Supplementary Online Content

DeBlanc J, Kay B, Lehrich J, et al. Availability of statistical code from studies using Medicare data in general medical journals. *JAMA Intern Med*. Published online April 13, 2020. doi:10.1001/jamainternmed.2020.0671

This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix 1. Articles included in the analysis that used national Medicare datasets and were published in 6 general medical journals between 2017 and 2018

1. Bansal N, Hailpern SM, Katz R, et al. Outcomes Associated With Left Ventricular Assist Devices Among Recipients With and Without End-stage Renal Disease. *JAMA Intern Med.* 2018;178(2):204–209.
2. Barnett ML, Olenski AR, Jena AB. Opioid-prescribing patterns of emergency physicians and risk of long-term use. *N Engl J Med*. 2017;376:663–673.
3. Berry SD, Rothbaum RR, Kiel DP, Lee Y, Mitchell SL. Association of Clinical Outcomes With Surgical Repair of Hip Fracture vs Nonsurgical Management in Nursing Home Residents With Advanced Dementia. *JAMA Intern Med.* 2018;178(6):774–780.
4. Bindman AB, Cox DF. Changes in Health Care Costs and Mortality Associated With Transitional Care Management Services After a Discharge Among Medicare Beneficiaries. *JAMA Intern Med.* 2018;178(9):1165–1171.
5. Blumenthal DM, Olenski AR, Tsugawa Y, Jena AB. Association Between Treatment by Locum Tenens Internal Medicine Physicians and 30-Day Mortality Among Hospitalized Medicare Beneficiaries. *JAMA.* 2017;318(21):2119–2129.
6. Bonfrer I, Figueroa JF, Zheng J, Orav EJ, Jha AK. Impact of Financial Incentives on Early and Late Adopters among US Hospitals: observational study. *BMJ.* 2018;360:j5622.
7. Bradford AC, Bradford WD, Abraham A, Bagwell Adams G. Association Between US State Medical Cannabis Laws and Opioid Prescribing in the Medicare Part D Population. *JAMA Intern Med.* 2018;178(5):667–672.
8. Carey CM, Jena AB, Barnett ML. Patterns of Potential Opioid Misuse and Subsequent Adverse Outcomes in Medicare, 2008 to 2012. *Ann Intern Med.* 2018;168:837–845.
9. Carico R, Zhao X, Thorpe CT, Thorpe JM, Sileanu FE, Cashy JP, et al. Receipt of Overlapping Opioid and Benzodiazepine Prescriptions Among Veterans Dually Enrolled in Medicare Part D and the Department of Veterans Affairs: A Cross-sectional Study. *Ann Intern Med.* 2018;169:593–601.
10. Desai NR, Bourdillon PM, Parzynski CS, et al. Association of the US Department of Justice Investigation of Implantable Cardioverter-Defibrillators and Devices Not Meeting the Medicare National Coverage Determination, 2007-2015. *JAMA.* 2018;320(1):63–71.
11. Dharmarajan K, Wang Y, Lin Z, et al. Association of Changing Hospital Readmission Rates With Mortality Rates After Hospital Discharge. *JAMA.* 2017;318(3):270–278.
12. Dharmarajan K, Qin L, Bierlein M, et al. Outcomes after observation stays among older adult Medicare beneficiaries in the USA: retrospective cohort study. *BMJ.* 2017;357:j2616.
13. Fedewa SA, Flanders WD, Ward KC, Lin CC, Jemal A, Goding Sauer A, et al. Racial and Ethnic Disparities in Interval Colorectal Cancer Incidence: A Population-Based Cohort Study. *Ann Intern Med*. 2017;166:857–866.
14. Figueroa JF, Joynt Maddox KE, Beaulieu N, Wild RC, Jha AK. Concentration of Potentially Preventable Spending Among High-Cost Medicare Subpopulations: An Observational Study. *Ann Intern Med.* 2017;167:706–713.

