Characterizing Preferences for Health Outcomes in Economic Evaluations

INTRODUCTION

The importance of preference-weighted health outcomes for assessing the economic value of interventions that influence quality of life is highlighted within the osteoporosis disease area. Two broad approaches for obtaining societal preference weights are considered: (1) direct assessment using health scenario descriptions, and (2) indirect assessment using preference-weighted health state classification systems. Empirical evidence from the alternative approaches is reviewed for hip and vertebral fracture. The indirect approach has the benefit of allowing societal values to be obtained for the full spectrum of health outcomes experienced among those with the condition of interest, but little evidence exists to support use of one classification system over another. Preference-weighted outcomes should be included in future clinical trials as secondary endpoints to support trial-based economic evaluation.

Annual direct medical expenditures for osteoporotic fractures are already estimated to exceed $17 billion[1]. The total number of men and women affected by osteoporosis will increase dramatically over the next decades as the elderly US population grows from about 34 million age 65 years and older in 1998 to 62 million in 2025[2]. At the same time, a growing number of costly new pharmacological agents is available to prevent and treat osteoporosis. These facts, taken together, motivate concern that economically sound approaches to osteoporosis prevention and treatment be identified and implemented.

The formal quantitative framework of cost-effectiveness analysis provides one method for identifying interventions that provide good value for the resources invested[3]. The cost-effectiveness ratio, which is defined as the net change in cost divided by the net change in effectiveness, is the primary outcome measure for such analyses. To allow the economic value of osteoporosis interventions to be compared with health care practices for other diseases, there is consensus that a general measure of health effectiveness that facilitates comparison across diseases is required. Quality-adjusted life years (QALY), which take both mortality and morbidity into account[3], are recommended for this purpose. Health-related quality of life is of paramount importance in osteoporosis, because the majority of osteoporotic fractures result in morbidity rather than premature death[4]. Indeed, published economic evaluations that focused on hip fracture prevention alone have shown that the incremental cost-effectiveness ratio for interventions may be reduced by roughly 50% when analyses are reported as cost per QALY gained rather than as cost per life-year gained[5].

QUALITY-ADJUSTED LIFE YEARS

When estimating QALY, each year of life is assigned a preference weight ranging from 1 to 0, where 1 represents perfect health and 0 represents death. Preference weights reflect how health states are valued relative to perfect health and death. QALY have the potential to capture the intangible costs of pain and suffering that are associated with fractures, but estimation requires data on preference weights (also referred to as utilities) for health outcomes associated with fracture. To assess the economic value of new osteoporosis interventions, there has been increased interest in the use of preference-based measures of health in osteoporosis[4].

Two recent reviews address preference-weights for fracture outcomes[4,6]. They document variation of utilities for fracture based on who is asked (e.g., a patient who survived a hip fracture vs a patient imagining a hip fracture) and how they are asked [e.g., visual analog scale (VAS), time tradeoff]. In spite of these variations, published studies consistently show lower values for osteoporosis-related health states in comparison to ideal health. For economic evaluations, it is recommended that societal health-state values be used in the analysis[3]. The 2 broad approaches for estimating societal preference weights are reviewed in the next sections.

DIRECT PREFERENCE ASSESSMENT

One approach for obtaining societal preference weights for fracture outcomes is to use outcome descriptions to convey unfamiliar health outcomes to individuals who do not have first-hand experience with the health state of interest. Preference assessments for the hypothetical health state are then undertaken using a standard technique, such as the time tradeoff, standard gamble, or VAS[7]. A key challenge for direct preference assessment is the development of the health outcome description or set of descriptions. It must be noted that there is variability in health outcomes following fracture, so that coming up with an "average" or set of "typical" health outcomes may be problematic.

INDIRECT PREFERENCE ASSESSMENT

Another approach for obtaining societal preference weights for fracture outcomes is to indirectly assess preferences for health outcomes by using a preference-weighted health state classification system such as the Health Utilities Index (HUI)[8,9] or the EuroQoL EQ-5D[10,11]. These systems consist of 2 components. First, a health status questionnaire defines a discrete number of health states based on the attributes (e.g., physical function, pain, etc.) and levels within attributes (e.g., severely impaired, moderately impaired, etc.). Second, a

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scoring algorithm(s) assigns a societal preference weight to each possible health state defined within the health state classification system (Figure 1). An advantage of the indirect assessment approach is that the questionnaire may be utilized in persons with the condition of interest to characterize the full spectrum of health outcomes. Despite this advantage, it should be noted that preference weights for each classification system do, at some point, rely on written outcome descriptions to convey unfamiliar health states to subjects, who directly value them using either (depending on the system and version) the standard gamble, time tradeoff, or VAS. Ultimately, statistical techniques are used to infer values for each health state in a classification system, because direct utility assessment for each health state is generally not feasible (e.g., there are thousands of health states in some systems).

