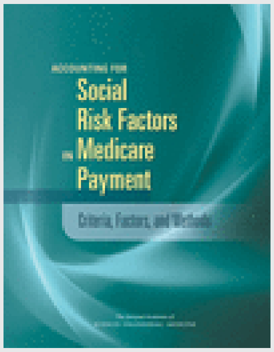

Accounting for Social Risk Factors in Medicare Payment: Criteria, Factors, and Methods

DETAILS

124 pages | 8.5 x 11 | PAPERBACK
ISBN 978-0-309-44293-0 | DOI: 10.17226/23513

AUTHORS

Committee on Accounting for Socioeconomic Status in Medicare Payment Programs; Board on Population Health and Public Health Practice; Board on Health Care Services; Health and Medicine Division; National Academies of Sciences, Engineering, and Medicine

ACCOUNTING FOR
Social Risk Factors
IN
Medicare Payment

Criteria, Factors, and Methods

Committee on Accounting for Socioeconomic Status in Medicare Payment Programs

Board on Population Health and Public Health Practice

Board on Health Care Services

Health and Medicine Division

The National Academies of
SCIENCES · ENGINEERING · MEDICINE

THE NATIONAL ACADEMIES PRESS
Washington, DC
www.nap.edu

THE NATIONAL ACADEMIES PRESS 500 Fifth Street, NW Washington, DC 20001

This activity was supported by Contract No. HHSP233201400020B from the Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization or agency that provided support for the project.

International Standard Book Number-13: 978-0-309-44293-0
International Standard Book Number-10: 0-309-44293-1
Digital Object Identifier: 10.17226/23513

Additional copies of this report are available for sale from the National Academies Press, 500 Fifth Street, NW, Keck 360, Washington, DC 20001; (800) 624-6242 or (202) 334-3313; http://www.nap.edu.

Printed in the United States of America

Suggested citation: National Academies of Sciences, Engineering, and Medicine. 2016. *Accounting for social risk factors in Medicare payment: Criteria, factors, and methods.* Washington, DC: The National Academies Press. doi: 10.17226/23513.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

The **National Academy of Sciences** was established in 1863 by an Act of Congress, signed by President Lincoln, as a private, nongovernmental institution to advise the nation on issues related to science and technology. Members are elected by their peers for outstanding contributions to research. Dr. Ralph J. Cicerone is president.

The **National Academy of Engineering** was established in 1964 under the charter of the National Academy of Sciences to bring the practices of engineering to advising the nation. Members are elected by their peers for extraordinary contributions to engineering. Dr. C. D. Mote, Jr., is president.

The **National Academy of Medicine** (formerly the Institute of Medicine) was established in 1970 under the charter of the National Academy of Sciences to advise the nation on medical and health issues. Members are elected by their peers for distinguished contributions to medicine and health. Dr. Victor J. Dzau is president.

The three Academies work together as the **National Academies of Sciences, Engineering, and Medicine** to provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions. The Academies also encourage education and research, recognize outstanding contributions to knowledge, and increase public understanding in matters of science, engineering, and medicine.

Learn more about the National Academies of Sciences, Engineering, and Medicine at **www.national-academies.org**.

COMMITTEE ON ACCOUNTING FOR SOCIOECONOMIC STATUS IN MEDICARE PAYMENT PROGRAMS

DONALD M. STEINWACHS (*Chair*), Professor, Johns Hopkins Bloomberg School of Public Health
JOHN Z. AYANIAN, Alice Hamilton Professor of Medicine, Director, Institute for Healthcare Policy and Innovation, University of Michigan
CHARLES BAUMGART, Senior Medical Director, xG Health Solutions
MELINDA BUNTIN, Professor and Chair, Department of Health Policy, Vanderbilt University School of Medicine
ANA V. DIEZ ROUX, Dean and Distinguished Professor of Epidemiology, Drexel University School of Public Health
MARC N. ELLIOTT, Senior Principal Researcher, RAND Corporation
JOSÉ J. ESCARCE, Professor of Medicine, David Geffen School of Medicine, University of California, Los Angeles
ROBERT FERRER, Dr. John M. Smith, Jr. Professor, Department of Family & Community Medicine, University of Texas Health Science Center at San Antonio
DARRELL J. GASKIN, William C. and Nancy F. Richardson Professor of Health Policy and Director, Johns Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health
MARK D. HAYWARD, Professor of Sociology, Centennial Commission Professor in the Liberal Arts, Faculty Research Associate, Population Research Center, The University of Texas at Austin
JAMES S. JACKSON, Daniel Katz Distinguished University Professor of Psychology, Research Professor, Institute for Social Research, University of Michigan
DANIEL POLSKY, Executive Director, Leonard Davis Institute of Health Economics, University of Pennsylvania
MEREDITH ROSENTHAL, Professor of Health Economics and Policy, Harvard T.H. Chan School of Public Health
ANTHONY SHIH, Executive Vice President, The New York Academy of Medicine

Study Staff
KATHLEEN STRATTON, Study Director
LESLIE Y. KWAN, Associate Program Officer
PATRICK ROSS, Research Assistant (from May 2016)
EMILY VOLLBRECHT, Senior Program Assistant (until May 2016)
ALEXIS WOJTOWICZ, Senior Program Assistant (from May 2016)
REBECCA MORGAN, Senior Research Librarian
DORIS ROMERO, Financial Associate
HOPE HARE, Administrative Assistant
ROSE MARIE MARTINEZ, Senior Board Director, Board on Population Health and Public Health Practice
SHARYL NASS, Board Director, Board on Health Care Services

National Academy of Medicine Greenwall Fellow in Bioethics
BRENDAN SALONER, Assistant Professor, Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health

Reviewers

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. We wish to thank the following individuals for their review of this report:

ARLENE S. ASH, University of Massachusetts Medical School
JACK EBELER, Independent Consultant
GEORGE ISHAM, HealthPartners
DANA MUKAMEL, University of California, Irvine
DAVID R. NERENZ, Henry Ford Health System
JOSHUA M. SHARFSTEIN, Johns Hopkins Bloomberg School of Public Health
STEPHEN B. THOMAS, University of Maryland School of Public Health
ALAN M. ZASLAVSKY, Harvard Medical School

Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by **GEORGES C. BENJAMIN**, American Public Health Association, and **CHARLES E. PHELPS**, University of Rochester. They were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Contents

APPENDIXES

Summary

The Centers for Medicare & Medicaid Services (CMS) are steadily moving from paying for volume (fee-for-service payments) to paying for quality, outcomes, and costs (value-based payment, or VBP) in the traditional Medicare program. Since Congress enacted the Patient Protection and Affordable Care Act of 2010, CMS has implemented a variety of VBP models, including quality incentives and risk-based, alternative payment models (APMs) (Burwell, 2015). In this report both types of strategies are referred to broadly as VBP. Financial incentives such as pay-for-performance programs link financial bonuses and/or penalties to quality or value (NASEM, 2016a). APMs include episode-based payments and population-based (global) payments, shifting greater financial risk to providers to hold them accountable for the quality and efficiency of care they provide, as well as health outcomes achieved (NASEM, 2016a). Although not considered entirely VBP models, Medicare Part C (i.e., Medicare Advantage) and Part D also have design features that tie quality and cost performance to payment (e.g., risk sharing and bonus payments).

Stakeholders have raised concerns that current Medicare quality measurement and payment programs, and VBP programs in particular, that do not account for social risk factors may underestimate the quality of care provided by providers disproportionately serving socially at-risk populations. (Note, the term *provider* in this report refers to the reporting unit [or, provider setting] being evaluated—e.g., hospitals, health plans, provider groups, etc.) Patients with social risk factors may require more resources and more intensive care to achieve certain health outcomes compared to the resources and care needed to achieve those same outcomes in more advantaged patients (NASEM, 2016b). At the same time, because these providers are also more likely to care for patients who are uninsured or covered by Medicaid, they have historically been less well funded than providers caring for larger proportions of patients with commercial insurance that pay more generously for care. If providers disproportionately serving vulnerable populations are likely to have fewer resources to begin with and care for patients who require more resources to achieve the same health care outcomes, these providers may be more likely to fare poorly on quality rankings (Chien et al., 2007; Joynt and Rosenthal, 2012; Ryan, 2013). The poorer average performance among providers disproportionately serving socially at-risk populations combined with the fact that they have fewer resources has raised concerns that Medicare's VBP programs may potentially increase disparities. Similar concerns apply to capitated payments made to Medicare Part C health plans.

STATEMENT OF TASK

In response to concerns about health equity and accuracy in reporting and to the Improving Medicare Post-Acute Care Transformation (IMPACT) Act approved by Congress in 2014, the Department of Health and Human Services (HHS) acting through the Office of the Assistant Secretary for Planning and Evaluation (ASPE) contracted with the National Academies of Sciences, Engineering, and Medicine to convene an ad hoc committee to identify criteria for selecting social risk factors, specific social risk factors Medicare could use, and methods of accounting for those factors in Medicare quality measurement and payment applications. The committee comprises expertise in health care quality, clinical medicine, health services research, health disparities, social determinants of health, risk adjustment, and Medicare programs (see Appendix B for biographical sketches).

This report is the third in a series of five brief reports that aim to inform ASPE analyses that account for social risk factors in Medicare payment programs mandated through the IMPACT Act. In the first report, the committee presented a conceptual framework and described the results of a literature search linking five social risk factors and health literacy to health-related measures of importance to Medicare quality measurement and payment programs—referred to in this report as *performance indicators used in VBP*. In the second report, the committee reviewed the performance of providers disproportionately serving socially at-risk populations, discussed drivers of variations in performance, and identified six community-informed and patient-centered systems practices that show promise to improve care for socially at-risk populations. Details of the statement of task and the sequence of reports can be found in Box 1-1. The committee will release reports every 3 months, addressing each item in the statement of task in turn. The statement of task requests committee recommendations only in the fourth report.

This report builds on the conceptual relationships and empirical associations between social risk factors and performance indicators used in VBP identified in the first report to provide guidance on which factors could be considered for Medicare accounting purposes, criteria to identify these factors, and methods to do so in ways that can improve care and promote greater health equity for socially at-risk patients. To that end, the committee also aims to address issues that must be carefully considered to maintain or enhance provider incentives to improve care for socially at-risk patients throughout the report while alsopromoting accuracy in reporting and compensating providers fairly. The committee's goals in accounting for social risk factors in Medicare payment programs are:

1. Reducing disparities in access, quality, and outcomes;
2. Quality improvement and efficient care delivery for all patients;
3. Fair and accurate public reporting; and
4. Compensating providers fairly.

To achieve these goals, accounting for social risk factors should neither mask low-quality care or health disparities nor reward poor performance. Additionally, inclusion of social risk factors in quality measurement and payment should not disincentivize providers from finding strategies to overcome the influence of social risk factors on health care outcomes.

CRITERIA FOR SELECTING SOCIAL RISK FACTORS

The primary goal of the criteria is to guide selection of social risk factors that could be accounted for in VBP so that providers or health plans are rewarded for delivering quality and value independent of whether they serve patients with relatively low or high levels of social risk factors. Under VBP, providers who care for patients who would score lower on the measures of performance as a result of factors outside of the providers' control (such as certain social risk factors), rather than as a result of the quality of care delivered, should not be penalized because of the influence of these non-modifiable factors. The effect of these other factors should be minimized. In sum, the criteria should guide identification of social risk factors that could be accounted for in performance indicators used in VBP to promote accuracy in reporting.

The criteria put forth by this committee adhere closely to the guidelines for selecting risk factors developed by the National Quality Forum (NQF) in their 2014 report *Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors*. Like NQF, the committee's criteria explicitly focuses on selecting risk factors that will be applied to adjustment of performance indicators used for VBP. However, the committee's criteria reflect the need to apply to a broader range of methods to account for social risk factors. Criteria developed to select risk factors for prior risk adjustment models that the committee reviewed and drew upon in developing their criteria are listed in Appendix A.

> *Conclusion 1: Three overarching considerations encompassing five criteria could be used to determine whether a social risk factor should be accounted for in performance indicators used in Medicare value-based payment programs. They are:*
>
> A. *The social risk factor is related to the outcome.*
>   1. *The social risk factor has a conceptual relationship with the outcome of interest.*
>   2. *The social risk factor has an empirical association with the outcome of interest.*
>
> B. *The social risk factor precedes care delivery and is not a consequence of the quality of care.*
>   3. *The social risk factor is present at the start of care.*
>   4. *The social risk factor is not modifiable through provider actions.*
>
> C. *The social risk factor is not something the provider can manipulate.*
>   5. *The social risk factor is resistant to manipulation or gaming.*

These criteria are described and summarized in Table S-1, along with the rationale and limitations of each criterion, as well as practical considerations.

TABLE S-1 Criteria for Selecting Social Risk Factors for Application in Medicare Quality Measurement and Payment, Rationale, and Potential Challenges

Criteria	Rationale	Challenges/Limitations	Practical Considerations
A. The social risk factor is related to the outcome. *This category is the most basic pair of criteria for a social risk factor—that there be both a plausible and valid reason why the risk factor would be associated with the outcome and empirical evidence that such a relationship holds in practice. Together these criteria lay the foundation for the validity and practical importance of the risk factor.*			
1. Conceptual relationship with the outcome of interest	A conceptual relationship informed by research and experience ensures that there is a reasonable conceptual basis for expecting a systematic relationship.	A conceptual relationship may not be consistent over time or across settings. It is not always possible to distinguish unique causal roles of factors, so usefulness in an adjustment model does not necessarily imply that outcomes would improve through interventions on risk factor.	Acceptability and face validity: Some factors may be indicated empirically, but would need to be excluded because it has poor face validity or because data would be unacceptable to collect and include.
2. Empirical association with the outcome of interest	An empirical association confirms the conceptual relationship. Without this criterion, an adjustor (social risk factor) may have no effect.	Empirical evidence may not be generalizable to the particular setting. The relationship may not hold in a multivariate model.	Data limitations often represent a practical constraint to what factors are included in risk models. The aim is to reliably and feasibly capture accurate data. The challenge is to push for greater reliability and feasibility of factors that may be important to include, even if factors are excluded today, because it is currently infeasible. Privacy laws and concerns about patient confidentiality may also be an issue. Contribution of unique variation in the outcome (i.e., not redundant or highly correlated with another risk factor): Prevent overfitting and unstable estimates, or coefficients that appear to be in the wrong direction; reduce data collection burden.

Criteria	Rationale	Challenges/Limitations	Practical Considerations
B. The social risk factor precedes care delivery and is not a consequence of the quality of care. *Factors that reflect a model of care delivery, a treatment decision, or the direct consequences of care or treatment decision are not appropriate adjustors, as they reflect true differences in quality of care or other outcomes.*			
3. The risk factor is present at the start of care.	If a risk factor is present at the start of care, then it is less likely that it would be the result of care provided.	Does not eliminate a risk factor being a consequence of care delivery in dynamic settings or under population health settings.	Prioritize slowly changing factors over rapidly changing variables: Measurement would have to be more frequent, but rapidly changing variables would not fully disqualify a measure. Consider whether a factor represents a cumulative life cycle effect or a transient effect.
4. The risk factor is not modifiable through the provider's actions.	The goal is to adjust for factors independent of the care provided. Adjusting for the care provided contravenes this goal.	It may be difficult to identify in practice the extent to which care provision might affect a particular social risk factor.	
C. The social risk factor is not something that the provider can manipulate.			
5. The risk factor is resistant to manipulation or gaming.	This criterion ensures validity of performance score as representing quality of care (versus, for example, upcoding).	It is often difficult to anticipate how a measure might be manipulated.	Prioritize specific coding over vague coding: vague codes are more vulnerable to manipulation; however, there are vaguely coded variables that may be important nevertheless, so this would not fully disqualify an indicator. Prioritize continuous over dichotomous measures of the same construct where applicable to reduce "edge" gaming. Carefully monitor high-leverage factors (i.e., risk factors that are not prevalent but highly predictive of outcomes), as they may be important but especially attractive for gaming.

APPLYING CRITERIA TO SOCIAL RISK FACTORS AND HEALTH LITERACY

The conceptual framework presented in the committee's first report illustrates the primary hypothesized conceptual pathways by which five social risk factors (socioeconomic position [SEP]; race, ethnicity, and cultural context; gender; social relationships; and residential and community context) as well as health literacy may directly or indirectly affect performance indicators used in Medicare VBP programs (NASEM, 2016a). As described in the committee's first report, the conceptual framework applies to all Medicare beneficiaries, including beneficiaries with disabilities and those with end-stage renal disease. The committee also identified specific indicators that correspond to the social risk factors. These indicators represent ways to measure the latent constructs of the social risk factors and are distinct from specific measures.

Figure S-1 illustrates the primary hypothesized relationships between social risk factors and health literacy and performance indicators used in VBP. The committee applied the selection criteria they developed to the five social risk factors (and their respective indicators) and health literacy, and also describes the rationale and limitations of each factor and indicator relative to those criteria.

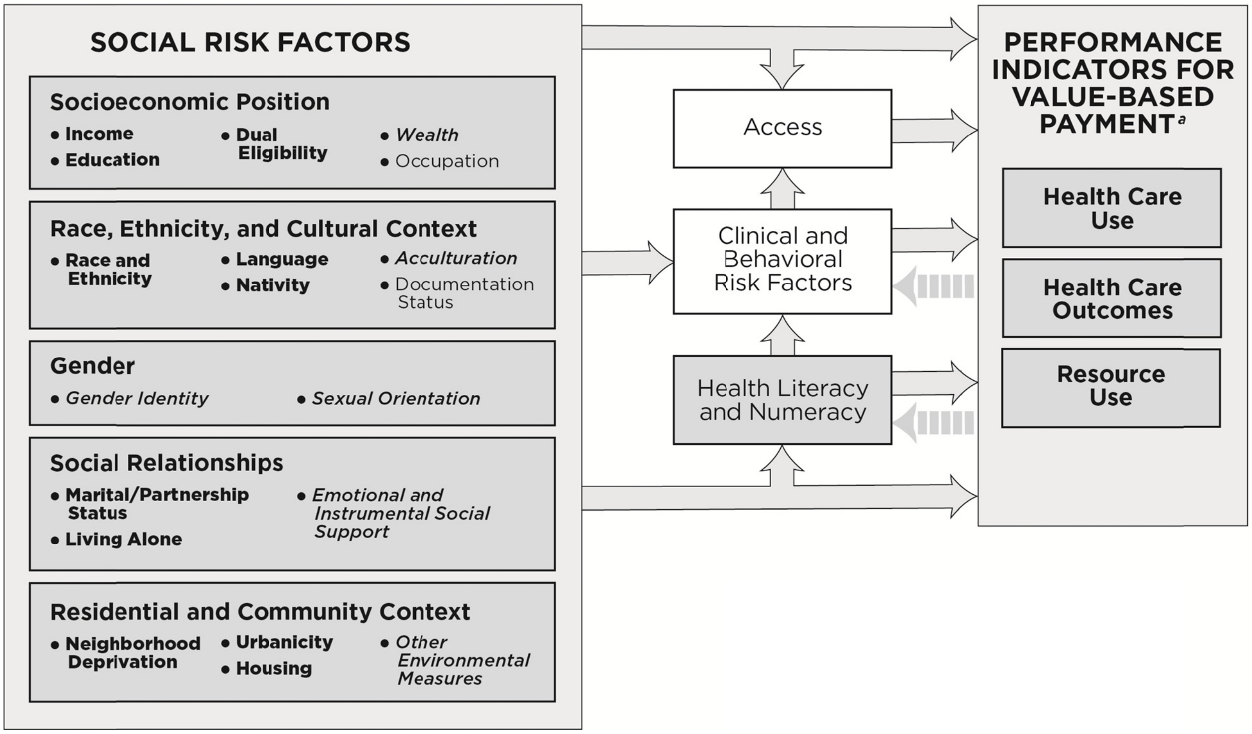

FIGURE S-1 Conceptual framework of social risk factors and performance indicators for value-based payment (VBP).

NOTES: This conceptual framework illustrates primary hypothesized conceptual relationships. For the indicators listed in bullets under each social risk factor, bold lettering denotes measurable indicators that could be accounted for in Medicare VBP programs in the short-term, italicized lettering denotes measurable indicators that capture the basic underlying constructs and currently present practical challenges, but are worth attention for potential inclusion in accounting methods in Medicare value-based payment programs in the longer term; and plain lettering denotes indicators that have considerable limitations.

[a] As described in the conceptual framework outlining primary hypothesized conceptual relationships between social risk factors and outcomes used in VBP presented in the committee's first report (NASEM, 2016a), health care use captures measures of utilization and clinical processes of care; health care outcomes capture measures of patient safety, patient experience, and health outcomes; and resource use captures cost measures.

Socioeconomic Position

SEP is commonly measured using indicators including income and wealth, education, and occupation and employment. In the medical field, insurance status is also used as a proxy for SEP. Income and education are promising indicators of SEP, because they are related to health care outcomes of interest, precede care delivery and are not a consequence of the quality of care, and meet practical considerations; measures are likely to be resistant to gaming and manipulation. Wealth is likely to be strongly associated with health and health care outcomes, but accurate data is difficult to collect. Dual eligibility as a proxy for SEP is also an available measure that meets practical criteria. Because dual eligibility captures elements of income, wealth, and health status, dual eligibility can be considered a broader measure of health-related resource availability that captures medical need. Occupation is likely to be strongly associated with performance indicators used in VBP, but practical considerations limit its potential use.

Race, Ethnicity, and Cultural Context

Indicators in this category include race, ethnicity, language, nativity, immigration history, and acculturation. Race, ethnicity, language (especially limited English proficiency), and nativity (i.e., foreign-born versus U.S. born; country of origin) are promising indicators, particularly in combination. Literature supports a conceptual relationship between acculturation and health care outcomes of interest, but existing measures have limitations, and empirical evidence is lacking. Documentation status as a measure of immigration history is likely to be sensitive to collect.

Gender

Normative gender categories (men and women) are strong candidates for inclusion in accounting methods, despite the fact that effects of gender are difficult to separate from biological effects of sex empirically. However, the committee notes that gender is already included in clinical risk adjustment. The relationship between gender identity (describing individuals who identify as transgender, intersex, or otherwise nonconforming gender) and sexual orientation (describing individuals who identify as lesbian, gay, bisexual, queer, questioning, or otherwise nonconforming) and health care outcomes is not well established. HHS is currently testing and collecting data on promising measures of gender identity and sexual orientation that could be revisited for potential inclusion when there is more evidence of an effect. In the short term, there is likely to be very low prevalence of individuals who have nonnormative gender identities. Thus, accounting for variations in gender identity is unlikely to have a significant effect in accounting methods.

Social Relationships

Social relationships are typically assessed using three indicators in health research: marital/partnership status, living alone, and emotional and instrumental social support. Marital/partnership status and living alone are likely to influence health and health care outcomes, are easy to measure, and may at least partly capture elements of emotional and instrumental social support. Some evidence suggests that the relationship between marital/partnership status and health is changing along with demographic shifts, which point to a need to reassess the empirical associations and revisit assumptions about the conceptual relationship over time. Emotional social support and instrumental social support are likely to influence health care outcomes. However, because social support is multidimensional, identifying the measure that represents the most relevant dimension for a given health care outcome may pose both conceptual and practical challenges for data collection and measurement.

Residential and Community Context

Residential and community context includes compositional characteristics that represent aggregate characteristics of neighborhood residents and characteristics of physical and social environments (i.e., environmental measures) (NASEM, 2016a). Compositional characteristics and environmental measures of residential and community context are related to health care outcomes, precede care delivery and are not a consequence of the quality of care, are not modifiable through provider action, and generally meet practical considerations, with some limitations. A measure of census tract-level neighborhood deprivation (i.e., a composite measure of neighborhood compositional characteristics) is likely a good proxy for a range of individual and true area-level constructs (compositional and environmental) relevant to performance indicators used in VBP. Measures of urbanicity and housing are also available. These measures are also feasible to obtain. Environmental measures are an emerging area of research and other measures could be revisited for potential inclusion when there is more empirical evidence and better measures.[1]

Health Literacy

The committee does not conceive of health literacy as a social risk factor, but rather as the product of an individual's skills and abilities (e.g., reading and other critical skills), social and cultural factors, education, health system demands, and the health care context. However, the committee included health literacy in its conceptual framework and retained it for consideration in this report because health literacy is included in the committee's charge and because it is specifically mentioned in the IMPACT Act and therefore of interest to Congress. Additionally, social risk factors like education and language influence health literacy. Health literacy (capturing the related construct of numeracy) is related to health care outcomes of interest and generally meets practical considerations. However, provider actions can potentially mitigate the effects of low health literacy. Thus, to preserve incentives to provide effective care to patients with low health literacy, it may be not be desirable to adjust performance measures to account for differences in health literacy. Nevertheless, it may be desirable to otherwise compensate providers for the greater effort or costs required to provide health literate care and thereby produce good health care outcomes.

After applying the selection criteria to indicators of the five social risk factors and health literacy, the committee made the following conclusions:

> *Conclusion 2: There are measurable social risk factors that could be accounted for in Medicare value-based payment programs in the short term. Indicators include*
>
> - *Income, education, and dual eligibility;*
> - *Race, ethnicity, language, and nativity;*

---

[1] The committee sees no conflict between this report and the 2013 IOM report *Variation in Health Care Spending: Target Decision Making, Not Geography*, which recommended against using area-level payment adjustments to account for regional practice patterns. That committee's charge was to evaluate whether area-level differences in per-beneficiary spending were real and if so, to develop explanations for the variation. That report examined whether health care markets (characterized using relatively large geographies such as hospital service areas, hospital referral regions, or metropolitan statistical areas) were characterized by persistent patterns of spending driven by commonalities in medical decision making or other provider behavior and concluded that area spending variability was mainly due to price markups in the commercial insurance market and variation in the use of post-acute care in Medicare. In contrast, this report focuses on differences in performance indicators used in VBP (including variations in health care utilization and resource use, but also quality) driven by differences in social characteristics of a provider or other risk-bearing entity's patient population. The use of area-level measures is therefore at much smaller geographic units (e.g., census tracts of patient place of residence) and serves to more accurately characterize providers' patient populations in Medicare quality measurement and payment programs.

- *Marital/partnership status and living alone; and*
- *Neighborhood deprivation, urbanicity, and housing.*

Conclusion 3: There are some indicators of social risk factors that capture the basic underlying constructs and currently present practical challenges, but they are worth attention for potential inclusion in accounting methods in Medicare value-based payment programs in the longer term. These include

- *Wealth,*
- *Acculturation,*
- *Gender identity and sexual orientation,*
- *Emotional and instrumental social support, and*
- *Environmental measures of residential and community context.*

METHODS TO ACCOUNT FOR SOCIAL RISK FACTORS IN VALUE-BASED PAYMENT PROGRAMS

When developing and selecting methods to account for social risk factors in VBP programs, understanding the type of incentive design is important for evaluating the potential benefits and challenges of various accounting methods. The incentive design will interact with the method used to account for social risk factor(s) and produce certain potential benefits and risks. Selecting the appropriate method (or, methods) to account for social risk factors will depend on the balance of these potential positive and negative consequences.

CMS payment models cover a spectrum of approaches from traditional fee-for-service to population-based payment models. Current Medicare financial incentive programs include

- Hospital-Acquired Condition Payment Reduction,
- Hospital Readmission Reductions Program,
- Hospital Value-Based Purchasing, and
- Physician Value-Based Modifier.

Current Medicare APMs include

- End-Stage Renal Disease Quality Incentive Program, and
- Medicare Shared Savings Program.

Other VBP mechanisms in Medicare payment programs include

- Medicare Advantage/Part C Star Ratings Bonus Payment and risk-adjusted capitation and
- Medicare Part D risk-adjusted capitation, individual reinsurance, and risk corridor adjustments.

VBP programs in development include

- Home Health Value-Based Purchasing,

- Skilled Nurse Facility Value-Based Purchasing, and
- Medicare and CHIP Reauthorization Act of 2015 (MACRA).

The Center for Medicare & Medicaid Innovation also tests innovative payment models. In early 2016, CMS identified 10 APMs, including several innovative models for inclusion under MACRA (CMS, 2016), including (among others):

- Bundled Payment Care Improvement initiative
- Next Generation Accountable Care Organizations, and
- Comprehensive Primary Care Plus.

Given that the Medicare VBP landscape is evolving and CMS is moving towards more comprehensive population-based APMs, the committee identified methods that could apply to any VBP program, not just the existing ones.

Potential Harms of the Status Quo Compared to Accounting for Social Risk Factors

Although adjustment for social risk factors could have important benefits, any proposal to account for social risk factors in Medicare payment programs will entail its own advantages and disadvantages that need to be carefully considered. The status quo (which does not account for social risk factors) has disadvantages that include incentives for providers and insurers to avoid serving patients with social risk factors, underpayment to providers who disproportionately serve socially at-risk populations, and underinvestment in quality of care. While proposals that do account for social risk factors would likely diminish these harms, there are also some potential ways in which accounting for social risk factors could incrementally introduce new harms. This includes reducing incentives to improve care for patients with social risk factors and limiting the ability of socially at-risk patients to identify providers who will deliver the best care for them. Neither an unadjusted or adjusted summary score provides information about which provider is better for a patient based on his or her level of social risk factors unless all providers are equally good or bad with all patients. Only stratification by social risk factors will reveal such insights. Additionally, any method that obscures differences due to poor quality could be unfair in terms of compensating providers who provide high-quality care. Finally, any method for accounting for social risk factors that holds providers to different standards for socially at-risk populations may create the perception that patients with social risk factors are entitled to a lower quality of care. Even if these concerns are unfounded, perceptions of inequitable treatment can further erode trust in the health care system among patients with social risk factors.

> *Conclusion 4: It is possible to improve on the status quo with regard to the effect of value-based payment on patients with social risk factors. However, it is also important to minimize potential harms to these patients and to monitor the effect of any specific approach to accounting for social risk factors to ensure the absence of any unanticipated adverse effects on health disparities.*

Methods to Account for Social Risk Factors

The committee's review of methods to account for social risk factors in Medicare VBP programs takes as the point of departure that the goals of Medicare payment and reporting systems reducing disparities in health care access, affordability, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensate providers fairly for the services they provide. Differences in quality by populations with social risk factors may reflect a combination of drivers, including mechanisms that occur during the patient–provider encounter (e.g., discrimination, bias), provider characteristics (e.g., fewer financial resources, fewer and lower-quality clinical/health care resources), and barriers to access and financial constraints for socially at-risk persons (NASEM, 2016b). In practice these mechanisms may occur simultaneously and also interact; it is difficult if not impossible to decompose observed differences into these components quantitatively. The committee therefore proposes approaches that do not require disentangling the mechanisms of these multiple pathways for social risk factors. The fact that some providers do well with socially at-risk populations does not imply that it is equally easy to do so on average, and such population differences may also affect the relationship between provider quality and observed provider scores. The standard for taking such factors into account should not be that it is impossible to provide optimal care, but that it is more difficult on average. Taking such factors into account need not "adjust away" disparities. Lower levels of performance for any group should not be reported as sufficient or receive maximum rewards. However, a provider that does not achieve performance on par with top performers (i.e., optimal care) could still be eligible for some reward because, for example, it improved substantially relative to its own benchmark.

> *Conclusion 5: Characteristics of a public reporting and payment system that could accomplish the goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly include*
>
> 1. *Transparency and accountability for overall performance and performance with respect to socially at-risk members of the population;*
> 2. *Accurate performance measurement—with high reliability and without bias (systematic error) related to differences in populations served;*
> 3. *Incentives for improvement overall and for socially at-risk groups, both within reporting units (i.e., the provider setting that is being evaluated—hospitals, health plans, etc.) and between reporting units.*

The committee reviewed literature on a range of methods to account for risk factors in public reporting and payment systems for which inclusion of social risk factors may be appropriate, with the aim to be inclusive.

> Finding: The committee identified four categories—(A) public reporting; (B) adjustment of performance measure scores; (C) direct adjustment of payments; and (D) restructuring payment incentive design—encompassing ten methods to account for social risk factors that could be used to address policy goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly.

Public reporting seeks to make overall quality visible—to consumers, providers, payers, and regulators (IOM, 2006). It may lead to quality improvement via reputation incentives, and particularly when linked to behavioral nudges, by increasing market share (i.e., influencing choice of provider) for higher-quality reporting units (IOM, 2006). Public reporting methods that could account for social risk factors include (1) stratification by patient characteristics within reporting units, and (2) stratification by reporting unit characteristics (e.g., comparing safety-net hospitals to peers).

Adjusting performance measure scores seeks to "level the playing field," to estimate true reporting unit quality—that which would occur if all units had the population average patient. Social risk factors can be considered confounders of true performance if they are beyond provider control and unevenly distributed across units and thereby distort (bias) comparisons. Adjustment is a means to account for social risk factors statistically in an effort to more accurately measure true performance. Methods to adjust performance measure scores include (1) risk adjustment for mean within-provider differences, (2) risk adjustment for within- and between-provider differences, and (3) adding quality measures for performance for at-risk groups in addition to the overall measure.

