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Health Policy Analysis

Moving Beyond Quality-Adjusted Life-Years in Elderly Care: How Can Multicriteria Decision Analysis Complement Cost-Effectiveness Analysis in Local-Level Decision Making



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ABSTRACT

Objectives: This study aimed to investigate how multicriteria decision analysis (MCDA) could complement cost-effectiveness analysis (CEA) to support investment decisions in elderly care at local level.

Methods: We used an integrated elderly care program in The Netherlands as a case study to demonstrate the application of both methods. In a 12-month quasi-experimental study ($n = 384$), data on the following outcome measures were collected: quality-adjusted life-years (CEA) and physical functioning, psychological well-being, social relationships and participation, enjoyment of life, resilience, person centeredness, continuity of care, and costs (MCDA). We performed regression analysis on inversed probability weighted data and controlled for potential confounders to obtain a double robust estimate of the outcomes. Probabilistic sensitivity analyses determined uncertainty for both methods.

Results: The integrated elderly care program was not likely (ie, 36%) to be cost-effective according to the CEA (incremental cost-effectiveness ratios: €88 249 from a societal perspective) using the conventional Dutch willingness-to-pay threshold (ie, €50 000). The MCDA demonstrated that informal caregivers and professionals slightly preferred the intervention over usual care, driven by enjoyment of life and person centeredness. Patients did not prefer either the intervention or usual care, whereas payers and policy makers slightly preferred usual care, mainly due to higher costs of the intervention.

Conclusions: MCDA could provide local-level decision makers with a broader measurement of effectiveness by including outcomes beyond health and longevity and the preferences of multiple stakeholders. This additional information could foster the acceptability and implementability of cost-effective innovations in elderly care.

Keywords: cost-effectiveness analysis, elderly care, integrated care, local-level decision making, multicriteria decision analysis, quality-adjusted life-year, well-being.

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Introduction

In cost-effectiveness analysis (CEA), the value of a new intervention versus an alternative is expressed as the additional costs it takes to get an additional unit of health, where the unit of health generally is a quality-adjusted life-year (QALY).¹ When the cost-per-QALY ratio is below a certain threshold value that reflects the opportunity costs of a QALY or the willingness to pay for a QALY, the intervention is deemed to have added value.² This metric is likely to be insufficient to capture the value created by innovations in elderly care, because in practice the quality-adjustment focuses on health-related quality of life (HRQoL),^{3,4} but the main aim of integrated care for frail elderly may not be to improve health, but to support the elderly in aging in place and improve well-being.^{5,6} Many elderly care programs also aim to improve the process of delivering care to the elderly and remove inefficiencies.^{7–9} One can measure these additional elements of

value and take them into account as contextual factors in support of a deliberate decision-making process, but an alternative approach is to weigh the attributes that matter in value assessment in a multicriteria decision analysis (MCDA) to better inform that process.

A CEA is done primarily to inform national- or regional-level decision making on services to include in the benefit package, generally considered as health technology assessment for formulary inclusion.¹⁰ A cascade of decision contexts follows next, from local-level decision making about the services a healthcare organization plans to offer (guided by clinical guidelines, care pathways, and protocols) down to shared clinical decision making to select the best therapeutic option for an individual. Information on the costs per QALY gained is likely to be insufficient in these lower-level decision contexts.¹¹ At these levels, decision makers need additional information, particularly on the extent to which the goals of an intervention in their specific context were reached.

Hence, there is a need for augmented CEA or MCDA that take values beyond the QALY into consideration, particularly in elderly care given that innovations in this area include health and social care services.¹²⁻¹⁵

Against this background, our study aimed to investigate how MCDA could complement CEA to support investment decisions in elderly care at local level. We applied both methods to evaluate an integrated elderly care program, called the care chain frail elderly (CCFE), in The Netherlands.¹⁶ This responds to the call of ISPOR's task force on MCDA for more head-to-head comparisons of both approaches.¹⁷

Methods

Setting and Decision Context

The study was part of the European Union-funded Sustainable Integrated Care Models for Multimorbidity Delivery, Financing And Performance (SELFIE) project. One of the aims of this project was to strengthen the evidence base of integrated care programs for individuals with multimorbidity by using a comprehensive evaluation approach, such as MCDA.¹⁸ The case study that was selected concerns the Dutch integrated care program, the CCFE.¹⁶ It was chosen to demonstrate the additional value of MCDA, because the aim of the care program reaches beyond health and because the program combines health and social care. The decision context for the CCFE was related to providing evidence on the effectiveness of the program to the professionals providing the program and the health insurers reimbursing the program, to support decisions on its continuation, reimbursement, and potential upscaling of the program within the current region and beyond. Therefore, the CCFE was compared with usual care.

