnett Michael L, Bender Jessica A. Rapidly Converting to "Virtual Practices": Outpatient Care in the Era of Covid-19. NEJM Catalyst. 2020. Accessed February 24, 2021. https://catalyst.nejm.org/doi/full/10.1056/CAT.20.0091

3. U.S. Food and Drug Administration. *Enforcement Policy for Non-Invasive Remote Monitoring Devices Used to Support Patient Monitoring During the Coronavirus Disease 2019 (COVID-19) Public Health Emergency (Revised)*. Rockville, MD. Food and Drug Administration Center for Devices and Radiological Health. October 28, 2020. Docket Number FDA-2020-D-1138. Accessed February 24, 2021. https://www.fda.gov/regulatory-information/search-fda-guidance-documents/enforcement-policy-non-invasive-remote-monitoring-devices-used-support-patient-monitoring-during
4. Centers for Medicare & Medicaid Services. Medicare Program; Revisions to Payment Policies Under the Physician Fee Schedule and Other Revisions to Part B for CY 2019; Medicare Shared Savings Program Requirements; Quality Payment Program; Medicaid Promoting Interoperability Program; Quality Payment Program-Extreme and Uncontrollable Circumstance Policy for the 2019 MIPS Payment Year; Provisions From the Medicare Shared Savings Program-Accountable Care Organizations-Pathways to Success; and Expanding the Use of Telehealth Services for the Treatment of Opioid Use Disorder Under the Substance Use-Disorder Prevention That Promotes Opioid Recovery and Treatment (SUPPORT) for Patients and Communities Act. November 23, 2018. 59452-60303. Document Number: 2018-24170. Accessed February 24, 2021. https://www.federalregister.gov/documents/2018/11/23/2018-24170/medicare-program-revisions-to-payment-policies-under-the-physician-fee-schedule-and-other-revisions
5. Centers for Medicare & Medicaid Services. Medicare Program; CY 2020 Revisions to Payment Policies Under the Physician Fee Schedule and Other Changes to Part B Payment Policies; Medicare Shared Savings Program Requirements; Medicaid Promoting Interoperability Program Requirements for Eligible Professionals; Establishment of an Ambulance Data Collection System; Updates to the Quality Payment Program; Medicare Enrollment of Opioid Treatment Programs and Enhancements to Provider Enrollment Regulations Concerning Improper Prescribing and Patient Harm; and Amendments to Physician Self-Referral Law Advisory Opinion Regulations Final Rule; and Coding and Payment for Evaluation and Management, Observation and Provision of Self-Administered Esketamine Interim Final Rule. November 15, 2019. 62568-63563. Document Number: 2019-24086. Accessed February 24, 2021. https://www.federalregister.gov/documents/2019/11/15/2019-24086/medicare-program-cy-2020-revisions-to-payment-policies-under-the-physician-fee-schedule-and-other
6. Centers for Medicare & Medicaid Services. Medicare and Medicaid Programs, Basic Health Program, and Exchanges; Additional Policy and Regulatory Revisions in Response to the COVID-19 Public Health Emergency and Delay of Certain Reporting Requirements for the Skilled Nursing Facility Quality Reporting Program. May 5, 2020. 27550-27629. Document Number: 2020-09608. Accessed February 24, 2021. https://www.federalregister.gov/documents/2020/05/08/2020-09608/medicare-and-medicaid-programs-basic-health-program-and-exchanges-additional-policy-and-regulatory
7. U.S. Department of Health & Human Services. Notification of Enforcement Discretion for Telehealth Remote Communications During the COVID-19 Nationwide Public Health Emergency. U.S. Department of Health & Human Services Office for Civil Rights. 2020. Accessed February 24, 2021. https://www.hhs.gov/hipaa/for-professionals/special-topics/emergency-preparedness/notification-enforcement-discretion-telehealth/index.html
8. Jeong IC, Healy R, Bao B, Xie W, Madeira T, Sussman M, Whitman G, Schrack J, Zahradka N, Hoyer E, et al. Assessment of patient ambulation profiles to predict hospital readmission, discharge location, and length of stay in a cardiac surgery progressive care unit. *JAMA Netw Open*. 2020;3:e201074. doi: 10.1001/jamanetworkopen.2020.1074
9. Versteeg H, Timmermans I, Widdershoven J, Kimman GJ, Prevot S, Rauwolf T, Scholten MF, Zitron E, Mabo P, Denollet J, et al. Effect of remote monitoring on patient-reported outcomes in European heart failure patients with an implantable cardioverter-defibrillator: primary results of the REMOTE-CIED randomized trial. *Europace*. 2019;21:1360–1368. doi: 10.1093/europace/euz140
10. Desai NR, Ross JS, Kwon JY, Herrin J, Dharmarajan K, Bernheim SM, Krumholz HM, Horwitz LI. Association between hospital penalty status under the hospital readmission reduction program and readmission rates for target and nontarget conditions. *JAMA*. 2016;316:2647–2656. doi: 10.1001/jama.2016.18533