VBPs incorporate explicit or implicit (as in the case of bundled or global payment including shared savings) rewards or penalties based on performance on quality and/or cost of care. This can be achieved through three underlying conceptual approaches. First, payers could pay more to those that are doing a better job in the measurement period (i.e., pay for achievement). Second, payers could pay for the mix of patients the reporting unit treats, that is, pay more to those that treat greater numbers of socially at-risk patients under the assumption that they simply need more resources. This approach lacks incentives to improve unless some other system for accountability is superimposed. Third, payers could pay for improvement, that is, pay more to those who improve to a greater degree.

The committee also expands on how VBP could incorporate measures of social risk factors. Payments could be directly adjusted using social risk factors, or incentive design could be restructured. Direct adjustments of payment explicitly use measures of social risk factors, but by themselves do not affect performance measure scores. Methods include (1) risk adjustment in payment formula without adjusting measured performance, and (2) stratification of benchmarks used for payment. Restructuring payment incentive designs do not explicitly use measures of social risk factors, but implicitly account for social risk factors. Methods include (1) paying for improvement relative to a reporting unit's own benchmark (to a greater extent or exclusively), including "growth models"; (2) downweighting social risk factor-sensitive measures in payment; and (3) adding a bonus for low disparities.

Applying Methods to Account for Social Risk Factors

In many cases, methods from multiple categories can be used together. In some cases, multiple methods from a single category can be used in combination. In this respect, each approach has some advantages and disadvantages and a combination of approaches may yield a better result than any one method alone. The committee underscores that the benefits and harms of any single or composite method of accounting for social risk factors should be assessed in reference to the status quo or some other feasible alternative rather than a perfect world in which social risk factors do not confound efforts to improve the quality and efficiency of health care delivery (referred to by some as a "full information" scenario).

> *Conclusion 6: To achieve goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair*

and accurate public reporting; and compensating providers fairly, a combination of reporting and accounting in both measures and payment are needed.

Considerations around the trade-offs of various methods of accounting for social risk factors are different for cost-related performance compared to quality performance. Costs in the context of VBP can refer to the costs of improving quality or achieving good outcomes for socially at-risk patient or to the cost of care billed to a payer. As noted earlier, because achieving high performance on performance indicators used in VBP may require greater investments on the part of health care providers and health plans to overcome barriers socially at-risk populations face, costs to achieve good outcomes and improve care quality for socially at-risk populations are likely to be higher than costs to achieve the same outcomes and improve care quality for more advantaged patients. Because at least some of these costs will be outside of the services that can be billed to payers like CMS, as described in an earlier section, a potential harm of not accounting for social risk factors in a VBP environment is that this increased cost may be a disincentive to care for socially at-risk populations. On the other hand, lower resource use observed in billed costs of care may reflect unmet need or barriers to access rather than the absence of waste. Thus, lower cost is not always better; whereas, higher quality is always better.

Conclusion 7: Strategies to account for social risk factors for measures of cost and efficiency may differ from strategies for quality measurement, because observed lower resource use may reflect unmet need rather than the absence of waste, and thus lower cost is not always better, while higher quality is always better.

Monitoring

Both the status quo and any new approach to accounting for social risk factors will have uncertain tradeoffs in terms of the goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly. Many unknowable factors including provider and patient beliefs and behavioral responses will affect the results that any new system yields. Monitoring data on a variety of indicators will facilitate assessment of the effects of existing and new programs on potential unintended adverse effects—such as, enrollment (for health plans), patient complaints, access to and quality of care for socially at-risk populations, and the financial sustainability of providers disproportionately caring for socially at-risk populations.

Conclusion 8: Any specific approach to accounting for social risk factors in Medicare quality and payment programs requires continuous monitoring with respect to the goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly.

Finally, because behavioral and other responses to new systems may change the balance of risks and benefits over time, to take into account these behavioral and other responses, the specific approach to accounting for social risk factors may need to be reassessed.

CONCLUDING REMARKS

The committee notes that it is not within its statement of task to recommend whether social risk factors should be accounted for in VPB or how; that decision sits elsewhere. The committee hopes that the conclusions in this report help CMS and the Secretary of HHS make that important decision. In the next report, the committee tackles the question of how to gather the data that could be used to account for social risk factors in Medicare VBP.

REFERENCES

Burwell, S. M. 2015. Setting value-based payment goals—HHS efforts to improve U.S. health care. *New England Journal of Medicine* 372(10):897-899.

Chien, A. T., M. H. Chin, A. M. Davis, and L. P. Casalino. 2007. Pay for performance, public reporting, and racial disparities in health care: How are programs being designed? *Medical Care Research and Review* 64(5 Suppl):283s-304s.

CMS (Centers for Medicare & Medicaid Services). 2016. *Overview of select alternative payment models*. https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2016-Fact-sheets-items/2016-03-03.html (accessed April 18, 2016).

IOM (Institute of Medicine). 2006. *Performance measurement: Accelerating improvement (pathways to quality health care series)*. Washington, DC: The National Academies Press.

IOM. 2013. *Variation in health care spending: Target decision making, not geography.* Washington, DC: The National Academies Press.

Joynt, K. E., and M. B. Rosenthal. 2012. Hospital value-based purchasing: Will Medicare's new policy exacerbate disparities? *Circulation: Cardiovascular Quality and Outcomes* 5(2):148-149.

NASEM (The National Academies of Sciences, Engineering, and Medicine). 2016a. *Accounting for social risk factors in medicare payment: Identifying social risk factors*. Washington, DC: The National Academies Press.

NASEM. 2016b. *Systems practices for the care of socially at-risk populations*. Washington, DC: The National Academies Press.

Ryan, A. M. 2013. Will value-based purchasing increase disparities in care? *New England Journal of Medicine* 369(26):2472-2474.

1

Introduction

The Centers for Medicare & Medicaid Services (CMS) are steadily moving from paying for volume (fee-for-service payments) to paying for quality, outcomes, and costs (value-based payment, or VBP) in the traditional Medicare program. Since Congress enacted the Patient Protection and Affordable Care Act of 2010, CMS has implemented a variety of value-based payment models including quality incentives and risk-based, alternative payment models (APMs) (Burwell, 2015). Quality incentives such as pay-for-performance schemes link financial rewards and penalties to the quality and efficiency of care provided. APMs such as episode-based (bundled) payments and accountable care organizations hold health care providers accountable for both the quality and cost of the care they deliver. In this report both types of strategies are referred to broadly as *value-based payment*.

A growing body of research has demonstrated that social risk factors (defined in the committee's first report as socioeconomic position; race/ethnicity and cultural context; gender; social relationships; and residential and community context) as well as health literacy may influence health outcomes as much as—or more than—medical care does (Deaton, 2016; McGinnis, 2016; NASEM, 2016a; Woolf and Purnell, 2016). These findings are a concern for policymakers and health care providers because Medicare beneficiaries with social risk factors for poor health care outcomes are disproportionately concentrated among a subset of health care providers (Bach et al., 2004; Jha et al., 2007, 2008). Clustering of socially at-risk patients is often found in a small subset of providers (e.g., safety-net hospitals, critical access hospitals, minority-serving institutions, community health centers) (NASEM, 2016b). Note, the term *provider* in this report refers to the reporting unit (or, provider setting) being evaluated—e.g., hospitals, health plans, provider groups, etc.

A wide range of stakeholders has raised concerns that current Medicare quality measures and payment programs that financially reward or penalize providers based on the health care outcomes of their patients and do not account for social risk factors may underestimate the quality of care for such providers. Patients with social risk factors may require more resources and more intensive care to achieve certain health outcomes compared to the resources and care needed to achieve those same outcomes in more advantaged patients (NASEM, 2016b). At the same time, because these providers are also more likely to care for patients who are uninsured or covered by Medicaid, they have historically been less well funded than providers caring for larger proportions of patients with commercial insurance that pay more generously for care. If providers disproportionately serving vulnerable populations are likely to have fewer resources to begin with and care for patients who require more resources to achieve the same health care outcomes, these providers may be more likely to fare poorly on quality rankings (Chien et al., 2007; Joynt and Rosenthal, 2012; Ryan, 2013). Indeed, evidence suggests hospitals disproportionately serving socially at-risk populations (safety-net, minority-serving, and critical access hospitals) perform worse on average on performance indicators used in VBP compared to hospitals serving the general population (NASEM, 2016b). However, there is also evidence of substantial variation among these providers such that some achieve performance on par with top performers among all hospitals (NASEM, 2016b). Additionally, evidence among ambulatory care providers disproportionately serving socially at-risk population is more mixed, with many performing as well as or better than their providers serving the general population (NASEM, 2016b).

The poorer average performance among providers disproportionately serving socially at-risk populations combined with the fact that they have fewer resources has raised concerns that Medicare's VBP programs may potentially increase disparities. For one, the disproportionate penalties among providers disproportionately serving socially at-risk populations can be perceived as penalizing providers for caring for socially at-risk populations and may reduce incentives to keep doing so. Additionally, if these providers are more likely to have lower average performance, they may also be less likely to receive rewards and more likely to be penalized under VBP schemes compared to providers serving the general population. In this way, VBP programs may be taking resources from the very organizations who need them most (Chien et al., 2007; Ryan, 2013). In so doing, quality in these providers may worsen (Grealy, 2014; Ryan, 2013) and the organizations could also fail, further reducing access to care for socially at-risk patients (Lipstein and Dunagan, 2014).

Proposals to improve VBP programs to address these unintended consequences on health disparities recommend accounting for differences in patient social risk factors when measuring quality and calculating payment, also referred as risk adjustment or payment adjustment. As defined in the committee's first report and discussed in more detail in Chapter 4 of this report, although the committee conceives of risk adjustment and payment adjustment as two separate methods, risk adjustment can become a method of payment adjustment when risk adjusted measures are used as the basis of payment. This proposal extends the rationale for adjusting for differences in clinical risk factors across providers to ensure accurate measurement and fair comparisons by taking into account differences that are beyond the control of individual providers (currently performed for all Medicare quality measures and payment programs) to also include social risk factors that may be beyond the control of providers (Girotti et al., 2014; Jha and Zaslavsky, 2014; Joynt and Jha, 2013; Pollack, 2013; Renacci, 2014).

Critics of such accounting are concerned that some forms of adjusting payments or quality measures for social risk factors may reduce incentives for providers who care for disadvantaged patients to improve the quality of care they provide to these patients (Bernheim, 2014; Kertesz, 2014). Critics of accounting for social risk factors also argue that adjusting measures would obscure health disparities, making it more difficult to hold providers accountable for lower-quality care and would also accept and potentially institutionalize a lower standard of care for socially at-risk populations (Bernheim, 2014; Jha and Zaslavsky, 2014; Kertesz, 2014; Krumholz and Bernheim, 2014; O'Kane, 2015). If the goal of value-based payment models is to improve quality and control costs while simultaneously enhancing health care equity and improving outcomes for disadvantaged patients, careful attention must be paid to the delicate balance between adjusting payments and quality measures and preserving incentives to improve the care these patients receive.

These concerns draw attention to possible harms that may be introduced after accounting for social risk factors that would not otherwise exist. However, new harms that may arise from accounting for social risk factors are best considered in relation to the possible advantages and disadvantages that already exist under the status quo. Evaluating the benefits and disadvantages of accounting for social risk factors thus requires evaluating the likely effect of new methodologies on existing disparities in quality and access to care, to understand whether accounting methods are likely to exacerbate or diminish these disparities.

STATEMENT OF TASK

In response to concerns about health equity and accuracy in reporting and to the Improving Medicare Post-Acute Care Transformation (IMPACT) Act approved by Congress in 2014, the Department of Health and Human Services acting through the Office of the Assistant Secretary for Planning and Evaluation (ASPE) contracted with the National Academies of Sciences, Engineering, and Medicine to convene an ad hoc committee to identify criteria for selecting social risk factors, specific social risk factors Medicare could use, and methods of accounting for those factors in Medicare quality measurement and payment applications. The committee comprises expertise in health care quality, clinical medicine, health services research, health disparities, social determinants of health, risk adjustment, and Medicare programs (see Appendix B for biographical sketches). This report is the third in a series of five brief reports that aim to inform ASPE analyses that account for social risk factors in Medicare payment programs mandated through the IMPACT Act. In the first report, the committee presented a conceptual framework and described the results of a literature search linking five social risk factors and health literacy to health-related measures of importance to Medicare quality measurement and payment programs. In the second report, the committee reviewed the performance of providers disproportionately serving socially at-risk populations, discussed drivers of variations in performance, and identified six community-informed and patient-centered systems practices that show promise to improve care for socially at-risk populations. Details of the statement of task and the sequence of reports can be found in Box 1-1. The committee will release reports every three months, addressing each item in the statement of task in turn. The statement of task requests committee recommendations only in the fourth report.

BOX 1-1
Statement of Task

An ad hoc committee will provide a definition of socioeconomic status (SES) for the purposes of application to Medicare quality measurement and payment programs; to identify the social factors that have been shown to impact health outcomes of Medicare beneficiaries; and to specify criteria that could be used in determining which social factors should be accounted for in Medicare quality measurement and payment programs. Furthermore, the committee will identify methods that could be used in the application of these social factors to quality measurement and/or payment methodologies. Finally, the committee will recommend existing or new sources of data and/or strategies for data collection. The committee's work will be conducted in phases and produce five brief reports, which build upon the Institute of Medicine of the National Academies of Sciences, Engineering, and Medicine's previous studies relevant to this study.

The first report will:

- Define socioeconomic status for the purpose of application to quality, resource use, or other measures used for Medicare payment programs.
- Identify SES factors and other social factors (such as race, health literacy, limited English proficiency) that have been shown to impact health outcomes of Medicare beneficiaries.

The second report will:

- Identify best practices of high-performing hospitals, health plans, and other providers that serve disproportionately higher shares of socioeconomically disadvantaged populations and compare those best practices to practices of low-performing providers serving similar patient populations.

The third report will:

- Specify criteria (along with their strengths and weaknesses) that could potentially be used to determine whether an SES factor or other social factor should be accounted for in Medicare quality, resource use, or other measures used in Medicare payment programs.
- Identify SES factors or other social factors that could be incorporated into quality, resource use, or other measures used in Medicare payment programs.
- Identify methods that could be used in the application of SES factors and other social factors to quality, resource use, or other measures used in Medicare payment programs.

The fourth report will:

- For each of the SES factors or other social factors described above, recommend existing or new sources of data on these factors and/or strategies for data collection, while also identifying challenges to obtaining appropriate data and strategies for overcoming these challenges.

In the fifth report:

- The committee will synthesize and interpret the 4 brief reports issued as described above into one report that will include comprehensive project findings, conclusion, and recommendations based on the 4 previous reports.

COMMITTEE PROCESS

In their first report, the committee laid out a conceptual framework that captures the relationships among social risk factors and health literacy and health care-related outcomes and other performance measures. This report builds on the conceptual relationships and empirical associations between social risk factors and health literacy and quality measures and health care outcomes identified in the first report to provide guidance on which factors could be considered for Medicare accounting purposes, criteria to identify these factors, and methods to do so in ways that can improve care and promote greater health equity for socially at-risk patients. To that end, the committee also aims to address issues that must be carefully considered to maintain or enhance incentives for providers to improve care for socially at-risk patients throughout the report while also promoting accuracy in reporting and compensating providers fairly. The committee's goals in accounting for social risk factors in Medicare payment programs are:

1. Reducing disparities in access, quality, and outcomes;
2. Quality improvement and efficient care delivery for all patients;
3. Fair and accurate public reporting; and
4. Compensating providers fairly.

To achieve these goals, accounting for social risk factors should neither mask low-quality care or health disparities nor reward poor performance. Additionally, inclusion of social risk factors in quality measurement and payment should not disincentivize providers from finding strategies to overcome the influence of social risk factors on health care outcomes.

In Chapter 2, the committee identifies criteria for selecting social risk factors that could be incorporated into Medicare quality measurement and payment programs along with the rationale for and potential challenges of each criterion. In Chapter 3, the committee applies the criteria identified in Chapter 2 to the social risk factors and their respective indicators identified in the committee's first report. The committee also identifies the rationale for including these factors and indicators based on the criteria, as well as their limitations relative to those criteria. Chapter 4 presents an overview of current and planned Medicare VBP programs and how they currently account for social risk factors (if at all) and describes alternative methods of accounting for social risk factors in these programs.

REFERENCES

Bach, P. B., H. H. Pham, D. Schrag, R. C. Tate, and J. L. Hargraves. 2004. Primary care physicians who treat blacks and whites. *New England Journal of Medicine* 351(6):575-584.

Bernheim, S. M. 2014. Measuring quality and enacting policy: Readmission rates and socioeconomic factors. *Circulation: Cardiovascular Quality and Outcomes* 7(3):350-352.

Burwell, S. M. 2015. Setting value-based payment goals—HHS efforts to improve U.S. health care. *New England Journal of Medicine* 372(10):897-899.

Chien, A. T., M. H. Chin, A. M. Davis, and L. P. Casalino. 2007. Pay for performance, public reporting, and racial disparities in health care: How are programs being designed? *Medical Care Research and Review* 64(5 Suppl):283s-304s.

Deaton, A. 2016. On death and money: History, facts, and explanations. *JAMA*.

Girotti, M. E., T. Shih, and J. B. Dimick. 2014. Health policy update: Rethinking hospital readmission as a surgical quality measure. *JAMA Surgery* 149(8):757-758.

Grealy, M. R. 2014. *Measure under consideration (MUC) comments: Letter to the National Quality Forum: Healthcare leadership council, December 5, 2014*. http://www.hlc.org/wp-content/uploads/2014/06/HLC_Early-Public-Comment-on-Measures-Under-Consideration.pdf (accessed October 30, 2015).

Jha, A. K., and A. M. Zaslavsky. 2014. Quality reporting that addresses disparities in health care. *JAMA* 312(3):225-226.

Jha, A. K., E. J. Orav, Z. Li, and A. M. Epstein. 2007. Concentration and quality of hospitals that care for elderly black patients. *Archives of Internal Medicine* 167(11):1177-1182.

Jha, A. K., E. J. Orav, J. Zheng, and A. M. Epstein. 2008. The characteristics and performance of hospitals that care for elderly hispanic americans. *Health Affairs (Millwood)* 27(2):528-537.

Joynt, K. E., and A. K. Jha. 2013. A path forward on medicare readmissions. *New England Journal of Medicine* 368(13):1175-1177.

Joynt, K. E., and M. B. Rosenthal. 2012. Hospital value-based purchasing: Will Medicare's new policy exacerbate disparities? *Circulation: Cardiovascular Quality and Outcomes* 5(2):148-149.

Kertesz, K. 2014. *Center for Medicare Advocacy comments on the impact of dual eligibily on MA and Part D quality scores*. http://www.medicareadvocacy.org/center-for-medicare-advocacy-comments-on-the-impact-of-dual-eligibility-on-ma-and-part-d-quality-scores/ (accessed October 30, 2015).

Krumholz, H. M., and S. M. Bernheim. 2014. Considering the role of socioeconomic status in hospital outcomes measures. *Annals of Internal Medicine* 161(11):833-834.

Lipstein, S. H., and W. C. Dunagan. 2014. The risks of not adjusting performance measures for sociodemographic factors. *Annals of Internal Medicine* 161(8):594-596.

McGinnis, J. M. 2016. Income, life expectancy, and community health: Underscoring the opportunity. *JAMA*.

NASEM (The National Academies of Sciences, Engineering, and Medicine). 2016a. *Accounting for social risk factors in medicare payment: Identifying social risk factors*. Washington, DC: The National Academies Press.

NASEM. 2016b. *Systems practices for the care of socially at-risk populations*. Washington, DC: The National Academies Press.

O'Kane, M. 2015. *Comment on the advance notice of methodological changes for calender year 2016 for Medicare Advantage call letter*. https://www.ncqa.org/PublicPolicy/CommentLetters/MedicareAdvantage032015.aspx (accessed November 3, 2015).

Pollack, R. 2013. *CMS-1599-p, Medicare program; hospital inpatient prospective payment systems for acute care hospitals and the long-term care hospital prospective payment system and proposed fiscal year 2014 rates; quality reporting requirements for specific providers; hospital conditions of participation; medicare program; proposed rule (vol. 78, no. 91): Letter to the cms administrator tavenner*. http://www.aha.org/advocacy-issues/letter/2013/130620-cl-cms-1599p.pdf (accessed October 30, 2015).

Renacci, J. B. 2014. *Letter to HHS Secretary Burwell and CMS Administrator Tavenner regarding the Medicare hospital readmissions reduction program*. http://tinyurl.com/q6shyoc (accessed October 30, 2015).

Ryan, A. M. 2013. Will value-based purchasing increase disparities in care? *New England Journal of Medicine* 369(26):2472-2474.

Woolf, S. H., and J. Q. Purnell. 2016. The good life: Working together to promote opportunity and improve population health and well-being. *JAMA*.

2

Criteria for Selecting Social Risk Factors for Application in Medicare Quality Measurement and Payment

RATIONALE FOR ACCOUNTING FOR SOCIAL RISK FACTORS IN QUALITY MEASUREMENT AND PAYMENT

Performance measurement and public reporting are critical building blocks for quality improvement and attainment of a high-performing health system. Public reporting provides information to payers, administrators, and regulators to help identify which providers offer high-quality care and which require improvement—or worse, merit sanctions (IOM, 2006). By enabling comparisons of provider performance, public reporting can also incentivize quality improvement and inform consumer decision making (IOM, 2006). As Medicare and the U.S. health care system at large shift their focus from providing individual treatments to providing preventive care and improving population health, payment systems have correspondingly reflected a shift from paying for the provision of services (fee-for-service or volume-based payment) to paying for the production of good health care outcomes (value-based payment, or VBP) (McGinnis, 2016). These VBP models tie payment to performance, which shifts greater financial risk to providers, thereby raising the stakes of performance measurement and public reporting.

Underlying the assumption that both public reporting and VBP will motivate improvement is the reasoning that performance measurement and comparisons of provider performance will help identify the drivers of variation, which will in turn inform how subpar performance can be improved. At the same time, meaningful comparisons aim to reflect provider performance with all else equal by minimizing the effect of other factors such as patient characteristics that may affect health care quality or outcomes independently of provider influence (Ash et al., 2013). In epidemiology, these other factors are considered confounders.

A confounder is a third variable that is associated with both an exposure (independent variable) and the outcome of interest (dependent variable), but does not mediate the effect of the exposure on the outcome (the confounder is not in the causal pathway). In performance measurement, the exposure is the reporting unit’s (e.g., hospital, health plan) performance and the outcome is the measure of health care use, health care outcomes, or resource use. The committee embraced measures from these domains in its expanded definition of “health outcomes” in its first report. Health care use captures measures of health care utilization and clinical processes of care; health care outcomes include health outcomes, but also measures of patient safety and patient experiences of care; and resource use captures cost measures. In this report, the committee groups these domains and measures into the overarching category of *performance indicators used in VBP*.

If confounders are unevenly distributed across comparison groups, this can lead to bias (systematic error) in performance measurement, which in turn leads to a distortion of the true association between the exposure and outcome (Aschengrau and Seage, 2008). In experimental studies (such as a randomized controlled trial), researchers can minimize the effect of confounders by randomizing known (and unknown) confounders across treatment groups to ensure the groups are comparable. However, in the real world (and thus observational data), confounders are typically unevenly distributed across groups. To minimize this bias, those assessing provider performances can identify specific factors as confounders and account for them statistically in an effort to more accurately measure the true association. When comparing health system performance, the principal method to account for differences in patient characteristics in quality and outcomes measurement is risk adjustment (also known as case-mix adjustment), although it is only one of several potential methods. (Methods are discussed in Chapter 4.)

Clinical risk factors are patient characteristics that may influence performance indicators used in VBP and may also be unevenly distributed across providers. For this reason, quality measures and payment models currently account for underlying and systematic differences in clinical risk factors known to independently drive variation in performance (NASEM, 2016a). For example, one health plan may have sicker patients than another health plan. Risk adjustment for clinical risk factors accounts for this selection (Kunkel and Powell, 1981; Pope et al., 2004). Accounting for social risk factors extends the rationale of accounting for clinical risk factors to also include social risk factors as characteristics that may impede accurate comparisons across health care providers. To the extent that social risk factors influence performance indicators used in VBP independently of provider actions and these social risk factors are unevenly distributed across providers, when providers are held accountable for their performance on these measures, accounting for underlying differences in social risk factors may be appropriate. Importantly, identifying a third variable as a confounder is primarily a conceptual exercise that can be supported by empirical data. However, a third variable can also have other conceptual relationships between an exposure and an outcome (for example, mediation and moderation). When factors have other relationships with an outcome of interest, it may be desirable to account for the factor in a different way or not account for the factor at all.

GUIDING PRINCIPLES

The committee developed selection criteria for social risk factors to support the methods for accounting for social risk factors in Medicare payment, particularly payment tied to performance indicators. Underlying the committee's approach to accounting for social risk factors is a commitment to achieving health equity. Health equity is an ethical value that broadly refers to the elimination of unfair inequalities in health status by power, wealth, or prestige that may exist across social groupings by virtue of factors such as race, income, or sex (Braveman and Gruskin, 2003). When applied to *health care*, equity represents the commitment of providers, health systems, or payers to achieving a universally high standard of health care quality for all patients. To the greatest extent possible, a commitment to equity requires the elimination of disparate outcomes that arise across otherwise similar patients because of their social risk factors. However, complete equality of outcomes may not be attainable within a health system because some of the factors contributing to disparities are not modifiable by providers, health systems, or payers. Additionally, achieving health equity requires more than equitable health care, or providing the same type and quality of health care to all patients regardless of social risk, because this may not be sufficient to reduce health disparities. Some subpopulations (such as those with greater levels of social risk factors) may require more intensive care to achieve the same health outcomes that can be achieved in the general population with less intensive care and at lower cost. A system of accounting for social risk factors in VBP achieves the ethical goal of equity when it appropriately recognizes the challenges of caring for populations with social risk factors, while creating incentives that are likely to lead to the improvement of care for socially at-risk patients.

The translation of this ideal into policies to account for social risk factors is complex for both philosophical and practical reasons. Philosophically, the concept of health equity is open to multiple possible interpretations, with different implications for resource distribution and measurement (Culyer, 2007). For example, achieving a fair distribution of resources across populations with different social risk factors is likely to require balancing resources across subgroups defined by level of disease burden, socioeconomic status, race, and other social risk factors. Establishing an equitable allocation of resources in these cases requires policy makers to define reasonable trade-offs between worthwhile societal goals, such as eliminating health disparities and improving overall health. Relatedly, there are significant trade-offs between health equity, efficiency, and other values.

The committee does not take a position on how to resolve the complex trade-offs inherent in promoting health equity, a task that exceeds the scope of this report. However, it is assumed that some conception of equity is always guiding choices of different methods for accounting for social risk factors, as well as the choices of measures used to represent health care quality and equity. Accordingly, it is important that any selection of methods to account for social risk factors be justified relative to a particular conception of equity, and trade-offs in resource allocation that arise from different alternative conceptions of equity be made transparent by policy makers and subjected to ethical deliberation among affected stakeholders.

Even after adopting a conception of equity to account for social risk factors, there is a tension around the best way to get there, because, as described above, equity is open to multiple possible interpretations. As described in Chapter 1 and in the committee's first report, critics of accounting for social risk factors in VBP programs are concerned about the potential to institutionalize a poorer standard of care and to reduce incentives to improve care for socially at-risk populations. Proponents are concerned about incentives for providers to avoid socially at-risk populations, further reducing already limited resources among providers disproportionately serving socially at-risk populations, and, consequently, increasing health disparities. Such differences may arise from differential weight these opposing views place on the potential harms of accounting for social risk factors in VBP and the harms of not accounting for social risk factors (i.e. the status quo). (Potential harms of the status quo compared to accounting for social risk factors are discussed in Chapter 4.)

Underlying these arguments is a fundamental disagreement about the interpretation of observed differences as well as the ability of providers to address social risk factors that may influence observed differences in performance. As described in the committee's second report, the lower average performance among providers disproportionately serving socially at-risk populations and the poorer health and health care outcomes among socially at-risk populations is likely neither wholly attributable to factors out of the control of providers nor wholly the result of poorer care on the part of providers (NASEM, 2016b). On the one hand, some opponents believe that because observed differences in performance indicators used in VBP could reflect actual differences in health care quality as well as the influence of social risk factors, given that it is not possible to determine whether or to what extent the poorer performance is due to real differences, risk adjustment could obscure real disparities and thereby reduce incentives to improve care and reduce health disparities. Proponents might counter that if the difference in outcomes affecting the disadvantaged groups is found consistently across the health care system, then providers treating more patients from those groups should not bear the entire penalty for those disparities. Opponents might argue that these providers should be held responsible for providing services in a manner that compensates for social risk factors, while proponents might view social risk factors as less easily addressed through provider actions compared to opponents. They may also believe the costs of addressing social risk factors to be high and thus must be accounted for in the payment system even if it is appropriate to expect providers to address social risk factors.

The primary goal of the criteria is, therefore, to guide selection of social risk factors that could be accounted for in VBP so providers or health plans are rewarded for delivering quality and value independent of whether they serve patients with relatively low or high levels of social risk factors. As described in the previous section, VBP aims to incentivize quality improvement for all patients by tying payment to performance. Under VBP, providers who care for patients who would score lower on the measures of performance as a result of factors outside of the providers' control (such as certain social risk factors), rather than as a result of the quality of care delivered, should not be penalized because of the influence of these non-modifiable factors. The measures should reflect quality; the effect of other factors, such as patient characteristics, should be minimized. In sum, the criteria should guide identification of social risk factors that could be accounted for in performance indicators used in VBP to promote accuracy in reporting.

COMMITTEE PROCESS

The criteria put forth by this committee adhere closely to the guidelines for selecting risk factors developed by the National Quality Forum (NQF) in their 2014 report *Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors*. However, the committee made several changes to reflect their priorities. Like NQF, the committee's criteria explicitly focuses on selecting risk factors that will be applied to adjustment of measures used for VBP. However, as will be discussed in detail in Chapter 4, there are multiple methods to account for social risk factors in VBP, including some models that adjust payment directly. The committee's criteria reflect the need for selected social risk factors to apply to this broader range of methods.

The NQF guidelines drew on guidelines previously developed for the Centers for Medicare & Medicaid Services (CMS) hierarchical condition categories (HCCs) risk adjustment model (Pope et al., 2004), which the committee also reviewed. Whereas the NQF guidelines and the committee's criteria reflect the increased need to account for social risk in addition to clinical risk as Medicare moves towards a payment model tied to performance, prevention, and population health (Burwell, 2015), the CMS-HCC model aims to predict medical expenditure risk. In developing the criteria, the committee also reviewed criteria developed to guide whether to include a specific HCC in the Department of Health and Human Services (HHS) HCC risk adjustment model for individual and small group markets (Kautter et al., 2014) as well as criteria to identify case-mix adjustors for the Consumer Assessment of Health Care Providers and Systems (CAHPS) surveys case-mix adjustment model (Elliott et al., 2009; O'Malley et al., 2005). The criteria the committee reviewed and drew upon in developing their criteria are listed in Appendix A.

CRITERIA FOR SELECTING SOCIAL RISK FACTORS

> *Conclusion 1: Three over-arching considerations encompassing five criteria could be used to determine whether a social risk factor should be accounted for in performance indicators used in Medicare value-based payment programs. They are:*
>
> *A. The social risk factor is related to the outcome.*
>
> *1. The social risk factor has a conceptual relationship with the outcome of interest.*
> *2. The social risk factor has an empirical association with the outcome of interest.*
>
> *B. The social risk factor precedes care delivery and is not a consequence of the quality of care.*
>
> *3. The social risk factor is present at the start of care.*
> *4. The social risk factor is not modifiable through provider actions.*
>
> *C. The social risk factor is not something the provider can manipulate.*
>
> *5. The social risk factor is resistant to manipulation or gaming.*

These criteria along with their rationale, potential limitations, and practical considerations for applying the criteria are described in detail in the subsequent sections.

Criteria Category A: The Social Risk Factor Is Related to the Outcome

This category is the most basic pair of criteria for a social risk factor—that there be both a plausible and valid reason why the risk factor would be associated with the outcome and empirical evidence that such a relationship holds in practice. Together these criteria lay the foundation for the validity and practical importance of the risk factor.

Criterion 1: Conceptual Relationship with the Outcome of Interest

A conceptual relationship between the social risk factor and the outcome of interest (i.e., performance indicators used in VBP) ensures there is a reasonable link that might explain an association between the factor and the outcome. Conceptual relationships can be direct or indirect; a risk factor may also be a marker or proxy for otherwise unmeasured factors. To meet this criterion, the conceptual relationship may follow any of these pathways—the factor may be in a direct causal pathway, mediate the causal pathway, or be associated with an otherwise unmeasured confounder. In other words, while this criterion requires some conceptual relationship, it does not require a well-established, direct, causal relationship.