Intervention

The CCFE has been described in detail elsewhere.¹⁶ The program targets the frailest of community-dwelling elderly by integrating services across health and social care and builds a network of support around the patient, aiming to improve their physical, mental, and social health and well-being and experience with care. Ideally, this also reduces secondary care and prevents or postpones residential long-term care admissions and thereby costs. A core team of a general practitioner (GP), a nurse practitioner specialized in elderly care, and a district nurse of a home care organization use a case-finding approach to identify potentially frail elderly. The nurse practitioner visits the elderly at home for a comprehensive geriatric assessment to confirm their frailty and make an inventory of their needs, preferences, capabilities, and resources. Thereafter, a multidisciplinary team meeting is held inviting the health and social care providers involved, a case manager is appointed to coordinate care, and an individual care plan is drafted. The elderly person and his or her informal caregiver are present at the multidisciplinary team meetings and invited to participate actively, and the care program is financed by a bundled payment in which all care for the frail elderly person provided by the GP practice is included. Hence, there are no separate consultation fees for disease-related primary care services provided by the GP practice.

Study Design and Data Collection

In this 12-month prospective quasi-experimental study, we collected data among elderly newly enrolled in the CCFE (intervention group) and among frail elderly receiving usual care (control group). Elderly in the control group, living in the same region as elderly in the intervention group, were identified by

their GP using the same case-finding approach as was applied in the intervention group. Data collection took place at baseline and after 6 and 12 months and consisted of an extensive questionnaire covering outcomes that span the triple aim of integrated care: improving health and well-being, improving experience with care, and reducing costs (increase).¹⁹ Trained interviewers visited the frail elderly at home to administer the questionnaire, to ensure that very frail elderly could participate and that questions were well understood by respondents. The medical ethics committee of the Erasmus Medical Center, The Netherlands, reviewed the study protocol and concluded that the rules laid down in the Dutch Medical Research Involving Human Subjects Act do not apply to this research (MEC-2017-121). All study participants have provided informed written consent. Data collection took place between April 2017 and August 2019.

Outcomes

The main outcome measure in the CEA was QALYs, whereas the main outcome measure in the MCDA was an overall value score, calculated as a weighted sum of 8 outcomes measures. The latter included 2 health outcomes, that is, physical functioning and psychological well-being; 3 well-being outcomes, that is, social relationships and participation, enjoyment of life, and resilience; and 2 care-process outcomes, that is, person centeredness, continuity of care, and total costs. These outcomes were selected based on literature reviews, workshops with representatives from 5 stakeholder groups, and focus groups with individuals with multimorbidity and measured with validated questionnaires (Appendix Table 1 in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>).²⁰

Costs

In both the CEA and the MCDA, costs were calculated from a societal perspective and a healthcare perspective. The healthcare perspective included the following cost categories: care program costs, home care, long-term care admissions, hospital admissions, emergency room visits, outpatient day-care activities, medical specialist care, paramedical care, GP, and medication. The societal perspective additionally included informal care costs. Resource utilization data were obtained with the iMTA Medical Consumption Questionnaire, using a 3-month recall period.²¹ Unit costs were largely based on reference prices from the Dutch Costing Manual, which were converted into 2018 prices using Consumer Price Index provided by Statistics Netherlands.^{22,23} Medication prescriptions were obtained from GP-information systems. In The Netherlands, GPs have formed care groups that negotiate with the health insurers about the bundled payment for integrated chronic care programs.¹⁶ CCFE program costs were retrieved from these care groups.¹⁶

Weighting Outcomes

In the CEA, the weights used to perform the HRQoL adjustments in the QALY calculation were based on the Dutch EQ-5D-5L tariff.²⁴ These weights were derived from the general population and only pertain to health outcomes. In the MCDA, weights were derived from 5 different stakeholder groups, that is, persons with multimorbidity, informal caregivers, professional care providers, payers, and policy makers, resulting in 5 different weight sets; see Appendix Table 2 in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>. These represent the most important stakeholders whose views are relevant to inform decision making on the CCFE. To obtain these weights, a discrete choice experiment in 724 Dutch respondents was conducted, the results of which were published elsewhere.²⁵

Statistical Analysis

Data analysis was performed according to the intention-to-treat principle. As this was a nonrandomized study, we used inverse probability weighting (IPW) to increase comparability between intervention and control group.^{26–28} To calculate the IPW, the following variables were included in the propensity score: age, sex, marital status, living situation, educational level, smoking status, and costs 3 months before baseline as a proxy for frailty. Of several matching techniques, IPW was chosen because it led to the best matching statistics; that is, Rubin's B was < 25 and Rubins' R between 0.5 and 2. A detailed description of this method was given in a previous article.²⁵

A double robust estimate of the outcomes was obtained by performing regression analysis on inversed probability weighted data and controlling for potential confounders.²⁹ Weighted linear mixed models were used to predict the mean scores of all outcome measures in both groups at each time point, assuming the control group had the same baseline score as the intervention group. We included a random intercept at individual level and corrected for time, intervention, the interaction between time and intervention, age, sex, marital status, living situation, educational level, and smoking status.

