NATIONAL QUALITY FORUM
Driving measurable health improvements together

Pocket Guide

Developing and Testing Risk Adjustment Models for Social and Functional Status-Related Risk Within Healthcare Performance Measurement

In partnership with the Centers for Medicare & Medicaid Services (CMS), NQF convened a Technical Expert Panel of diverse multistakeholder experts to develop Technical Guidance on social and functional status-related (referred to as 'functional risk' hereafter) risk adjustment in quality measurement.

Purpose

Risk adjusting measures to account for differences in patient health status and clinical factors (e.g., comorbidities, severity of illness) that are present at the start of care has been widely accepted and implemented. Adjustment allows accountable entities to be accurately assessed and not inappropriately penalized as a result of caring for patient populations that carry higher risk, whether social, functional, or clinical in nature.

Measure developers have long expressed a need for standardization and guidance on developing and testing social, functional, and/or clinical risk adjustment models for endorsement and maintenance of quality performance measures.

This pocket guide is a supplement to the larger and more detailed **Technical Guidance**. Throughout this guide, text from the Technical Guidance has been abbreviated. Please refer to the full Technical Guidance for complete text. Moving forward, NQF will need to garner feedback from the broader NQF stakeholder community on how the guidance recommendations and standards will be further operationalized for both measure development and endorsement.

Core Principles of Risk Adjustment[i]

- **Performance measurement is critical to advancing quality.**
- **Disparities in health and healthcare should be identified and reduced.**
- **Performance measurement should not lead to increased disparities.**
- **Outcomes (including cost/resource use) may be influenced by patient health status and clinical, functional, and social factors, in addition to the quality and effectiveness of healthcare services, treatments, and interventions.**
- **Performance measures that are influenced by factors other than the care received need to be adjusted and stratified for relevant differences in patient case mix.**
- **Performance measurement and risk adjustment must be based on sound measurement science.**
- **Risk adjustment may be constrained by data limitations and/or data collection burden.**
- **The methods, factors, and rationale for risk adjustment should be transparent.**
- **Race as a sociodemographic risk factor may reflect complex, and at times multiple, underlying concepts.**

Technical Guidance Steps

Five steps are detailed in the Technical Guidance and described below. Each step is accompanied by one or more best practices for a total of seven standards that developers should do, at a minimum.