Establishing a unique causal effect can be difficult. In particular, identifying causal mechanisms can be challenging when risk factors operate through multiple pathways, as many social risk factors do (NASEM, 2016a). The main rationale for including social risk factors for which the precise causal mechanism is not well established is the fundamental cause theory (Link and Phelan, 1995). From this perspective, the causal mechanisms are expected to change over time, but the effect of fundamental causes like social risk factors on health outcomes are expected to persist. For example, it is well established that race and ethnicity may influence health. (See the committee's first report [NASEM, 2016a] or Chapter 3 for a more thorough discussion.) However, the precise mechanism by which race and ethnicity affect a given health care outcome in a particular setting may be less well established and may change over time. When the aim is prediction and accounting for differences in underlying risk between providers, rather than explanation, how a social risk factor like race/ethnicity affects health, is less important than that factor's predictive power (i.e., the strength of the relationship between race/ethnicity and the outcome of interest) (Elliott et al., 2009; O'Malley et al., 2005). Thus, an association between a social risk factor and outcome that persisted despite changes in the underlying causal mechanism would meet this criterion. Note that, because the goal is not to identify causes of poor quality, but rather to allow providers to see their performance with and without the influence of social risk factors, the existence of a conceptual relationship does not necessarily imply that outcomes would improve through interventions targeted at social risk factors or at ameliorating the effects of social risk factors.

Establishing the conceptual relationship to meet this criterion can be informed by the academic literature such as theories from the epidemiologic or social sciences literature, or by clinical expertise. For example, Link and Phelan use their fundamental cause theory to establish a relationship between race and health outcomes, while Epstein and colleagues used clinical criteria to establish an association between race and renal transplant utilization (Epstein et al., 2000; Phelan and Link, 2015). If the only conceptual rationale is that the social risk factor is correlated with an otherwise unmeasured factor, it would be preferable to have a direct measure for that factor. However, if the unmeasured factors cannot be measured, then, while not ideal, it may be justifiable to include the confounded factor as a proxy. Establishing a conceptual relationship takes into account several practical considerations.

One consideration is that some factors that are conceptually related to the outcome might nonetheless be unacceptable for inclusion in risk adjustment or alternative methods because of concerns regarding face validity or acceptability. For example, if people who profess a particular religious affiliation had systematically lower-quality scores, it might be unacceptable for a hospital's payment to be in any way influenced by its patients' religious affiliations. Similarly, it would be problematic if all the social risk factors included in a model were selected because of social norms or political considerations rather than an established conceptual relationship. Another practical issue would be to consider whether and how the construct works in a population of interest. This may be particularly relevant when identifying the appropriate indicator and measure used to assess a given social risk factor. For example, current occupation would not be a good indicator of SEP among beneficiaries who qualify for Medicare based on disability, because not working is an eligibility requirement.

Criterion 2: Empirical Association with the Outcome of Interest

An empirical relationship means that there is a statistical association of a meaningful magnitude between the social risk factor and the set of outcomes of interest (i.e., performance indicators used in VBP) that is unlikely to be caused by chance. Empirical support for a conceptual relationship between a social risk factor and an outcome can come in part from the literature.

A common method to identify an empirical relationship is to assess the association or correlation between the two variables. For example, mortality is higher for those with lower income. The correlation in this example is known as a bivariate relationship, as it refers to the association of two variables (mortality and income). The committee considers a bivariate relationship the minimum standard necessary to meet this criterion. A multivariate association is one that considers more than two variables at a time. For example, in a bivariate association, low-income older adults have higher Medicare expenditures than high-income older adults. However, low income is also associated with health status. Specifically, low-income older adults are sicker than high-income older adults. Thus, if the third variable of health status is added to create a multivariate model, after the association between income and expenditures is adjusted for underlying differences in health status, low-income older adults may have expenditures that do not differ from higher-income older adults. As seen in this example, assessment of the empirical relationship using the bivariate relationship can lead to a different conclusion than assessment in a multivariate context. In general, evidence of multivariate associations may be considered stronger evidence of an empirical association as multivariate evidence is closer to establishing a unique association between the social risk factor under consideration and the outcome. Such multivariate evidence also rules out the possibility that the additional variables in the model completely explain the bivariate association.

This discussion raises one of several practical considerations for implementation that are specific to the setting under consideration. First, when relying on the literature to establish an empirical relationship, the setting of the empirical association in the literature may not be generalizable to the particular setting to which it is being applied with respect to VBP. Relatedly, evidence of bivariate or multivariate associations of a social risk factor with an outcome is more compelling and relevant if it has been established within different reporting units within the setting in question (Elliott et al., 2001; Jha and Zaslavsky, 2014; Zaslavsky et al., 2001). For example, one might consider education as a social risk factor for flu immunization in Medicare health plans. Suppose that flu immunization is lower overall for those with less education. If no such association exists after controlling for the health plan in which a Medicare beneficiary is enrolled, then there is no within-plan association—the initial overall association would be entirely "between-plans." In this scenario, the observed association between education and immunization rates reflects only differences in immunization rates between plans that differ in their members' education. In other words, the observed association between education and immunization may be capturing the unmeasured influence of a provider (health plan) characteristic linked to overall quality as a proxy and may reflect an ecological fallacy (incorrectly drawing inferences about individuals within a group from inferences about the group to which those individuals belong). Therefore, the between-plan association provides only weak evidence of the effect of education itself on immunization rates.

If, however, beneficiaries with lower education were less likely to receive flu immunizations than beneficiaries with more education in the same health plans, this would be evidence of a within-plan association of education and flu immunization. Here, the observed association between education and immunization rates reflects differences in patient characteristics rather than health plan characteristics. Thus, this within-plan association supports the hypothesis that the health plans achieve worse outcomes with patients with low education compared to patients with high education on average. Given that this criterion is meant to confirm the hypothesized conceptual relationship, this within-plan association therefore provides stronger evidence of the hypothesized relationship between patient education and flu immunization than only an overall or between-plan association in the context of health plans.

This raises a related consideration. A particular multivariate model in the literature may reduce the association of interest due to a variable that might not be included in the model being built for Medicare payment adjustment. Thus, it may be important to statistically assess the empirical association of a specific social risk factor within the particular multivariate setting in which it is being applied. In particular, social risk factors should contribute unique variation in the outcome of interest. Social risk factors will not affect scores or payment unless they both (a) vary across units, and (b) predict performance indicators used in VBP within reporting units after considering other retained social risk factors. For example, gender might not vary much across health plans (situation a), whereas one measure of socioeconomic position (SEP) might not predict any performance measures strongly if another measure of SEP strongly correlated with it were already included (situation b). Thus, some social risk factors might be “redundant” for some or all performance measures in a given setting at a given time. To the extent that the goal is prediction/adjustment rather than explanation/causal inference, which the committee believes to be the case (as described in the first criterion regarding establishment of a conceptual relationship), prediction/adjustment is not harmed by the inclusion of redundant social risk factors. To the extent that the data collection of a particular risk factor is costly or burdensome to collect, the government may choose not to measure a risk factor that appears to explain little of the variation in relevant outcomes, but this criterion should be applied weakly and should not be used to exclude social risk factors that are important to some performance measures. Moreover, if a disparity associated with a social risk factor has been eliminated, consideration should be given to continuing to include the factor to preserve incentives, in addition to monitoring disparities associated with the social risk factor.

Finally, when applying this criterion, it will be important to consider whether accurate data on the social risk factor is feasible to collect and use. This consideration should take into account privacy laws (such as those relating to the Health Insurance Portability and Accountability Act of 1996, also known as HIPAA) and privacy concerns regarding data collection, use, and disclosure (IOM, 2014). This may be especially relevant when accounting for social risk factors, because social risk factors touch upon numerous sensitive issues and because individual-level data is needed to identify within-plan differences (IOM, 2014). This consideration should also take into account data that is both currently available and used, available but underutilized data, as well as future sources of data. It is important to note that current literature can only provide evidence of descriptive (i.e., observed) relationships. It should be noted that these descriptive relationships do not represent necessary relationships, and as noted, these relationships may change over time.

It is critical to consider whether the data exist in data sources that are underused. For example, electronic health records (EHRs) collect substantial amounts of data about individuals that are not used in performance measurement for VBP. Additionally, CMS already conducts data collection through CAHPS surveys that could be applied to other outcomes at an aggregated level. For example, Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) collects data on a sample of patients at a given hospital, and thus could be a source of hospital-level data that could be used to account for differing populations with different levels of social risk factors. The valid use of this approach may currently be very limited, as it cannot be used to establish within-hospital associations or to develop within-hospital adjustments. However, in future, if HCAHPS data could be linked to other patient data and there remains sufficient sample size at the intersection of these data sets, it might be possible to use this data to account for social risk factors.

With respect to future sources of data, collecting accurate data is important and should be balanced against data burden and feasibility. Other considerations include whether the missing data elements regarding social risk factors may be issues that are more subjective and therefore potentially subject to manipulation. Additionally, providers may have the ability to gather information on risk factors, but the desire to collect data providers report should be balanced against the need for objective sources of data. Data sources are the topic of the committee's next and fourth report.

Criteria Category B: The Social Risk Factor Precedes Care Delivery and Is Not a Consequence of the Quality of Care

Factors that reflect a model of care delivery (e.g., nurse staffing levels in a hospital), a treatment decision, or the direct consequences of care or treatment decision are not appropriate adjustors, as they reflect true differences in quality of care or other outcomes. In addition, adjusting for some modifiable risk factors may discourage some means of quality improvement and disparity reduction. To achieve goals of VBP as stated above, it is critical to consider whether risk factors are the consequence of provider efforts. If a factor can be influenced by the provider, then accounting for it may diminish incentives to improve that risk factor. For example, if health literacy improves health care outcomes and can be improved by providers or health plans, using the level of health literacy in risk adjustment would diminish incentives to do so. At the same time, it may still be appropriate to account for health literacy in other ways if improving health literacy or if aligning the demands of the health system to patients' skills and abilities to facilitate their access, understanding, and use of health information and services is costly and/or low-literacy patients require more resources (e.g., the use of navigators) to achieve the same health care outcomes.

Criterion 3: Risk Factor Is Present at the Start of Care

While not a guarantee of avoiding selection of social risk factors that are a consequence of the care provided, identifying factors that are present at the start of care are unlikely to be affected by the care they are about to receive. Note that for some criteria, it is possible to have reasonable confidence that a factor was present at the start of care even if measured later—such as educational attainment for Medicare beneficiaries. This criterion may be inadequate for highlighting some risk factors that are the consequence of care in the context of repeated use of the same provider or arrangements that hold providers accountable for population health. In these contexts, the "start of care" may also be the "end of care" one period earlier.

Often the timing of a risk factor must be carefully considered in a particular application. If one adjusts for a factor as it was present at the start of care, one is accounting for its influence on or associations with outcomes for the duration of a particular hospitalization, a particular year of outpatient care from a plan, or some other limited period. One would have to acknowledge that if a patient sees the same provider for many years, such an adjustment does not control for any effects that provider had on the factor before the start of the episode of care in question. For this reason, it may be helpful to prioritize slowly-changing factors over rapidly-changing factors.

This may be particularly challenging when a risk factor can change quickly in response to the circumstance under consideration. For example, marital status and living alone are indicators of social support. Both indicators can change quickly, especially in older persons. For example, if a husband and wife live together and the husband dies, the woman would suddenly be widowed and living alone. In that case, the measured risk factor could change. Social risk factors that are subject to rapid change may be more likely to be a consequence of the care provided. Similarly, it is important to consider whether a factor represents a cumulative life cycle effect or a transient effect. For example, poverty has a cumulative effect over a lifetime, whereas transportation unavailability might be transient.

Criterion 4: Risk Factor Is Not Modifiable Through Provider Actions

To avoid selecting factors that are the consequence of the quality of care, in addition to avoiding factors that are not present at the start of care, it is important to critically assess whether that factor is something that a provider can modify either directly or indirectly. Although such factors are often highly correlated with outcomes, accounting for such factors contravenes the goal to account for factors that are either largely beyond a provider's control or only modifiable at great expense and with great difficulty. The absence of air conditioning in the patient's home, for example, could be an indicator of a patient's environmental context as a social risk factor for poor outcomes that can be present at the start of care. At the same time, if purchasing air conditioners for their high-risk patients were somehow to become an indicator of high-quality care, absence of air conditioning could be a characteristic of the care provided. If air conditioning were then to be adjusted for in quality measurement, providers with more patients without air conditioning would receive a higher payment. At the same time, providers that purchased air conditioners for their high risk patients to improve quality would not fully benefit in terms of VBP because, although outcomes may improve, these providers would also have lower risks and thus risk adjustment would lower their payment. Applying this criterion together with the preceding one (the risk factor is present at the start of care) could help avoid the challenge of identifying factors that may be present at the start of care, but can also be a characteristic of the care provided.

It is important to distinguish between factors that can themselves be modified or influenced and those that are unmodifiable themselves, but can be addressed by appropriately tailored approaches that improve outcomes without changing the underlying disadvantage. Unmodifiable factors include race and ethnicity, nativity, and gender. Although themselves unmodifiable, these factors and indeed all efforts at disparity reduction and quality improvement for socially at-risk patients are predicated on the assumption that tailored, appropriate care for those with any particular risk factors is possible. Other factors, like income, wealth, occupation, language, housing, and transportation are potentially modifiable, but doing so likely requires substantial effort and cost. Health care providers can advocate for the inclusion of health in all policies to address underlying social conditions as root causes of health care outcomes, but the responsibility to improve transportation and education systems, reduce poverty, teach English, and ensure a living wage and sufficient affordable housing stock lies outside of the health care system. At the same time, the committee acknowledges that health care providers are increasingly held responsible for addressing social risk factors by, for example, partnering with social service agencies, public health agencies, and community-based organizations. Examples of these interventions are described in detail in the committee's second report (NASEM, 2016b). Although such interventions mitigate the effects of social risk factors on certain health care outcomes, they do not change the underlying social conditions. Both unmodifiable factors and factors that are potentially modifiable but beyond the purview of the health care system would meet this criterion. Methods of adjusting or otherwise accounting for social risk factors, as described in Chapter 4, can account for unmodifiable risk factors while rewarding providers who provide better, appropriate, tailored care that minimize the impact of social risk factors on certain health care outcomes.

The critical challenge of applying this criterion is that it can be difficult to identify the extent to which care provision might affect a particular risk factor in practice. While it is fairly easy to determine whether a risk factor is present at the start of care, a great deal of judgment may come into play when deciding whether a risk factor could be altered by higher-quality care particularly as care providers become responsible for population health and may engage in interventions that are not contained within the provider's health care setting.

Criteria Category C: The Social Risk Factor Is Not Something That the Provider Can Manipulate

Criterion 5: The Risk Factor Is Resistant to Manipulation or Gaming

Gaming is unproductive behavior by the agent being evaluated (e.g., the provider) that distorts measurement to improve the agent's performance measure score (better measured care or outcomes) without a corresponding improvement in the intended care or outcome for which the performance measure is capturing (better actual care or outcomes) (Bevan and Hood, 2006). In this case, the focus is not on gaming a performance measure but rather on gaming a measure of a social risk factor that will in some way change the interpretation of the performance measure inappropriately. Gaming the measure of a social risk factor results in obscuring rather than clarifying true performance.

The rationale for this criterion is to protect against including social risk factors that might create perverse incentives for providers to engage in unproductive behavior or deliver suboptimal care for the purpose of the payment system rather than for the purpose of quality of care. Such a perverse incentive might include the possibility that a target could be achieved by reducing the quality of care for patients with low social risk rather than improving the quality of care for socially at-risk patients and overall. Any provider or health plan should be expected to maximize payment within legal limits (McGuire, 2000). This has been documented extensively in terms of coding patient diagnoses more completely in order to ensure higher payments (Dafny, 2003; Kronick and Welch, 2014). Selecting the most advantageous patients within any given group has been documented as well (Newhouse et al., 2012). Note that this criterion to address potential gaming is not an ethical judgment about health care providers. Rather, these providers operate within systems in which quality improvement and disparities reduction goals are not aligned with the payment system. Consequently, these systems may not optimally allocate resources to improve quality and reduce health disparities and may therefore embed perverse incentives for providers.

Gaming the measurement of social risk factors may be less likely if measures are externally collected and reported. Gaming may be more likely if measures used for accounting purposes were based on provider reporting. For example, if hospitals reported patients who were referred to receive meal delivery as a measure of food insecurity and indicator of financial stress, hospitals might "over-refer" patients who do not need this type of support. Additionally, if the indicator (or measure) were based on a sample of patients, the sample could be taken in a way that was not representative of the provider's entire pool of patients.

Gaming can be practically addressed in several ways. First, continuous measures are preferable to discrete ones because there are no large gains from threshold level changes. For example, if adjustment only accounted for the population below 100 percent of the federal poverty level (FPL), then systems might have a lot to gain from capturing income at a particular low point that would increase the number of people falling below 100 percent of FPL than if adjustment were continuous at all levels of income. Second, one could prioritize specific coding over vague coding. In diagnostic criteria, measure developers limited the potential for gaming by giving greater weight, for example, to a diagnosis of cancer that could be verified by a biopsy result in a chart review, than to a symptom report of fatigue. Similarly, more weight was given to an acute myocardial infarction than to a non-specific chest pain diagnosis. These principles can be generalized and applied to social risk factors. For example, one could consider a measure that indicates enrollment in specific nutritional assistance programs that are means-tested rather than using a subjective measure of food insecurity captured at the time of hospital readmission. Third, one could pay particular attention to potentially influential (high-leverage) risk factors. Risk factors that are not prevalent but highly predictive of outcomes can be particularly influential. As such, they may be particularly tempting with regard to gaming if such gaming is possible. Such measures therefore require particular scrutiny with regard to gaming. Nonetheless, such factors may be particularly important if gaming can be avoided, as a failure to account for such factors could greatly disadvantage providers who care for large proportions of patients with high levels of social risk factors.

The committee's criteria along with the rationale and potential challenges of each criterion are summarized in Table 2-1.

TABLE 2-1 Criteria for Selecting Social Risk Factors for Application in Medicare Quality Measurement and Payment, Rationale, and Potential Challenges

Criteria	Rationale	Challenges/Limitations	Practical Considerations
A. The social risk factor is related to the outcome			
1. Conceptual relationship with the outcome of interest	A conceptual relationship informed by research and experience ensures that there is a reasonable conceptual basis for expecting a systematic relationship.	A conceptual relationship may not be consistent over time or across settings. It is not always possible to distinguish unique causal role of factor so usefulness in an adjustment model does not necessarily imply that outcomes would improve through interventions on risk factor.	Acceptability and face validity: Some factors may be indicated empirically, but would need to be excluded because it has poor face validity or because data would be unacceptable to collect and include.
2. Empirical association with the outcome of interest	An empirical association confirms the conceptual relationship. Without this criterion, an adjustor (social risk factor) may have no effect.	Empirical evidence may not be generalizable to the particular setting. Relationship may not hold in multivariate model.	Data limitations often represent a practical constraint to what factors are included in risk models. The aim is to reliably and feasibly capture accurate data. The challenge is to push for greater reliability and feasibility of factors that may be important to include, even if factors are excluded today, because it is currently infeasible. Privacy laws and concerns about patient confidentiality may also be an issue. Contribution of unique variation in the outcome (i.e., not redundant or highly correlated with another risk factor): Prevent overfitting and unstable estimates, or coefficients that appear to be in the wrong direction; reduce data collection burden.
B. Social risk factor precedes care delivery and is not a consequence of the quality of care			
3. The risk factor is present at the start of care	If a risk factor present at start of care, then it less likely that it would be the result of care provided	Does not eliminate a risk factor being a consequence of care delivery in dynamic settings or under population health settings	Prioritize slowly changing factors over rapidly changing variables: Measurement would have to be more frequent, but rapidly changing variables would not fully disqualify a measure

Criteria	Rationale	Challenges/Limitations	Practical Considerations
			Consider whether a factor represents a cumulative life cycle effect or a transient effect.
4. The risk factor is not modifiable through the provider actions	The goal is to adjust for factors independent of the care provided. Adjusting for the care provided contravenes this goal.	It may be difficult to identify in practice the extent to which care provision might affect a particular social risk factor	
C. The social risk factor is not something that the provider can manipulate.			
5. The risk factor is resistant to manipulation or gaming	This criterion ensures validity of performance score as representing quality of care (versus, for example, upcoding)	It is often difficult to anticipate how a measure might be manipulated.	Prioritize specific coding over vague coding: vague codes are more vulnerable to manipulation; however, there are vaguely coded variables that may be important nevertheless, so this would not fully disqualify an indicator. Prioritize continuous over dichotomous measures of the same constrict where applicable to reduce “edge” gaming. Carefully monitor high-leverage factors (i.e., risk factors that are not prevalent but highly predictive of outcomes), as they may be important but especially attractive for gaming.

GUIDANCE REGARDING THE PROCESS FOR USING SELECTION CRITERIA

Given that there is more than one appropriate way of accomplishing the same ideal objective, the committee does not offer a formula for using the criteria specified above. However, the committee does offer guidance on how to apply these criteria. With respect to applying criteria to individual social risk factors, indicators, or measures, the committee proposes:

- The rationale for selecting a factor, as well as alternatives considered, is transparent.
- Trade-offs with respect to how well a factor meets the criteria are discussed and weighed in the final determination of whether to include a factor.
- Although a social risk factor may meet all five criteria, it may still be excluded from inclusion due to practical considerations—for example, if it lacked face validity or due to data limitations.

The committee also offers guidance on developing a set of social risk factors that could be used together for accounting purposes:

- Priority should be given to how a set of indicators perform together over the performance of each indicator on its own.
- When criteria are met, common measures across outcomes are preferred as this would be more practical and may improve the face validity of the models.
- Where possible and appropriate, it is preferred to use a common set of adjusters across the different measures in a given setting.

For both individual social risk factors (and respective indicators and measures) and also a set of social risk factors, the committee offers the following considerations:

- In terms of how measures are implemented and concerns of misuse:
    - Stakeholders such as providers and patient advocates have an opportunity to weigh in on the measures
    - The opportunities for gaming and misuse are discussed and considered. Often, potential stakeholders may have more insights into this process than modelers.
- It is critical to monitor the application of the selected risk factors.
    - How and whether a social risk factor meets the criteria may require continuous evaluation and reassessment of criteria; these criteria are applied in a dynamic setting. As health care evolves and health care disparities get addressed, the justification for certain measures may lapse and others may become more important.
    - Monitoring is also necessary to assess whether the use of social risk factors in Medicare payment strategies is appropriately incentivizing both improved quality and reduction in health disparities. Yet the criteria themselves are meant to be stable and reapplied to allow for an adaptive system.

The next chapter returns to the social risk factor framework presented by the committee in its first report and applies the criteria outlined above to specific measures of social risk.

REFERENCES

Aschengrau, A., and G. Seage. 2008. *Essentials of epidemiology in public health*. Sudbury, MA: Jones and Bartlett Publishers.

Ash, A. S., M. Schwartz, E. A. Pekoz, and A. D. Hanchate. 2013. Comparing outcomes across providers. In *Risk adjustment for measuring health care outcomes*, edited by L. I. Iezzoni. Chicago, IL: Health Administration Press.

Bevan, G., and C. Hood. 2006. What's measured is what matters: Targets and gaming in the English public health care system. *Public Administration* 84(3):521.

Braveman, P., and S. Gruskin. 2003. Defining equity in health. *Journal of Epidemiology & Community Health* 57(4):254-258.

Burwell, S. M. 2015. Setting value-based payment goals—HHS efforts to improve U.S. health care. *New England Journal of Medicine* 372(10):897-899.

Culyer, A. J. 2007. Equity of what in healthcare? Why the traditional answers don't help policy and what to do in the future. *HealthcarePapers* 8(Sp).

Dafny, L. S. 2003. *How do hospitals respond to price changes?* Cambridge, MA: National Bureau of Economic Research.

Elliott, M. N., R. Swartz, J. Adams, K. L. Spritzer, and R. D. Hays. 2001. Case-mix adjustment of the national cahps benchmarking data 1.0: A violation of model assumptions? *Health Services Research Journal* 36(3):555-573.

Elliott, M. N., A. M. Zaslavsky, E. Goldstein, W. Lehrman, K. Hambarsoomians, M. K. Beckett, and L. Giordano. 2009. Effects of survey mode, patient mix, and nonresponse on CAHPS hospital survey scores. *Health Services Research Journal* 44(2 Pt 1):501-518.

Epstein , A. M., J. Z. Ayanian, J. H. Keogh, S. J. Noonan, N. Armistead, P. D. Cleary, J. S. Weissman, J. A. David-Kasdan, D. Carlson, J. Fuller, D. Marsh, and R. M. Conti. 2000. Racial disparities in access to renal transplantation—clinically appropriate or due to underuse or overuse? *New England Journal of Medicine* 343(21):1537-1544.

IOM (Institute of Medicine). 2006. *Performance measurement: Accelerating improvement (pathways to quality health care series)*. Washington, DC: The National Academies Press.

IOM. 2014. *Capturing social and behavioral domains and measures in electronic health records: Phase 2.* Washington, DC: The National Academies Press.

Jha, A. K., and A. M. Zaslavsky. 2014. Quality reporting that addresses disparities in health care. *JAMA* 312(3):225-226.

Kautter, J., G. C. Pope, M. Ingber, S. Freeman, L. Patterson, M. Cohen, and P. Keenan. 2014. The HHS-HCC risk adjustment model for individual and small group markets under the Affordable Care Act. *Medicare & Medicaid Research Review* 4(3):E1-E46.

Kronick, R., and W. P. Welch. 2014. Measuring coding intensity in the Medicare Advantage program. *Medicare & Medicaid Research Review* 4(2):E1-E19.

Kunkel, S. A., and C. K. Powell. 1981. The adjusted average per capita cost under risk contracts with providers of health care. *Transactions of Society of Actuaries* 33:221-230.

Link, B. G., and J. Phelan. 1995. Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior* Spec No:80-94.

McGinnis, J. M. 2016. Income, life expectancy, and community health: Underscoring the opportunity. *JAMA*.

McGuire, T. G. 2000. Physician agency. *Handbook of Health Economics* 1:461-536.

NASEM (The National Academies of Sciences, Engineering, and Medicine). 2016a. *Accounting for social risk factors in medicare payment: Identifying social risk factors*. Washington, DC: National Academies Press.

NASEM. 2016b. *Systems practices for the care of socially at-risk populations*. Washington, DC: National Academies Press.

NQF (National Quality Forum). 2014. *Risk adjustment for socioeconomic status or other sociodemographic factors*. Washington, DC: National Quality Forum.

Newhouse, J. P., M. Price, J. Huang, J. M. McWilliams, and J. Hsu. 2012. Steps to reduce favorable risk selection in Medicare Advantage largely succeeded, boding well for health insurance exchanges. *Health Affairs* 31(12):2618-2628.

O'Malley, A. J., A. M. Zaslavsky, M. N. Elliott, L. Zaborski, and P. D. Cleary. 2005. Case-mix adjustment of the cahps hospital survey. *Health Services Research Journal* 40(6 Pt 2):2162-2181.

Phelan, J. C., and B. G. Link. 2015. Is racism a fundamental cause of inequalities in health? *Annual Review of Sociology* 41:311-330.

Pope, G. C., J. Kautter, R. P. Ellis, A. S. Ash, J. Z. Ayanian, M. J. Ingber, J. M. Levy, and J. Robst. 2004. Risk adjustment of medicare capitation payments using the CMS-HCC model.

Zaslavsky, A. M., L. B. Zaborski, L. Ding, J. A. Shaul, M. J. Cioffi, and P. D. Cleary. 2001. Adjusting performance measures to ensure equitable plan comparisons. *Health Care Financing Review* 22(3):109-126.

3

Applying Selection Criteria to Social Risk Factors and Health Literacy

In its first report, the committee presented a conceptual framework that illustrates the primary hypothesized conceptual relationships by which five social risk factors—socioeconomic position (SEP); race, ethnicity, and cultural context; gender; social relationships; and residential and community context—as well as health literacy may directly or indirectly affect measures of health care use, health care outcomes, and resource use outcomes among Medicare beneficiaries (NASEM, 2016a). The conceptual framework applies to all Medicare beneficiaries, including beneficiaries with disabilities and those with end-stage renal disease (ESRD). Although the committee acknowledges heterogeneity among Medicare beneficiaries (including among beneficiaries age 65 and older), the committee expects the effect of social risk factors to be similar for all Medicare subpopulations. As described in its first report, the committee considers variations in the effect of social risk factors among beneficiaries under age 65 with disabilities, beneficiaries age 65 and older, and beneficiaries with ESRD to fall within a continuous spectrum of effects. Notably, Medicare beneficiaries with disabilities differ systematically from persons with disabilities more generally, because eligibility for federal disability benefits requires that a person is unable to work, has a low income, and meets certain medical criteria (SSA, n.d.). Therefore, Medicare beneficiaries with disabilities are by definition a socially at-risk group. Additionally, the Centers for Medicare & Medicaid Services (CMS) uses the same measures to assess quality, outcomes, and resource use for Medicare beneficiaries regardless of the origin for entitlement (i.e., whether an individual qualified because of age, disability, or ESRD). The committee still holds these assumptions to be true.

In its first report, the committee also identified specific indicators that correspond to the five social risk factors. These indicators represent ways to measure the latent constructs of the social risk factors and are distinct from specific measures. For example, education is an indicator of socioeconomic position that can be measured in multiple ways (e.g., highest degree attained, years of education). Figure 3-1 presents a modified version of the committee's conceptual framework, expanded to include indicators of each social risk factor. The framework also groups the domains that the committee embraced in its expanded definition of "health outcomes" in its first report (health care use, health care outcomes, and resource use) under the umbrella of *performance indicators for value-based payment* (VBP).

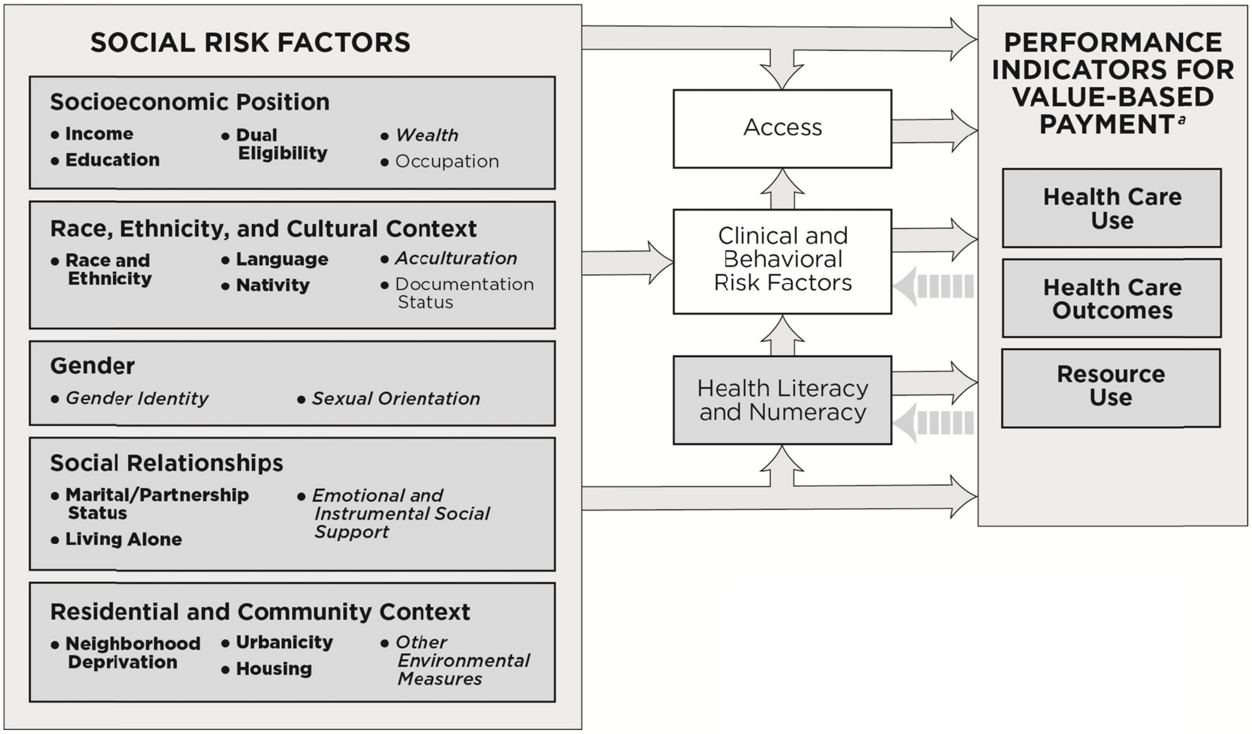

FIGURE 3-1 Conceptual framework of social risk factors and performance indicators for value-based payment (VBP).