All analyses were performed in Stata 16.1 (Stata Corp LLC, College Station, TX).

CEA

We calculated the number of QALYs for each patient as the area under the predicted utility curve. The incremental cost-effectiveness ratios (ICERs) were calculated as the mean difference in total costs divided by the mean difference in QALYs.

MCDA

All predicted outcome scores used in the MCDA were standardized on a 0 to 1 scale using relative standardization:

$$S_{aj} = \frac{x_{aj}}{(x_{aj}^2 + x_{bj}^2)^{1/2}}$$

where x is the predicted mean score on the natural scale, a is the intervention group, b is the control group, and j is outcome measure. For all outcomes in the MCDA, a higher score indicates better performance. Hence, x is replaced by $1/x$ for outcomes where a higher score on the natural scale indicates a worse performance (eg, costs). Subsequently, all standardized outcome scores were weighted according to each of the 5 stakeholder perspectives and summed to gain overall value scores for both the intervention and control group.

Uncertainty Analysis

In the CEA, uncertainty was illustrated by the cost-effectiveness plane and the cost-effectiveness acceptability curve (CEAC) using the ICERs of 10 000 bootstrap replications. The CEAC represents the proportion of replications in which the ICER is lower than the threshold value of the willingness to pay for a QALY. The Dutch threshold is determined by the burden of disease expressed in QALYs lost due to disease as a proportion of quality-adjusted life expectancy of the age- and gender-matched general population (ie, proportional shortfalls).³⁰ The proportional shortfall was estimated to be 0.66, which indicates that a threshold value of €50 000 per QALY should be used.³¹

In the MCDA, uncertainty was illustrated with the conditional multiattribute acceptability curve (CMAC). We used Monte Carlo simulations to assess the joint uncertainty of the preference

weights and outcome scores.^{32,33} We used the Cholesky decomposition to obtain 10 000 replications of the weights and outcome scores. For each replication, overall value scores were calculated, as previously described, to determine how often the CCFE was preferred over usual care and to present the 95% confidence interval around the overall value scores. To draw the CMAC, we calculated the probability the CCFE is the preferred alternative (ie, has a higher overall value score) whereas the budget remains below a set threshold. This threshold represents the available budget, given a certain target population size. We used a target population of 2000 frail older persons, which reflects approximately 100 GP's that would implement the CCFE (average general practice size: 2095 patients³⁴ and the CCFE targets approximately 1% of them).¹⁶

Deliberation

An integral part of performing an MCDA is the deliberation on the results.¹⁸ Representatives from the 5 stakeholder groups discussed the outcome measures included in the study and the weights resulting from the discrete choice experiment. MCDA results were reflected upon by professionals and payers directly involved in the care program, for example, GPs and representatives from the care groups and health insurance company.

Results

Characteristics of the Sample

In total, 384 frail elderly participated in the study, 222 in the CCFE group and 162 receiving usual care. Their mean age was 83.4 years and 83.6 years, respectively (Table 1). Women were over-represented in both groups. There are very little differences in baseline characteristics between groups, except for social relationships and participation and person centeredness, where the intervention group scores a bit worse. In both the intervention and control group, the loss to follow-up was 30% after 12 months. Main reasons of loss to follow-up included death, burden of study participation, and cognitive incapacity.

CEA

Over a 1-year period, the number of QALYs was 0.023 higher in the CCFE group than in the usual care group (Table 2). When adopting a healthcare perspective, the total costs in the CCFE group were on average €14 418 for each frail elderly person over a 1-year period whereas these costs were €12 785 in the control group. Therefore, the incremental costs of the CCFE were €1633 from a healthcare perspective and €2017 from a societal perspective. A specification with all cost categories can be found in Appendix Figure 1 in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>. The ICERs for the CCFE were €71 460 and €88 249, respectively.

The cost-effectiveness plane shows that the majority of the ICERs (67% from a healthcare perspective and 68% from a societal perspective) appeared in the northeast quadrant, indicating that the CCFE was more effective than usual care but also more costly (Fig. 1A,B). From a healthcare perspective, 18% of the bootstrap replications fell within the southeast quadrant of the plane, indicating that the CCFE was the dominant strategy, that is, less costly and more effective (Appendix Fig. 2 in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>). The probability that the CCFE was cost-effective at a willingness to pay of €50 000 per QALY at 12 months was 42% from a healthcare perspective. From a societal perspective, the probability was slightly lower, that is, 36%.