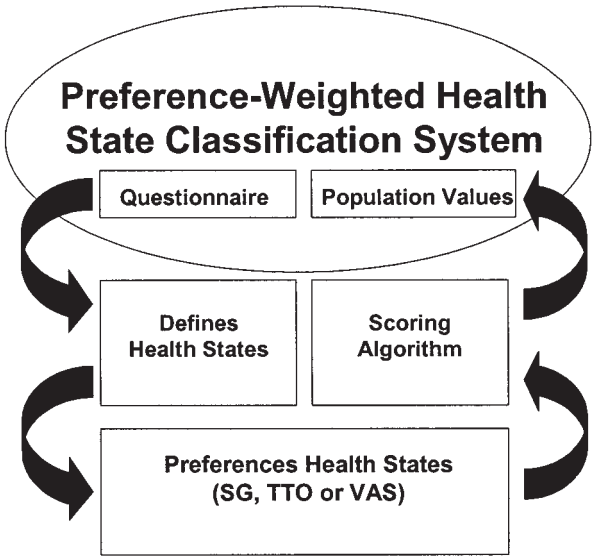

Figure 1. Components of a preference-weighted health state classification system. Preferences for health states are valued using standard gamble (SG), time tradeoff (TTO), or visual analog scale (VAS).

CURRENT EVIDENCE

To characterize how the preference assessment approach affects values obtained for health states we examine evidence pertaining to hip fracture and vertebral fracture outcomes. First, preference weights for hip fracture outcomes are considered. Two studies report directly assessed time tradeoff values for hip fracture using outcome scenarios[12,13]. Salkeld, *et al*[13] reported hip fractures described as "bad" (requiring nursing home placement) or "good," while Gabriel, *et al*[12] reported on a "disabling" hip fracture (grouped with "good" in Figure 2 because nursing home placement was not required). Gabriel, *et al* also reported values for hip fracture using the HUI with Mark 2 scoring and a quality of well-being score estimated based on the Medical Outcome Study Short Form-36 health status instrument[14]. Mean values for the indirect approach were nearly double those obtained using direct assessment of health scenarios, and this was shown to affect incremental cost-effectiveness ratios for a hypothetical intervention to prevent hip fracture. Interestingly, when time tradeoff assessments for current health were considered for the subgroup of women who considered their experience to have been the same as or worse than the disabling hip fracture outcome description, mean preference weights did not differ significantly from HUI Mark 2 values for the entire group of hip fracture subjects. Thus, although the indirect assessed preference weights were significantly higher than directly assessed values for hypothetical outcome scenarios, they did not differ from values for current health among the subgroup of women who considered their health outcomes to be comparable to the outcome description.

When multiple vertebral fractures were considered, a

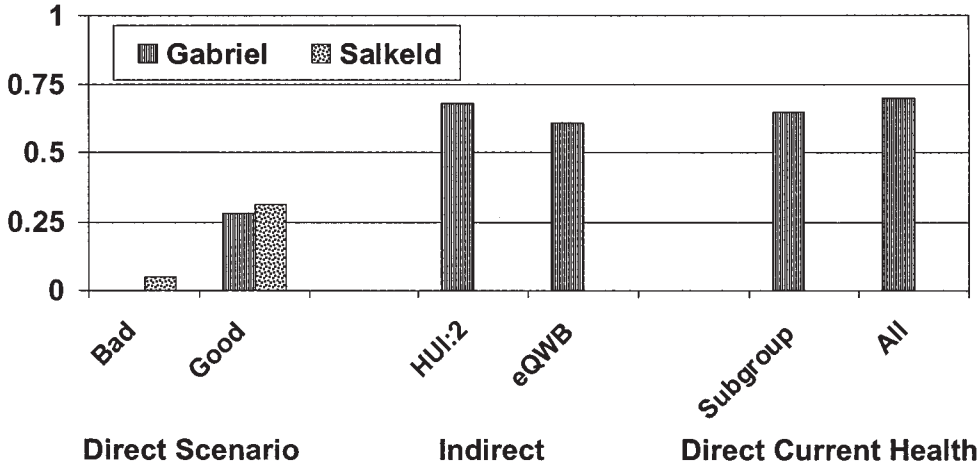

Figure 2. Mean health state values associated with hip fracture by assessment technique as reported by Gabriel, *et al*[12] or Salkeld, *et al*[13].