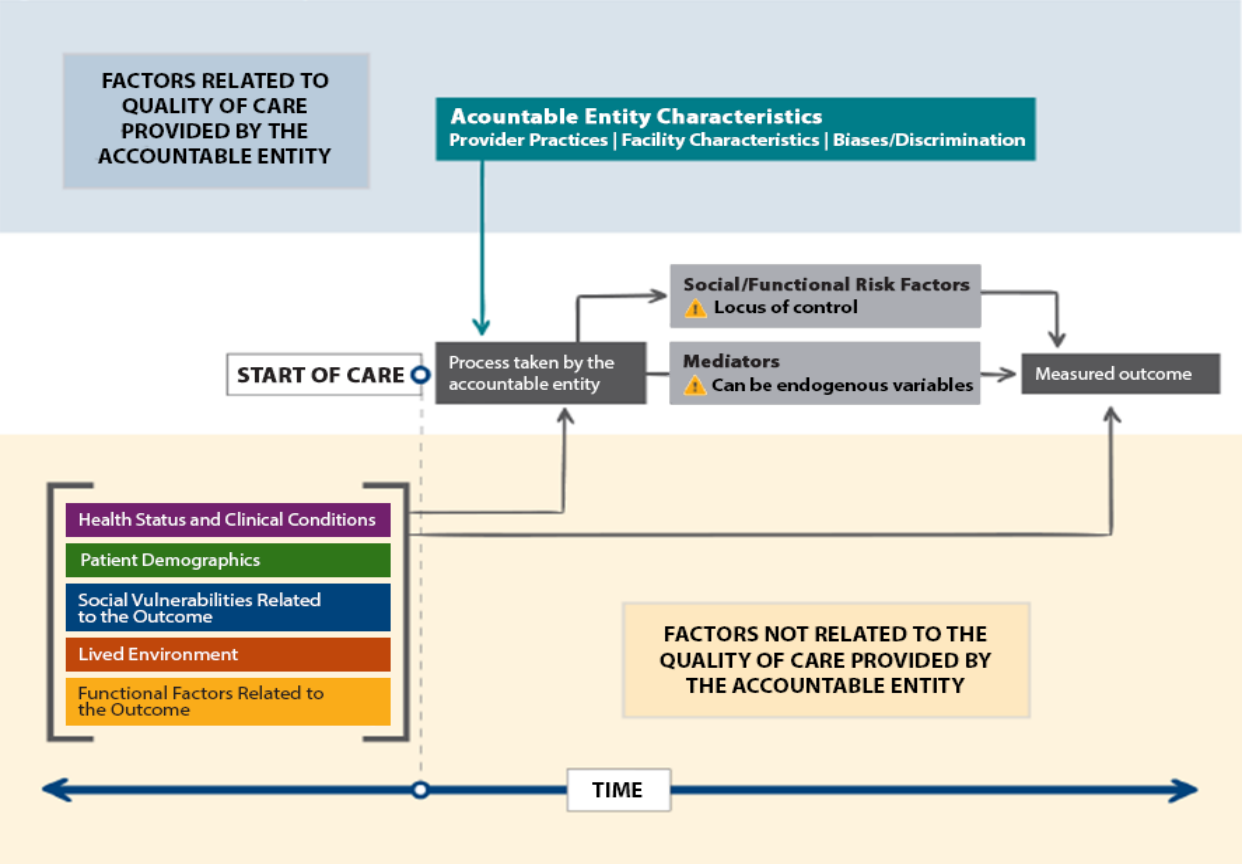
1. Conceptualizing the Model (pg. 22)
2. Identifying and Selecting Potential Data Sources and Variables (pg. 32)
3. Empirically Testing Risk Factors (pg. 36)
4. Empirically Testing the Adequacy of the Risk Model (pg. 38)
5. Considerations for Determining the Final Risk Adjustment Model (pg. 41)

1. Conceptualizing the Model (Min. Std. #1, 2)

A conceptual model illustrates the hypothesized pathways between the social and/or functional risk factors, patient clinical factors, healthcare processes, and the measured healthcare outcome. This can be done graphically as shown in Figure 1 below but must be done narratively for transparency and understanding of the final risk adjustment model. Decisions regarding the conceptual model must be informed by a literature review and expert panels.

Minimum Standard #1[i]

A conceptual model is required and should illustrate the hypothesized pathways between the social and/or functional status-related risk factors, patient clinical factors, quality of care, and the measured healthcare outcome.



This first step is important because measure developers can clearly communicate the evidence base and assumptions made by mapping relationships between the risk variables and a given outcome, and the mediators of those relationships. The conceptual model is critical to guide and justify developer decisions about the final risk adjustment model and to inform empiric testing of any risk factors to help inform their inclusion in or exclusion from a model.

Minimum Standard #2[i]

Developers must, at a minimum, consider age, gender, race, ethnicity, an indicator of urbanicity/rurality, indicator of poverty, indices of social vulnerability, and indicators of frailty and disability for inclusion when developing the conceptual model.

2. Identifying and Selecting Potential Data Sources and Variables (Min. Std. #3, 4)

Minimum Standard #3[i]

If social and/or functional risk factor data are not available in a data source of sufficient quality, but these factors were included in the conceptual model, the developer should describe the potential bias that may exist.

In the second step, the developer identifies and selects data sources and variables for inclusion in the risk model. This step is about turning the factors referenced in the conceptual model into variables for use in the risk adjustment model.

The developer can facilitate transparency and help reviewers understand the various data quality considerations by disclosing the characteristics of selected data sources (e.g., type of data [claims, registry, survey, electronic health record], dates of data collection).