Table 1. Baseline characteristics and baseline values of outcome measures.

| Baseline characteristics | CCFE (n = 222) | UC (n = 162) | P value |
|--|----------------|--------------|-------------------|
| Age, mean (SD) | 83.4 (6.3) | 83.6 (5.9) | .768 |
| Female (%) | 63.5 | 64.8 | .780 |
| Marital status (%) | | | .973 |
| Single, never married | 3.6 | 2.6 | |
| Married or living together | 44.6 | 45.0 | |
| Widow(er) | 44.6 | 47.1 | |
| Divorced | 7.2 | 5.4 | |
| Living situation (%) | | | .818 |
| Independent, alone | 54.1 | 55.2 | |
| With others | 46.0 | 44.8 | |
| Educational level (%) | | | .986 |
| Low | 70.3 | 73.3 | |
| Medium | 20.3 | 14.3 | |
| High | 9.5 | 12.4 | |
| Current smoker (%) | 14.4 | 13.8 | .863 |
| Baseline values of outcome measures, mean (SD) | | | |
| Physical functioning (0-15)* | 4.4 (2.8) | 4.5 (3.2) | .597 |
| Psychological well-being (0-100) | 71.4 (18.9) | 70.6 (18.2) | .673 |
| Health-related quality of life (0-1) | 0.6 (0.3) | 0.6 (0.3) | .785 |
| Enjoyment of life (1-4) | 2.8 (0.8) | 2.9 (0.9) | .138 |
| Social relationships and participation (7-35)* | 9.2 (4.1) | 8.2 (3.2) | .004 [†] |
| Resilience (6-30) | 19.3 (4.4) | 19.0 (4.3) | .392 |
| Autonomy (7-35) | 22.3 (4.3) | 21.9 (4.1) | .309 |
| Burden of medication (0-10)* | 2.1 (2.8) | 2.5 (2.8) | .086 |
| Person centeredness (0-18) | 11.7 (3.9) | 12.7 (3.9) | .010 [†] |
| Continuity of care (1-5) | 3.7 (0.8) | 3.8 (0.7) | .067 |
| Total costs 3 months before the study (€)* | 5453 (6994) | 5631 (6946) | .789 |

Note. This table presents the baseline characteristics and outcome scores after IPW. The flowchart of patient inclusion and the results of IPW have been presented elsewhere.

CCFE indicates care chain frail elderly; IPW, inverse probability weighting; UC, usual care.

*Higher score indicating worse performance.

[†]P < .05.

MCDA

The predicted scores and standardized scores on all outcome measures at 12 months are presented in Table 3. Largest differences in performance scores between the CCFE and usual care were found in the scores for person centeredness in favor of the CCFE (CCFE 0.744 vs UC 0.668) and total costs from a healthcare perspective in favor of usual care (0.663 vs 0.748).

The MCDA table with the weights, weighted scores, and summed overall value scores for the CCFE and usual care is presented in Table 4. It includes the costs from a societal perspective. In all stakeholder groups, enjoyment of life received the highest relative importance weight (range 0.22-0.25), followed by psychological well-being (range 0.15-0.18). Total costs received the lowest relative importance weight (range 0.03-0.07) according to patients, partners, professionals, and policy makers. Payers attached the

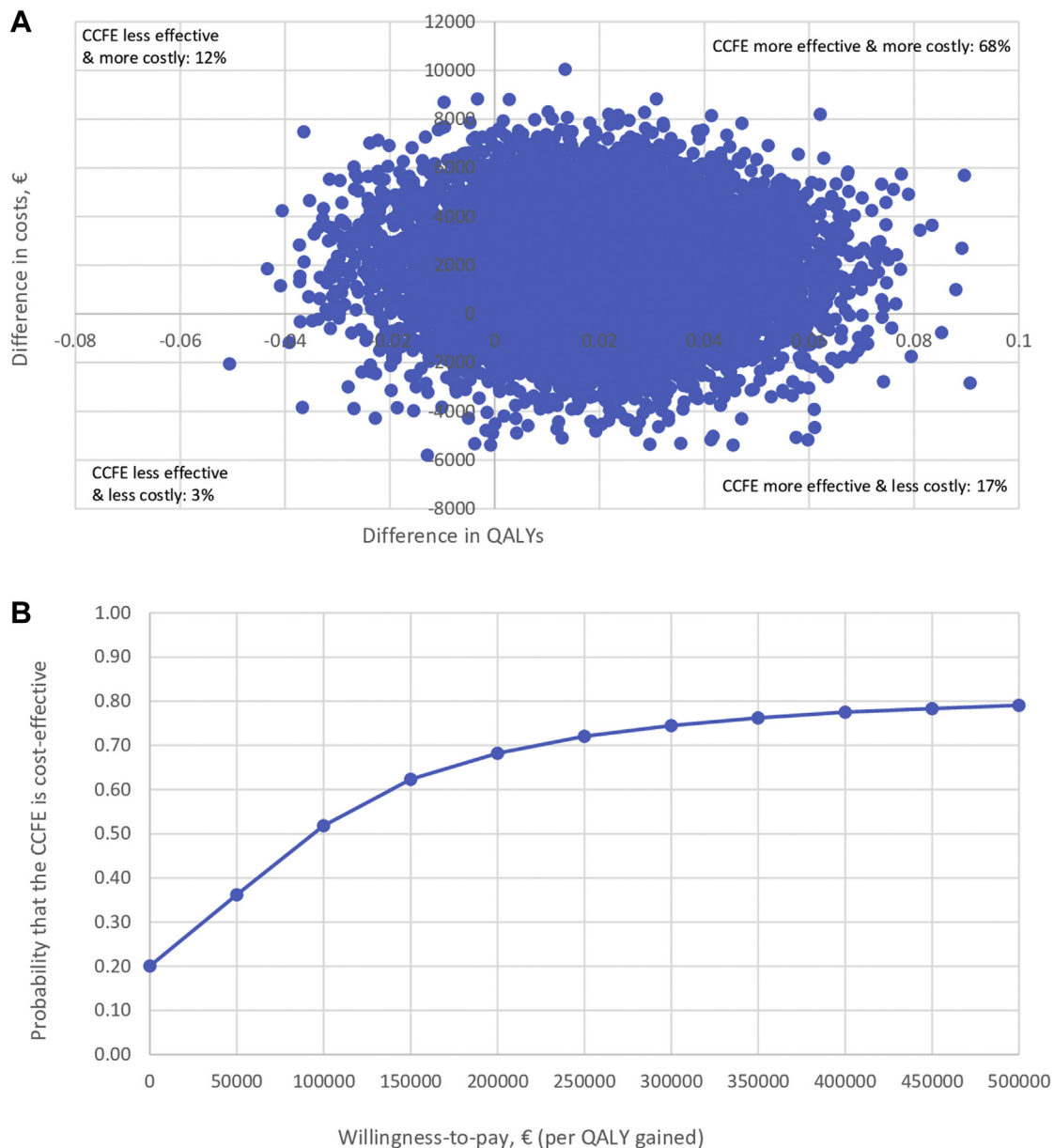
Table 2. QALYs, costs, and ICERs from a healthcare and societal perspective.