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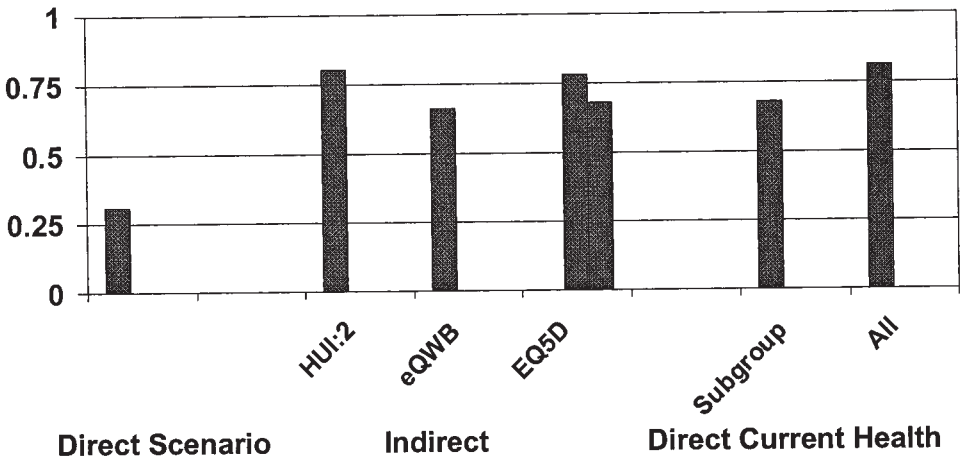

Figure 3. Mean health state values associated with vertebral fracture as reported by Gabriel, *et al*[12] or Oleksik, *et al*[15] (EQ-5D only).

similar phenomenon was noted when comparing direct time tradeoff assessments for the hypothetical health states and indirect assessments among women with the condition of interest (Figure 3). Although the EQ-5D values came from a randomized controlled trial[15], the similarity in values across instruments is noteworthy.

Similar evidence that preference assessment methods may affect the economic analyses in meaningful ways is provided by Suarez-Almazor, *et al*[16] within the area of rheumatoid arthritis. This study compared direct assessment of mild and severe health outcome states using the VAS, time tradeoff, and standard gamble to assess outcome descriptions patterned on the generic health state classification system used for EQ-5D. Comparisons were made between directly-assessed preference weights and those obtained using York weights[11] for EQ-5D. Although there were not large discrepancies across the mild health states relative to the EQ-5D values, there were striking differences noted for the directly assessed values relative to EQ-5D for the severe health state.

In summary, studies in both the osteoporosis and rheumatoid arthritis disease areas provide compelling evidence that there may be important differences between individual and societal weights. These studies also suggest that differences in preference weights may result in qualitatively different incremental cost-effectiveness ratios[12,16]. Nonetheless, it appears that the indirect assessment approach utilizing preference-weighted health state classification systems (Figure 1) is a superior approach for obtaining societal values. In addition to being easy to implement (e.g., a 5-item questionnaire defines health states for the EQ-5D), the indirect approach has the distinct advantage of allowing the broad spectrum of health outcomes experienced by individuals with the condition of interest to be considered. Thus, rather than choosing an "average" or "typical" health outcome, the full spectrum of outcomes can be assessed and indirectly valued. A caveat, however, is that not all adverse events associated with treatment will be measurable using the indirect assessment approach.

CHALLENGES FOR FUTURE RESEARCH

Several specific challenges within the osteoporosis disease area for preference-weighted outcomes include assessing the influence of multiple fractures on QALY and the longitudinal influence of fracture prevention on QALY. Methodological challenges remain regarding whether or not there are meaningful differences between systems for indirect preference assessment and whether or not "hidden" quality of life consequences of treatment can or should be valued. To address these issues, one way forward is to include preference-based measures of health outcome in clinical trials. This would provide data for trial-based economic evaluations and would also provide an empirical evidence base for further investigation of indirect assessment approaches. Such data are critically needed for assessing the cost-effectiveness of alternative osteoporosis interventions.

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