NOTE: This conceptual framework illustrates primary hypothesized conceptual relationships. For the indicators listed in bullets under each social risk factor, bold lettering denotes measurable indicators that could be accounted for in Medicare VBP programs in the short term; italicized lettering denotes measurable indicators that capture the basic underlying constructs and currently present practical challenges, but are worth attention for potential inclusion in accounting methods in Medicare VBP programs in the longer term; and plain lettering denotes indicators that have considerable limitations.

[a] As described in the conceptual framework outlining primary hypothesized conceptual relationships between social risk factors and outcomes used in value-based payment presented in the committee's first report (NASEM, 2016a), health care use captures measures of utilization and clinical processes of care; health care outcomes capture measures of patient safety, patient experience, and health outcomes; and resource use captures cost measures.

In this chapter, the committee applies the criteria identified in Chapter 2 of this report to these social risk factors and health literacy (and their respective indicators), and also identifies the rationale and limitations of each factor and indicator relative to those criteria. To review, the committee identified three broad categories of criteria for selecting social risk factors that could be accounted for in Medicare VBP programs:

A. The social risk factor is related to the outcome;
B. The social risk factor precedes care delivery and is not a consequence of the quality of care; and
C. The social risk factor is not something the provider can manipulate.

The committee also identified practical considerations. These are empirical questions that may be best assessed using specific measures and data. Additionally, data collection and measurement is the subject of the committee's fourth and next report. Because the committee can recommend new data sources and new methods of data collection in this next report (and is therefore not limited to existing measures and data sources), the criteria related to practical considerations such as issues of measurement feasibility are not discussed exhaustively in this report.

SOCIOECONOMIC POSITION

Socioeconomic position describes an individual's absolute and relative position in a society's stratification system. SEP captures a combination of access to material and social resources as well as relative status—prestige- or rank-related characteristics (Krieger et al., 1997). As described in the committee's first report (NASEM, 2016a), the committee prefers *socioeconomic position* to the more common phrase *socioeconomic status*, because *socioeconomic position* is a broader term encompassing resources as well as status (Krieger et al., 1997). SEP is commonly measured using indicators including income and wealth, education, and occupation and employment. In the medical field, insurance status (whether someone has insurance and the type of insurance—i.e., public or private) is also used as a proxy for SEP.

Income

Individual income can affect health and health care outcomes through multiple pathways (Braveman et al., 2005). It can affect health directly as a means of purchasing health care and indirectly as a means of acquiring health promoting resources, such as better education, housing, and nutrition (Adler and Newman, 2002). This effect is stronger at lower levels of income (i.e., poverty and deprivation). However, the association between income and health is graded such that increases in income are associated with increases in health status above a threshold of material deprivation (i.e., poverty level) (Adler et al., 1994; Braveman et al., 2010; NASEM, 2016a). Thus, literature supports a conceptual relationship between income and health-relevant measures of interest to Medicare quality and payment programs. As identified in the committee's first report, literature indicates that income may influence health care utilization, clinical processes of care, health care costs, health outcomes, and patient experience (NASEM, 2016a). Therefore, literature also supports an empirical association as well. Income is generally not a consequence of health care. Income is potentially susceptible to rapid changes as a consequence of a health event across individual trajectories. However, income's average association with health care outcomes is not likely to change rapidly. In other words, income precedes care delivery and is not a consequence of the quality of care.

Income is the most commonly used measure of economic resources (Braveman et al., 2005), largely because there are available measures, but also because income has strong face validity. When self-reported, measuring income can be sensitive to collect, but reliable methods exist to accurately, reliably, and feasibly collect income data (Moore and Welniak, 2000). These measures are likely to be resistant to gaming or manipulation. Although there may be less variation in income among older populations, especially the very old (age 80 and older), because income includes both earned and unearned income, there is likely to be sufficient variation in income among the Medicare population (albeit a narrower range than among the general population) to capture the full variation in SEP (HHS, 2015c). In sum, income is related to health care outcomes of interest, precedes care delivery and is not a consequence of the quality of care, is not something the provider can manipulate, and meets practical considerations.

Wealth

Wealth is an alternate measure of economic resources that represents total accumulated economic resources (assets). Wealth is likely to be as important for health and health care outcomes as is income as a means of acquiring health care and health-promoting resources (Braveman et al., 2005; Deaton, 2002; NASEM, 2016a). Moreover, whereas income may capture less variation in economic attainment among Medicare beneficiaries, especially the very old, wealth may capture more variation. Therefore, wealth may be a more sensitive indicator of SEP for the very old (Allin et al., 2009). Wealth can also buffer the effects of changes in income (such as those due to unemployment or illness) (Cubbin et al., 2011). However, wealth may still be susceptible to changes as a consequence of health events among individuals (Lee and Kim, 2008). For example, onset of a new chronic condition may require out-of-pocket medical expenditures and costs associated with rearranging housing or transportation. These costs can lead an individual to incur both a sudden increase in health-related costs as well as costs that accrue over time, both of which could deplete wealth. This may be particularly relevant for low-income persons who also share a disproportionate of disease burden. However, as with income, the association between wealth and health at a population level is unlikely to be a consequence of health care. An additional challenge of using wealth as an indicator of SEP is that there are substantial differences by subgroups, especially racial and ethnic subgroups and by gender. For example, blacks have significantly less wealth compared to whites even at the same income levels (Kochhar and Fry, 2014; Shapiro et al., 2013). Moreover, relatively few studies have examined the relationship between wealth and health care outcomes (Braveman et al., 2005; NASEM, 2016a). Hence, there is little evidence documenting an empirical association. This may be due in large part to the difficulty of measuring net worth. Like income, it can be sensitive to assess. Unlike income, although some good measures exist, missing data at the upper and lower ends of the wealth distribution can be problematic (Cubbin et al., 2011; Eckerstorfer et al., 2015; Eggleston and Klee, 2015). Collecting self-reported net worth is challenging because many individuals do not know the value of their net worth or what assets they have (Braveman et al., 2005; Eggleston and Klee, 2015). Some studies have used simplified or proxy measures such as home or car ownership, but there remains little empirical evidence on the association between wealth and health care outcomes (Braveman et al., 2005). Literature supports a conceptual relationship between wealth and health care outcomes of interest, but a lack of available measures and thus evidence of an empirical association present limitations for using wealth as an indicator of SEP. Practical considerations present challenges for collecting accurate wealth data.

Insurance Status: Dual Eligibility

In health research, numerous studies assess the effects of insurance coverage on health status (see, for example, IOM, 2009a), but its use here is restricted to its use as a proxy for resources to support health and health care and thus as an indicator of SEP. For the Medicare population, Medicaid eligibility—also referred to as dual (Medicare and Medicaid) eligibility—is an indicator of insurance status that can be used as a proxy that captures elements of both income and wealth. Dual eligibility captures elements of income, because Medicaid eligibility requires an income below a certain threshold (set at a national minimum level of 133 percent of the federal poverty level [FPL]) (CMS, n.d.-a). However, like any measure of insurance, it is generally an imperfect proxy of income, because it does not capture the full continuum of SEP. This is particularly true for dual eligibility, which is a dichotomous measure representing high or low income. Additionally, individuals with low incomes that exceed Medicaid income thresholds may be eligible for Medicaid coverage under "spend down" rules that allow medically needy individuals to spend down (or, subtract) medical expenses from their income (CMS, n.d.-b). Dual eligibility also captures elements of wealth, because Medicaid eligibility also includes asset limits (CMS, n.d.-a). Similar to income, individuals with few assets that nonetheless exceed the Medicaid asset threshold may "spend down" their assets to become eligible for Medicaid coverage. Because dual eligibility status interacts with the health system in this way, it is a measure that captures both income and wealth in a particular functional form (that of the eligibility criteria) that may or may not be the best predictor of performance indicators used in VBP. Importantly, because states establish Medicaid eligibility, what dual eligibility represents also varies by state. Similarly, Medicaid covers long-term care for those who meet additional eligibility requirements, in which case dual eligibility would capture still another functional form of health-related resources among institutionalized persons.

Dual eligibility may also capture dimensions of health status that are unmeasured by other data sources, because it represents insurance coverage as a concept distinct from SEP. For example, dual eligibles receive more generous health coverage through Medicare and Medicaid than uninsured or underinsured persons who have relatively higher SEP, but who are ineligible for Medicaid coverage because they have income and/or wealth just above the eligibility threshold. Relatedly, dual eligibility may capture clinical characteristics covering those who are under age 65 and eligible for Medicaid coverage based on disability. As noted in the introduction, the committee expects social risk factors to operate similarly among all Medicare beneficiaries including disabled persons. However, the committee notes that in its use here as a proxy measure for SEP as a social risk factor that could be accounted for in Medicare quality measurement and payment (and not as a characteristics of the population to which the social risk factor framework applies), dual eligibility may capture health status–related elements of disability because of eligibility criteria for Medicaid coverage based on disability. Because dual eligibility captures elements of income, wealth, and health status, dual eligibility can be considered a broader measure of health-related resource availability that captures medical need.

Dual eligibility is empirically associated with health and health care outcomes including health care utilization, clinical processes of care, and patient experience (NASEM, 2016a). Dual eligibility also has face validity, particularly among health and medicine researchers, and is a relatively easy to measure and collect. Additionally, dual eligibility is not a consequence of care and likely to be resistant to gaming and manipulation at the population level. Hence, dual eligibility is an available proxy measure of resources available for goods and services to support health and health care.

Occupation

Occupation includes both employment status (whether an individual participates in the paid labor force or not, and if so, to what degree), as well as the type of occupation among the employed (Adler and Newman, 2002; NASEM, 2016a). Additionally, occupation can be collected in its current state or in a past state, as primary lifetime occupation. Among Medicare beneficiaries, fewer of whom participate in the paid work force than the general population—

especially disabled Medicare beneficiaries who by definition cannot work—employment status may be more relevant than job type. Occupation can affect health through exposure to environmental health hazards as well as through psychosocial risks associated with job strain, lack of control, and increased stress (Kasl and Jones, 2000; Theorell, 2000). Additionally, literature suggests that employment and occupation are associated with health outcomes including unhealthy behaviors, morbidity, and mortality (NASEM, 2016a). Literature therefore supports a conceptual relationship between occupation and performance indicators used in VBP. However, there is relatively little empirical evidence on the association between employment or occupation and health care outcomes, especially using U.S. data (NASEM, 2016a). This is likely because of the difficulty of collecting and classifying occupation in the United States. Measures of occupation and employment are likely to be resistant to gaming and manipulation and the United States maintains a Standard Occupational Classification System, but many of the categories are too heterogeneous to be meaningful (Braveman et al., 2005). Additionally, some groups such as retired persons and homemakers may not have an employment related to occupation, making it difficult to identify their SEP. Despite these measurement challenges, occupation and employment are not logical consequences of the quality of care, although like other measures of SEP, employment is potentially susceptible to changes as a consequence of a health effect, such as losing a job because one becomes too ill to work. However, again, at the population level, occupation is unlikely to be a consequence of health care quality. In short, like wealth, occupation is a conceptually powerful indicator of SEP, but practical considerations limit its potential use.

Education

Education is important for health because it shapes future employment and economic resources (Adler and Newman, 2002; IOM, 2014; NASEM, 2016a). Education can therefore affect health indirectly through other indicators of SEP—employment, occupation, and income. At the same time, education can also affect health by enabling individuals to access and understand health information and health care and to make decisions that promote health and reduce health risks, and by contributing to a patient's ability to advocate for him-or herself in health care (Cutler and Lleras-Muney, 2006; IOM, 2014). Thus, literature supports a conceptual relationship between education and performance indicators used in VBP. Education is strongly associated with health behavior, health status, morbidity, and mortality (IOM, 2014). However, the relationship between health and health care outcomes may vary across age cohorts owing to changes in the distribution of education over time (Lynch, 2003). Nevertheless, as identified in the committee's first report, literature indicates that education may influence health care utilization, health outcomes, and patient experience, thus providing support for an empirical association (NASEM, 2016a). Education has face validity, precedes care delivery, and is not a logical consequence of care. Education can be measured as continuous or categorical years of schooling completed or as educational attainment measured by credentials of formal schooling (e.g., high school diploma, college degree) (Braveman et al., 2005; IOM, 2014). These measures are feasible to collect and likely to be resistant to gaming. In short, education is related to health care outcomes of interest, precedes care delivery and is not a consequence of the quality of care, is not something the provider can manipulate, and meets practical considerations.

Summary

Income and education are promising indicators. Wealth is likely to be strongly associated with health and health care outcomes, but accurate data is difficult to collect. Dual eligibility meets practical criteria and can be considered a proxy for SEP as a measure of resources available for goods and services to support health and health care. Occupation is likely to be strongly associated with performance indicators used in VBP, but practical considerations limit its potential use.

RACE, ETHNICITY, AND CULTURAL CONTEXT

Race and Ethnicity

Race and ethnicity are social categories that represent dimensions of a society's stratification system by which resources, risks, and rewards are distributed. Categories of race and ethnicity capture a range of health-relevant dimensions, especially those related to social disadvantage. These include access to social institutions and rewards; behavioral norms and other sociocultural factors; inequitable distribution of power, status, and material resources; and psychosocial exposures like discrimination and bias (Phelan and Link, 2015; Williams, 1997). Race and ethnicity are strongly associated with health and health care outcomes, even after accounting for measures of SEP (Krieger, 2000; LaVeist, 2005; NASEM, 2016a; Williams, 1999; Williams et al., 2010). This effect may be caused by the lack of comparability of a given SEP measure across racial and ethnic groups (for example, as described above, wealth is differentially correlated with income by race), the importance of other unmeasured social factors that are patterned by race and ethnicity (for example, neighborhood environments, discrimination, immigration-related factors, language), and measurement error in SEP (NASEM, 2016a). Together, this literature supports a conceptual relationship between race and ethnicity and health. In its first report, the committee identified literature indicating that race and ethnicity may influence health care utilization, clinical processes of care, health care costs, health outcomes, patient safety, and patient experiences of care (NASEM, 2016a). Thus, literature supports an effect. Race and ethnicity precede care delivery and are not logical consequences of care. However, observed differences by race and ethnicity may represent differences in the quality of care received, including differences related to poor communication, poor cultural competence, discrimination, and bias (IOM, 2003a).

Race and ethnicity are typically identified through self-reported categories, and measures of race and ethnicity are resistant to gaming or manipulation. Refinement of standardized race and ethnicity measures is still needed. In health research, Hispanic ethnicity is frequently combined with racial categories. The most commonly used "racial" categories are: non-Hispanic white, non-Hispanic black, Hispanic, and Asian (see, for example, AHRQ, 2016; CMS, 2016). This categorization is problematic because it conceals substantial heterogeneity within certain categories. In particular, there are substantial differences across Asian groups from different countries. Additionally, Hispanic groups from different (Latin American) countries use racial classifications that differ from U.S. racial classifications (for example, who is considered black), because they reflect different sociopolitical constructs (Wade, 1997). Some existing standards include federal standards from the White House Office of Management and Budget, which the Department of Health and Human Services (HHS) is increasingly adopting (CDC, 2010; IOM, 2009c; OMB, 1995), and those recommended in a 2009 Institute of Medicine (IOM) report (IOM, 2009c). Because race and ethnicity are conceptually distinct, these standards recommend using separate items for collecting race and ethnicity. In sum, race and ethnicity are related to health care outcomes, precede care delivery and are not a consequence of the quality of care, are not things a provider can manipulate, and meet practical considerations. At the same time, the committee acknowledges that causal pathways by which race and ethnicity influence health include mechanisms that can be related to quality of care.

Language

Language typically represents language barriers, such as speaking a primary language that is not English, having limited English proficiency, or otherwise needing interpreter services. This includes deaf American Sign Language users. Language barriers are strongly associated with health and health care outcomes—in particular, poorer access to health care, poorer health status, poorer quality care, including less recommended care, and more adverse health events (NASEM, 2016a). Thus, literature supports both a conceptual relationship and an empirical association between language and health care outcomes. Language is not a consequence of health care. Measures of language are resistant to gaming or manipulation and are also relatively easy to assess. The same 2009 IOM report recommending standards for collecting and measuring race and ethnicity data also included recommended standards for language data (IOM, 2009c). Language is thus related to health care outcomes, precedes care delivery and is not a consequence of the quality of care, is not something the provider can manipulate, and meets practical considerations.

Nativity, Immigration History, and Acculturation

Nativity refers to country of origin. Immigration history includes refugee and documentation status, as well as duration in the United States. Acculturation describes the extent to which an individual adheres to the social norms, values, and practices of his or her own ethnic group or home country or to those of the United States (NASEM, 2016a). Because acculturation is expected to increase with the amount of time spent in the United States, duration in the United States is also used as a proxy for acculturation. Nativity and duration in the United States may influence health and health care outcomes through differences in language, communication, and health care use (IOM, 2014). Nativity and immigration history may also expose individual to different health risks or protective factors prior to arriving in the United States. Risks include environmental exposures, infectious diseases, and poverty, whereas protective factors may arise from cultural differences that shape health behaviors such as smoking, diet, and physical activity (IOM, 2014). These characteristics are likely to have important interactions with race and ethnicity (Jerant et al., 2008; Newhouse et al., 2012). Literature therefore supports several pathways by which nativity, immigration history, and acculturation may affect health. In its first report, the committee identified literature indicating that nativity may influence clinical processes of care and patient experience, supporting an empirical association (NASEM, 2016a). Evidence on the relationship between acculturation and health care outcomes is not well established, in part due to measurement challenges (Abraído-Lanza et al., 2006; IOM, 2014; NASEM, 2016a). These factors are not logical consequences of health care or health events.

Measures of nativity include identifying a specific country of origin or a dichotomous measure comparing foreign-born to U.S.-born individuals. These measures of nativity and measuring duration in the United States could therefore feasibly be collected during an office visit or in an electronic health record. Measures of nativity and time in the United States are also less sensitive than measures of documentation status or citizenship (IOM, 2014). Because there is a strong interaction between acculturation and race and ethnicity, measures of acculturation frequently assess acculturation among specific subgroups (e.g., Hispanic immigrants) (HHS, 2014). Nativity, duration in the United States, and measure of language can be crude proxies for acculturation. Measures of nativity, immigration history, and acculturation are likely to be resistant to gaming or manipulation. All told, measures of nativity and immigration history are related to health care outcomes, precede care delivery and are not a consequence of the quality of care, are not things a provider can manipulate, and meet practical considerations. Literature supports a conceptual relationship between acculturation and health care outcomes of interest, but existing measures pose challenges to feasibility. Consequently, there is a lack of empirical evidence about the relationship between acculturation and performance indicators used in VBP.

Summary

Race, ethnicity, language (especially limited English proficiency), and nativity are promising indicators, particularly in combination (Goodell and Escarce, 2007). Literature supports a conceptual relationship between acculturation and health care outcomes of interest, but existing measures have limitations and empirical evidence is lacking. Documentation status as a measure of immigration history is likely to be sensitive to collect.

GENDER

The committee uses the term *gender* broadly to capture the social dimensions of gender as distinguished from biological effects of sex. Gender captures both normative gender identity and gender minorities, including individuals who identify as transgender, intersex, or otherwise non-conforming gender. Normative gender categories (men and women) are strongly associated to health and health care outcomes (NASEM, 2016a). However, deconstructing the effects of gender and sex can be challenging. Frequently, investigators do not specify which construct they are measuring and use the terms interchangeably (for example, incorrectly referring to sex differences as gender differences), and because sex and gender may interact to produce health outcomes (Krieger, 2003). Nevertheless, gender has face validity, is not a consequence of care, and there are good self-reported measures that are resistant to gaming. For accountability purposes in Medicare payment, gender is already included as a risk factor in clinical adjustment.

Gender Identity

Gender minorities may experience differences in health and health care outcomes, but there remains little empirical evidence. Additionally, although gender identity is not a consequence of health care, what evidence does exist suggests that differential health care outcomes may arise from miscommunication, lack of cultural competence, or bias in the patient-provider encounter (IOM, 2011). The lack of evidence is due in part to the lack of a good existing measure, although, based on recommendations from a 2011 IOM report, HHS has been actively working to improve data collection. In recent years, questions on gender identity have been included in national surveys such as the Behavioral Risk Factor Surveillance System, National Health Interview Survey, National Survey of Family Growth, National Survey on Drug Use and Health, and National Health Service Corps Patient Satisfaction Survey (Copen et al., 2016; HHS, 2015b; Ward et al., 2014). Additionally, the Office of the National Coordinator's (ONC's) final rule specifying meaningful use criteria included gender identity measures (HHS, 2015a). Measures of gender identity are likely to be resistant to gaming or manipulation, but because there is a very low prevalence of gender minorities, gender identity is unlikely to have a significant effect in adjustment models and other methods of accounting for social risk factors. Emerging literature supports a relationship between gender identity and health care outcomes of interest, but existing measures pose challenges to feasibility. Hence, the empirical association is poorly established.

Sexual Orientation

Sexual orientation includes individuals who identify as lesbian, gay, bisexual, queer, questioning, or otherwise non-conforming. Sexual orientation is typically defined with respect to three dimensions: attraction, behavior, and identity (IOM, 2011). Like gender minorities, sexual minorities may experience differences in health and health care outcomes although there is currently little empirical evidence (NASEM, 2016a). Moreover, as with gender identity, emerging evidence suggests that differential health care outcomes among sexual minorities may be largely attributable to drivers related to the quality of care provided (e.g., miscommunication, poor cultural competence, discrimination) (Elliott et al., 2015; IOM, 2011). Similar to the practical challenges of establishing better evidence between gender identity and health care outcomes, there are no good existing measures, although the HHS has also included sexual orientation items in the surveys discussed above, and ONC also recommended inclusion of sexual orientation in its meaningful use criteria (CDC, 2010; HHS, 2015a,b). One limitation of existing measures is that they frequently only capture one dimension of sexual orientation, and identifying the dimension or dimensions most relevant to the outcome of interest can be conceptually challenging (IOM, 2011). Specifically, some individuals do not present consistently across the three dimensions of sexual orientation. For example, some men report that they have sex with other men, but do not identify as gay. In cases of such inconsistency across dimensions, identifying the dimension or dimensions most relevant for the outcome of interest will be important to accurately classify individuals. Taken together, like gender identity, emerging literature supports a relationship between sexual orientation and health care outcomes of interest, but poor existing measures have limited available evidence.

Summary

Normative gender categories (men and women) are strong candidates for inclusion in accounting methods, despite the fact that effects of gender are difficult to separate from biological effects of sex in measurement. However, the committee notes that gender is already included in clinical risk adjustment. Promising measures of gender identity and sexual orientation that HHS is currently testing and collecting data on could be revisited for potential inclusion when there is more empirical evidence supporting the relationship between gender identity and sexual orientation and health care outcomes. Certainly, in the short term, there is likely to be a very low prevalence of individuals who have non-normative gender identities. In addition, the relationship of these constructs to health care outcomes is not well established.

Thus, accounting for variations in gender identity is unlikely to have a significant effect in accounting methods.

SOCIAL RELATIONSHIPS

Many dimensions of social relationships are important to health, health care use, and health care outcomes (Berkman and Glass, 2000; Cohen, 2004; Eng et al., 2002; Holt-Lunstad et al., 2010; House et al., 1988; Umberson and Montez, 2010). These include access to social networks that can provide access to resources, including material resources and emotional and instrumental social support. Social relationships may be especially relevant to health care access and outcomes among older adults and persons with limitations in activities of daily living (ADLs) and instrumental activities of daily living (IADLs) (Cornwell and Waite, 2009; Hawton et al., 2011; Houser et al., 2010; Seeman et al., 2001; Tomaka et al., 2006). Hence, literature supports a conceptual relationship between social relationships and health care outcomes of interest. In health research, social relationships are typically assessed using three indicators: marital/partnership status, living alone, and emotional and instrumental social support.

Marital/Partnership Status

Marital or partnership status is a foundational structural element of social relationships that is also often considered an important indicator of social support. Being married or partnered is associated with better health care outcomes, while being single, widowed, or otherwise unpartnered is associated with worse health care outcomes (NASEM, 2016a). Literature suggests that this relationship holds true for both heterosexual partners and same-sex couples (Liu et al., 2013). Additionally, the relationship between marriage and health outcomes interacts with gender. Not only might marriage affect health in different ways by gender, but some evidence also suggests that marriage is also more beneficial to men than women (IOM, 2014). Thus, there is a conceptual relationship between marital/partnership status and health. In its first report, the committee identified literature indicating that marital status may influence health care utilization, clinical processes of care, health care outcomes, patient experiences of care, and health care costs (NASEM, 2016a). Thus, there is evidence of an empirical association. It is important to note demographic shifts in family structure over the past several decades—marriage rates have declined while the number of cohabiting individuals and persons who never married has increased (Wang and Parker, 2014). Some evidence suggests that the relationship between marital status and health is changing along with these demographic shifts (Liu and Umberson, 2008). It will therefore be important to monitor the empirical association between marital/partnership status and health and revisit assumptions about their conceptual relationship over time.

Marital or partnership status is not a logical consequence of care, but is potentially susceptible to rapid changes—both gaining and losing a partner—across individual trajectories. However, at the population level, marital/partnership status is not likely to be susceptible to rapid changes. Marital and partnership status is likely to contribute to unique variation in outcomes of interest, especially among older adults. Additionally, there is likely to be greater variability in the future with the increase in the never-married and cohabiting populations, which are increasingly tied to SEP, race, ethnicity, and community of residence (Aughinbaugh et al., 2013; Tamborini, 2007; Wang and Parker, 2014). Measures of marital or partnership status include dichotomous measures of whether someone is married or not and whether someone is partnered or lacks a partner. Other measures include more categories, such as individuals who are single, widowed, and divorced. These measures are relatively easy and acceptable to collect via self-report and are likely to be resistant to gaming. Marital or partnership status is therefore related to health care outcomes, precedes care delivery and is not a consequence of the quality of care, is not something the provider can manipulate, and meets practical considerations. However, demographic changes suggest that monitoring the relationship between marital/partnership status and health outcomes over time is needed.

Living Alone

Living alone is a structural element of social relationships. In health research, living alone is typically an indicator of social isolation or loneliness, which have been shown to have important consequences for health (Berkman and Glass, 2000; Brummett et al., 2001; Cohen, 2004; Eng et al., 2002; House et al., 1988; Wilson et al., 2007). Living alone is also likely to at least partly capture elements of social support. Thus, literature supports a conceptual relationship between living alone and health care outcomes. Living alone is strongly associated with health, although literature on the association between living alone and health care outcomes is sparse (NASEM, 2016a). Nevertheless, the committee identified literature indicating that living alone may influence health care utilization, clinical processes of care, and health outcomes in its first report (NASEM, 2016a). Living alone is potentially susceptible to rapid changes, including changes resulting from a health care interaction. For example, an ill parent may temporarily move in with his or her child following a health event or the advice of a doctor. However, living alone is not likely to be susceptible to rapid changes on average. Living alone is unlikely to vary across reporting units substantially, although there may be specific geographic regions with substantially higher prevalence of older adults living alone. Therefore, it may be important to measure living alone with regional interactions. Living alone can be fairly easily and feasibly assessed in the clinical setting using a dichotomous measure (living alone or not) or more finely graded household composition measures (e.g., living alone, with one other person, two other persons, and so on). Thus, living alone is related to performance indicators used in VBP, precedes care delivery and is not a consequence of the quality of care, is not something the provider can manipulate, and meets practical considerations.

Emotional or Instrumental Social Support

Social support is a key function of social relationships and includes emotional elements (such as through caring and concern) as well as instrumental components (such as material and other practical supports). Emotional social support may affect health through psychosocial mechanisms—for example, boosting self-efficacy to practice health-promoting behaviors like quitting smoking or to follow a treatment regimen (Berkman and Glass, 2000). Emotional social support may also buffer negative effects of health risks or facilitate health behaviors (IOM, 2014). At the same time, social support can have a negative effect on health, for example, from distress caused by negative social interactions or because negative influences promote risky health behaviors (Uchino, 2006). Instrumental social support can support access to health-promoting resources (e.g., delivery of nutritious meals) and health care (e.g., providing transportation to a doctor's appointment) (Berkman and Glass, 2000). Hence, literature supports a conceptual relationship between social support and performance indicators used in VBP. In its first report, the committee identified literature indicating that social support may influence health care utilization, clinical processes of care, health outcomes, and patient experiences of care (NASEM, 2016a). Generally, higher levels of social support are associated with better health care outcomes while lower levels of social support are associated with poorer health care outcomes (NASEM, 2016a).Thus, there is evidence of an empirical association.

Similar to indicators of SEP, social support is potentially susceptible to rapid changes, including changes that result from health care interactions. For example, a person who previously lacked social support may gain it following a health event, because members of their social network reach out to help the person in their recovery. Or, a physician may provide instrumental support such as organizing meal deliveries or transportation services during a clinical encounter. However, on average, social support is not a consequence of the quality of care. For this reason, researchers often measure an individual's perceived or potential social support through measures of social connections or social integration, which may represent potential sources of social support (IOM, 2014).

Measures of social support are likely resistant to gaming and manipulation, but they may pose feasibility issues. Some measures have many items and are burdensome to collect or may only assess one element of social support (e.g., instrumental but not emotional support; perceived support versus actual support). Additionally, because social support is multidimensional, identifying the measure that represents the most relevant dimension for a given health care outcome can be challenging. Despite these limitations, measures of social support are still likely to capture elements of social relationships that are relevant for health care outcomes. Taken together, emotional or instrumental social support is related to health care outcomes, precedes care delivery and is not a consequence of the quality of care, is not something the provider can manipulate, and generally meets practical considerations, with some limitations.

Summary

Marital status and living arrangements (living alone) are likely to influence health and health care outcomes, are easy to measure, and may at least partly capture elements of emotional and instrumental social support. Some evidence suggests that the relationship between marital/partnership status and health is changing along with demographic shifts, which point to a need to reassess the empirical associations and revisit assumptions about the conceptual relationship over time. Emotional social support and instrumental social support are likely to influence health care outcomes. However, because social support is multidimensional, identifying the measure that represents the most relevant dimension for a given health care outcome may pose both conceptual and practical challenges for data collection and measurement.

RESIDENTIAL AND COMMUNITY CONTEXT

Residential and community context refers to a broad set of characteristics that could be important to health and health care processes. These include compositional characteristics that represent aggregate characteristics of neighborhood residents, characteristics of physical and social environments (i.e., environmental measures), as well as policies, infrastructural resources, and opportunity structures that influence individuals' everyday lives (NASEM, 2016a).

Compositional Characteristics

Compositional characteristics of communities include, for example, dimensions of SEP, the proportion of racial and ethnic minority residents, foreign-born residents, single-parent households, and English language proficient residents. Compositional characteristics can be interpreted to represent a combination of environmental effects, group-level effects, and as a proxy for effects of individual characteristics. Compositional characteristics might affect health care outcomes in similar ways to their individual-level correlates. For example, lower education or lower income on average may influence health and health care outcomes through differences in accessing health-promoting and health care resources. Compositional characteristics might also affect health care outcomes through genuine group-level effects. For example, one study found that for foreign-born Latinos, living in neighborhoods with high-proportions of foreign-born Latinos was protective for health, potentially through greater levels of social support or through lower levels acculturation and its related health-damaging effects (e.g., less nutritious diets, less physical activity) (Acevedo-Garcia and Bates, 2008). Thus, literature supports a conceptual relationship. Studies have shown that community composition may affect health behaviors and other risk factors, morbidity, and mortality (Diez Roux and Mair, 2010). In its first report, the committee identified literature indicating that compositional characteristics may influence health care utilization, clinical processes of care, health care outcomes, and patient safety (NASEM, 2016a). Thus, literature also supports an empirical association between compositional characteristics and performance indicators used in VBP. Neighborhood compositional characteristics are not logical consequences of care (NASEM, 2016a).

Compositional characteristics can be assessed and used individually—for example, neighborhood racial and ethnic composition or neighborhood SEP. Compositional characteristics can also be assessed using composites, such as a summary indicator of neighborhood deprivation or neighborhood SEP. For example, Roblin (2013) developed a summary measure to assess the neighborhood SEP of a managed care organization's enrollees measured at the Census tract level using seven indicators: percent of households with income below the FPL, percent of households receiving public assistance, percent of households with low income, percent of unemployed adult males, percent of adults with low educational attainment, median household income, and median home value. Of note, the level of aggregation (e.g., Census tracts, block groups, zip codes) is important when measuring compositional characteristics, because effects may vary based on the units of aggregation used (e.g., Krieger et al., 2002). Additionally, compositional characteristics can be messy to measure, because they can represent an individual characteristic or a genuine area-level effect. Furthermore, when used as a proxy for individual-level effects, they may also pick up area-level (environmental) effects. Measures are likely resistant to gaming or manipulation and relatively easy to assess (IOM, 2014). In total, despite some measurement issues, compositional characteristics of residential and community context are related to performance indicators used in VBP, precede care delivery and are not a consequence of the quality of care, are not things a provider can manipulate, and generally meet practical considerations.