| | CCFE (n = 156) | Usual care (n = 113) | Incremental (95% CI*) |
|-----------------------------|----------------|----------------------|-------------------------|
| Total QALYs | 0.665 | 0.642 | 0.023 (−0.071 to 0.122) |
| Total costs | | | |
| Healthcare perspective | €14 418 | €12 785 | €1633 (−1776 to 5042) |
| Societal perspective | €22 676 | €20 659 | €2017 (−2361 to 6395) |
| ICER—healthcare perspective | | | €71 460 |
| ICER—societal perspective | | | €88 249 |

CCFE indicates care chain frail elderly; CI, confidence interval; ICER, incremental cost-effectiveness ratio; PSA, probabilistic sensitivity analysis; QALY, quality-adjusted life-year.

*95% CI based on PSA.

Figure 1. (A) Cost-effectiveness planes and (B) cost-effectiveness acceptability curves obtained by bootstrap replications, from a societal perspective.



CCFE indicates care chain frail elderly; QALY, quality-adjusted life-year.

least importance to person centeredness (0.06). For patients, the overall value scores did not differ between the CCFE and usual care. The overall value scores for the CCFE were numerically slightly higher than usual care when weighted according to the preferences of partners (0.708 vs 0.706) and professionals (0.714 vs 0.713) and slightly lower when weighted according to the preferences of payers (0.697 vs 0.702) and policy makers (0.706 vs 0.708). The latter was mainly driven by a lower performance on physical functioning and higher costs for the CCFE. Confidence intervals around the value scores of the 2 groups largely overlapped. The MCDA table with costs from a healthcare perspective can be found in [Appendix Table 3](#) in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>, showing that the overall value scores for the CCFE and usual care were equal

according to patients, informal caregivers, and professionals. Payers and policy makers still preferred usual care.

The CMAC ([Fig. 2](#)) shows the probability of the CCFE being effective and affordable from a societal perspective given a certain target population and available budget. The CMAC that considers the healthcare perspective can be found in [Appendix Figure 3](#) in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>. The probability that the CCFE is effective and affordable (compared with usual care) increases to a maximum of 50% for patients, 54% for professionals, and 57% for partners at a budget of €56 000 000 for a 1-year period for 2000 frail elderly persons, or €28 000 per person. For payers and policy makers, the probability of being effective and affordable is higher for usual care.

