HALE and hearty: Toward more meaningful health measurement in the clinical setting

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Delivery Science

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compare to a target level of care in reducing the relative risk of adverse clinical outcomes in a population.17

These efforts represent important advances toward more sophisticated measurement frameworks for health care quality. But quality metrics must push further to capture the comprehensive measurement of health status embodied by HALE. We believe that the ability to reliably measure and improve HALE from the clinical setting is an important unmet need in the effort to build a health care system that delivers health.

The adoption of HALE itself as a clinical outcome metric has been proposed.11,21 However, the derivation of HALE has historically been conducted using population-level aggregated morbidity and mortality data over long time horizons, making it difficult for health care systems to use these data to reflect the impact of care delivered to their fluid sub-populations in real time. Health care systems define their populations in terms of persons receiving care, creating an attribution challenge for population health measures based more on geographic distinctions.12 As a result, a more robust indicator of health status such as HALE historically resides outside the realm of clinical care.

2. A new HALE metric

We propose a new framework for measuring HALE as a quality metric in the health care setting. This approach incorporates the electronic medical record (EMR), patient-reported data, and a mathematical model to calculate HALE at the point of care. As with traditional HALE approaches, we use two general dimensions – mortality and morbidity – to capture the fundamental conceptual objectives of both a long and healthy life.

2.1. Mortality

As opposed to the typical population-level methods of calculating life expectancy, we propose using a person-level prediction of life expectancy based on a mathematical model that incorporates an individual’s specific risk profile. The use of predictive modeling in health care has generally lagged behind that in other industries, with the exception of claims-based actuarial analysis by insurance companies. However, the prevalence of EMRs and clinical data warehouses offers a rich and growing repository of data to run advanced modeling analytics. Indeed, mathematical models validated to predict individualized risk-related outcomes based on the demographic, biometric, and risk behavior data are increasingly common and more sophisticated.13–15 As these tools demonstrate sufficient evidence of clinical predictive validity, patient-reported data can be integrated with historical and biometric data from the EMR and run through the model to calculate a specific individual’s estimated life expectancy at each clinical encounter.

2.2. Morbidity

To weight this measure of longevity by quality of life, we propose using an index of health-related quality of life (HRQL) – the same tool used for calculating the “quality-adjusted” component of QALYs at the population level. These HRQL indices are brief, patient-reported questionnaires that assess overall well-being in physical, mental, and social domains, and several have been validated in large population surveys to value different health states on a relative scale of 0–1 (anchoring a continuum from death to full health).16 For example, the EuroQol EQ-5D is both well-validated and can be administered in less than 5 min. Such data can be collected from the patient at the same time as the mortality risk-related data during a pre-visit phone call, via tablet/kiosk in the waiting area, or by a medical assistant during intake.

2.3. Health-adjusted life expectancy

The estimated life expectancy is then multiplied by the 0–1 HRQL score to derive the patient’s HALE (see Fig. 1). This adapts the standard population methods of calculating HALE to the individual in the clinical setting in real time. The calculated HALE can then be further adapted based on how the data may be most useful in different settings. For example, to zero in on the modifiable components of HALE, Eddy’s Global Outcomes Score framework17 could be used to derive a 0–100 “Healthy Life Score”.

Fig. 1. A framework for clinical summary health measurement estimating health-adjusted life expectancy (HALE).
where current HALE is referenced to a target HALE based on what should be achievable given an individual’s sociodemographics and comorbidities.

2.4. Patient-level use

The above data are collected and calculated prior to the actual clinical encounter, such that the clinician can pull up a succinct profile of the patient’s morbidity and mortality status during the clinical encounter to help frame the visit. The patient’s morbidity profile helps guide clinicians toward the pain, mood, mobility, and self-care issues most affecting the patient’s quality of life. The morbidity profile, because it is based on a model, can be broken down and ranked by the predicted years of life expectancy to be gained by each of a range of potential interventions.

For patients, a point-of-care HALE metric allows for placing a broad and often confusing list of health care interventions in the context of a clear, understandable goal – living a longer, healthier life. Patient communication can be personalized in this healthy life context to create a tangible framework for valuing medical interventions and healthy behaviors. A patient-facing interface can be adjusted in accord with a variety of evidence-based risk communication strategies. For example, HALE might be communicated in terms of a 0–100 “Healthy Life Score” as above (“You are achieving 60% of your ideal health and here’s how you can improve your score”), as an adjusted chronological age (“You have the health of an average 62-year-old and here’s how you can lower your health age”), or in terms of absolute health gain (“In someone like you, quitting smoking would be expected to add around four years to your life”).