Environmental Measures

Environmental measures are indicators of residential and community context. They represent dimensions of residential environments including the physical or built environment (e.g., housing, walkability, transportation options, and proximity to services—including health care services) as well as social environments (e.g., safety and violence, social disorder, the presence of social organizations, and social cohesion). Neighborhood environments can affect health through the distribution of health-relevant resources (e.g., access to recreational spaces, healthy foods, or health care services) or by exposing residents to environmental hazards (e.g., air pollution) (Diez Roux and Mair, 2010; IOM, 2003b). Neighborhood environments can also expose residents to physical and social exposures (e.g., decay, safety and violence, discrimination, segregation) that negatively affect health through stress and other psychosocial processes (Diez Roux and Mair, 2010; IOM, 2003b). Thus, there is a conceptual relationship between environmental measures of residential and community context and health care outcomes of interest. Additionally, environmental characteristics are not logical consequences of care.

Although environmental measures are likely to be associated with health and health care outcomes, evidence is currently limited (NASEM, 2016a). Environmental measures are potentially easy to collect, although measures need to be tested further. These measures are also likely to be resistant to gaming or manipulation. For example, a growing body of literature shows that some neighborhoods have substantially fewer safe recreation spaces, purveyors of healthy foods, and health care resources (Blustein et al., 2010; Diez Roux and Mair, 2010). However, evidence regarding the effect of these factors on health care outcomes is still lacking. This is therefore an emerging area of research that could be reevaluated for potential inclusion as more evidence emerges. In sum, environmental measures are conceptually powerful, but this is an emerging area of research and the empirical association with health care outcomes is poorly established. Two environmental measures for which there is more empirical evidence—urbanicity and housing—are discussed in more detail.

Urbanicity

Urbanicity describes where an individual's place of residence falls on the spectrum from urban to rural. On one end of the spectrum, rural areas are associated with poorer access to health care owing to both distance and availability. Rural areas are also associated with increased risks from environmental hazards associated with rural industries such as pesticides in farming (IOM, 2003b). On the other end, urban areas may have regions with concentrated disadvantage that expose residents to negative effects of poverty, negative psychosocial exposures, and physical decay. Cities may also expose residents to environmental hazards associated with air pollution and safety hazards of old or densely populated buildings (IOM, 2003b). Thus, urbanicity is conceptually related to health care outcomes of interest. In its first report, the committee identified literature indicating that urbanicity may influence health care utilization, clinical processes of care, health care costs, and patient experiences of care, particularly at the far ends of the spectrum (NASEM, 2016a,b). This supports an empirical association. Urbanicity is not a logical consequence of care.

Urbanicity can be measured dichotomously (i.e., urban or rural), trichotomously (i.e., urban, suburban, rural), or on a graded spectrum (e.g., percent urban). Urbanicity can be measured as a provider or patient characteristic. Urbanicity as a provider characteristic (e.g., urbanicity of a hospital) can only measure between-unit effects, whereas patient urbanicity (e.g., rural versus urban patients) can be used to assess both within- and between-unit effects. However, patient urbanicity may differ in significant ways across provider urbanicity because, for example, rural patients who receive care from urban hospitals are likely to differ significantly from rural patients who receive care at rural hospitals. Measures are resistant to gaming and manipulation, and they are relatively easy to collect. However, assessing urbanicity may pose some potential measurement issues related to identifying the appropriate size to avoid misclassification (Krieger et al., 2002). For example, at the Census tract level, there can be substantial variation in population and geographic size. Additionally, Census tracts may be too small to capture truly rural or urban areas, misclassifying, for example, areas within a large metropolitan county as "rural" or small towns in rural areas as "urban" (Hart et al., 2005). Taken together, urbanicity is related to health care outcomes, precedes care delivery and is not a consequence of the quality of care, is not modifiable through provider action, and generally meets practical considerations, with some limitations.

Housing

Health-relevant elements of housing include housing stability homelessness, and quality and safety. Homelessness and housing instability (lack of access or threats to reasonable quality housing) (Frederick et al., 2014) are associated with lower access to care and higher physical and mental morbidity, as well as increased mortality (NASEM, 2016a). Additionally, poor housing conditions can expose individuals to harmful exposures such as lead or poor air quality, infectious disease, poor sanitation, and injury (IOM, 2003b; NASEM, 2016a). Thus, literature supports a conceptual relationship. Substantial literature supports associations between poor housing, housing instability, and homelessness with a wide range of health conditions covering physical and mental health (IOM, 2003b; Krieger, 2003). However, the empirical association between housing and health care outcomes is less well established. Literature suggests that homeless persons have high hospital readmission rates (Buck et al., 2012; Doran et al., 2013). In its second report, the committee also identified case studies in which housing conditions—stairs and loose wires—were considered risk factors for poor health care outcomes (e.g., falls) (NASEM, 2016b). In its first report, the committee identified a small number of studies examining the relationship between type of residence (namely, private or institutional post-discharge residence) and readmissions, and these studies found no association with either short-term (30-day) or long-term (1-year) readmissions (NASEM, 2016a). To that end, housing is potentially susceptible to rapid changes as a consequence of health care. For example, after a serious health event, a hospital may discharge a patient to an institutional setting such as a skilled nursing facility, which may have resources and conditions that differ substantially from the patient's residence in the community. However, at the population level, housing is unlikely to be susceptible to rapid changes.

Measures of housing and homelessness are likely to be resistant to gaming or manipulation, but currently present some practical limitations. Homelessness is typically assessed using counts, which requires large teams to physically count homeless persons residing within a given geographic area (HUD, 2012). Some measures of housing insecurity also exist (e.g., how often an individual was worried about paying rent in the past month) (CDC, 2013), but these measures tend to be proxies for financial stress or SEP rather than assessing housing adequacy. Other measures, such as housing characteristics collected through the Medicare Current Beneficiary Survey (CMS, 2006) and those the Department of Housing and Urban Development uses to assess housing quality under its Section 8 program include many items requiring comprehensive inspections and can therefore be burdensome to collect (HUD, 1998).

Summary

Compositional characteristics and environmental measures of residential and community context are related to health care outcomes, precede care delivery and are not a consequence of the quality of care, are not modifiable through provider action, and generally meet practical considerations, with some limitations. A measure of Census-tract neighborhood deprivation (i.e., a composite measure of neighborhood compositional characteristics) is likely a good proxy for a range of individual and true area-level constructs (compositional and environmental) relevant to performance indicators used in VBP. These measures are also feasible to obtain. Measures of urbanicity and housing are also available. Environmental measures are an emerging area of research and other measures could be revisited for potential inclusion when there is more empirical evidence and better measures.[1]

HEALTH LITERACY

Health literacy is "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (IOM, 2004, p.32). The committee does not conceive of health literacy as a social risk factor, but rather as the product of an individual's skills and abilities (e.g., reading and other critical skills), social and cultural factors, education, health system demands, and the health care context (IOM, 2004). However, the committee included health literacy in its conceptual framework and retained it for consideration in this report because health literacy is included in the committee's charge and because it is specifically mentioned in the Improving Medicare Post-Acute Care Transformation (IMPACT) Act and therefore of interest to Congress. Additionally, social risk factors like education and language influence health literacy. The committee's conception of health literacy also captures the related concept of numeracy, or the ability to understand information presented in mathematical terms and to use mathematical knowledge and skills in a variety of applications across a variety of settings (IOM, 2014).

By definition, health literacy and numeracy are conceptually related to health care outcomes. Furthermore, in part because health literacy and numeracy are defined as barriers to accessing health care and adhering to treatment regimens, they may have strong face validity, especially among health care professionals. Low health literacy is associated with poorer knowledge of disease management and health-promoting behaviors and poorer health status (IOM, 2004). In its first report, the committee also identified literature indicating that health

---

[1] The committee sees no conflict between this report and the 2013 IOM report *Variation in Health Care Spending: Target Decision Making, Not Geography*, which recommended against using area-level payment adjustments to account for regional practice patterns. That committee's charge was to evaluate whether area-level differences in per-beneficiary spending were real and if so, to develop explanations for the variation. That report examined whether health care markets (characterized using relatively large geographies such as hospital service areas, hospital referral regions, or metropolitan statistical areas) were characterized by persistent patterns of spending driven by commonalities in medical decision making or other provider behavior and concluded that area spending variability was mainly due to price markups in the commercial insurance market and variation in the use of post-acute care in Medicare. In contrast, this report focuses on differences in performance indicators used in VBP (including variations in health care utilization and resource use, but also quality) driven by differences in social characteristics of a provider or other risk-bearing entity's patient population. The use of area-level measures is therefore at much smaller geographic units (e.g., Census tracts of patient place of residence) and serves to more accurately characterize providers' patient populations in Medicare quality measurement and payment programs.

literacy may influence health care utilization, clinical processes of care, health care cost, and patient experiences of care (NASEM, 2016a). This literature supports an empirical association. There is less evidence on effects of numeracy on health and health care outcomes (NASEM, 2016a). Available measures of health literacy and numeracy exist, but some of these instruments are long and may be burdensome to collect in the clinical setting (IOM, 2009b). Others capture limited components of health literacy—for example, reading and writing skills, but not listening and speaking skills, or an individual's lack of background knowledge or cultural differences that may influence his or her understanding (IOM, 2004). The committee expects these measures to be resistant to gaming and manipulation.

Although the committee acknowledges that the burden of improving health literacy does not fall solely on the health care system, the health care system does carry significant responsibility. Health care providers can mitigate the effects of low health literacy (IOM, 2004; Pleasant et al., 2016). For example, a systematic review identified methods that are effective at improving patient health literacy (Berkman, 2011). Thus, taking a universal precautions approach, which assumes that it may be difficult for all patients to understand health information and access health services, health care providers can tailor care to each patient's level of health literacy and numeracy to ameliorate the effects that low health literacy and numeracy have on health care outcomes (Kripalani et al., 2014). Similarly, health literate health care organizations can align the demands of the health care system with patients' skills and abilities to make it easier for patients to access, understand, navigate, and use health information and health care services (Brach et al., 2012; IOM, 2012). Thus, health literacy is something providers can act upon and can be a consequence of the quality of health care provided.

Summary

Health literacy is related to health care outcomes of interest and generally meets practical considerations. However, provider actions can mitigate the effects of low health literacy. Thus, to preserve incentives to provide effective care to patients with low health literacy, it would not be desirable to adjust or otherwise account for differences in health literacy in performance indicators used in VBP. Nevertheless, it may be desirable to reward or incentivize the greater effort or greater costs required to provide health literate care and thereby produce good health care outcomes in other ways.

SYNOPSIS

Table 3-1 summarizes the social risk factors as well as health literacy, along with their rationale for inclusion in methods to account for them and potential limitations. In the table, specific criteria as they apply to indicators of social risk factors are indicated using the criteria numbers from the previous chapter (in parentheses). To review, the criteria are:

A. The social risk factor is related to the outcome.
    1. The social risk factor has a conceptual relationship with the outcome of interest.
    2. The social risk factor has an empirical association with the outcome of interest.

B. The social risk factor precedes care delivery and is not a consequence of the quality of care.
   3. The social risk factor is present at the start of care.
   4. The social risk factor is not modifiable through provider actions.

C. The social risk factor is not something the provider can act upon and manipulate.
   5. The social risk factor is resistant to manipulation or gaming.

TABLE 3-1 Application of Selection Criteria to Indicators of Social Risk Factors and Health Literacy

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
Socioeconomic Position				
Income		Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with outcomes used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Potentially susceptible to (rapid) changes as a consequence of a health event (3) Although measures are available, they may be sensitive to collect (2)	May be less salient especially among the very old (80+) where there is less variation in income—although income includes both earned and unearned income, so there is still sufficient variation (albeit narrower than the general population) among Medicare beneficiaries
Wealth (as an alternate measure of economic resources)		Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with outcomes used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Salient for Medicare beneficiaries, but sensitive to collect (people often don't know the value of their assets, or what assets they have); missing data at ends of distribution (2) Potentially susceptible to (rapid) changes as a consequence of a health event (3)	

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
Insurance (as a proxy for income)	Specifically, Medicaid status/dual eligibility in Medicare payment context (represents eligibility requirements)	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Less precise indicator of SEP; captures less variation, captures insurance coverage (1) Interacts with elements of the health system—e.g., spend down to meet income requirements (5)	
Education		Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)		Implications for health may vary across age cohorts due to changes in the distribution of education over time.
Occupation	Can cover both employment status (whether or not and to what degree an individual is employed) as well as the type of occupation among the employed; can be collected for current state or as primary lifetime occupation	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Difficult to collect and classify in U.S. context (2) Potentially susceptible to (rapid) changes as a consequence of a health event (3)	Many Medicare beneficiaries are out of the labor force (including all who are eligible based on disability); some groups such as older women may not have an employment-related occupation, making it difficult to identify SEP

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
Other measures	Other proxy measures of access to economic resources include food sufficiency/insecurity, self-reported financial burden, and financial barriers	Has a conceptual relationship with performance indicators used in VBP (1) Not a consequence of care (3, 4)	Lack of evidence of associations with outcomes (2)	Practical considerations will depend on the specific measure
SUMMARY	*Income and education are promising measures. Dual eligibility/Medicaid status is also an available measure of resources available for goods and services to support health and health care capturing elements of income and wealth and is thus a crude proxy for SEP. Wealth is also promising, but collecting accurate data especially at the ends of the distribution is currently difficult. Occupation is conceptually strong, but measuring occupation in the United States poses substantial practical challenges.*			
		Race, Ethnicity, and Cultural Context		
Race and ethnicity	Social categories that are dimensions of society's stratification system by which resources, risks, and rewards are distributed; capture a range of health-relevant dimensions related to social disadvantage (e.g., access to social institutions, power/status/material resources, psychosocial exposures), also behavioral norms, sociocultural factors	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Refinement of standardized race and ethnicity measures is still needed; there can be substantial heterogeneity within categories (especially Hispanic ethnicity, Asian/Pacific Islander race) (2)	Some existing standards include White House Office of Management and Budget standards and IOM recommendations (IOM, 2009)

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
Language	Typically represents language barriers such as speaking a primary language other than English, having limited English proficiency or otherwise needing interpreter services; can also serve as crude proxy for acculturation	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)		Likely to have important interactions with race and ethnicity
Nativity , immigration history, and acculturation	Includes country of origin (specific country or foreign-born versus U.S.-born), immigration status (including refugee and documentation status), duration in the United States, and measures of acculturation (i.e., the extent to which an individual adheres to the social norms, values, and practices of his own ethnic group or home country or to those of the United States): nativity can be a rough proxy for acculturation	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Collecting data on documentation status as an indicator of immigration history may be highly sensitive (2) Measures of acculturation are probably not feasible to collect in the clinical setting, and links to health care outcomes are likely not well established (2)	Likely to have important interactions with race and ethnicity
SUMMARY	*Race, ethnicity, language, and nativity are promising measures, particularly in combination. Documentation status as a measure of immigration history is likely to be sensitive to collect. Literature supports a conceptual relationship between acculturation and health care outcomes of interest, but existing measures have limitations and empirical evidence is lacking.*			

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
		Gender		
Gender (normative)	Represents social dimensions of gender, distinguished from biological effects of sex	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Hard to decompose gender effects from biological sex effects (2)	Already included in clinical adjustment
Gender identity (non-conforming)	Includes individuals who identify as transgender, intersex, queer, questioning, and otherwise non-conforming	Has a conceptual relationship with performance indicators used in VBP (1) Present at the start of care (3) Resistant to gaming/manipulation (5)	Lack of empirical evidence and a good existing measure (2) Differential health outcomes may arise from provider–patient encounter (miscommunication, lack of cultural competence, bias (4)	Very low prevalence, unlikely to have a significant effect in adjustment models: CMS is piloting measures for sexual orientation that could be revisited for potential inclusion when there is more data
Sexual orientation	Includes individuals who identify as lesbian, gay, bisexual, queer, questioning	Has a conceptual relationship with performance indicators used in VBP (1) Present at the start of care (3) Resistant to gaming/manipulation (5)	Lack of empirical evidence and a good existing measure (2) Differential health outcomes may arise from provider–patient encounter (miscommunication, lack of cultural competence, bias (4)	CMS is piloting measures for sexual orientation that could be revisited for potential inclusion when there is more data

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
SUMMARY	*Normative gender identity (men and women) is promising, but already included in clinical risk adjustment models. Gender identity and sexual orientation could be revisited when there are better measures and data. However, in the short term, prevalence of individuals who have a non-conforming gender identity is likely to be low and thus not substantially affect adjustments.*			
Social Relationships				
Marital/ partnership status	Foundational structural element of social relationships; often considered an important indicator of social support	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Potentially susceptible to rapid changes (3)	
Living alone	Structural element of social relationships, typically an indicator of social isolation or loneliness in health care and health services research	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Potentially susceptible to rapid changes (3) Changes in living status (positive or negative) may result from health care interactions (3, 4)	Unlikely to vary across reporting units substantially, but there may be specific geographic regions with substantially higher prevalence of older adults living alone; may be important to measure with regional interactions (9)

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
Emotional and instrumental social support	Key function of social relationships, includes emotional elements (e.g., through caring and concern) as well as instrumental components (i.e., material and other practical support)	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Measuring social support can be challenging (2) Potentially susceptible to rapid changes (3) Changes in social status (positive or negative) may result from health care interactions (3, 4)	
SUMMARY	*Marital/partnership status and living arrangements (living alone) are feasible to measure and may at least partly capture social support elements. Emotional and instrumental social support are strongly related to health care outcomes; some measures exist, but because they are multidimensional and causal mechanisms are poorly understood, measuring social support can be difficult both conceptually and practically.*			
		Residential and Community Context		
Compositional characteristics	Includes dimensions of SEP, the proportion of racial and ethnic minority residents, foreign-born residents, single parent households, English language proficient residents, either individually or in composite (e.g., in a summary neighborhood deprivation measure)	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Can be a messy measure: When used as a proxy for individual-level effects, may also pick up area-level effects (1)	Can be used as proxy for individual characteristics or as area-level measure; can be assessed using individual characteristics or as a composite

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
Environmental measures	Dimensions of residential environments including the physical environment (e.g., housing, walkability, transportation options, and proximity to services) and social environments (e.g., safety and violence, social disorder, presence of social organizations, and social cohesion)	Has a conceptual relationship with performance indicators used in VBP (1) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Lack of evidence, but potentially easy to measure/collect (2) Measures need to be tested further (8)	Effects are small (at population level, may be unlikely to rise above SEP
Urbanicity	Describes where a place (of an individual's residence) falls on the spectrum from urban to rural	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Not a consequence of care (3, 4) Resistant to gaming/manipulation (5)	Some potential measurement challenges; need to measure at the appropriate size to avoid misclassification (2)	
Housing	Health-relevant dimensions of housing include housing insecurity, homelessness, and quality and safety.	Has a conceptual relationship with performance indicators used in VBP (1) Resistant to gaming/manipulation (5)	Lack of evidence (2) Potentially susceptible to (rapid) changes as a consequence of a health event (3) Potentially a characteristic of care (4) Measures need to be tested further (2)	

Indicator	Definitional Issues	Rationale	Potential Limitations/Challenges	Other Considerations
SUMMARY	*A measure of Census-tract neighborhood deprivation is likely good proxy for a range of individual-level and true area-level constructs relevant to outcomes of interest and feasible to obtain. Environmental measures are an area of emerging research that could be revisited when there is more empirical evidence and better measures. Measures of urbanicity and housing are also available.*			
		Health Literacy		
Health literacy (and numeracy)	Health literacy is the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions; numeracy describes the ability to understand information presented in mathematical terms and to use mathematical knowledge and skills in a variety of applications across a variety of settings	Has a conceptual relationship with performance indicators used in VBP (1) Has an empirical relationship with performance indicators used in VBP (2) Resistant to gaming/manipulation (5)	Validated measures exist, but may be burdensome to collect (2) Malleable in individuals and can be improved as a consequence of the quality of care provided (3) Providers can act upon to ameliorate effects; thus, potentially a characteristic of care (4)	Health literacy and numeracy are outcomes of social risk factors (like SEP, language)
SUMMARY	*Health literacy is the result of social risk factors and the effects of low literacy can be mitigated via actions that are squarely within the purview of the health care system. Thus, risk adjustment is likely to reduce incentives to tailor care to or improve patients' health literacy.*			

After applying the selection criteria to indicators of the five social risk factors and health literacy, the committee made the following conclusions:

> *Conclusion 2: There are measurable social risk factors that could be accounted for in Medicare value-based payment programs in the short-term. Indicators include:*
>
> - *Income, education, and dual-eligibility;*
> - *Race, ethnicity, language, and nativity;*
> - *Marital/partnership status and living alone; and*
> - *Neighborhood deprivation, urbanicity, and housing.*

> *Conclusion 3: There are some indicators of social risk factors that capture the basic underlying constructs and currently present practical challenges, but they are worth attention for potential inclusion in accounting methods in Medicare value-based payment programs in the longer term. These include:*
>
> - *Wealth,*
> - *Acculturation,*
> - *Gender identity and sexual orientation,*
> - *Emotional and instrumental social support, and*
> - *Environmental measures of residential and community context.*

IMPLEMENTATION CONSIDERATIONS

The committee applied selection criteria to each social risk factor and relevant indicators of these factors individually. However, as discussed in the previous chapter, the goal is to identify a set of measures that perform well together. To that end, a combination of measures might perform differently than the sum of its parts. Additionally, some social risk factors may have regional interactions. For example, as previously described, living alone may not vary substantially across reporting units except in certain communities with exceptionally high proportions of older adults living alone. Furthermore, as discussed with regard to measures of neighborhood deprivation and indicators of social support, proxy measures may cover multiple indicators. Finally, as described in Chapter 2, the committee expects the relationships between social risk factors and health and health care outcomes to change over time. Thus, it will be important to continuously evaluate the individual risk factors, indicators, and measures as well as the overall set of measures over time. These are empirical issues to test and apply when using real data.

REFERENCES

Abraído-Lanza, A. F., A. N. Armbrister, K. R. Flórez, and A. N. Aguirre. 2006. Toward a theory-driven model of acculturation in public health research. *American Journal of Public Health* 96(8):1342-1346.

Acevedo-Garcia, D., and L. M. Bates. 2008. Latino health paradoxes: Empirical evidence, explanations, future research, and implications. In *Latinas/os in the United States: Changing the face of America*. New York, NY: Springer. Pp. 101-113.

Adler, N. E., and K. Newman. 2002. Socioeconomic disparities in health: Pathways and policies. *Health Affairs (Millwood)* 21(2):60-76.

Adler, N. E., T. Boyce, M. A. Chesney, S. Cohen, S. Folkman, R. L. Kahn, and S. L. Syme. 1994. Socioeconomic status and health: The challenge of the gradient. *American Psychologist* 49(1):15-24.

AHRQ (Agency for Healthcare Research and Quality). 2016. *2015 national healthcare quality and disparities report and 5th anniversary update on the national quality strategy*. http://www.ahrq.gov/sites/default/files/wysiwyg/research/findings/nhqrdr/nhqdr15/2015nhqdr.pdf (accessed June 8, 2016).

Allin, S., C. Masseria, and E. Mossialos. 2009. Measuring socioeconomic differences in use of health care services by wealth versus by income. *American Journal of Public Health* 99(10):1849-1855.

Aughinbaugh, A., O. Robles, and H. Sun. 2013. Marriage and divorce: Patterns by gender, race, and educational attainment. *Monthly Labor Review* 136:1.

Berkman, L., and T. Glass. 2000. Social integration, social networks, social support, and health. In *Social epidemiology*. New York: Oxford University Press.

Berkman, N. D. 2011. *Health literacy interventions and outcomes: An updated systematic review*. Vol. 199. Rockville, MD: Agency for Healthcare Research and Quality.

Blustein, J., W. B. Borden, and M. Valentine. 2010. Hospital performance, the local economy, and the local workforce: Findings from a us national longitudinal study. *PLoS Medicine* 7(6):e1000297.

Brach, C., D. Keller, L. M. Hernandez, C. Baur, B. Dreyer, P. Schyve, A. J. Lemerise, and D. Schillinger. 2012. *Ten attributes of health literate health care organizations*. Washington, DC: Institute of Medicine.

Braveman, P. A., C. Cubbin, S. Egerter, S. Chideya, K. S. Marchi, M. Metzler, and S. Posner. 2005. Socioeconomic status in health research: One size does not fit all. *JAMA* 294(22):2879-2888.

Braveman, P. A., C. Cubbin, S. Egerter, D. R. Williams, and E. Pamuk. 2010. Socioeconomic disparities in health in the United States: What the patterns tell us. *American Journal of Public Health* 100(S1):S186-S196.

Brummett, B. H., J. C. Barefoot, I. C. Siegler, N. E. Clapp-Channing, B. L. Lytle, H. B. Bosworth, R. B. Williams, Jr., and D. B. Mark. 2001. Characteristics of socially isolated patients with coronary artery disease who are at elevated risk for mortality. *Psychosomatic Medicine* 63(2):267-272.

Buck, D. S., C. A. Brown, K. Mortensen, J. W. Riggs, and L. Franzini. 2012. Comparing homeless and domiciled patients' utilization of the Harris County, Texas public hospital system. *Journal of Health Care for the Poor and Underserved* 23(4):1660-1670.

CDC (Centers for Disease Control and Prevention). 2010. *National Health Interview Survey annotated bibliography*. http://www.cdc.gov/nchs/nhis/rhoi/rhoi_bibliography.htm (accessed April 26, 2016).

CDC. 2013. *Behavioral Risk Factor Surveillance System questionnaire*. http://www.cdc.gov/brfss/questionnaires/pdf-ques/2013%20BRFSS_English.pdf (accessed May 18, 2016).

CMS (Centers for Medicare & Medicaid Services). 2006. *Medicare current beneficiary survey*. https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/MCBS/Downloads/OLD/2006CBQah.pdf (accessed June 6, 2016).

CMS. 2016. *Racial and ethnic disparities in health care in medicare advantage*. https://www.cms.gov/About-CMS/Agency-Information/OMH/Downloads/National-Level-Results.pdf (accessed June 8, 2016).

CMS. n.d.-a. *Eligibility*. https://www.medicaid.gov/medicaid-chip-program-information/by-topics/eligibility/eligibility.html (accessed May 18, 2016).

CMS. n.d.-b. *Get help paying costs: Medicaid*. https://www.medicare.gov/your-medicare-costs/help-paying-costs/medicaid/medicaid.html (accessed May 18, 2016).

Cohen, S. 2004. Social relationships and health. *American Psychologist* 59(8):676-684.

Copen, C., A. Chandra, and I. Febo-Vazquez. 2016. Sexual behavior, sexual attraction, and sexual orientation among adults aged 18-44 in the United States: Data from the 2011-2013 National Survey of Family Growth. *National Health Statistics Reports* (88):1-14.

Cornwell, E. Y., and L. J. Waite. 2009. Social disconnectedness, perceived isolation, and health among older adults. *Journal of Health and Social Behavior* 50(1):31-48.

Cubbin, C., C. Pollack, B. Flaherty, M. Hayward, A. Sania, D. Vallone, and P. Braveman. 2011. Assessing alternative measures of wealth in health research. *American Journal of Public Health* 101(5):939-947.

Cutler, D. M., and A. Lleras-Muney. 2006. *Education and health: Evaluating theories and evidence.* Cambridge, MA: National Bureau of Economic Research.

Deaton, A. 2002. Policy implications of the gradient of health and wealth. *Health Affairs* 21(2):13-30.

Diez Roux, A. V., and C. Mair. 2010. Neighborhoods and health. *Annals of the New York Academy of Sciences* 1186:125-145.

Doran, K. M., K. T. Ragins, A. L. Iacomacci, A. Cunningham, K. J. Jubanyik, and G. Y. Jenq. 2013. The revolving hospital door: Hospital readmissions among patients who are homeless. *Medical Care* 51(9):767-773.

Eckerstorfer, P., J. Halak, J. Kapeller, B. Schütz, F. Springholz, and R. Wildauer. 2015. Correcting for the missing rich: An application to wealth survey data. *Review of Income and Wealth*.

Eggleston, J. S., and M. A. Klee. 2015. *Reassessing wealth data quality in the survey of income and program participation*. http://www.census.gov/library/working-papers/2016/demo/SEHSD-WP2016-17.html (accessed May 18, 2016).

Elliott, M. N., D. E. Kanouse, Q. Burkhart, G. A. Abel, G. Lyratzopoulos, M. K. Beckett, M. A. Schuster, and M. Roland. 2015. Sexual minorities in England have poorer health and worse health care experiences: A national survey. *Journal of General Internal Medicine* 30(1):9-16.

Eng, P. M., E. B. Rimm, G. Fitzmaurice, and I. Kawachi. 2002. Social ties and change in social ties in relation to subsequent total and cause-specific mortality and coronary heart disease incidence in men. *American Journal of Epidemiology* 155(8):700-709.

Frederick, T. J., M. Chwalek, J. Hughes, J. Karabanow, and S. Kidd. 2014. How stable is stable? Defining and measuring housing stability. *Journal of Community Psychology* 42(8):964-979.

Goodell, S. G., and J. J. Escarce. 2007. *Racial and ethnic disparities in access to and quality of health care*.

http://www.health.state.mn.us/divs/hpsc/hep/transform/novdocuments/rwjsynthesis.pdf (accessed June 6, 2016).

Hart, L. G., E. H. Larson, and D. M. Lishner. 2005. Rural definitions for health policy and research. *American Journal of Public Health* 95(7):1149-1155.

Hawton, A., C. Green, A. P. Dickens, S. H. Richards, R. S. Taylor, R. Edwards, C. J. Greaves, and J. L. Campbell. 2011. The impact of social isolation on the health status and health-related quality of life of older people. *Quality of Life Research* 20(1):57-67.

HHS (Department of Health and Human Services). 2014. *Improving cultural competence: A treatment improvement protocol*. Rockville, MD: U.S. Substance Abuse and Mental Health Services Administration.

HHS. 2015a. 2015 edition health information technology (health IT) certification criteria, 2015 edition base electronic health record (EHR) definition, and ONC health IT certification program modifications. *Federal Register*. (80): 62601 -62759.

HHS. 2015b. *Developing better information*. http://www.hhs.gov/programs/topic-sites/lgbt/better-information/index.html (accessed April 21, 2016).

HHS. 2015c. *A profile of older Americans: 2015*. http://www.aoa.acl.gov/aging_statistics/profile/2015/docs/2015-Profile.pdf (accessed June 6, 2016).

Holt-Lunstad, J., T. B. Smith, and J. B. Layton. 2010. Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine* 7(7):e1000316.

House, J. S., K. R. Landis, and D. Umberson. 1988. Social relationships and health. *Science* 241(4865):540-545.

Houser, A., M. J. Gibson, and D. L. Redfoot. 2010. Trends in family caregiving and paid home care for older people with disabilities in the community: Data from the national long-term care survey. *AARP Public Policy Institute*. http://nasuad.org/sites/nasuad/files/hcbs/files/196/9758/caregiving2010.pdf (accessed May 18, 2016).

HUD (Department of Housing and Urban Development). 1998. *Resident assessment of housing quality: Lessons from pilot surveys*. https://www.huduser.gov/portal/Publications/pdf/quality.pdf (accessed May 18, 2016).

HUD. 2012. *Using data to understand and end homelessness*. https://www.huduser.gov/portal/periodicals/em/summer12/highlight2.html (accessed May 10, 2016).

IOM (Institute of Medicine). 2003a. *Unequal treatment: Confronting racial and ethnic disparities in health care*. Washington, DC: The National Academies Press.

IOM. 2003b. *The future of the public's health in the 21st century*. Washington, DC: The National Academies Press.

IOM. 2004. *Health literacy: A prescription to end confusion*. Washington, DC: The National Academies Press

IOM. 2009a. *America's uninsured crisis: Consequences for health and health care*. Washington, DC: The National Academies Press.

IOM. 2009b. *Measures of health literacy: Workshop summary*. Washington, DC: The National Academies Press.

IOM. 2009c. *Race, ethnicity, and language data: Standardization for health care quality improvement*. Washington, DC: The National Academies Press.

IOM. 2011. *The health of lesbian, gay, bisexual, and transgender people: Building a foundation for better understanding*. Washington, DC: The National Academies Press

IOM. 2012. *How can health care organizations become more health literate?: Workshop summary*. Washington, DC: The National Academies Press.

IOM. 2013. *Variation in health care spending: Target decision making, not geography.* Washington, DC: The National Academies Press.

IOM. 2014. *Capturing social and behavioral domains and measures in electronic health records: Phase 2*. Washington, DC: The National Academies Press

Jerant, A., R. Arellanes, and P. Franks. 2008. Health status among us hispanics: Ethnic variation, nativity, and language moderation. *Medical Care* 46(7):709-717.

Kasl, S. V., and B. A. Jones. 2000. The impact of job loss and retirement on health. *Social Epidemiology* 118-136.