Table 3. Predicted and standardized scores at 12 months for the CCFE and usual care.

| Outcomes measures | Predicted scores | | Standardized scores | |
|---|------------------|----------------------|---------------------|------------|
| | CCFE (n = 156) | Usual care (n = 113) | CCFE | Usual care |
| Health and well-being | | | | |
| Physical functioning (0-15) | 5.715* | 5.328* | 0.682 | 0.731 |
| Psychological well-being (0-100) | 69.998 | 71.256 | 0.701 | 0.713 |
| Enjoyment of life (1-4) | 2.874 | 2.839 | 0.711 | 0.703 |
| Social relationships and participation (7-35) | 9.424* | 9.779* | 0.720 | 0.694 |
| Resilience (6-30) | 19.347 | 19.426 | 0.706 | 0.709 |
| Experience of care | | | | |
| Person centeredness (0-18) | 13.060 | 11.727 | 0.744 | 0.668 |
| Continuity of care (1-5) | 3.833 | 3.704 | 0.719 | 0.695 |
| Costs | | | | |
| Total health and social care costs (€)—healthcare perspective | 14 418* | 12 785* | 0.663 | 0.748 |
| Total health and social care costs (€)—societal perspective | 22 676* | 20 659* | 0.673 | 0.739 |

CCFE indicates care chain frail elderly.

*Higher score indicating worse performance.

Discussion

In this study, we investigated how MCDA could complement CEA to aid local-level decision making in elderly care by applying both methods to a person-centered integrated elderly care program, the CCFE. According to CEA and the associated CEAC, the program was not likely to be cost-effective at a willingness-to-pay threshold of €50 000. The MCDA and associated CMAC

demonstrated the CCFE is potentially equally effective and affordable as usual care. Therefore, the investment decision based on the 2 approaches could differ. Using CEA, the CCFE would be very unlikely to be investable, but using MCDA decision makers may choose to favor the intervention, because given the uncertainty they could improve enjoyment of life (the most important criterion for all stakeholder groups) and promote person-centered care, which is in line with national policy guidance.

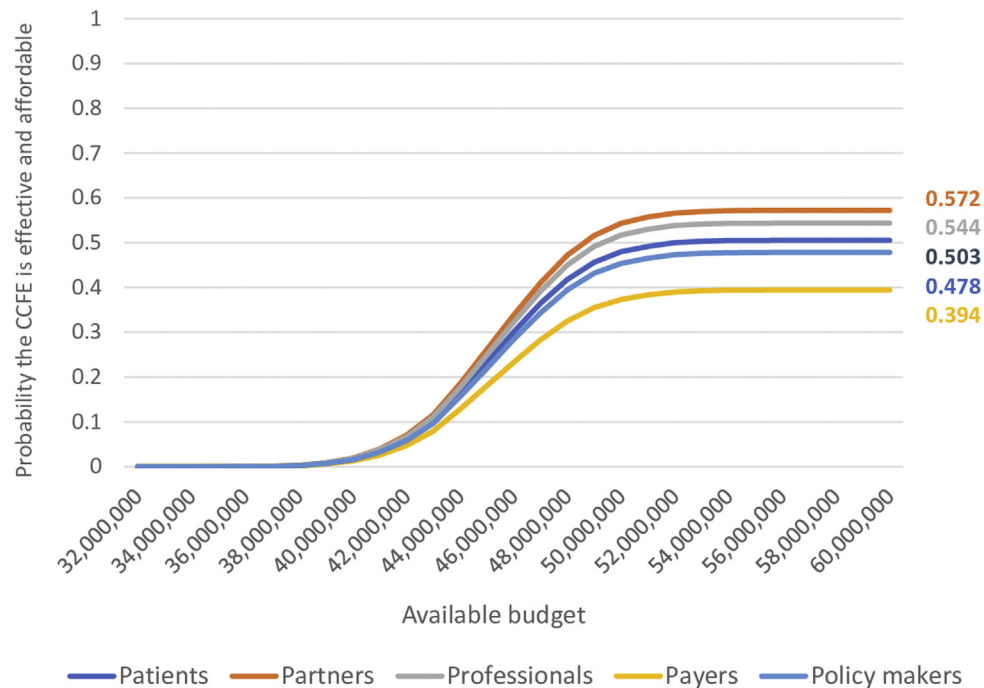
Table 4. MCDA table: weights, weighted performance scores, and overall value scores for the CCFE and usual care from a societal perspective.