15. Figueroa JF, Lyon Z, Zhou X, Grabowski DC, Jha AK. Persistence and Drivers of High-Cost Status Among Dual-Eligible Medicare and Medicaid Beneficiaries: An Observational Study. *Ann Intern Med.* 2018;169:528–534.
16. Finkelstein A, Ji Y, Mahoney N, Skinner J. Mandatory Medicare Bundled Payment Program for Lower Extremity Joint Replacement and Discharge to Institutional Postacute Care: Interim Analysis of the First Year of a 5-Year Randomized Trial. *JAMA.* 2018;320(9):892–900.
17. Goodwin JS, Salameh H, Zhou J, Singh S, Kuo Y, Nattinger AB. Association of Hospitalist Years of Experience With Mortality in the Hospitalized Medicare Population. *JAMA Intern Med.* 2018;178(2):196–203.
18. Gray B, Vandergrift J, Landon B, Reschovsky J, Lipner R. Associations Between American Board of Internal Medicine Maintenance of Certification Status and Performance on a Set of Healthcare Effectiveness Data and Information Set (HEDIS) Process Measures. *Ann Intern Med.* 2018;169:97–105.
19. Harris JA, Byhoff E, Perumalswami CR, Langa KM, Wright AA, Griggs JJ. The Relationship of Obesity to Hospice Use and Expenditures: A Cohort Study. *Ann Intern Med*. 2017;166:381–389.
20. Jena AB, Olenski AR, Molitor D, Miller N. Association between rainfall and diagnoses of joint or back pain: retrospective claims analysis. *BMJ*. 2017;359:j5326.
21. Jena, AB, Mann, NC, Wedlund, LN, & Olenski, A. Delays in Emergency Care and Mortality during Major U.S. Marathons. *New England Journal of Medicine.* 2017;*376*(15):1441-1450.
22. Johnston KJ, Wen H, Hockenberry JM, Joynt-Maddox KE. Association Between Patient Cognitive and Functional Status and Medicare Total Annual Cost of Care: Implications for Value-Based Payment. *JAMA Intern Med.* 2018;178(11):1489–1497.
23. Joynt Maddox KE, Orav EJ, Epstein AM. Evaluation of Medicare's Bundled Payments Initiative for Medical Conditions. *New England Journal of Medicine*. 2018;379(18):e33.
24. Krumholz HM, Wang K, Lin Z, et al. Hospital-Readmission Risk- Isolating Hospital Effects from Patient Effects. *New England Journal of Medicine.* 2017;377(11):1055-1064.
25. Lam MB, Figueroa JF, Feyman Y, Reimold KE, Orav EJ, Jha AK. Association between patient outcomes and accreditation in US hospitals: observational study. *BMJ*. 2018;363:k4011.
26. Landon BE, Keating NL, Onnela J, Zaslavsky AM, Christakis NA, OMalley AJ. Patient-Sharing Networks of Physicians and Health Care Utilization and Spending Among Medicare Beneficiaries. *JAMA Intern Med.* 2018;178(1):66–73.
27. Lichtman JH, Jones MR, Leifheit EC, et al. Carotid Endarterectomy and Carotid Artery Stenting in the US Medicare Population, 1999-2014. *JAMA.* 2017;318(11):1035–1046.
28. Liu P, Dhruva SS, Shah ND, Ross JS. Medicare Beneficiary Out-of-Pocket Costs for Generic Cardiovascular Medications Available Through $4 Generic Drug Discount Programs. *Ann Intern Med*. 2018;169:817–819.

29. Makam AN, Nguyen OK, Xuan L, Miller ME, Goodwin JS, Halm EA. Factors Associated With Variation in Long-term Acute Care Hospital vs Skilled Nursing Facility Use Among Hospitalized Older Adults. *JAMA Intern Med.* 2018;178(3):399–405.
30. Maust DT, Kim HM, Chiang C, Kales HC. Association of the Centers for Medicare & Medicaid Services' National Partnership to Improve Dementia Care With the Use of Antipsychotics and Other Psychotropics in Long-term Care in the United States From 2009 to 2014. *JAMA Intern Med.* 2018;178(5):640–647.
31. McWilliams JM, Gilstrap LG, Stevenson DG, Chernew ME, Huskamp HA, Grabowski DC. Changes in Postacute Care in the Medicare Shared Savings Program. *JAMA Intern Med.* 2017;177(4):518–526.
32. Navathe AS, Liao JM, Dykstra SE, et al. Association of Hospital Participation in a Medicare Bundled Payment Program With Volume and Case Mix of Lower Extremity Joint Replacement Episodes. *JAMA.* 2018;320(9):901–910.
33. Obermeyer Z, Cohn B, Wilson M, Jena AB, Cutler DM. Early death after discharge from emergency departments: analysis of national US insurance claims data. *BMJ*. 2017;356:j239.
34. Olesen SW, Barnett ML, MacFadden DR, Lipsitch M, Grad YH. Trends in outpatient antibiotic use and prescribing practice among US older adults, 2011-15: observational study. *BMJ.* 2018;362:k3155.
35. Peterson GG, Geonnotti KL, Hula L, et al. Association Between Extending CareFirst's Medical Home Program to Medicare Patients and Quality of Care, Utilization, and Spending. *JAMA Intern Med.* 2017;177(9):1334–1342.
36. Resnick MJ, Graves AJ, Thapa S, et al. Medicare Accountable Care Organization Enrollment and Appropriateness of Cancer Screening. *JAMA Intern Med.* 2018;178(5):648–654.
37. Roberts ET, Zaslavsky AM, Barnett ML, Landon BE, Ding L, McWilliams JM. Assessment of the Effect of Adjustment for Patient Characteristics on Hospital Readmission Rates: Implications for Pay for Performance. *JAMA Intern Med.* 2018;178(11):1498–1507.
38. Roberts ET, McWilliams JM, Hatfield LA, et al. Changes in Health Care Use Associated With the Introduction of Hospital Global Budgets in Maryland. *JAMA Intern Med*. 2018;178(2):260–268.
39. Roberts ET, Zaslavsky AM, McWilliams JM. The Value-Based Payment Modifier: Program Outcomes and Implications for Disparities. *Ann Intern Med*. 2018;168:255–265.
40. Ryan AM, Krinsky S, Adler-Milstein J, Damberg CL, Maurer KA, Hollingsworth JM. Association Between Hospitals' Engagement in Value-Based Reforms and Readmission Reduction in the Hospital Readmission Reduction Program. *JAMA Intern Med.* 2017;177(6):862–868.
41. Sacks CA, Lee CC, Kesselheim AS, Avorn J. Medicare Spending on Brand-name Combination Medications vs Their Generic Constituents. *JAMA.* 2018;320(7):650–656.
42. Stevens JP, Nyweide DJ, Maresh S, Hatfield LA, Howell MD, Landon BE. Comparison of Hospital Resource Use and Outcomes Among Hospitalists, Primary Care Physicians, and Other Generalists. *JAMA Intern Med.* 2017;177(12):1781–1787.