For clinicians, a point-of-care HALE metric could help organize patient preferences and an ever-expanding medical literature by prioritizing a lengthy list of recommended actions by the proportional impact of specific interventions on the health of the patient in front of them. In other words, clinicians can use their time more efficiently by increasing the likelihood that their limited time with a patient will lead to substantial improvements in health, using a roadmap for the clinical encounter that is focused and prioritized based on individualized data.

Figs. 2 and 3 illustrate two patient-level use cases of the HALE metric, in these examples utilizing the EQ-5D morbidity measure and the mortality model developed by Braithwaite and colleagues. Patient #1 presents with a calculated HALE of about 7 years. His morbidity and mortality profiles guide a clinical encounter focused on pain, depression, smoking, weight loss and blood pressure control. The resulting pharmacological, physical therapy, and social work interventions increase the patient’s HALE by an estimated 3.9 healthy life years.

Patient #2 presents with a HALE of 4.4 years, based on the additional risk factor of uncontrolled diabetes and a HRQL profile highlighting problems with mobility, self-care, and loneliness due to a caretaker son’s new job. In this case, the morbidity and mortality profiles help guide a different set of prioritized interventions, including the initiation of long-acting insulin, connection to community resources for elders, and a home safety evaluation. This set of interventions increases the patient’s HALE by an estimated 3.0 healthy life years.

In each case, the HALE framework elevates a very different set of priorities and interventions for consideration by patients and physicians, including the kinds of social and behavioral interventions current quality metrics may not measure or reward. Yet despite their differences, in both cases the HALE is increased by a similar amount, reflecting the proportional impact of the tailored recommendations on the particular patient’s health. Furthermore,
this approach can be readily adapted to address the differential impact of alternative interventions for specific conditions.

2.5. Population-level use

The synthesis of component risks and morbidities into the common currency of healthy life years confers unique advantages for population-level health management as well. Using a summary HALE metric allows for placing often diverse system-level efforts into a coherent framework by aggregating data into a unifying “healthy life dashboard” that illuminates which diseases and risk factors are the greatest drivers of poor health in a population.

For example, a large health system could calculate the distribution of HALE in its population and set a goal of saving a million years of healthy life over a defined time period. By aggregating data across the full population of patients cared for by the delivery system, and weighting standard primary care-based interventions by their potential to HALE, clinical resources and investments can be guided and prioritized.

When major contributors to lost HALE are less amenable to clinical interventions, these data could identify priority areas for developing capacity or building bridges with community-based programs in behavioral health, social work, care coordination, or public health. A metric that could successfully bridge clinical and population health in this way might serve as a more tangible metric for federal requirements that hospitals provide community benefit in order to maintain tax-exempt status. Careful thought must be put into risk communication strategies when talking about mortality, and we have discussed several different options for communicating HALE metric data to patients (e.g., 0–100 score, health age). In general, we prefer to frame counseling materials positively in terms of potential life years to be gained with different interventions, rather than the predicted HALE itself. Health systems may wish to experiment with different approaches to identify those that are best received by their particular patient population.

Finally, this broad notion of health may be insensitive to interventions delivered in health care settings. Indeed, an individual’s physical, mental, and social well being is influenced by a broad set of medical, behavioral, social, and environmental determinants. We view this as a strength of the measure, as it fosters consideration of a patient’s health beyond the medical context and may engender...
common cause with nonclinical partners. Furthermore, the inclusion of HRQL helps ensure that issues most important to patients are addressed during clinical encounters.20

3. Conclusion

A recent Institute for Healthcare Improvement white paper on measuring the triple aim (improved population health, better patient care, lower costs) concluded that “the health outcomes of mortality, health and functional status, and their combination – healthy life expectancy [HALE] – are ultimate outcome measures for population health”.21 For the health care system to effectively deliver population health value, we need robust and actionable population health metrics to guide the way. Indeed, reliable and meaningful measurement is central to the science of systems improvement. The current inaccessibility of patient-level HALE data to health care delivery systems represent an important obstacle to achieve a higher performance health system.

Here we propose a new framework for using HALE as a quality measure to guide population health improvement from the clinical setting. This approach is not intended to replace other quality metrics, but rather to complement, organize, and contextualize them in a population health framework. We present the framework as a general template for piloting and experimentation, to be carefully evaluated and adapted with clinical feedback and evolving data systems. With experience and refinement, we believe that a HALE metric may help contribute to a more sophisticated next generation of quality measures, helping chart a path toward a health care system that more effectively and efficiently delivers health.

References