| Outcome measures | Patients | | | Partners | | | Professionals | | | Payers | | | Policy makers | | |
|--|----------------|-------------|-------------|----------------|-------------|-------------|----------------|-------------|-------------|----------------|-------------|-------------|----------------|-------------|-------------|
| | Weighted score | | | Weighted score | | | Weighted score | | | Weighted score | | | Weighted score | | |
| | Weight | CCFE | UC | Weight | CCFE | UC | Weight | CCFE | UC | Weight | CCFE | UC | Weight | CCFE | UC |
| Physical functioning | 0.16 | 0.109 | 0.117 | 0.11 | 0.075 | 0.080 | 0.12 | 0.082 | 0.088 | 0.14 | 0.095 | 0.102 | 0.14 | 0.095 | 0.102 |
| Psychological well-being | 0.17 | 0.119 | 0.121 | 0.15 | 0.105 | 0.107 | 0.18 | 0.126 | 0.128 | 0.18 | 0.126 | 0.128 | 0.15 | 0.105 | 0.107 |
| Enjoyment of life | 0.23 | 0.164 | 0.162 | 0.25 | 0.178 | 0.176 | 0.22 | 0.157 | 0.155 | 0.24 | 0.171 | 0.169 | 0.22 | 0.157 | 0.155 |
| Social relationships and participation | 0.08 | 0.058 | 0.056 | 0.09 | 0.065 | 0.062 | 0.11 | 0.079 | 0.076 | 0.10 | 0.072 | 0.069 | 0.10 | 0.072 | 0.069 |
| Resilience | 0.15 | 0.106 | 0.106 | 0.14 | 0.099 | 0.099 | 0.13 | 0.092 | 0.092 | 0.11 | 0.078 | 0.078 | 0.14 | 0.099 | 0.099 |
| Person centeredness | 0.08 | 0.060 | 0.053 | 0.08 | 0.060 | 0.053 | 0.08 | 0.060 | 0.053 | 0.06 | 0.045 | 0.040 | 0.08 | 0.060 | 0.053 |
| Continuity of care | 0.10 | 0.072 | 0.069 | 0.12 | 0.086 | 0.083 | 0.11 | 0.079 | 0.076 | 0.08 | 0.058 | 0.056 | 0.10 | 0.072 | 0.069 |
| Total costs—societal perspective | 0.03 | 0.020 | 0.022 | 0.06 | 0.040 | 0.044 | 0.06 | 0.040 | 0.044 | 0.08 | 0.054 | 0.059 | 0.07 | 0.047 | 0.052 |
| Overall value scores | | 0.707 | 0.707 | | 0.708 | 0.706 | | 0.714 | 0.713 | | 0.698 | 0.702 | | 0.706 | 0.707 |
| 95% CI* | | 0.696-0.717 | 0.697-0.717 | | 0.697-0.718 | 0.695-0.716 | | 0.697-0.717 | 0.695-0.716 | | 0.695-0.717 | 0.697-0.719 | | 0.695-0.717 | 0.696-0.718 |
| % CCFE>UC | | 50% | | | 57% | | | 54% | | | 39% | | | 48% | |

CCFE indicates care chain frail elderly; CI, confidence interval; UC, usual care.

*Based on the Monte Carlo simulation; color scheme ranges from white (lowest score) to green (highest score).

Figure 2. Conditional multiacceptability curves from a societal perspective presenting the probability of the CCFE to be accepted as the preferred alternative over different levels of budget available to be allocated to either the CCFE or usual care given a target population of 2000 frail elderly persons.



CCFE indicates care chain frail elderly.

MCDA results could support decision makers, especially on a local level. Although on a national level it is decided to put focus on integrated elderly care, the further interpretation of how this care should look like is delegated to the regional level. In The Netherlands, these interventions are often developed by care providers, but the decision to reimburse new types of care lays with the health insurers, whereas in the UK the decision makers could be the Integrated Care Systems³⁵ and in Australia the Primary Health Networks.³⁶ Nevertheless, decision makers could benefit from additional information because improvements in HRQoL are difficult to measure or achieve in elderly care, or both.⁵ Furthermore, our findings showed that HRQoL (as measured by physical functioning and psychological well-being) did not receive the highest relative importance by any stakeholder group, which questions the suitability of QALYs, and therefore CEA in this context. MCDA could provide such additional information. First, in MCDA a broad set of outcome measures can be taken into account, for example, covering the triple aim. Second, in MCDA it is possible to incorporate multiple stakeholder perspectives by means of different weight sets. In CEA it is not easily possible to include other perspectives on the value of health outcomes than that of the general population—as value sets are derived from the general population. Third, MCDA is useful in comparing and/or ranking new initiatives in elderly care, as programs may focus on various aims, eg, improving social participation versus improving experience with care. Finally, MCDA can facilitate the choice among many different elderly care initiatives, as are often presented to local-level decision makers.

Comparison With Other Research

There are 2 other studies that investigated how MCDA relates to CEA and whether it can alter the decision of continuation,

reimbursement, and upscaling of innovations, albeit focusing on other types of interventions and target groups. The first study used the weights elicited in the SELFIE study to perform an MCDA of “Primary Care Plus,” a new model care in which GPs could refer patients to medical specialists located at a primary care site.³⁷ Nevertheless, they did not collect performance on the full range of outcome measures, and weights needed to be rescaled. This may have led to the comparable results of CEA and MCDA and the decision to recommend Primary Care Plus given that it was dominant over usual care in both methods. The second study, an evaluation of interventions for knee osteoarthritis,³⁸ investigated to which explicit extent stakeholders’ preferences elicited in the MCDA were consistent with the more implicit trade-offs made in CEA. Hence, they used the same outcomes in MCDA and CEA, thereby ignoring the potential of MCDA to adopt a broader view of a program’s effectiveness. They found a good correlation in intervention ranking between MCDA and CEA, which was to be expected given that both approaches included the same outcomes. Even though in both studies the decision was not altered, the richness of information MCDA provided could shape up decisions, which could be altered as innovations are evolving and need close monitoring and “fine-tuning,” rather than a one-off decision.