Kochhar, R., and R. Fry. 2014. Wealth inequality has widened along racial, ethnic lines since end of great recession. *Pew Research Center* 12.

Krieger, N. 2000. Refiguring “race”: Epidemiology, racialized biology, and biological expressions of race relations. *International Journal of Health Services* 30(1):211-216.

Krieger, N. 2003. Genders, sexes, and health: What are the connections—and why does it matter? *International Journal of Epidemiology* 32(4):652-657.

Krieger, N., D. R. Williams, and N. E. Moss. 1997. Measuring social class in U.S. public health research: Concepts, methodologies, and guidelines. *Annual Review of Public Health* 18:341-378.

Krieger, N., J. T. Chen, P. D. Waterman, M.-J. Soobader, S. Subramanian, and R. Carson. 2002. Geocoding and monitoring of U.S. socioeconomic inequalities in mortality and cancer incidence: Does the choice of area-based measure and geographic level matter? The public health disparities geocoding project. *American Journal of Epidemiology* 156(5):471-482.

Kripalani, S., K. Wallston, K. Cavanaugh, C. Osborn, S. Mulvaney, A. McDougald Scott, and R. Rothmann. 2014. Measures to assess a health-literate organization. *Vanderbilt Center for Effective Health Communication*, http://www.nationalacademies.org/hmd/Activities/PublicHealth/HealthLiteracy/~/media/Files/Activity%20Files/PublicHealth/HealthLiteracy/Commissioned-Papers/Measures_to_Assess_HLO.pdf (accessed June 27, 2016).

LaVeist, T. A. 2005. Disentangling race and socioeconomic status: A key to understanding health inequalities. *Journal of Urban Health* 82(2 Suppl 3):iii26-iii34.

Lee, J., and H. Kim. 2008. A longitudinal analysis of the impact of health shocks on the wealth of elders. *Journal of Population Economics* 21(1):217-230.

Liu, H., and D. J. Umberson. 2008. The times they are a changin’: Marital status and health differentials from 1972 to 2003. *Journal of Health and Social Behavior* 49(3):239-253.

Liu, H., C. Reczek, and D. Brown. 2013. Same-sex cohabitors and health the role of race-ethnicity, gender, and socioeconomic status. *Journal of Health and Social Behavior* 54(1):25-45.

Lynch, S. M. 2003. Cohort and life-course patterns in the relationship between education and health: A hierarchical approach. *Demography* 40(2):309-331.

Moore, J. C., and E. J. Welniak. 2000. Income measurement error in surveys: A review. *Journal of Official Statistics* 16(4):331.

NASEM (The National Academies of Sciences, Engineering, and Medicine). 2016a. *Accounting for social risk factors in medicare payment: Identifying social risk factors*. Washington, DC: The National Academies Press.

NASEM. 2016b. *Systems practices for the care of socially at-risk populations*. Washington, DC: The National Academies Press.

Newhouse, J. P., M. Price, J. Huang, J. M. McWilliams, and J. Hsu. 2012. Steps to reduce favorable risk selection in medicare advantage largely succeeded, boding well for health insurance exchanges. *Health Affairs* 31(12):2618-2628.

OMB (Office of Management and Budget). 1995. *Standards for the classification of federal data on race and ethnicity*. https://www.whitehouse.gov/omb/fedreg_race-ethnicity (accessed April 21, 2016).

Phelan, J. C., and B. G. Link. 2015. Is racism a fundamental cause of inequalities in health? *Annual Review of Sociology* 41:311-330.

Pleasant, A., R. E. Rudd, C. O'Leary, M. K. Paasche-Orlow, M. P. Allen, W. Alvarado-Little, L. Myers, K. Parson, and S. Rosen. 2016. Considerations for a new definition of health literacy. http://nam.edu/wp-content/uploads/2016/04/Considerations-for-a-New-Definition-of-Health-Literacy.pdf (accessed May 18, 2016).

Roblin, D. W. 2013. Validation of a neighborhood SES index in a managed care organization. *Medical Care* 51(1):e1-e8.

Seeman, T. E., T. M. Lusignolo, M. Albert, and L. Berkman. 2001. Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: Macarthur studies of successful aging. *Health Psychology* 20(4):243-255.

Shapiro, T., T. Meschede, and S. Osoro. 2013. The roots of the widening racial wealth gap: Explaining the black-white economic divide. *Institute on Assets and Social Policy*. http://iasp.brandeis.edu/pdfs/Author/shapiro-thomas-m/racialwealthgapbrief.pdf (accessed June 24, 2016).

SSA (Social Security Administration). n.d. *Disability planner: How we decide if you are disabled.* https://www.ssa.gov/planners/disability/dqualify5.html (accessed May 18, 2016).

Tamborini, C. R. 2007. Never-married in old age: Projections and concerns for the near future, the. *Social Security Bulletin* 67:25.

Theorell, T. 2000. Working conditions and health. In *Social epidemiology*, edited by L. F. Berkman and I. Kawachi. New York: Oxford University Press.

Tomaka, J., S. Thompson, and R. Palacios. 2006. The relation of social isolation, loneliness, and social support to disease outcomes among the elderly. *Journal of Aging and Health* 18(3):359-384.

Uchino, B. N. 2006. Social support and health: A review of physiological processes potentially underlying links to disease outcomes. *Journal of Behavioral Medicine* 29(4):377-387.

Umberson, D., and J. K. Montez. 2010. Social relationships and health a flashpoint for health policy. *Journal of Health and Social Behavior* 51(1 Suppl):S54-S66.

Wade, P. 1997. *Race and ethnicity in latin america*. Sterling, VA: Pluto Press.

Wang, W., and K. C. Parker. 2014. *Record share of americans have never married: As values, economics and gender patterns change*. Washington, D.C.: Pew Research Center, Social & Demographic Trends Project.

Ward, B. W., J. M. Dahlhamer, A. M. Galinsky, and S. S. Joestl. 2014. Sexual orientation and health among U.S. adults: National Health Interview Survey, 2013. *National Health Statistics Reports* (77):1-10.

Williams, D. R. 1997. Race and health: Basic questions, emerging directions. *Annals of Epidemiology* 7(5):322-333.

Williams, D. R. 1999. Race, socioeconomic status, and health: The added effects of racism and discrimination. *Annals of the New York Academy of Sciences* 896:173-188.

Williams, D. R., S. A. Mohammed, J. Leavell, and C. Collins. 2010. Race, socioeconomic status, and health: Complexities, ongoing challenges, and research opportunities. *Annals of the New York Academy of Sciences* 1186:69-101.

Wilson, R. S., K. R. Krueger, S. E. Arnold, J. A. Schneider, J. F. Kelly, L. L. Barnes, Y. Tang, and D. A. Bennett. 2007. Loneliness and risk of alzheimer disease. *Archives of General Psychiatry* 64(2):234-240.

4

Methods to Account for Social Risk Factors in Medicare Value-Based Payment

When developing and selecting methods to account for social risk factors in Medicare quality measurement and payment applications, understanding the type of incentive design is important in evaluating the potential benefits and challenges of various accounting methods. The incentive design will interact with the method used to account for social risk factor(s) and produce certain potential harms. Selecting the appropriate method (or, methods) to account for social risk factors will require weighing these potential harms. Given that the Medicare payment landscape is evolving and the Centers for Medicare & Medicaid Services (CMS) is moving toward more comprehensive population-based alternative payment models (APMs), the committee developed methods that could apply to any Medicare quality measurement and/or payment program, not just the existing ones. The chapter begins with a brief review of the current Medicare payment landscape, with a focus on capitated payments to Medicare Advantage (also known as Medicare Part C) and Medicare Part D plans and on value-based payment (VBP) programs that tie payment to performance in traditional Medicare and Medicare Advantage, and the planned developments. The chapter proceeds with describing the potential benefits and harms of the status quo (not accounting for social risk factors) and compares them to the potential benefits and harms of accounting for social risk factors generally. The chapter then proposes alternative methods for accounting for social risk factors. The chapter closes with guidance on an approach to applying the methods to achieve simultaneous goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly.

INCENTIVE DESIGN IN MEDICARE PAYMENT PROGRAMS

The Patient Protection and Affordable Care Act of 2010 (ACA), and subsequent legislation such as the Improving Medicare Post-Acute Care Transformations (IMPACT) Act of 2014 and the Medicare and CHIP Reauthorization Act of 2015 (MACRA) require CMS to implement VBP programs. VBP aims to align payment and care delivery goals to improve health care quality and outcomes, while also controlling costs (Rosenthal, 2008). Together these reforms shift focus from delivery of and payment for individual services to a system that focuses on population health management and holds providers accountable for both quality and cost (McGinnis, 2016; Rajkumar et al., 2014).

In addition to congressionally mandated requirements to implement VBP programs, in 2015, Secretary of Health and Human Services (HHS) Sylvia Burwell announced a goal for CMS to have 30 percent of Medicare payments in alternative payment models by the end of 2016 and 50 percent by the end of 2018, as well as to have 85 percent of Medicare payments tied to quality or value by 2016 and 90 percent by 2018 (Burwell, 2015). As described in the committee's first report, CMS currently administers eight VBP programs and has two in planning (NASEM, 2016a). Additionally, CMS is continually developing and reorganizing more VBP programs, and the Center for Medicare & Medicaid Innovation (CMMI) also tests innovative payment models.

CMS payment models cover a spectrum of approaches from traditional fee-for-service to population-based payment models. As described in Chapter 1 and in the committee's first report, VBP models fall into two broad categories, which the committee roughly categorizes as financial incentives and APMs (NASEM, 2016a). Financial incentives such as pay-for-performance programs link financial bonuses and/or penalties to quality or value (NASEM, 2016a). APMs include episode-based payments and population-based (global) payments, shifting greater financial risk to providers to hold them accountable for the quality and efficiency of care they provide, as well as health outcomes achieved (NASEM, 2016a). Additionally, although not considered entirely VBP models nor do they classify strictly as financial incentives or APMs, Medicare Advantage and Part D have design features that tie quality and cost performance to payment, and thus are relevant for purposes of accounting for social risk factors in payment. They also include risk sharing that necessitates consideration of risk adjustment for the capitation amount or global spending target or may include VBP mechanisms such as bonus payments. Moreover, the study sponsor, the Office of the Assistant Secretary for Planning and Evaluation of HHS, included Medicare Advantage and Medicare Part D as relevant payment models in its presentation to the committee at the first meeting (Epstein, 2015). CMS VBP programs and their specific incentive designs are described briefly below.

Current Financial Incentive Programs

Penalties for Poor Performance

Hospital-Acquired Condition Payment Reduction Program Implemented beginning fiscal year (FY) 2015, the Hospital-Acquired Condition Payment Reduction Program reduces payments to acute care hospitals paid under the Inpatient Prospective Payment System based on their performance on select hospital-acquired condition quality measures, including the Agency for Healthcare Research and Quality Patient Safety Indicator 90 and the Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network infection measures. The bottom 25 percent worst performing hospitals receive a payment reduction of 1 percent for all discharges in those hospitals.

Hospital Readmission Reductions Program Begun in 2012, the Hospital Readmission Reductions Program (HRRP) is a penalty program for acute care hospitals paid under the Inpatient Prospective Payment System. The HRRP requires CMS to reduce a share of the base operating payments to hospitals that have excess readmissions (CMS, 2014b). For FY 2013 and FY 2014, CMS calculated excess readmissions for three conditions: acute myocardial infarction, heart failure, and pneumonia. In FY 2014, CMS refined the measures to account for planned readmissions, and in FY 2015, the program was expanded to include excess readmission from chronic obstructive pulmonary disease and total hip arthroplasty or total knee arthroplasty. The program further expanded to include coronary artery bypass graft surgery for FY 2017 (HHS, 2014; NASEM, 2016a). For FY 2013, the maximum reduction was 1 percent of the hospital's base operating payment; for FY 2014, the maximum reduction was 2 percent; and in FY 2015, the maximum reduction was 3 percent (CMS, 2014b). For FY 2016, the maximum reduction remains 3 percent (HHS, 2014; NASEM, 2016a).

Rewards and Penalties for Performance

Hospital Value-Based Purchasing Program The Hospital Value-Based Purchasing Program is the only Medicare hospital incentive program that offers both rewards and sanctions. Beginning FY 2013, acute care hospitals paid under the Inpatient Prospective Payment System became eligible for rewards and penalties based on performance on quality, patient experience, and efficiency (Medicare spending per beneficiary). Incentives could total up to 1 percent in FY 2013 and increase in 0.25 percent increments annually to 2 percent in FY 2017 and subsequent years (MLN, 2013). The program is a budget neutral program, so total incentive payments must equal the total payment reductions (penalties).

Physician Value-Based Modifier Program Required by the ACA and established by CMS beginning in 2015, the Physician Value-Based Modifier is a budget-neutral, pay-for-performance program (CMS, n.d.-d). In this program, physicians can receive incentive payments or penalties based on performance on quality, costs, and patient experiences of care. The program divides physicians into two categories based on whether physicians meet minimum reporting requirements using the Physician Quality Reporting System (category 1) or not (category 2). In category 1, physicians are eligible to receive either upward or downward adjustments based on their performance on quality and costs. Physicians in category 2 are subject to a modifier payment set at a fixed downward adjustment (1 percent in 2015 and 2 percent in 2016). Because the program is budget-neutral, total upward adjustments for category 1 must equal total downward adjustments for categories 1 and 2 combined.

Current Alternative Payment Models

APM with Downside Risk: End-Stage Renal Disease Quality Improvement Program

The Medicare Improvements for Patients and Providers Act (MIPPA) of 2008 authorized the End Stage Renal Disease (ESRD) Quality Improvement Program. MIPPA requires CMS to reduce payments to outpatient dialysis facilities treating ESRD patients based on the clinical measures that assess a facility's performance and reporting measures (i.e., whether facilities have met reporting requirements) (CMS, 2015a). Beginning in 2012, CMS reduced the bundled payment rate to ESRD facilities with poor performance by up to 2 percent. To determine penalties, CMS first calculates both an achievement and improvement score for each clinical measure (except the CDC National Healthcare Safety Network Bloodstream Infection in Hemodialysis Outpatients measure, which receives only an achievement score) (CMS, 2014a). Facilities that meet a minimum total performance score receive full payment, while those that fall under this threshold are subject to a reduction between 0.5 percent and 2.0 percent (CMS, 2014a, n.d.-a).

APM with Upside Gainsharing and Downside Risk

Medicare Shared Savings Program The Medicare Shared Savings Program (MSSP) is a key provision of the ACA that establishes accountable care organizations (ACOs), a payment and delivery system model that aims to motivate better care coordination, better quality care, and more efficient care through payment reforms (CMS, 2015d). CMS is phasing in the program with two tracks: a one-sided model (shared savings only) and a two-sided model (shared savings and losses). Before each performance year, CMS calculates a risk-adjusted, historical benchmark for per-beneficiary costs. At the end of each performance period, CMS compares the actual spending of each MSSP ACO to the calculated benchmark. Organizations that meet a minimum saving threshold qualify for shared savings, while those that meet a minimum loss threshold must share losses.

Other Current Value-Based Payment Models and Mechanisms

Medicare Advantage/Part C Bonus Payments

Medicare Advantage is the insurance program that covers Part A (inpatient care) and Part B (outpatient care) benefits, typically offers Part D prescription drug coverage, and may also offer additional benefits and services for additional cost (MedPAC, 2015a). For beneficiaries enrolled in MA plans (30 percent of all Medicare beneficiaries in 2015), CMS pays MA plans an annual capitated rate based on national and regional historical benchmarks that are risk adjusted using the CMS hierarchical condition category model. MA plans that achieve higher quality ratings under Medicare's Five Star Quality Rating System are also eligible for quality bonus payments. In 2016, these bonus payments equal 5 percent of the county-level rate per beneficiary.

Part D

Medicare Part D is a pharmaceutical drug reimbursement program administered by CMS and run by Medicare-approved private insurance plans. CMS pays these plans in several ways, including direct subsidies, low-income subsidies for cost sharing and premiums (costs above the direct subsidy an enrollee otherwise pays for out of pocket), and two risk-sharing mechanisms: individual reinsurance and risk corridor adjustments. Through individual reinsurance, Medicare subsidizes 80 percent of drug spending above an out-of-pocket threshold (enrollee costs including the deductible and cost sharing, also known as the catastrophic cap), while the insurance plan pays 15 percent and the enrollee pays 5 percent (Medicare.gov, n.d.; MedPAC, 2014). Risk corridor adjustment limits plans' potential gains or losses by financing costs that are higher than expected and recouping profits deemed excessive (MedPAC, 2015b). CMS calculates risk corridor adjustments at the end of each benefit year, comparing the plan's actual costs to its bid. Up to 5 percent above or below the bid, plans keep all profits and losses. Between 5 and 10 percent above or below the bid, plan share half of savings and losses with Medicare. Above or below 10 percent, Medicare covers 80 percent of the risk and plans are at risk of 20 percent.

Future and Developing Value-Based Payment Programs

Home Health Value-Based Purchasing

In its calendar year 2016 Home Health Prospective Payment Final Rule, CMS proposed a home health value-based purchasing model that would subject home health agencies to upward or downward payment adjustments based on quality and efficiency measures (HHS, 2015). CMS randomly selected nine states (Arizona, Florida, Iowa, Maryland, Massachusetts, Nebraska, North Carolina, Tennessee, and Washington) representing nine regional groups for model participation beginning January 1, 2016. CMS requires all home health agencies within the states to participate. Beginning in 2016, CMS assesses and reports performance. CMS proposed implementing payment adjustments beginning in 2018, with proposed maximum adjustments increasing incrementally from 3 percent in 2018, 5 percent in 2019, 6 percent in 2020, 7 percent in 2021, and 8 percent in 2022 (HHS, 2015). CMS proposed payment adjustment scoring using both achievement and improvement scores (HHS, 2015).

Skilled Nursing Facility Value-Based Purchasing

The Protecting Access to Medicare Act of 2014 authorizes a skilled nursing facility incentive program and also specifies details about quality measures, scoring performance, the performance standards and periods, and public reporting (CMS, n.d.-c). Beginning in 2016, CMS will measure performance on the Skilled Nursing Facility 30-Day All-Cause Readmission Measure (CMS, n.d.-c). CMS will also send skilled nursing facilities feedback reports on their performance beginning in the summer of 2016 and quarterly thereafter, and CMS will publish post-performance data publicly on Nursing Home Compare starting in October 2016. Beginning in 2018 (FY 2019), Skilled Nursing Facilities (SNFs), defined broadly as any institution that primarily provides skilled nursing or rehabilitative services, will receive incentive payments based on the quality of care they provide. CMS submitted a report to Congress detailing their implementation plan and has proposed several incentive design options, including paying for attainment, paying for improvement, and a hybrid attainment and improvement model (HHS, 2012).

The Medicare and the Children's Health Insurance Program Reauthorization Act

Among other provisions, MACRA streamlines current public reporting programs and incentivizes the development and uptake of VBP models through establishment of a new Merit-Based Incentive Payment System (MIPS) and incentive payments for participation in certain APMs (Conway et al., 2015). In 2019, quality incentive programs including the Physician Value-Based Modifier, the Physician Quality Reporting System, and the Medicare Electronic Health Records Incentive Program (also known as the Meaningful Use program) will end. MIPS will combine these separate programs into a single initiative. MIPS requires the Secretary of HHS to develop a composite performance score that combines performance on each of four weighted categories: quality, resource use, meaningful use, and clinical practice improvement activities (CMS, 2015b). Based on this score, providers may receive an upward or downward adjustment, or no adjustment. Maximum adjustments will be 4 percent in 2019, 5 percent in 2020, 7 percent in 2021, and 9 percent from 2022 forward (CMS, 2015b). From 2019 to 2024, the highest performers will also receive an additional payment adjustment. The program is budget neutral, so total upward adjustments must equal total downward adjustments.

MACRA encourages provider participation in APMs through incentive payments. Qualifying participants are excluded from MIPS payment adjustments and instead receive a lump sum equaling 5 percent of the preceding year's estimated total Part B expenditures (CMS, n.d.-b; Conway et al., 2015). To qualify for these payments, in 2019 and 2020, qualifying participants must have 25 percent of their payments or patients through an eligible payment entity (CMS, n.d.-b). In 2021 and 2022, the threshold increases to 50 percent of payments or patients and in 2023 and subsequent years, the threshold rises to 75 percent. In early 2016, CMS identified 10 APMs, including MSSP (described above) and several innovative models such as Next Generation ACOs and Bundled Payment Care Improvement, described in the following section (CMS, 2016e).

Select Innovative Payment Models

CMMI designs and tests innovative payment and care deliver models. Three such payment models that tie payment to quality and efficiency of care delivered to Medicare beneficiaries, and thus for which accounting for social risk factors may be relevant, are described below.

Bundled Payment Care Improvement

The Bundled Payments for Care Improvement (BPCI) initiative incentivizes coordinated, efficient, and high quality care across clinicians and care settings by linking payments for clinical services related to a single episode of care (Press et al., 2016). BPCI tests four types of bundled payments (Press et al., 2016). In model 1, the episode of care includes all diagnostic-related groups for the duration of an inpatient stay at an acute care hospital (CMS, 2016a). The first cohort of model 1 began in April 2013 and concluded in March 2016; the remaining participants conclude in December 2016. In models 2, 3, and 4, participating providers choose the episode of care for one or more of 48 conditions as well as the duration of the episode (hospitalization and related readmissions only, hospitalization and postacute care up to 90 days, or postacute care up to 90 days only) (Press et al., 2016). The elected duration determines the model (CMS, 2016a). Although the payment methodology varies somewhat by model, in each, Medicare compares actual costs to a target bundled rate. Providers whose actual costs are under the target can keep savings, while those with costs over the target must compensate Medicare for the difference (Froimson et al., 2013). As of April 1, 2016, more than 1,500 health care providers were participating in BCPI Phase 2, including 681 skilled nursing facilities, 385 acute care hospitals, 283 physician group practices, 99 home health agencies, 9 inpatient rehabilitation facilities, and 1 long-term care hospital (CMS, 2016a).

Advanced APMs

Next Generation ACOs Next Generation ACOs build on experience from earlier ACO models such as the MSSP described above and Pioneer ACOs.[1] These Next Generation ACOs offer a

---

[1] The Pioneer ACO Model is a CMMI accountable care initiative with higher levels of savings and risk compared to MSSP, which also allows eligible participants to elect to move from fee-for-service to a population-based payment

range of payment mechanisms from fee-for-service to capitation (referred to in the model as all-inclusive population-based payments), which allow participating organizations to take on substantially more financial risk—up to 100 percent (CMS, 2016d; HHS, 2016). This provides the participating organizations with the potential to share a greater proportion of savings, although this also puts the organizations at greater financial risk for losses. Also unlike previous models, CMS will calculate a prospective (rather than retrospective) benchmark, and participating organizations receive a prospective budget (i.e., before the performance year) (HHS, 2016). The Next Generation ACOs also include a set of delivery system tools to enhance beneficiary engagement. These include potential reward payments to beneficiaries for receiving care through the ACO and affiliated providers and increased access to care coordination services, such as access to telehealth, postdischarge home visits, and skilled nursing facility services, among others (CMS, 2016d). In 2016, 21 organizations are participating in the model (HHS, 2016).

Comprehensive Primary Care Plus The Comprehensive Primary Care Plus (CPC+) model is a regionally based, advanced primary care medical home model comprising multipayer payment reform and delivery system reforms that build on the existing Comprehensive Primary Care initiative (Ayanian and Hamel, 2016; Dale et al., 2016). With respect to care delivery, participants meet a series of incremental requirements to achieve five functions: access and continuity, care management stratified by patient risk, preventive care and planned care for chronic conditions, patient and caregiver engagement, and coordinated and comprehensive care (CMS, 2016c; Sessums et al., 2016). For practices with more experience delivering advanced primary care, CPC+ has a separate track that requires these providers to provide additional services, such as identifying psychosocial needs of patients with complex needs and providing resources and other supports to meet those needs (Sessums et al., 2016). To facilitate this care delivery, CPC+ aligns payment, claims and feedback provision, and quality measures across commercial and public payers in a given region (Sessums et al., 2016). CPC+ also includes several payment mechanisms including a prospective monthly care management fee, performance-based incentive payments, and, for track 2 (experienced) models, an upfront comprehensive primary care payment for evaluation and management (CMS, 2016c). CMS also aims to aggregate cost and utility data across all payers as well as to convene health information technology vendors to facilitate providing data and tools to participants to inform practice redesign and quality improvement (Sessums et al., 2016). CMS expects to select up to 5,000 practices in 20 regions to begin a 5-year model in January 2017 (CMS, 2016b; Sessums et al., 2016).

POTENTIAL HARMS OF THE STATUS QUO COMPARED TO ACCOUNTING FOR SOCIAL RISK FACTORS

Although adjustment for social risk factors could have important benefits, any proposal to account for social risk factors in Medicare payment programs will entail its own advantages and disadvantages that need to be carefully considered. Current Medicare VBP programs that do not

---

model (prospective per beneficiary per month payment) in the third year of participation (CMS, 2016). CMS also requires Pioneer ACOs to cover at least 15,000 beneficiaries (5,000 for rural ACOs) and encourages them to negotiate VBP arrangements with other payers by the second year of participation. See https://innovation.cms.gov/initiatives/Pioneer-ACO-Model/Pioneer-ACO-FAQs.html (accessed May 19, 2016).

account for social risk factors could result in tangible harms to populations with social risk factors and to the providers who serve them (Friedberg et al., 2010; Gilman et al., 2015; Joynt and Jha, 2013). Patients with social risk factors may require more intensive care and greater costs to overcome barriers they face to achieving the same health outcomes as patients with fewer risks. By not accounting for the greater cost of caring for these patients, existing payment systems may contribute to disparities in access and quality of care (Joynt and Rosenthal, 2012; Woolhandler and Himmelstein, 2015).

Under current APMs, physicians and hospitals that disproportionately care for socially at-risk populations receive payments that may undervalue the resources and effort required to provide high-quality care for these individuals (Chien et al., 2007). Similarly, it may be difficult for even dedicated providers who disproportionately care for socially at-risk populations (including safety-net providers, minority-serving institutions, critical access hospitals, and community health centers) to gain (or not lose) revenue under quality incentive schemes (e.g., pay-for-performance), because it can be more costly to help patients with social risk factors achieve quality benchmarks (Joynt et al., 2014).

When providers who disproportionately serve patients with social risk factors lose revenue, quality of care and access for patients could decline (Chien et al., 2007; Cunningham et al., 2008; Grealy, 2014; Ryan, 2013; Volpp et al., 2006). In the short term, these providers may be required to limit staffing or reduce the variety of services provided to patients with social risk factors (Lindrooth et al., 2006). Over the longer term, revenue shortfalls could contribute to financial distress for providers and to the closure of hospitals, clinics, and physician offices in underserved communities (Kane et al., 2012; Lipstein and Dunagan, 2014). These closures, in turn, would make it difficult for patients with social risk factors to access care in their communities, contributing to delays in use of clinically beneficial treatments (Bazzoli et al., 2012; Buchmueller et al., 2006; Walker et al., 2011).

Similarly, payments to insurance plans that do not account for social risk factors could lead insurers to avoid covering underserved populations. For example, as described in the previous section, Medicare Advantage plans receive a risk-adjusted annual capitated rate and receive bonuses for achieving quality benchmarks based on performance measures risk adjusted for clinical, behavioral, and some social risk factors under the Five-Star Quality Rating System. However, even after adjustment, plans that have a large number of individuals with social risk factors find it more difficult to achieve the benchmarks because these individuals have lower adherence and greater difficulty managing illnesses, making it difficult for the insurer to obtain star ratings comparable to other plans (Young et al., 2014). In response, plans could decide to withdraw from insurance markets in which populations with social risk factors reside (Chien et al., 2007). When insurers leave markets, this has the effect of diminishing choice and competition, leading to potentially higher premiums for beneficiaries (Gaynor and Town, 2011). VBP could also reduce incentives for hospitals to care for socially at-risk populations if penalties are larger than hospitals' margins to care for these patients (Joynt and Jha, 2013).

Finally, under the status quo, plans and providers that serve mixed populations that include individuals with both low and high levels of social risk factors may find that they have incentives to improve care only for patients with low levels of social risk factors (Casalino et al., 2007). For example, to reach a target rate for hemoglobin A1C control among diabetic patients, a physician practice may find it is less costly to focus on improving care for patients that have access to better quality diets and who are more easily able to attend regular checkup visits. As a result, those patients with greater social risk factors may not receive effective interventions available to patients with better social and economic resources.

In summary, the status quo has disadvantages that include incentives for providers and insurers to avoid serving patients with social risk factors, underpayment to providers who disproportionately serve socially at-risk populations, and underinvestment in quality of care. While proposals that do account for social risk factors would likely diminish these harms, there are also some potential ways in which accounting for social risk factors could incrementally introduce new harms.

First, incentives to improve the quality of care for patients with social risk factors could be diluted under some approaches that adjust for social risk factors. Setting lower benchmarks for patients with social risk factors relative to those without social risk factors can, in some circumstances, diminish provider incentives to exceed the established benchmarks. This could be problematic in settings where providers are capable of delivering the same standard of care for patients with and without social risk factors.

Second, any method for accounting for social risk factors that sets lower-quality improvement benchmarks for patients with social risk factors or otherwise holds providers and insurers to different standards for these populations can have a negative symbolic value. While certainly not intended, these adjustments may create the perception that patients with social risk factors are entitled to a lower quality of care. These perceptions are particularly acute because of a well-documented history of exclusion and inequitable treatment in health care settings of racial and ethnic minorities and low-income populations (HealthyPeople.gov, 2016; IOM, 2003). Even if these concerns are unfounded, perceptions of inequitable treatment can further erode trust in the health care system among patients with social risk factors.

Third, adjustment for social risk factors will not necessarily help patients find providers who will deliver the best quality of care for them. For example, star ratings are intended to guide patients to providers who provide an excellent average quality of care to patients. When only one single summary measure of quality is created for a provider or plan (such as a star rating), unadjusted results convey information about providers' unadjusted performance for their whole patient population, which varies across reporting units. Adding social risk factors to existing risk-adjustment methods may provide more accurate information about the relative performance across reporting units if they were faced with an average patient. However, neither summary score provides information about which provider is better for a patient based on his or her level of social risk factors unless all providers are equally good or bad with all patients. This may be especially true when patients with social risk factors comprise a small number of patients in a practice. Only stratification by social risk factors will reveal such insights.

Finally, some methods of accounting for social risk factors could obscure differences due to poor quality care, such as failure to tailor care or provide culturally competent care, which may result in uneven relative allocation of rewards relative to effort.

> *Conclusion 4: It is possible to improve on the status quo with regard to the effect of value-based payment on patients with social risk factors. However, it is also important to minimize potential harms to these patients and to monitor the effect of any specific approach to accounting for social risk factors to ensure the absence of any unanticipated adverse effects on health disparities.*

METHODS TO ACCOUNT FOR SOCIAL RISK FACTORS IN VALUE-BASED PAYMENT PROGRAMS

Any approach chosen to account for social risk factors should aim to minimize the potential harms described in the previous section. In particular, accounting for social risk factors, especially adjustment, is not intended to obscure disparities that do exist. Disparities should be brought to light, and the payment system should be sure to include sufficient incentive for quality improvement for both socially at-risk populations and for patients overall. Hence, the use of these factors in quality measurement and payment schemes should not disincentivize providers from doing all they can to overcome the influence of these factors on outcomes. Incentivizing providers to find strategies to overcome barriers to better outcomes in socially at-risk populations is critical to the reduction of health disparities. At the same time, incentivizing quality improvement and efficient care for all patients is an important goal of including social risk factors in VBP. Finally, achieving good outcomes (or improving outcomes over time) may be more difficult for providers caring for patients with social risk factors precisely because the influence of some social risk factors on health care outcomes is beyond provider control. Similarly, achieving good outcomes may also be more costly for providers caring for patients with social risk factors owing to additional costs required to tailor care appropriately or because these patients have fewer resources outside the health systems available to contribute to outcomes. Accounting for these factors in performance measurement and payment mechanisms under VBP would level the playing field by ensuring that provider compensation is commensurate with the true quality of care they deliver (i.e., fair and accurate). Thus, the committee's review of methods to account for social risk factors in Medicare VBP programs takes as the point of departure that the goal of Medicare payment and reporting systems are reducing disparities in health care access, affordability, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers for the services they provide.

Observed differences in quality by social risk factors may reflect a combination of drivers, including:

- Mechanisms that occur during the patient–provider encounter (e.g., inadequate tailoring of care to account for social risk factors, discrimination and bias);
- Provider characteristics such as having fewer financial resources (e.g., lower margins, historically lower reimbursement rates) and having fewer and lower-quality clinical/health care resources (e.g., fewer technological resources and lower information technology capacity, fewer and less qualified clinicians);
- Differences in patient preferences; and
- Barriers to access and financial constraints for disadvantaged persons (NASEM, 2016b).