43. Teno JM, Gozalo P, Trivedi AN, et al. Site of Death, Place of Care, and Health Care Transitions Among US Medicare Beneficiaries, 2000-2015. *JAMA.* 2018;320(3):264–271.
44. Trish E, Ginsburg P, Gascue L, Joyce G. Physician Reimbursement in Medicare Advantage Compared With Traditional Medicare and Commercial Health Insurance. *JAMA Intern Med.* 2017;177(9):1287–1295.
45. Tsugawa Y, Jena AB, Orav EJ, et al. Age and sex of surgeons and mortality of older surgical patients: observational study. *BMJ*. 2018;361:k1343.
46. Tsugawa Y, Blumenthal DM, Jha AK, Orav EJ, Jena AB. Association between physician US News & World Report medical school ranking and patient outcomes and costs of care: observational study. *BMJ.* 2018;362:k3640.
47. Tsugawa Y, Jena AB, Figueroa JF, Orav EJ, Blumenthal DM, Jha AK. Comparison of Hospital Mortality and Readmission Rates for Medicare Patients Treated by Male vs Female Physicians. *JAMA Intern Med.* 2017;177(2):206–213.
48. Tsugawa Y, Newhouse JP, Zaslavsky AM, Blumenthal DM, Jena AB. Physician age and outcomes in elderly patients in hospital in the US: observational study. *BMJ.* 2017;357:j1797.
49. Tsugawa Y, Jena AB, Orav EJ, Jha AK. Quality of care delivered by general internists in US hospitals who graduated from foreign versus US medical schools: observational study. *BMJ.* 2017;356:j273.
50. Tsugawa Y, Jha AK, Newhouse JP, Zaslavsky AM, Jena AB. Variation in Physician Spending and Association With Patient Outcomes. *JAMA Intern Med.* 2017;177(5):675–682.
51. Xu T, Park A, Bai G, et al. Variation in Emergency Department vs Internal Medicine Excess Charges in the United States. *JAMA Intern Med.* 2017;177(8):1139–1145.

eAppendix 2. Email template

Dear _____,

On behalf of the Code in Observational Data for Enhancing Replication (CODER) team, we are asking you to participate in our study to assess the practice of sharing statistical code. Enhancing open science is becoming a priority in research, as it can help limit duplications of efforts and improve overall methodological practices. Yet these efforts have been particularly limited in health services and outcomes research, in part due to the lack of an adequate system for sharing statistical code to encourage reproducibility.

To this end, we are conducting a study of recent papers that utilize national Medicare data to assess the practice of statistical code sharing. We are not interested in collecting data-just the code pertaining to how the analysis was performed. Our goal is to determine 1) how willing researchers are to share their code and 2) how well their code is annotated in general and its overall usability. By statistical code, we mean we are interested in code that would allow for full replication of reported analyses including code related to both cohort construction and statistical modeling. The study has been determined to be exempt by the University of Michigan Institutional Review Board.

