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Calculating the value for money of quality improvements when health-related outcome measures are unavailable; using quality indicators in decision-analytic modelling

BACKGROUND

Quality indicators are often used to quantify the effect of quality improvements and may be related to different dimensions of quality, including system characteristics, continuity of care, and patient experiences. Thus, they are often not measures that reflect impact on patients' health per se. In contrast, in health economic evaluation the measures of effectiveness should reflect impact on health, for instance through patient-relevant outcomes, to enable the establishment of the value for money of interventions.

As a result, the application of non-health-related quality indicators in quality improvement projects may preclude health economic evaluation of quality-improving initiatives by the use of conventional health economic methods. Ultimately, it may hamper informed decision-making and potentially cause benefits foregone, if cost-effective quality improvements cannot be identified.

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OBJECTIVES

To advance a framework for identifying the value for money of quality improvements, for which the effect has been established by the use of quality indicators, and investigate the requirements for quality indicators to be usable in health economic evaluation.

METHODS

Bayesian decision theory and value of information analysis were used to construct a framework for the inclusion of quality indicators in decision-analytic models. This method provides a systematic approach to decision-making under uncertainty that enables incorporation and explicit investigation of uncertain and certain parameters in the model. Decision-analytic modelling enables the inclusion of quality indicators as intermediate links in the relationship chain between quality-improving interventions and final impact on health, i.e., patient-relevant outcomes (See Figure 1 for exemplification).

When quality indicators are introduced into the relationship chain, the association between interventions and patient-relevant outcomes are partitioned into two separate, uncertain parameters; namely the association between the intervention and the quality indicator, and the quality indicator and patient-relevant outcomes. This increases the total decision uncertainty and carries a potential cost of uncertainty, which may be estimated as the expected value of perfect parameter information.

RESULTS

A Bayesian decision theoretical and value of information-analytical framework may enable health economic evaluation of quality improvements, for which direct impact on health cannot be established, by the introduction of quality indicators as intermediate links in the relationship chain between interventions and patient-relevant outcomes.

For this to be feasible, the applied quality indicators should be outcome-validated, and a quantifiable relationship between the quality indicator and patient-relevant outcomes should be established. If the applied quality indicator does not reflect all impact on patient-relevant outcomes, more, mutually exclusive quality indicators could be included. All impact of the quality improvement under investigation should be conveyed through the applied quality indicator(s). If the relationships are misspecified, the validity of analyses may be compromised.

The uncertainty of using quality indicators as intermediate links should be evaluated by value of information analysis, and the potential cost of that uncertainty should be compared to the expected resources of eliminating said uncertainty.

CONCLUSIONS

Bayesian decision theory and value of information analysis might provide a viable framework for health economic evaluation of quality improvements by enabling the introduction of quality indicators as intermediate links in decision-analytic models. Despite the lack of evidence on impact on health-related outcomes, analyses may, thus, yet be performed and be informative as long as the potential cost of uncertainty is sufficiently highlighted.
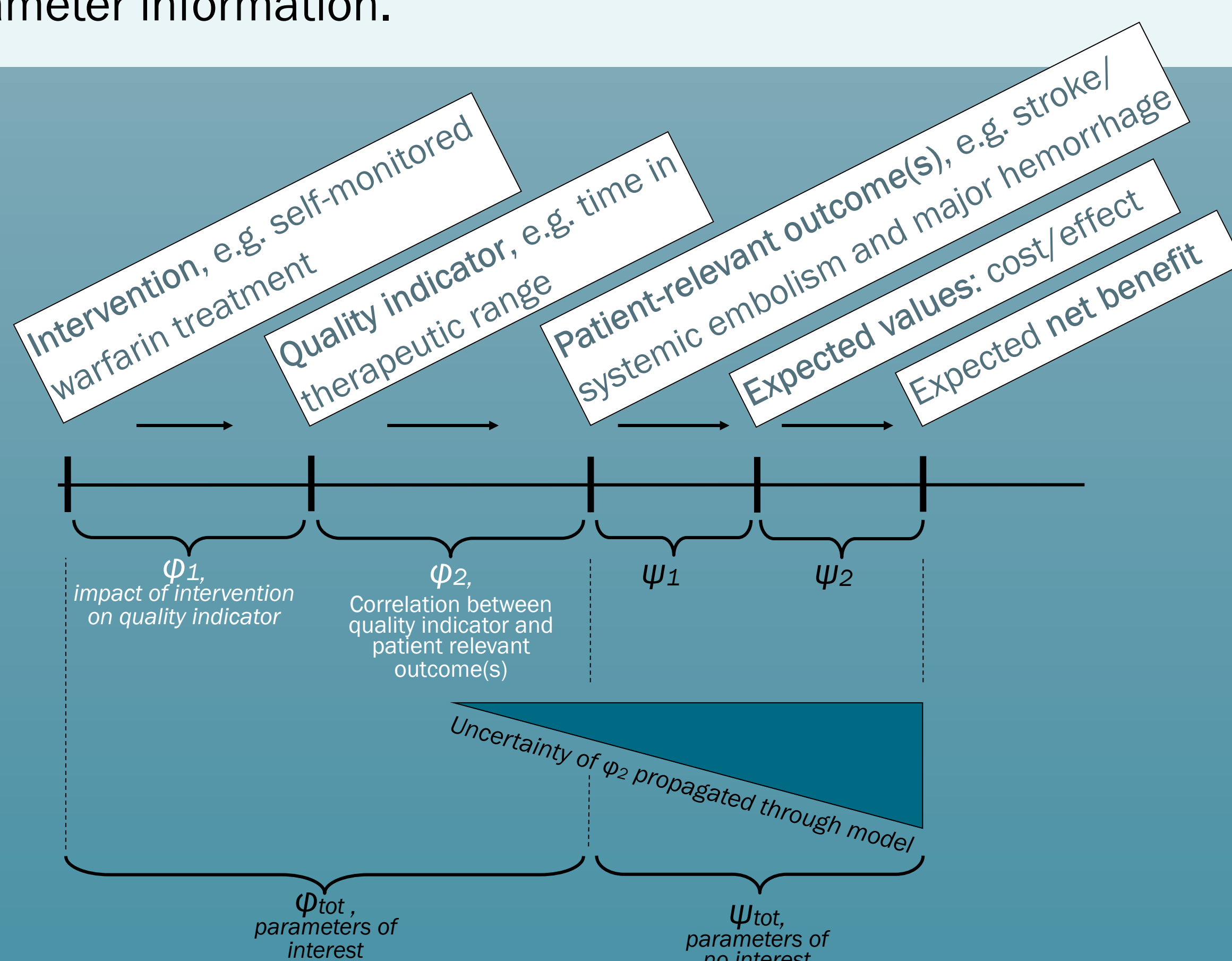

Figure 1. Exemplification of the use of time in therapeutic range as a quality indicator in the case of warfarin treatment. Establishment of a correlation between the quality indicator and patient-relevant outcomes, here stroke/systemic embolism and major hemorrhage, could potentially enable estimation of the cost-effectiveness of interventions, such as self-monitored warfarin treatment, when the effectiveness is evaluated by time in therapeutic range. The uncertainty of the correlation between achieved time in therapeutic range and occurrence of patient-relevant outcomes is propagated through the model and affects the entire decision uncertainty.

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