In practice these mechanisms may occur simultaneously and also interact; it is difficult if not impossible to decompose observed differences into these components quantitatively. The committee therefore proposes approaches that do not require disentangling the mechanisms of these multiple pathways for social risk factors.[2] The fact that some units (e.g., providers) do well

---

[2] These mechanisms describe direct effects of social risk factors on performance indicators used in VBP. Some effects may be mediated by health status and therefore at least partly accounted for in clinical adjustments. At the

with socially at-risk populations does not imply that it is equally easy to do so on average, and such population differences may also affect the relationship between provider quality and observed provider scores. The standard for taking such factors into account should not be that it is impossible to provide optimal care, but that it is more difficult on average. Taking such factors into account need not "adjust away" disparities. Lower levels of performance for any group should not be considered sufficient or qualify a provider to receive maximum rewards. However, a provider that does not achieve performance on par with top performers (i.e., optimal care) could still be eligible for some reward because, for example, it improved substantially relative to its own benchmark.

> *Conclusion 5: Characteristics of a public reporting and payment system that could accomplish the goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly include:*
>
> 1. *Transparency and accountability for overall performance and performance with respect to socially at-risk members of the population;*
> 2. *Accurate performance measurement—with high reliability and without bias (systematic error) related to differences in populations served;*
> 3. *Incentives for improvement overall and for socially at-risk groups, both within reporting units (i.e., the provider setting that is being evaluated—hospitals, health plans, etc.) and between reporting units.*

The committee reviewed literature on a range of methods to account for social risk factors in public reporting and payment systems for which inclusion of social risk factors may be appropriate, with the aim to be more inclusive. These methods are described briefly in the following text and in more detail in Table 4-1.

> Finding: The committee identified four categories—(A) public reporting; (B) adjustment of performance measure scores; (C) direct adjustment of payments; and (D) restructuring payment incentive design—encompassing ten methods to account for social risk factors in that could be used to address policy goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly.

Public reporting seeks to make overall quality visible—to consumers, providers, payers, and regulators (IOM, 2007). It may lead to quality improvement via reputation incentives, and particularly when linked to behavioral nudges, by increasing market share (i.e., influencing choice of provider) for higher-quality reporting units (IOM, 2007). Public reporting methods that could be used to account for social risk factors include (1) stratification by patient characteristics within reporting units (i.e., for population subgroups by social risk factors) and (2) stratification by reporting unit characteristics (i.e., comparisons to peers, such as those with a similar share of low-income patients). (Methods are described in more detail in Table 4-1.) If publicly reported

---

same time, social risk factors may also capture unmeasured differences in clinical risk and are likely to have independent effects on performance indicators used in VBP. Evidence described in Chapter 3 includes documented associations of social risk factors on performance indicators used in VBP above and beyond effects of social risk factors on health status. The committee's approaches do not require disentangling pathways mediated through health status.

performance is stratified by indicators of social risk, public reporting can also be important for monitoring disparities, particularly when applied together with risk and or payment adjustment.

Adjusting performance measure scores seeks to "level the playing field," to estimate true reporting-unit quality—that which would occur if all units had the population average patient. As described in Chapter 2, social risk factors can be considered confounders of true performance if they are beyond provider control and unevenly distributed across units and thereby distort (bias) comparisons. Adjustment is a means to account for social risk factors statistically in an effort to more accurately measure true performance. Methods include:

1. risk adjustment for mean within-provider differences (e.g., to account for the average disparity between population subgroups with high and low level of social risk factors);
2. risk adjustment of performance data for within- and between-provider differences (e.g., to account for all patient-level differences in performance associated with social risk factors); and
3. adding quality measures tailored (and only meaningful) to socially at-risk groups in addition to overall performance. Applicable statistical methods may include linear or logistic regression with or without mixed effects, doubly robust estimation, and direct and indirect standardization (Elliott et al., 2001, 2009a,b; Lyratzopoulos et al., 2012; Zaslavsky and Jha, 2015; Zaslavsky et al., 2001).

Any effects of risk adjustment on payment are indirect and require consideration of the particular form of the payment function.

VBP incorporates explicit or implicit (as in the case of bundled or global payment including shared savings) rewards or penalties based on performance on quality and/or cost of care. This can be achieved through three underlying conceptual approaches. First, payers could pay for more to those that are doing a better job in the measurement period (i.e., pay for achievement). Second, payers could pay for the mix of patients the reporting unit treats, that is, pay more to those that treat greater numbers of socially at-risk patients under the assumption that they simply need more resources. This approach lacks incentives to improve unless some other system for accountability is superimposed. Third, payers could pay for improvement, that is, pay more to those who improve to a greater degree.

The committee also expands upon how VBP could incorporate measures of social risk factors. Payments could be directly adjusted using social risk factors, or incentive design could be restructured. Direct adjustments of payment explicitly use measures of social risk factors, but by themselves do not affect performance measure scores. Methods include (1) risk adjustment in the payment formula without adjusting measured performance (i.e., applying a different payment threshold or increment for rewards or sanctions based on the reporting unit's mix of social risk factors), or (2) stratification of benchmarks used for payment (i.e., applying payment multipliers to reporting-unit strata based on social risk factors). Restructuring payment incentive designs do not explicitly use measures of social risk factors, but implicitly account for social risk factors. Methods include (1) paying for improvement (rather than attainment), (2) downweighting social-risk factor-sensitive measures in payment (i.e., weighting measures differentially in the payment formula to alter their importance to providers), or (3) adding a bonus for achieving low disparities.

Table 4-1 summarizes the four categories of methods that could be used individually or in combination to account for social risk factors in Medicare value-based purchasing programs. The table also lists the possible methods within each category described briefly above and describes them in more detail along with prerequisites or optimal conditions for implementation, as well as potential advantages and disadvantages. Because considerations for cost performance may differ compared to quality performance, the table also notes special concerns for cost-related incentive programs, including bundled and global payment.

TABLE 4-1 Methods to Account for Social Risk Factors in Medicare VBP Programs

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
A. Public Reporting Methods *Stratification by itself does not influence payment, but reporting may influence choice or provider, leverage reputational incentives, and/or be important for monitoring disparities in conjunction with methods B and/or C.*					
1. Stratification by patient characteristics within reporting units[a]	Present performance data for population subgroups.[b]	Social risk factors can be represented by discrete strata (e.g., high and low income, Black and white patients). Works best if there are only a few key dimensions and few interactions among dimensions or reporting will become complex. Requires sufficient sample sizes.	All data can be seen. Disparities can be monitored. High and low performers for at-risk groups visible.	Too many dimensions or strata may lead to ambiguity and information overload.	Interpretation of cost differences for at-risk population complicated by demand effects: patients with higher income consume more services all else equal either due to income effects, price effects for un/under-insured or access constraints for those receiving Medicaid. Likewise, other characteristics of patients with more social risk factors such as low educational attainment, may cause under-use of services relative to need.

---

[a] Casalino et al., 2007; Martino et al., 2013; NQF, 2014; Price et al., 2015.

[b] See, for example, https://www.cms.gov/About-CMS/Agency-Information/OMH/Downloads/National-Level-Results.pdf (accessed June 9, 2016).

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
2. Stratification by reporting unit characteristics[c] **(e.g., safety-net hospitals)**	Present performance data for subsets of reporting units (e.g., reporting quality performance separately for physicians located in Health Provider Shortage Areas).	Requires a meaningful method of classifying providers, hospitals, or health plans according to the population they serve.	Comparisons made within peer groups: different types of providers and health plans have different capabilities for attaining and improving performance owing to patient differences and resource constraints. Stratification at the unit level requires only unit-level data (characterization of the unit rather than each patient contributing to performance data).	Does not illuminate within reporting unit differences (for example, differences due to quality compared to those due to patient mix), which might also be important. Reporting units could try to manipulate their patient mix in order to change strata. "Notch" effects are possible, and units near a notch may especially distort their behavior. Finally, the correlation between the mix of social risk factors and resource constraints may be limited.	
B. Adjustment of performance measure scores[d] *Seeks to improve measurement and estimate provider quality under similar patient populations. Any effects on payment are indirect and one must consider the particular form of the payment function.*					
1.Risk adjustment for mean within provider differences[e]	Statistical methods are used to account for (remove) the average disparity	Social risk factors can be measured at the patient level. Mean within-provider	Scores improve with improvement in care to any group. Avoids adjusting for "true"	Effects on payment may be limited. Depending on payment functions, could reduce incentives to improve.	Adjustment will typically increase estimated costs for at risk populations. Unclear interpretation

---

[c] Casalino et al., 2007; MedPAC, 2013; NQF, 2014.

[d] Examples of applicable statistical methods: linear or logistic regression with or without mixed effects, doubly robust estimation, indirect and direct standardization (Elliott et al., 2001, 2009a,b; Lyratzopoulos et al., 2012; Zaslavsky and Jha, 2015; Zaslavsky et al., 2001).

[e] Casalino et al., 2007.

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
	between high- and low-social risk factor groups.	differences represent what is typically achievable.	between-differences in quality. May reduce disincentives to avoid patients with social risk factors compared to no adjustment. Better quality measurement may better focus "nudges" into better plans to reduce between-plan SES disparities.	Under-adjusts if between-provider differences are caused by patient characteristics. Does not make disparities visible without also using method (A). Does not allow unit-level adjustors.	of disparity.
2.Risk adjustment of performance data for within- ***and*** **between-provider differences**	Statistical methods are used to account for (remove) all differences in performance associated with social risk factors at the patient level.	Social risk factors can be measured at the patient level. Providers have little control over either social risk factors or their impact on performance. There is no true difference in the quality of providers seen by those with and without social risk factors.	May capture full effects of social risk factors on quality measures if caring for at-risk patients reduces quality via resources or some similar mechanism. Allows unit-level adjustors.	Depending on payment functions, could reduce incentives to improvement. Does not make disparities visible without also using method (A).	Adjustment will typically increase estimated costs for at risk populations. Unclear interpretation of resulting performance estimates.

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
3. Add quality measures for performance for at-risk groups in addition to overall measure relates to A1	Tailors performance data to target populations through measures that are only meaningful for target populations.	Adequate sample sizes in at-risk groups.	Fewer model assumptions than adjusted models; direct measure of performance for at-risk groups.	Will not be available for all units—how to pay then? How much to pay relative to overall score? May be strongly correlated with overall performance.	
C. Direct Adjustment of Payments *By themselves do not affect performance measure scores*					
1. Risk adjustment in payment formula without adjusting measured performance[f] *Approach may be based on B(1) or B(2) methods; magnitude might be calibrated to less or more than the indirect effect via*	Alter the payment threshold or increment of bonus/penalty based on mix of social risk factors—specifically increase the ROI for improving performance for at-risk populations.	Social risk factors (social risk factors) can be measured at the patient level. Social risk factors result in differential cost of improvement that needs to be compensated for equal "incentive" or the value of improvement is greater for at-risk populations.	Resources are allocated in a manner more favorable to institutions serving at-risk populations. Improvement in care for at-risk populations is differentially rewarded. Magnitude of adjustment can be directly controlled.	Does not improve the accuracy of publicly reported quality measures. Providers/health plans can be rewarded despite poor outcomes/performance.	Adjustment will typically reduce payments associated with at-risk populations through bundled, global or shared savings mechanisms. Such adjustment would freeze in place patterns of use known to be reflective of underuse at least for some services.

---

[f] CMS, 2015c.

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
measurement					
2. Stratification of benchmarks used for payment[g]	First determine payments according to any pay-for-performance approach, including the current one. Second, select reporting unit strata based on social risk factors. Third, multiply payments by factors that result in equal mean payouts for each stratum (as in A2).	Meaningful strata of social risk factors exist (high and low income, safety-net versus other, AMC versus community). Not too many strata. Social risk factors and their consequences are beyond the control of provider/health plan.	Comparisons are possible across a wider range—stretch goals may be more apparent, while ensuring that resource allocation does not punish institutions that serve at-risk groups. Incentives may strengthen for at-risk groups.	For payment if benchmarks are stratified, the number of social risk factor dimensions would be limited. Incentives may weaken for groups not at risk. Reporting units could try to manipulate their patient mix in order to change strata. "Notch" effects are possible, and units near a notch may especially distort their behavior. Finally, the correlation between the mix of social risk factors and resource constraints may be limited.	Adjustment will typically increase payments associated with at-risk populations.
D. **Restructure Payment Incentive Design** *Measures of Social Risk Factors Not Explicitly Used but Implicitly Accounted For*					

---

[g] Damberg et al., 2015.

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
1. Pay for improvement relative to own benchmark (to a greater extent or exclusively), including "growth models"[h]	Payment formula is based in part or wholly based on percentage improvement relative to prior period rather than absolute level of performance.	Good measurement of prior performance of well-defined unit (how to handle mergers, etc.).	Strongly controls for unobserved social risk factors. Clear incentives for improvement.	Does not explicitly recognize absolute level of performance. No guarantee that providers disproportionately serving socially at-risk populations are more likely to achieve improvement compared to achievement targets (though they do in some work in progress). Do you ratchet-improve vs. best ever or do you allow rewards for alternation? How to handle ceiling effects (high-performing units that may have little room to improve during the performance period) is unclear. Depends on functional form of both the payment formula and the effort required to improve from different baselines.	Rewards units that have high baseline costs where improvement is more feasible.

---

[h] The Medicare Advantage and Hospital Value Based Purchasing payment arrangements currently include a measure of improvement (or failure rate reduction) in their payment formula (CMS, 2012). The committee lists this approach here to acknowledge the benefits and risks of such an approach vis à vis accounting for social risk factors in other Medicare payment systems. The committee also notes that increasing the weight given to improvement or altering the particular approach to scoring improvement (e.g., in terms of absolute improvement versus failure rate reduction for Hospital Value Based Purchasing) is a method open to CMS for obtaining a different balance of incentives in programs that currently incorporate improvement (Casalino et al., 2007; Rosenthal et al., 2004).

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
				Measuring improvement is noisier than comparing performance to a fixed (achievement) benchmark—particularly for rare events like mortality.	
2. Downweight social risk factor-sensitive measures in payment	In payment formula measures can be weighted differentially to alter their importance to providers	Some quality measures – like readmissions and intermediate outcomes – are strongly associated with social risk factors Some performance measures—like inpatient safety measures – can be expected to have little relationship to social risk factors. Ideally, the measures not affected by social risk factors signal high quality/value overall.	May reallocate resources appropriately without providing incentives to cherry pick patients.	Does not improve quality measurement. Social risk factor-sensitive measures may be important dimensions of quality that are not picked up by social risk factor-insensitive ones.	

Method	Description	Prerequisites/Optimal Conditions	Potential Advantages	Potential Disadvantages	Special Considerations for Cost
3. Add bonus for low disparities[i]	In addition to other rewards and penalties explicitly measure and reward the magnitude of difference between groups.	Adequate sample sizes in low-risk and high-risk groups.	Directly rewards equity.	Requires other components to address improvement or overall level of performance. Disparity could be reduced by making better off group worse unless steps are taken to avoid this.	Might reward cost increases for at-risk populations that may or may not be warranted.

---

[i] In simple linear scoring, this is equivalent to giving greater than proportional weight to performance with the high risk (H) group relative to the low risk (L) group. If FL, FH is fraction in the groups (FL + FH = 1), Y = mean performance in a group (YL, YH), then the proportionally weighted score is FL*YL + FH*YH with a linear penalty on disparity YL – YH, the score is FL*YL + FH*YH – C*(YL – YH) = (FL – C)*YL + (FH + C)*YH (Blustein et al., 2011; Casalino et al., 2007).

APPLYING METHODS TO ACCOUNT FOR SOCIAL RISK FACTORS

In many cases, methods from multiple categories can be used together. In some cases, multiple methods from a single category can be used in combination. In this respect, each approach has some advantages and disadvantages and a combination of approaches may yield a better result than any one method alone. As described in the previous section, the committee underscores that the benefits and harms of any single or composite method of accounting for social risk factors should be assessed in reference to the status quo or some other feasible alternative rather than a perfect world in which social risk factors do not confound efforts to improve the quality and efficiency of health care delivery (referred to by some as a "full information" scenario). As illustrations, Table 4-2 compares the potential harms of accounting for social risk factors relative to the status quo. Box 4-1 describes a hypothetical example of stratification by social risk factors and a simple risk adjustment of a performance measure for mean within-provider differences between groups with high and low levels of social risk factors. This example also describes potential advantages and disadvantages of this approach relative to the status quo (no adjustment for social risk factors).

> *Conclusion 6: To achieve goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly, a combination of reporting and accounting in both measures and payment are needed.*

TABLE 4-2 Potential Harms of Accounting for Social Risk Factors Compared to the Status Quo

Status Quo	Accounting for Social Risk Factors
Patient dumping/avoidance	Reduces this risk relative to the status quo
Unfair to providers disproportionately serving socially at-risk populations (if factors beyond provider control—and/or the cost of improvement is higher for populations with social risk factors—causes poor performance)	Unfair to providers who provide high quality care to all patients if truly poor quality causes poorer performance for socially at-risk patients
Will reduce quality and access for socially at-risk populations	Reduces this risk relative to the status quo
Incentives to improve care might favor focusing on patients with few social risk factors if they are easier to improve	Same unless payment is adjusted upward for socially at-risk populations

BOX 4-1
Example: Stratification by Social Risk Factors and Simple Adjustment of a Quality Measure to Reflect Varying Levels of Social Risk Factors Across Providers

This example shows the calculation of a hypothetical adjusted quality measure. The quality measure is represented as a percentage and can be thought of as the proportion of a population receiving quality care or achieving a good outcome. The adjustment process increases the score of the providers serving greater-than-average numbers of patients with social risk factors and decreases the score for providers serving lower-than-average numbers of patients with social risk factors.

For the sake of simplicity, all three providers in this example have the same total number of patients. Patients are either high risk or low risk, and each provider has a different proportion of high-risk patients (20, 40, or 80 percent in Providers A, B, and C, respectively). As shown in Table 1, the "national" average is 46.7 percent at high risk.

TABLE 1 Patient Mix Across Providers

	High Level of Social Risk Factors	Lower Level of Social Risk Factors	Total Patients	% High-Risk
Provider A	20	80	100	20.0%
Provider B	40	60	100	40.0%
Provider C	80	20	100	80.0%
"National"	140	160	300	46.7%

Table 2 presents the unadjusted overall score for each provider and nationally, as well as scores stratified by patients' level of social risk. Here, each provider performs better for the lower social risk group than for the disadvantaged group with more social risk factors. Each provider's unadjusted overall score is equal to the average of the scores for the two groups, weighted by the number of patients in each group.

TABLE 2 Stratification and Adjustment of Quality Scores

	Stratification by Social Risk Factor Level Within Reporting Units				Risk Adjustment for Mean Within-Provider Differences	
	Quality Score for High-Risk Group	Quality Score for Lower-Risk Group	Unadjusted Overall Score	Within-Provider Difference Low Risk/High Risk	Adjustment	Adjusted Score
Provider A	70.0%	82.0%	79.6%	–12.0%	–3.3%	76.3%
Provider B	60.0%	70.0%	66.0%	–10.0%	–0.8%	65.2%
Provider C	65.0%	80.0%	68.0%	–15.0%	4.1%	72.1%
"National"	64.3%	77.3%	71.2%	–12.3%		71.2%

The last row of Table 2 shows the "national" scores. The national average difference in scores between the high-risk group and the lower-risk group is –13.0% (64.3% – 77.3%). Some of this difference is a between-provider difference, reflecting the greater concentration of high-risk patients in lower-performing providers. The average within-provider difference is –

12.3 percent, meaning that on average, a given provider achieves scores for high-risk patients that are 12.3 percentage points worse than those for low-risk patients. In this example adjustment is based on this average within-provider difference in scores. Specifically, a provider's unadjusted score is increased or decreased by product of (a) this average within-provider difference, (b) the amount by which the provider's proportion of high-risk patients exceeds or falls short of the national average, and (b) –1. The adjustment for each provider is listed in the column second from the right. For Provider A this is equal to –12.3%*(20.0% – 46.7%)*(–1) = –3.3 percent.

Each provider's score and the national score adjusted for this national average (mean within provider) difference is listed in the far right column. Provider C, which has a larger-than-average proportion of high-risk patients, sees its score increase through adjustment. Provider B, which is close to the national average in its proportion of high-risk patients sees a very small adjustment. Provider A, which delivers the highest-quality care to both groups, has a modest downward adjustment that reflects it is smaller than average proportion of high-risk patients. Importantly, however, with this adjustment process in place, Provider A does not have a reason to limit service to the high risk group for fear of adversely affecting its quality score and ranking. Overall, the adjustment also has the property that increasing quality for either low- or high-risk patients increases a provider's adjusted score to the same extent.

Under a value-based payment system, these providers might receive bonuses or penalties proportional to quality scores or might be eligible for shared savings only if they exceed a quality threshold. In the current world in which such scores are adjusted in some instances for clinical risk factors, but not social risk factors, all of these providers have incentives to limit their service to patients at high social risk. In addition, those with above average share of high risk patients are financially penalized for the poorer process or outcomes measures which may perpetuate a perverse cycle of under-reimbursement for patients that might require extra resources to treat. With an adjustment system such as the one in this example in place, that incentive is removed and the providers can improve their scores by improving care delivered to the high-risk group, low-risk group, or both.

Finally, it is important to note that the stratified scores by group also convey important information that patients may deserve. In particular, patients in the high risk group might want to know which providers deliver the highest-quality care to patients like themselves. Thus, regardless of the adjustment system used, making providers' adjusted scores and scores by patient group available to consumers may inform their choices of provider.

Considerations around the trade-offs of various methods of accounting for social risk factors are different for cost-related performance compared to quality performance. Costs in the context of VBP can refer to the costs of improving quality or achieving good outcomes for socially at-risk patient or to the cost of care billed to a payer. As noted earlier, because achieving high performance on performance indicators used in VBP may require greater investments on the part of health care providers and health plans to overcome barriers socially at-risk populations face, costs to achieve good outcomes and improve care quality for socially at-risk populations are likely to be higher than costs to achieve the same outcomes and improve care quality for more advantaged patients. Because at least some of these costs will be outside of the services that can be billed to payers like CMS, as described in an earlier section, a potential harm of not accounting for social risk factors in a VBP environment is that this increased cost may be a disincentive to care for socially at-risk populations. On the other hand, lower resource use observed in billed costs of care may reflect unmet need or barriers to access rather than the absence of waste. Thus, lower cost is not always better; whereas, higher quality is always better.

> *Conclusion 7: Strategies to account for social risk factors for measures of cost and efficiency may differ from strategies for quality measurement, because observed lower resource use may reflect unmet need rather than the absence of waste, and thus lower cost is not always better, while higher quality is always better.*

MONITORING METHODS TO ACCOUNT FOR SOCIAL RISK FACTORS

As described earlier in the chapter, accounting for social risk factors in Medicare value-based purchasing programs is intended to achieve a balance between incentives for reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly. Both the status quo and any new approach to accounting for social risk factors will have uncertain trade-offs in terms of these goals—many unknowable factors including provider and patient beliefs and behavioral responses will affect the results that any new system yields. Monitoring data on a variety of indicators will facilitate assessment of the effects of existing and new programs on potential unintended adverse effects. Such indicators might include enrollment (for health plans), patient complaints, access to and quality of care for socially at-risk populations, and the financial sustainability of providers disproportionately caring for socially at-risk populations.

> *Conclusion 8: Any specific approach to accounting for social risk factors in Medicare quality and payment programs requires continuous monitoring with respect to the goals of reducing disparities in access, quality, and outcomes; quality improvement and efficient care delivery for all patients; fair and accurate public reporting; and compensating providers fairly.*

Finally, because behavioral and other responses to new systems may change the balance of risks and benefits over time, to take into account these behavioral and other responses, the specific approach to accounting for social risk factors may need to be reassessed.

CONCLUDING REMARKS

The committee notes that it is not within its statement of task to recommend whether social risk factors should be accounted for in VBP or how; that decision sits elsewhere. The committee hopes that the conclusions in this report help CMS and the Secretary of HHS make that important decision. In the next report, the committee tackles the question of how to gather the data that could be used to account for social risk factors in Medicare VBP.

REFERENCES

Ayanian, J. Z., and M. B. Hamel. 2016. Transforming primary care—we get what we pay for. *New England Journal of Medicine* 374(15):457.

Bazzoli, G. J., W. Lee, H. M. Hsieh, and L. R. Mobley. 2012. The effects of safety net hospital closures and conversions on patient travel distance to hospital services. *Health Services Research* 47(1Pt1):129-150.

Blustein, J., J. S. Weissman, A. M. Ryan, T. Doran, and R. Hasnain-Wynia. 2011. Analysis raises questions on whether pay-for-performance in medicaid can efficiently reduce racial and ethnic disparities. *Health Affairs* 30(6):1165-1175.

Buchmueller, T. C., M. Jacobson, and C. Wold. 2006. How far to the hospital?: The effect of hospital closures on access to care. *Journal of Health Economics* 25(4):740-761.

Burwell, S. M. 2015. Setting value-based payment goals—HHS efforts to improve U.S. health care. *New England Journal of Medicine* 372(10):897-899.

Casalino, L. P., A. Elster, A. Eisenberg, E. Lewis, J. Montgomery, and D. Ramos. 2007. Will pay-for-performance and quality reporting affect health care disparities? *Health Affairs* 26(3):w405-w414.

Chien, A. T., M. H. Chin, A. M. Davis, and L. P. Casalino. 2007. Pay for performance, public reporting, and racial disparities in health care: How are programs being designed? *Medical Care Research and Review* 64(5 Suppl):283s-304s.

CMS (Centers for Medicare & Medicaid Services). 2012. *Frequently asked questions: Hospital value-based purchasing system*. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/hospital-value-based-purchasing/downloads/HVBPFAQ022812.pdf (accessed November 2, 2015).

CMS. 2014a. *End-stage renal disease quality incentive program payment year 2016 program details*. https://www.cms.gov/medicare/quality-initiatives-patient-assessment-instruments/esrdqip/downloads/qip-details-py16.pdf (accessed October 26, 2015).

CMS. 2014b. *Readmissions reduction program*. https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html (accessed October 26, 2015).

CMS. 2015a. *End-stage renal disease quality incentive program frequently asked questions*. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/ESRDQIP/Downloads/ESRDQIPFrequentlyAskedQuestions.pdf (accessed October 26, 2015).

CMS. 2015b. *The Medicare Access & CHIP Reauthorization Act of 2015: Path to value*. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/MACRA-MIPS-and-APMs/MACRA-LAN-PPT.pdf (accessed April 19, 2016).

CMS. 2015c. Medicare program; contract year 2016 policy and technical changes to the medicare advantage and the medicare prescription drug benefit programs. Final rule. *Federal Register* 80(29):7911.

CMS. 2015d. *Shared savings program*. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/sharedsavingsprogram/index.html (accessed October 26, 2015).

CMS. 2016a. *Bundled Payments for Care Improvement initiative (BPCI)*. https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2016-Fact-sheets-items/2016-04-18.html?DLPage=1&DLEntries=10&DLSort=0&DLSortDir=descending (accessed April 18, 2016).

CMS. 2016b. *Comprehensive primary care plus*. https://innovation.cms.gov/initiatives/comprehensive-primary-care-plus (accessed April 18, 2016).

CMS. 2016c. *Comprehensive Primary Care Plus (CPC+) fact sheet*. https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2016-Fact-sheets-items/2016-04-11.html (accessed April 18, 2016).

CMS. 2016d. *Next generation aco model: Frequently asked questions.* https://innovation.cms.gov/Files/x/nextgenacofaq.pdf (accessed April 20, 2016).

CMS. 2016e. *Overview of select alternative payment models*. https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-sheets/2016-Fact-sheets-items/2016-03-03.html (accessed April 18, 2016).

CMS. n.d.-a. *End-stage renal disease quality incentive program summary: Payment years 2014-2018*. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/ESRDQIP/Downloads/ESRDQIPSummaryPaymentYears2014-2018.pdf (accessed October 26, 2015).

CMS. n.d.-b. *MACRA RFI posting "RFI on physician payment reform" (CMS-3321-NC) external FAQ*. https://innovation.cms.gov/Files/x/macra-faq.pdf (accessed April 19, 2016).

CMS. n.d.-c. *The skilled nursing facility value-based purchasing program (SNFVBP)* https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/Other-VBPs/SNF-VBP.html (accessed April 19, 2016).

CMS. n.d.-d. *Summary of 2015 physician value-based payment modifier policies*. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/PhysicianFeedbackProgram/Downloads/CY2015ValueModifierPolicies.pdf (accessed October 26, 2015).

Conway, P., T. Gronniger, H. Pham, K. Goodrich, A. Bassano, and J. Sharp. 2015. MACRA: New opportunities for Medicare providers through innovative payment systems (updated). *Health Affairs Blog* [blog on the Internet].

Cunningham, P. J., G. J. Bazzoli, and A. Katz. 2008. Caught in the competitive crossfire: Safety-net providers balance margin and mission in a profit-driven health care market. *Health Affairs* 27(5):w374-w382.

Dale, S. B., A. Ghosh, D. N. Peikes, T. J. Day, F. B. Yoon, E. F. Taylor, K. Swankoski, A. S. O'Malley, P. H. Conway, R. Rajkumar, M. J. Press, L. Sessums, and R. Brown. 2016. Two-year costs and quality in the comprehensive primary care initiative. *New England Journal of Medicine* 374(24):2345-2356.

Damberg, C. L., M. N. Elliott, and B. A. Ewing. 2015. Pay-for-performance schemes that use patient and provider categories would reduce payment disparities. *Health Affairs* 34(1):134-142.

Elliott, M. N., R. Swartz, J. Adams, K. L. Spritzer, and R. D. Hays. 2001. Case-mix adjustment of the national CAHPS benchmarking data 1.0: A violation of model assumptions? *Health Services Research* 36(3):555-573.

Elliott, M. N., A. M. Haviland, D. E. Kanouse, K. Hambarsoomian, and R. D. Hays. 2009a. Adjusting for subgroup differences in extreme response tendency in ratings of health care: Impact on disparity estimates. *Health Services Research* 44(2 Pt 1):542-561.

Elliott, M. N., A. M. Zaslavsky, E. Goldstein, W. Lehrman, K. Hambarsoomians, M. K. Beckett, and L. Giordano. 2009b. Effects of survey mode, patient mix, and nonresponse on CAHPS hospital survey scores. *Health Services Research* 44(2 Pt 1):501-518.

Epstein, A. M. 2015. *Accounting for socioeconomic status in Medicare payment programs: ASPE's work under the impact act*. Paper presented to the Committee on Accounting for Socioeconomic Status in Medicare Payment Programs, Washingon, DC.

Friedberg, M. W., D. G. Safran, K. Coltin, M. Dresser, and E. C. Schneider. 2010. Paying for performance in primary care: Potential impact on practices and disparities. *Health Affairs* 29(5):926-932.

Froimson, M. I., A. Rana, R. E. White, A. Marshall, S. F. Schutzer, W. L. Healy, P. Naas, G. Daubert, R. Iorio, and B. Parsley. 2013. Bundled payments for care improvement initiative: The next evolution of payment formulations: Aahks bundled payment task force. *The Journal of Arthroplasty* 28(8):157-165.

Gaynor, M., and R. J. Town. 2011. *Competition in health care markets.* Cambridge, MA: National Bureau of Economic Research.

Gilman, M., E. K. Adams, J. M. Hockenberry, A. S. Milstein, I. B. Wilson, and E. R. Becker. 2015. Safety-net hospitals more likely than other hospitals to fare poorly under Medicare's value-based purchasing. *Health Affairs* 34(3):398-405.

Grealy, M. R. 2014. *Measure under consideration (MUC) comments: Letter to the National Quality Forum: Healthcare leadership council, December 5, 2014*. http://www.hlc.org/wp-content/uploads/2014/06/HLC_Early-Public-Comment-on-Measures-Under-Consideration.pdf (accessed October 30, 2015).

HealthyPeople.gov. 2016. *Foundation health measures: Disparities*. https://www.healthypeople.gov/2020/about/foundation-health-measures/Disparities (accessed May 19, 2016).

HHS (Department of Health and Human Services). 2012. *Report to Congress: Plan to implement a Medicare skilled nursing facility value-based purchasing program*. https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/SNFPPS/Downloads/SNF-VBP-RTC.pdf (accessed April 19, 2016).

HHS. 2014. Medicare program; hospital inpatient prospective payment systems for acute care hospitals and the long-term care hospital prospective payment system and fiscal year 2015 rates; quality reporting requirements for specific providers; reasonable compensation equivalents for physician services in excluded hospitals and certain teaching hospitals; provider administrative appeals and judicial review; enforcement provisions for organ transplant centers; and electronic health record (EHR) incentive program. *Federal Register* 79(163):50094.

HHS. 2015. Medicare and Medicaid programs; CY 2016 home health prospective payment system rate update; home health value-based purchasing model; and home health quality reporting requirements *Federal Register* 80:39840.