Potential biases may be introduced due to data availability challenges. The Technical Guidance discusses how to describe the potential bias of a factor that is not accessible or is not in a data source of sufficient quality. A clear explanation of the developer's final choices and the rationale for using selected data sources or samples is essential. It is also important to understand and consider the reliability, validity, completeness, comprehensiveness, timeliness, and generalizability for data elements considered for inclusion in the model.

Minimum Standard #4[i]

Developers should document and fully disclose data sources, dates of data collection, any data cleaning or manipulation, the data's assumed quality, and describe the populations covered within each data set.

3. Empirically Testing Risk Factors (Min. Std. #5)

Minimum Standard #5

Developers should provide descriptive statistics on how the risk variables identified from the conceptual model are distributed across the measured entities.

In the third step, the developer empirically tests risk variables and assumptions made in the prior steps. Testing for validity and reliability of proxy variables and explaining how they capture the intent of the risk factor in conceptual model is also important for transparency and understanding. The Technical Guidance reviews testing methodologies for statistically analyzing risk factors for inclusion in the model.

At a minimum, developers should consider if there is sufficient variation in the prevalence of the risk factor to help signal quality differences, whether a proxy variable is necessary, and whether the desired variables are at the patient-level or at a higher level (e.g., county-level). For example, these findings help determine the path forward for operationalizing variables for use in the risk adjustment model.

4. Empirically Testing the Adequacy of the Risk Model (Min. Std. #6)

In the fourth step, the developer empirically tests the overall adequacy of the model. Empirically testing model performance with and without social and functional risk factors, and also in relevant subpopulations, provides evidence of a robust and sufficiently valid risk adjustment model. While no model will be perfect, the totality of these model performance studies will provide important information on model validity to multistakeholder measure evaluation Committees. This section within the Technical Guidance details steps on how to analyze a model's predictive ability, discrimination, and calibration.

Minimum Standard #6[i]

Model calibration should be conducted within the overall population and within relevant subgroups that may bias the outcome. Measures that include social or functional risk factors in the final risk model should be calibrated for race, ethnicity, an indicator of urbanicity/rurality, an indicator of poverty, and an indicator of disability, as possible/relevant.

The developer should explain how well the risk model is performing in comparison to expectations established during the conceptualizing the model phase (step 1 above). Discrimination examines whether randomly selected patients are showing the expected risk, given their outcome. Calibration examines whether certain sub-populations of interest are showing the expected risk as well. Empirical tests are not solely deterministic for the final model and must be considered in conjunction with the conceptual model.

5. Considerations for Determining the Final Risk Adjustment Model (Min. Std. #7)

Minimum Standard #7[i]

Final measure specifications should provide a stratification approach informed by literature, patients, experts, other stakeholders, and the conceptual model. At a minimum, developers should consider stratification by race, ethnicity, an indicator of urbanicity/rurality, an indicator of poverty, and an indicator of disability, as possible/relevant.

Measure developers should examine each measure on a case-by-case basis to determine the appropriateness for social and/or functional risk adjustment. Developers should deliberate on the potential for negative unintended consequences of adjusting or not adjusting and determine if they outweigh the benefits of the performance measure in facilitating progress toward achieving high quality, efficient healthcare.

This guidance acknowledges that there may be situations in which social and/or functional risk adjustment is unnecessary or inappropriate. Balanced and thorough consideration and discussion of the trade-offs in adjusting for social and/or functional risk are critical. To avoid incorrect inferences about performance and mitigate concerns that risk adjustment will mask disparities, measures that are risk-adjusted for social and/or functional risk should also be stratified by the risk factor(s) of interest, rather than solely being adjusted.

[i] The core principles and Minimum Standards #1, 2, 3, 4, 6, and 7 are abbreviated for this document. Please refer to pages 15-16, 22, 29, 33, 34, 41, and 44 in the Technical Guidance for full text.