After reviewing all publications from 2017-2018 in a select group of high-impact journals that utilized Medicare claims date, we have determined that your paper, [Name] in [Journal], met the inclusion criteria for our study. Since the statistical code used for this study was not publicly available through the journal, we are asking if you would be willing to provide it to us. Sharing code in this way is not in violation of Medicare data use agreements as long as no identifiable information is including in the programming. We also will not report specific examples from code related to any particular publication but will only provide information on summary statistics.

Of course, to shift towards more transparent code sharing within health services and outcomes research, we also would like to potentially include your code in a general online repository that we are considering hosting as part of this project. The purpose of this repository would be to help improve code sharing practices. However, we would not do this without your explicit written permission. If you do decide to provide code for our study, but do not wish to have it placed in the repository, we will destroy the code at the end of the study period and never share it with an outside party or individual.

Finally, as part of this process, we are also asking you to fill out a short survey available through this anonymous Qualtrics link https://umichumhs.qualtrics.com/jfe/form/SV_5puilyA5WUY2j7D.

The survey asks about your views and opinions regarding statistical code sharing in health services and outcomes research. We would appreciate it if you would fill this out, regardless of your decision about sharing code with us.

We thank you in advance for your time.

Best regards,

The CODER team.

The CODER team consists of a group of University of Michigan investigators that include: Brahmajee Nallamothu, Jennie DeBlanc, Bradley Kay, Jessica Lehrich and Bradley Trumpower. If you have any questions about the team or the purposes of the study, feel free to reach out to us.

eAppendix 3. Survey

This set of questions is designed to evaluate researcher's opinions and reasoning for sharing or not sharing statistical code in published research papers. Please answer all questions in terms of the specific paper that we contacted you about.

1. ***What gender would you choose to describe yourself?***
   a. Female
   b. Male
   c. Other
   d. Prefer not to answer

2. ***What (advanced?) degrees do you currently hold? Please select all that apply***.
   a. MD
   b. DO
   c. PhD
   d. MPH
   e. MS
   f. Other [Fill in blank]

3. ***What best describes your current work/research environment?***
   a. Public University or Hospital
   b. Private University or Hospital
   c. Non-profit Organization
   d. Commercial Organization
   e. Other [Fill in blank]

4. ***What is your current age?***
   a. <20
   b. 20-29
   c. 30-39
   d. 40-49
   e. 50-59
   f. 60-69
   g. 70-79
   h. 80-89

5. ***In what region of the country is your primary place of work/research?***
   a. East Coast (Maine, New Hampshire, Vermont, Pennsylvania, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland)
   b. Midwest (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin)
   c. South East (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia, Arkansas, Louisiana, District of Columbia)

d. Western (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Oklahoma, and Texas)
e. Western (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming, Oklahoma, and Texas)
f. U.S. territories
g. Non U.S. [Fill in Blank]

6. ***Is the code for the paper in question currently available (or would you be willing to make the code available) to the public?***
   a. Yes- Skip to Question 8
   b. No

7. ***If you responded 'No' to the above question, please select all the reasons that you would be unable to share the full statistical code upon reasonable request:***
   a. Uncertain how the code would be utilized
   b. Time/effort involved in sharing code
   c. Protecting private information/intellectual property
   d. Code is not annotated or clean enough to share
   e. Other [Fill in blank]

8. ***What reasons compelled you to make your code available? Please select all that apply.***
   a. Ethics committee/IRB requirement
   b. Institutional/University requirement
   c. Journal requirement
   d. External funding requirement
   e. To make methods more transparent/reproducible
   f. Other [Fill in Blank]

9. ***Please select the option that best applies to your available code for the paper in question. You may select more than one if applicable***
   a. Partial statistical code is publicly available
   b. Partial statistical code is available upon request
   c. Full statistical code is publicly available
   d. Full statistical code is available upon request

10. ***Please indicate Y/N if you would consider the following a reasonable reason to request your full statistical code:***
    a. Requester wants to replicate primary findings: Y/N
    b. Requester wants to use code to assess secondary outcome measures: Y/N
    c. Requester wants to add code to statistical code database to make it publicly available for future related research: Y/N
    d. Other [Fill in Blank]

11. ***Have you previously received requests to share statistical code for the paper in question?***

a. Yes, and we were able to provide access to the code
b. Yes, but we were unable to provide access to the code
c. No – Skip to Question 13

12. ***[If yes to the previous question] How many direct requests for sharing your statistical code have you received?***
    a. 1
    b. 2
    c. 3
    d. 4+

13. ***Would you support the formation of an online repository of statistical code that is accessible for others to reference/use in the research community?***

    a. Yes
    b. No
    c. Maybe