HHS. 2016. *New hospitals and health care providers join successful, cutting-edge federal initiative that cuts costs and puts patients at the center of their care*. http://www.hhs.gov/about/news/2016/01/11/new-hospitals-and-health-care-providers-join-successful-cutting-edge-federal-initiative.html (accessed April 20, 2016).

IOM (Institute of Medicine). 2003. *Unequal treatment: Confronting racial and ethnic disparities in health care (full printed version)*. Washington, DC: The National Academies Press.

IOM. 2007. *Rewarding provider performance: Aligning incentives in medicare (pathways to quality health care series)*. Washington, DC: The National Academies Press.

Joynt, K. E., and A. K. Jha. 2013. A path forward on medicare readmissions. *New England Journal of Medicine* 368(13):1175-1177.

Joynt, K. E., and M. B. Rosenthal. 2012. Hospital value-based purchasing: Will Medicare's new policy exacerbate disparities? *Circulation: Cardiovascular Quality and Outcomes* 5(2):148-149.

Joynt, K. E., N. Sarma, A. M. Epstein, A. K. Jha, and J. S. Weissman. 2014. Challenges in reducing readmissions: Lessons from leadership and frontline personnel at eight minority-serving hospitals. *The Joint Commission Journal on Quality and Patient Safety* 40(10):435-435.

Kane, N. M., S. J. Singer, J. R. Clark, K. Eeckloo, and M. Valentine. 2012. Strained local and state government finances among current realities that threaten public hospitals' profitability. *Health Affairs* 31(8):1680-1689.

Lindrooth, R. C., G. J. Bazzoli, J. Needleman, and R. Hasnain-Wynia. 2006. The effect of changes in hospital reimbursement on nurse staffing decisions at safety net and nonsafety net hospitals. *Health Services Research* 41(3 Pt 1):701-720.

Lipstein, S. H., and W. C. Dunagan. 2014. The risks of not adjusting performance measures for sociodemographic factors. *Annals of Internal Medicine* 161(8):594-596.

Lyratzopoulos, G., M. Elliott, J. M. Barbiere, A. Henderson, L. Staetsky, C. Paddison, J. Campbell, and M. Roland. 2012. Understanding ethnic and other socio-demographic differences in patient experience of primary care: Evidence from the english general practice patient survey. *BMJ Quality and Safety* 21(1):21-29.

Martino, S. C., R. M. Weinick, D. E. Kanouse, J. A. Brown, A. M. Haviland, E. Goldstein, J. L. Adams, K. Hambarsoomian, D. J. Klein, and M. N. Elliott. 2013. Reporting CAHPS and HEDIS data by race/ethnicity for medicare beneficiaries. *Health Services Research* 48(2 Pt 1):417-434.

McGinnis, J. M. 2016. Income, life expectancy, and community health: Underscoring the opportunity. *JAMA*.

Medicare.gov. n.d. *Glossary - m*. https://www.medicare.gov/glossary/m.html (accessed October 26, 2015).

MedPAC (Medicare Payment Advisory Commission). 2013. Report to the Congress. Medicare and the health care delivery system. Washington, DC: MedPAC.

MedPAC. 2014. *Explainer: Risk sharing mechanisms in Part D*. http://www.medpac.gov/blog/october-2014/october-2014/2014/10/15/explainer-risk-sharing-mechanisms-in-part-d (accessed October 26, 2015).

MedPAC. 2015a. Medicare advantage program payment system. In *Payment basics*. Washington, DC: MedPAC.

MedPAC. 2015b. Part D payment system. In *Payment basics*. Washington, DC: MedPAC.

MLN (Medicare Learning Network). 2013. *Hospital value-based purchasing program*. https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/Hospital_VBPurchasing_Fact_Sheet_ICN907664.pdf (accessed October 26, 2015).

NASEM (The National Academies of Sciences, Engineering, and Medicine). 2016a. *Accounting for social risk factors in medicare payment: Identifying social risk factors*. Washington, DC: The National Academies Press.

NASEM. 2016b. *Systems practices for the care of socially at-risk populations*. Washington, DC: The National Academies Press.

NQF (National Quality Forum). 2014. *Risk adjustment for socioeconomic status or other sociodemographic factors*. Washington, DC: National Quality Forum.

Press, M. J., R. Rajkumar, and P. H. Conway. 2016. Medicare's new bundled payments: Design, strategy, and evolution. *JAMA* 315(2):131-132.

Price, R. A., A. M. Haviland, K. Hambarsoomian, J. W. Dembosky, S. Gaillot, R. Weech-Maldonado, M. V. Williams, and M. N. Elliott. 2015. Do experiences with Medicare managed care vary according to the proportion of same-race/ethnicity/language individuals enrolled in one's contract? *Health Services Research* 50(5):1649-1687.

Rajkumar, R., P. H. Conway, and M. Tavenner. 2014. CMS—engaging multiple payers in payment reform. *JAMA* 311(19):1967-1968.

Rosenthal, M. B. 2008. Beyond pay for performance—emerging models of provider-payment reform. *New England Journal of Medicine* 359(12):1197-1200.

Rosenthal, M. B., R. Fernandopulle, H. R. Song, and B. Landon. 2004. Paying for quality: Providers' incentives for quality improvement. *Health Affairs* 23(2):127-141.

Ryan, A. M. 2013. Will value-based purchasing increase disparities in care? *New England Journal of Medicine* 369(26):2472-2474.

Sessums, L. L., S. J. McHugh, and R. Rajkumar. 2016. Medicare's vision for advanced primary care: New directions for care delivery and payment. *JAMA*.

Volpp, K. G., A. J. Epstein, and S. V. Williams. 2006. The effect of market reform on racial differences in hospital mortality. *Journal of General Internal Medicine* 21(11):1198-1202.

Walker, K. O., R. Clarke, G. Ryan, and A. F. Brown. 2011. Effect of closure of a local safety-net hospital on primary care physicians' perceptions of their role in patient care. *The Annals of Family Medicine* 9(6):496-503.

Woolhandler, S., and D. U. Himmelstein. 2015. Collateral damage: Pay-for-performance initiatives and safety-net hospitals. *Annals of Internal Medicine* 163(6):473-474.

Young, G. J., N. M. Rickles, C. H. Chou, and E. Raver. 2014. Socioeconomic characteristics of enrollees appear to influence performance scores for Medicare Part D contractors. *Health Affairs* 33(1):140-146.

Zaslavsky, A. M., and A. K. Jha. 2015. The role of socioeconomic status in hospital outcomes measures. *Annals of Internal Medicine* 162(9):669-670.

Zaslavsky, A. M., L. B. Zaborski, L. Ding, J. A. Shaul, M. J. Cioffi, and P. D. Cleary. 2001. Adjusting performance measures to ensure equitable plan comparisons. *Health Care Financing Review* 22(3):109-126.

Appendix A

Criteria for Selecting Risk Factors Reviewed by the Committee

When developing the criteria that could be used to select social risk factors that should be accounted for in Medicare value-based payment programs, the committee reviewed existing criteria for selecting risk factors for risk adjustment models from the literature. These include criteria, principles, and other guidance from:

- Centers for Medicare & Medicaid Services Hierarchical Condition Categories (CMS-HCC) model for risk adjustment of Medicare capitation payments (Pope et al., 2004);
- Consumer Assessment of Healthcare Providers and Systems (CAHPS) Hospital Survey case-mix adjustment (Elliott et al., 2009; O'Malley et al., 2005);
- Department of Health and Human Services (HHS)-HCC risk adjustment model for individual and small group markets under the Affordable Care Act (Kautter et al., 2014); and
- The National Quality Forum 2014 report *Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors.*

The criteria reviewed are excerpted below.

CMS-HCC MODEL CRITERIA

> The following 10 principles guided the creation of the diagnostic classification system.
>
> *Principle 1*—Diagnostic categories should be clinically meaningful. Each diagnostic category is a set of ICD-9-CM [International Classification of Diseases, 9th Revision, Clinical Modification] codes (CDC, 2004). These codes should all relate to a reasonably well-specified disease or medical condition that defines the category. Conditions must be sufficiently clinically specific to minimize opportunities for gaming or discretionary coding. Clinical meaningfulness improves the face validity of the classification system to clinicians, its interpretability, and its utility for disease management and quality monitoring.
>
> *Principle 2*—Diagnostic categories should predict medical expenditures. Diagnoses in the same HCC should be reasonably homogeneous with respect to their effect on

both current (this year's) and future (next year's) costs. (In this article we present prospective models predicting future costs.)

Principle 3—Diagnostic categories that will affect payments should have adequate sample sizes to permit accurate and stable estimates of expenditures. Diagnostic categories used in establishing payments should have adequate sample sizes in available data sets. Given the extreme skewness of medical expenditure data, the data cannot reliably determine the expected cost of extremely rare diagnostic categories.

Principle 4—In creating an individual's clinical profile, hierarchies should be used to characterize the person's illness level within each disease process, while the effects of unrelated disease processes accumulate. Because each new medical problem adds to an individual's total disease burden, unrelated disease processes should increase predicted costs of care. However, the most severe manifestation of a given disease process principally defines its impact on costs. Therefore, related conditions should be treated hierarchically, with more severe manifestations of a condition dominating (and zeroing out the effect of) less serious ones.

Principle 5—The diagnostic classification should encourage specific coding. Vague diagnostic codes should be grouped with less severe and lower-paying diagnostic categories to provide incentives for more specific diagnostic coding.

Principle 6—The diagnostic classification should not reward coding proliferation. The classification should not measure greater disease burden simply because more ICD-9-CM codes are present. Hence, neither the number of times that a particular code appears, nor the presence of additional, closely related codes that indicate the same condition should increase predicted costs.

Principle 7—Providers should not be penalized for recording additional diagnoses (monotonicity). This principle has two consequences for modeling: (1) no condition category should carry a negative payment weight, and (2) a condition that is higher-ranked in a disease hierarchy (causing lower-rank diagnoses to be ignored) should have at least as large a payment weight as lower-ranked conditions in the same hierarchy.

Principle 8—The classification system should be internally consistent (transitive). If diagnostic category A is higher-ranked than category B in a disease hierarchy, and category B is higher ranked than category C, then category A should be higher ranked than category C. Transitivity improves the internal consistency of the classification system and ensures that the assignment of diagnostic categories is independent of the order in which hierarchical exclusion rules are applied.

Principle 9—The diagnostic classification should assign all ICD-9-CM codes (exhaustive classification). Because each diagnostic code potentially contains relevant clinical information, the classification should categorize all ICD-9-CM codes.

Principle 10—Discretionary diagnostic categories should be excluded from payment models. Diagnoses that are particularly subject to intentional or unintentional discretionary coding variation or inappropriate coding by health plans/providers, or that are not clinically or empirically credible as cost predictors, should not increase cost predictions. Excluding these diagnoses reduces the sensitivity of the model to coding variation, coding proliferation, gaming, and upcoding.

In designing the diagnostic classification, principles 7 (monotonicity), 8 (transitivity), and 9 (exhaustive classification) were followed absolutely. For example, if the expenditure weights for our models did not originally satisfy monotonicity, we imposed constraints to create models that did. Judgment was used to make trade-offs among other principles. For example, clinical meaningfulness (principle 1) is often best served by creating a very large number of detailed clinical groupings. But a large number of groupings conflicts with adequate sample sizes for each category (principle 3). Another trade-off is encouraging specific coding (principle 5) versus predictive power (principle 2). In current coding practice, non-specific codes are common. If these codes are excluded from the classification system, substantial predictive power is sacrificed. Similarly, excluding discretionary codes (principle 10) can also lower predictive power (principle 2). We approached the inherent trade-offs involved in designing a classification system using empirical evidence on frequencies and predictive power, clinical judgment on relatedness, specificity, and severity of diagnoses, and the judgment of the authors on incentives and likely provider responses to the classification system. The DCG [Diagnostic Cost Group]/HCC models balance these competing goals to achieve a feasible health-based payment system (Pope et al., 2004).

CAHPS CASE-MIX ADJUSTMENT CRITERIA

Our criterion for selection of case-mix adjustors is the “impact factor,” which is the product of two measures: predictive power (the strength of the relationship between the candidate adjustor and the outcome variable at the individual level) and heterogeneity factor (the amount of variation among hospitals in the adjustor variable) (Zaslavsky, 1998). Predictive power quantifies the improvement in model fit (R2) attributable to a variable; unlike tests of statistical significance, it does not depend on sample size. The heterogeneity factor measures the extent to which the characteristic is unevenly distributed across hospitals and therefore potentially a source of bias in comparisons. A variable, such as gender, could be highly predictive of responses but have little impact on case-mix adjustment because its distribution is relatively homogeneous across hospitals. Conversely, a variable could have quite different distributions in different hospitals but be unrelated to the rating. By combining both predictive power and heterogeneity into a single measure, the impact factor is more informative than purely predictive measures such as R2; it approximates the magnitude of the incremental adjustments due to adding a variable to the case-mix model (O’Malley et al., 2005).

Explanatory power (Zaslavsky, 1998) was used to assess the relative importance of individual PMA [patient-mix adjuster] variables to hospital-level adjustment. Explanatory power is the product of two components: (1) the individual predictive power of a PMA variable (as measured by the improvement in R2 attributable to a candidate predictor) and (2) the hospital-level heterogeneity of a PMA variable (Elliott et al., 2009).

HHS-HCC RISK ADJUSTMENT MODEL CRITERIA

There are 264 HHS-HCCs in the full diagnostic classification, of which a subset is included in the HHS risk adjustment model. The criteria for including HCCs in the model are now described. These criteria were sometimes in conflict and trade-offs had to be made among them in assessing whether to include specific HCCs in the HHS risk adjustment model.

> Criterion 1—Represent clinically significant, well-defined, and costly medical conditions that are likely to be diagnosed, coded, and treated if they are present.
>
> Criterion 2—Are not especially subject to discretionary diagnostic coding or "diagnostic discovery" (enhanced rates of diagnosis through population screening not motivated by improved quality of care).
>
> Criterion 3—Do not primarily represent poor quality or avoidable complications of medical care.
>
> Criterion 4—Identify chronic, predictable, or other conditions that are subject to insurer risk selection, risk segmentation, or provider network selection, rather than random acute events that represent insurance risk.

Following an extensive review process, we selected 127 HHS-HCCs to be included in the HHS risk adjustment model … Finally, to balance the competing goals of improving predictive power and limiting the influence of discretionary coding, a subset of HHS-HCCs in the risk adjustment model were grouped into larger aggregates, in other words "grouping" clusters of HCCs together as a single condition with a single coefficient that can only be counted once. After grouping, the number of HCC factors included in the model was effectively reduced from 127 to 100 (Kautter et al., 2014).

NATIONAL QUALITY FORUM CRITERIA GUIDELINES FOR SELECTING RISK FACTORS FOR ADJUSTMENT

TABLE A-1 Guidelines for Selecting Risk Factors for Adjustment

Guideline	Rationale	Clinical/ Health Status Factors[a]	SDS Factors[b]
Clinical/conceptual relationship with the outcome of interest	Begin with conceptual model informed by research and experience	✓	✓
Empirical association with the outcome of interest	To confirm conceptual relationship	✓	✓

Guideline	Rationale	Clinical/ Health Status Factors[a]	SDS Factors[b]
Variation in prevalence of the factor across the measured entities	If there is no variation in prevalence across health care units being measured, it will not bias performance results	✓	✓
Not confounded with quality of care, risk factors should:	Trying to isolate effects of quality of care	✓	✓
• Be present at the start of care and	Ensures not a result of care provided	✓	✓
• not an indicator or characteristic of care provided (e.g., treatments, interventions, expertise of staff)	Although these could explain variation in outcome, in performance measurement the goal is to isolate differences in performance due to differences in the care provided	✓	✓
Resistant to manipulation or gaming—generally, a diagnosis or assessment data (e.g., functional status score) is considered less susceptible to manipulation than a clinical procedure or treatment (e.g., physical therapy)	Ensures validity of performance score as representing quality of care (versus, for example, upcoding)	✓	✓
Accurate data that can be reliably and feasibly captured	Data limitations often represent a practical constraint to what factors are included in risk models	✓	✓
Contribution of unique variation in the outcome (i.e., not redundant or highly correlated with another risk factor)	Prevent overfitting and unstable estimates, or coefficients that appear to be in the wrong direction; reduce data collection burden	✓	✓
Potentially, improvement of the risk model (e.g., risk model metrics of discrimination—i.e., sensitivity/specificity, calibration) and sustained with cross-validation	Change in R-squared or C-statistic may not be significant, but calibration at different deciles of risk might improve. May not appear to be a big change but could represent meaningful differences in terms of the outcome (e.g., lives, dollars). Order of entry into a model may influence this result	✓	✓
Potentially, face validity and acceptability	Some factors may not be indicated empirically, but could improve acceptability—need to weigh against negative impact on model, feasibility and burden of data collection	✓	✓

NOTE: SDS = sociodemographic status.

[a] Examples of clinical and health status factors include comorbidity; severity of illness; patient-reported health status, etc.

[b] Examples of sociodemographic factors include income; education; English language proficiency, etc.

SOURCE: NQF, 2014.

REFERENCES

Centers for Disease Control and Prevention. 2013 *International Classification of Diseases, Ninth Revision, Clinical Modification (IC+CD-9-CM).* http://www.cdc.gov/nchs/icd/icd9cm.htm (accessed June 24, 2016).

Elliott, M. N., A. M. Zaslavsky, E. Goldstein, W. Lehrman, K. Hambarsoomians, M. K. Beckett, and L. Giordano. 2009. Effects of survey mode, patient mix, and nonresponse on CAHPS Hospital Survey scores. *Health Services Research* 44(2 Pt 1):501-518.

Kautter, J., G. C. Pope, M. Ingber, S. Freeman, L. Patterson, M. Cohen, and P. Keenan. 2014. The HHS-HCC risk adjustment model for individual and small group markets under the Affordable Care Act. *Medicare & Medicaid Research Review* 4(3)1-4.

NQF (National Quality Forum). 2014. *Risk adjustment for socioeconomic status or other sociodemographic factors*. Washington, DC: National Quality Forum.

O'Malley, A. J., A. M. Zaslavsky, M. N. Elliott, L. Zaborski, and P. D. Cleary. 2005. Case-mix adjustment of the CAHPS Hospital Survey. *Health Services Research* 40(6 Pt 2):2162-2181.

Pope, G. C., J. Kautter, R. P. Ellis, A. S. Ash, J. Z. Ayanian, M. J. Ingber, J. M. Levy, and J. Robst. 2004. Risk adjustment of Medicare capitation payments using the CMS-HCC model. *Health Care Financing Review* 25(4): 120-123.

Zaslavsky, A. M. 1998. Issues in case-mix adjustment of measures of the quality of health plans. In Proceedings, Government and Social Statistics Sections, edited by Alexandria, VA: American Statistical Association.

Appendix B

Committee Biosketches

Donald M. Steinwachs, Ph.D. (*Chair*), is a professor in the Department of Health Policy and Management at the Johns Hopkins Bloomberg School of Public Health. He is active in the Center for Health Services and Outcomes Research, previously named the Health Services Research and Development Center, where he served as director for many years. His research spans the design and application of health information systems for evaluation and management, development of classification systems and modeling tools, and research on the impact of organization, financing, and quality of care on outcomes for persons with chronic diseases. Dr. Steinwachs was a co-developer of the widely used ACG (Adjusted Clinical Groups) case-mix adjustment and co-developer of the Johns Hopkins HaH (Hospital at Home). He developed methods for measuring provider continuity, needs and unmet needs for care, and measures of the timeliness of care. He was president of the Association for Health Services Research (now AcademyHealth) and received the 2013 Distinguished Research Award from AcademyHealth. He currently serves on the National Research Advisory Council of the Department of Veterans Affairs. He served on numerous committees of the National Academies of Sciences, Engineering, and Medicine, including the Board on Health Care Services and the Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care. He holds a Ph.D. from Johns Hopkins University and is an elected member of the National Academy of Medicine.

John Z. Ayanian, M.D., M.P.P., is director of the Institute for Healthcare Policy and Innovation, the Alice Hamilton Professor of Medicine at the School of Medicine, professor of health management and policy at the School of Public Health, and professor of public policy at the Ford School of Public Policy, all at the University of Michigan. He also serves as associate editor of the *New England Journal of Medicine*. Dr. Ayanian has focused his career on health policy and health services research related to access to care, quality of care, and health care disparities, and has served in key health policy advisory roles to state and federal government. Prior to joining the University of Michigan, Dr. Ayanian was a professor at the Harvard Medical School and at the Harvard School of Public Health, and a practicing primary care physician at Brigham and Women's Hospital in Boston. At Harvard, Dr. Ayanian also directed the Health Disparities Research Program of Harvard Catalyst, Harvard's Clinical and Translational Sciences Center; the Outcomes Research Program of the Dana-Farber/Harvard Cancer Center; and the Harvard Medical School Fellowship in General Medicine and Primary Care. In addition to his medical degree from Harvard Medical School, he holds an M.P.P. from Harvard's John F.

Kennedy School of Government. He is an elected member of the National Academy of Medicine.

Charles Baumgart, M.D., is senior medical director at xG Health Solutions, an organization that was spun out of Geisinger Health System, designed to partner with health care organizations nationally to bring Geisinger population health management expertise to local health care improvement efforts. He has worked with numerous health care systems, both academic and community based, as well as with managed care organizations. He has most recently been the xG Health clinical/physician lead for support of a New York Delivery System Reform Incentive Payment program site, the Suffolk County Care Collaborative (Stony Brook University Hospital). Before joining xG Health Solutions, Dr. Baumgart was the Geisinger Health Plan senior medical director for government programs. His responsibilities included the development of the clinical management program for a new Managed Medicaid program in northeast Pennsylvania, leveraging Geisinger's existing Advanced Medical Home model. In his role, he worked with all aspects of population and quality management, including support of medical home development, analytics, and provider pay-for-performance programs. Dr. Baumgart previously served as a senior medical director and then the vice president and chief medical officer for Presbyterian Health Plan in Albuquerque, New Mexico. Dr. Baumgart graduated with an M.D. from the University of Iowa. Dr. Baumgart is board certified in internal medicine and quality assurance and utilization review. He has participated in the advanced training program in health care delivery improvement with Intermountain Healthcare, is a certified managed care executive through America's Health Insurance Plans, and served as a senior examiner with the Malcolm Baldrige National Quality Award Program.

Melinda Buntin, Ph.D., is professor and the chair of the Department of Health Policy at Vanderbilt University's School of Medicine. She previously served as deputy assistant director for health at the Congressional Budget Office (CBO), where she was responsible for managing and directing studies of health care and health care financing issues in the Health, Retirement, and Long-term Analysis Division. Prior to joining CBO, Dr. Buntin worked at the Office of the National Coordinator for Health Information Technology, where she established and directed the economic analysis, evaluation, and modeling group, while on leave from RAND Corporation. At RAND, Dr. Buntin served as deputy director of RAND Health's Economics, Financing, and Organization Program, director of Public Sector Initiatives for RAND Health, and co-director of the Bing Center for Health Economics. Her research at RAND focused on insurance benefit design, health insurance markets, provider payment, and the care use and needs of the elderly. She has a Ph.D. in health policy with a concentration in economics from Harvard University. Dr. Buntin is a member of the National Academies of Sciences, Engineering, and Medicine's Board on Health Care Services.

Ana V. Diez Roux, M.D., Ph.D., M.P.H., is Distinguished University Professor of Epidemiology and dean of the Drexel University Dornsife School of Public Health. Before joining Drexel University, she served on the faculties of Columbia University and the University of Michigan, where she was chair of the Department of Epidemiology and director of the Center for Social Epidemiology and Population Health at the University of Michigan School of Public Health. Dr. Diez Roux is internationally known for her research on the social determinants of population health and the study of how neighborhoods affect health. She has been a member of the MacArthur Network on Socioeconomic Factors and Health and was co-director of the Network on Inequality, Complexity and Health. Dr. Diez Roux received an M.D. from the

University of Buenos Aires and a master's degree in public health and doctorate in health policy and management from the Johns Hopkins Bloomberg School of Public Health. She is an elected member of the National Academy of Medicine and has served on numerous committees of the National Research Council and the Institute of Medicine, most recently on the Committee on Recommended Social and Behavioral Domains and Measures for Electronic Health Records.

Marc N. Elliott, Ph.D., is a senior principal researcher and holds the Distinguished Chair in Statistics at the RAND Corporation. His areas of interest include health disparities, Medicare, vulnerable populations, experiences with health care, profiling of health care institutions, survey sampling, experimental design, causal inference, and case-mix adjustment. He has developed Bayesian methods of estimating race/ethnicity and associated disparities using surname and address information. Dr. Elliott led an Office of Minority Health project, developing novel, cost-effective sampling and analytic methods to improve national health estimates for small racial/ethnic subgroups. Since 2006, he has led the Centers for Medicare & Medicaid Services Medicare CAHPS (Consumer Assessment of Health Providers and Systems) Analysis project. Since 1996, he has been RAND's lead statistician on the Agency for Healthcare Research and Quality (AHRQ) CAHPS I-III projects and currently co-leads the AHRQ CAHPS IV project. Dr. Elliott was recognized by Thomas Reuters as being one of the Top 1 percent of Cited Scientists 2002-2012. Dr. Elliott is a fellow of the American Statistical Association. He earned his Ph.D. in statistics from Rice University.

José J. Escarce, M.D., Ph.D., is a professor of medicine in the David Geffen School of Medicine at the University of California, Los Angeles (UCLA), and a professor of health policy and management in the UCLA Fielding School of Public Health. His research interests and expertise include health economics, managed care, physician behavior, racial/ethnic and socioeconomic disparities in health care, technological change in medicine, and access, costs, and quality of care. Dr. Escarce is currently working on projects that address sociodemographic barriers to access, vertical integration between acute and postacute care, bundled payments, and the effects of financial and nonfinancial incentives on costs and quality in provider groups and health systems. He holds an M.D. from the University of Pennsylvania School of Medicine and a Ph.D. from the Wharton School. Dr. Escarce is an elected member of the National Academy of Medicine and was a member of the Institute of Medicine Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care and of the National Academies of Sciences, Engineering, and Medicine's Board on Population Health and Public Health Practice.

Robert Ferrer, M.D., M.P.H., is John M. Smith, Jr. Professor and vice chair for research in the Department of Family and Community Medicine at the University of Texas Health Science Center at San Antonio (UTHSCSA). Dr. Ferrer is a practicing family physician with research interests at the interface of primary care and public health, including primary care transformation and quality improvement, social determinants of health, and applications of complexity science to health and health care. Currently, he also serves as director of community engagement for UTHSCSA's Clinical Translational Science Award. Dr. Ferrer is active in community health initiatives, having served as chair of the leadership team for San Antonio's Communities Putting Prevention to Work grant from the Centers for Disease Control and Prevention and is now vice-chair of the Bexar County Health Collaborative. He has also been a member of the Expert Panel for the Agency for Healthcare Research and Quality Innovations Exchange. Dr. Ferrer holds an M.D. from Hahnemann University School of Medicine and an M.P.H. from the University of Washington.

Darrell J. Gaskin, Ph.D., is William C. and Nancy F. Richardson Professor of Health Policy and director of the Johns Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health. His research aims to improve access to care for poor, minority, and other vulnuerable populations and to eliminate racial/ethnic and socioeconomic disparities in health care. His current research explores the relationship between "place" and health care disparities and examines racial/ethnic and socioeconomic disparities in hospital care. He is vice chair of the Board of Directors of AcademyHealth and a member of the Center for Health Policy Development Board and the board of directors for the National Academy of State Health Policy. He has served as a member of the Congressional Black Caucus Commission on the Budget Deficit, Economic Crisis, and Wealth Creation and of the Board of Directors of the Maryland Health Insurance Plan, the state's high-risk pool, and was vice chair of the Board of Directors of the Maryland Health Benefits Exchange Commission. He has also served as a member of several Institute of Medicine committees, including the Committee on Valuing Community-Based, Non-Clinical Prevention Policies and Wellness Strategies and the Committee on the Future of Emergency Care in the United States Health System. He received an M.S. from the Massachusetts Institute of Technology and a Ph.D. from the Johns Hopkins Bloomberg School of Public Health.

Mark D. Hayward, Ph.D., is Centennial Commission Professor in the Liberal Arts and professor of sociology at the University of Texas at Austin. From 2005 to 2015, he was director of the university's Population Research Center. His primary research addresses how life course exposures and events influence the morbidity and mortality experiences of the adult population. Recent studies have clarified how early life conditions and especially educational experience influence socioeconomic, race, and gender disparities in adult morbidity and mortality; the demography of race/ethnic and gender disparities in healthy life expectancy; social inequality in the biomarkers of aging; and the health consequences of marriage, divorce, and widowhood. He recently served as the president of the Southern Demographic Association and chair of the Aging and Life Course section of the American Sociological Association. He has served on the boards of the Population Association of America and the Society of Biodemography and Social Biology, and he was a member and then chair of the Inter-University Consortium for Political and Social Research Council. Currently, he is a member of the National Advisory Committee for the Robert Wood Johnson Foundation's Health and Society Scholars Program. He served on the National Research Council (NRC) Committee on Population and the NRC Panel on New Directions in Social Demography, Social Epidemiology, and the Sociology of Aging. Dr. Hayward received his Ph.D. in sociology from Indiana University.

James S. Jackson, Ph.D., is the past director of the Institute for Social Research and the Daniel Katz Distinguished University Professor of Psychology at the University of Michigan. He has previously held positions as chair of the Social Psychology Training Program and director of the Research Center for Group Dynamics, the Program for Research on Black Americans, and the Center for Afroamerican and African Studies, all at the University of Michigan. His research focuses on issues of racial and ethnic influences on life course development, attitude change, reciprocity, social support, and coping and health among African Americans. His research efforts include carrying out a number of national and international surveys of black populations. Dr. Jackson is a fellow of the American Academy of Arts and Sciences and the American Academy of Political and Social Science, and was appointed to the National Science Board of the United States by President Obama in 2014. He has served on several committees of the National Academies of Sciences, Engineering, and Medicine, including currently on the Board on the

Health of Select Populations; on the Board on Behavioral, Cognitive, and Sensory Sciences; Standing Committee on Integrating New Behavioral Health Measures into the Substance Abuse and Mental Health Services Administration's Data Collection Programs (as chair); and Roundtable on the Application of Social and Behavioral Science Research. Dr. Jackson holds a Ph.D. in social psychology from Wayne State University and is an elected member of the National Academy of Medicine.

Daniel Polsky, Ph.D., is the executive director of the Leonard Davis Institute of Health Economics, Professor of Medicine in the Perelman School of Medicine, and the Robert D. Eilers Professor of Health Care Management in the Wharton School at the University of Pennsylvania. His research areas include access to health care, provider payment, disparities, and economic evaluation of medical and behavioral health interventions. He serves on the Congressional Budget Office's Panel of Health Advisers and the National Academies of Sciences, Engineering, and Medicine's Board on Population Health and Public Health Practice. He was the senior economist on health issues at the President's Council of Economic Advisers in 2007-2008. He received a Ph.D. in Economics from the University of Pennsylvania and a master of public policy from the University of Michigan.

Meredith Rosenthal, Ph.D., is professor of health economics and policy and the associate dean of diversity at the Harvard T.H. Chan School of Public Health. She is a member of the Massachusetts Public Health Council and an elected board chair of the Massachusetts Health Quality Partners. Dr. Rosenthal's research focuses primarily on policies that will help slow the growth in health care spending. These efforts include changes in payment incentives, benefit design, and the provision of information and behavioral "nudges" to both patients and providers. Her research has influenced the design of provider payment systems in both the public and private sectors. She has advised federal and state policy makers in health care payment policy and implementation, and has also testified in congressional hearings on pay-for-performance and in legislative hearings in California and Massachusetts concerning health care provider payment and benefit design policies. Dr. Rosenthal earned her Ph.D. in health policy (economics track) at Harvard. She is an elected member of the National Academy of Medicine.

Anthony Shih, M.D., M.P.H., is executive vice president of The New York Academy of Medicine (NYAM). Established in 1847, NYAM advances solutions that promote the health and well-being of people in cities worldwide. Dr. Shih's expertise is in health care policy, urban health, health system performance measurement, health care quality improvement, and health care philanthropy. Prior to joining NYAM, Dr. Shih served as The Commonwealth Fund's executive vice president for programs, overseeing all of the fund's program and research activities, which were focused on improving the U.S. health care system. Previously, Dr. Shih held several senior management roles, including chief quality officer and vice president of strategy at IPRO, a leading independent, not-for-profit health care quality improvement organization. At IPRO, he developed and managed large-scale quality assessment and improvement projects for Medicare and Medicaid populations, as well as led IPRO's Health Care Transparency Group. Earlier in his career, Dr. Shih was assistant medical director for a community-based mental health organization serving immigrant and refugee populations in Oakland, California. Board-certified in preventive medicine, Dr. Shih received his M.D. from the New York University School of Medicine and his M.P.H. from the Columbia University Mailman School of Public Health.