The latter study did find differences in the perception of costs between the models, as low-cost interventions were consistently ranked higher in the CEA than in the MCDA, and vice versa. Hence, one of their conclusions is to exclude “cost” as an outcome measure from the MCDA. This is in accordance with recent literature that has discussed the potential of MCDA in health technology assessment, but emphasizes the need for advancement in robust methodology.^{17,39–44} One of those methodological challenges is whether to include cost as a criterion. An advantage of including costs is that the relative importance stakeholders attach to costs is determined by deliberately making trade-offs between costs and

the other outcomes. Others argue that the opportunity costs are then not addressed adequately, given that it is unrealistic to assume that respondents can fulfill this task.⁴⁵ Therefore, outcome measures, such as costs, resource use, and cost-effectiveness, should not be included in the MCDA. Accordingly, we performed the MCDA without costs by rescaling the weight sets; see [Appendix Table 4](https://doi.org/10.1016/j.jval.2022.04.1728) in Supplemental Materials found at <https://doi.org/10.1016/j.jval.2022.04.1728>. Results showed that the CCFE is then preferred by all stakeholder groups. Nevertheless, now opportunity costs for the new composite benefit score created with the MCDA need to be estimated. This is similar to CEA, where the opportunity costs for 1 additional QALY are estimated. This also requires determining cost-effectiveness thresholds for each composite benefit score, which may not be feasible, especially in decision making on a local level, given that outcome measures in the MCDA are context specific and not generalizable. Comparisons among several diseases would be difficult, and it would be up to the policy maker to decide whether there is enough budget. Additionally, we showed that the CMAC could then aid in allocating the budget that is available for a certain target population. Where in CEA budget impact is dealt with as a separate criterion, apart from the CEAC, in MCDA affordability is already included in the CMAC.

Implications

The choice of which method to consult to aid your decision depends on the decision context. CEA is recommended to inform decisions pertaining to the benefit package on a national level, based on the costs/QALY and existing willingness-to-pay thresholds, yet in local-level decision making CEA may be insufficient to fully determine the value of interventions. Given the benefits of MCDA, we advocate for an ongoing monitoring framework based on MCDA to be used in investment decisions in elderly care where a QALY is not informative to decision makers. Given that weight sets were already derived from 5 stakeholder groups, only data regarding the performance scores need to be collected to carry out the MCDA. Using routinely collected data, the intervention could be monitored and continuously adapted based on results. This MCDA framework could then improve the acceptability of innovations by (1) the patients as they can get information on outcomes they can comprehend, such as enjoyment of life and person centeredness; (2) healthcare and social care professionals, as they see the reflection of their work on intermediate outcomes such as person centeredness which helps to stay motivated; and (3) managers/commissioners/payers, as they can monitor the performance of ongoing innovations on short- and medium-term outcomes while keeping services within budgets.

Strengths and Limitations

One of the main strengths of this study is the comprehensive data collection among a difficult to study target group. Although this could be challenging in implementing an MCDA framework, we demonstrated in our case study that it is feasible by closely collaborating with the care providers and embedding the evaluation study early in the implementation of the integrated care program. Trained interviewers administered the questionnaire during home visits, enabling frail elderly that would otherwise not be capable of filling in such an extensive questionnaire, to participate. Nevertheless, this additional data collection may be less of a burden in the future as Patient-Reported Outcome Measures (PROMs) and Patient-Reported Experience Measures (PREMs) are increasingly becoming part of routinely collected data.⁴⁶ Another difficulty of implementing an MCDA framework lies in the comparative opportunities between interventions. To

achieve this, there needs to be consensus about which outcomes to include in the MCDA framework. In our study, this consensus was reached by involving all relevant stakeholder groups during the selection of outcome measures.

Our study has not been able to demonstrate the full potential of MCDA. First, the effect of the intervention was small explaining why differences between MCDA and CEA were not very distinct. If the program had larger effects reflected in performance scores on multiple outcomes, differences between both methods may have been more explicit. Second, we only compared the CCFE with usual care instead of assessing multiple interventions, thereby not exploiting all possibilities available with MCDA. Third, the differences in weights between the stakeholder groups were not large, which led to small differences in overall value scores.

Conclusions

In comparison with CEA, MCDA could provide local-level decision makers with a broader measurement of effectiveness by including outcomes beyond health and longevity and the preferences of multiple stakeholders, in a systematic manner. This additional information aids decision making in elderly and social care—where interventions are generally pointed at improving these broader outcomes—because decisions regarding reimbursement or scaling-up become more transparent and nuanced. This could foster the acceptability and implementability of integrated elderly care innovations.

Supplemental Materials

Supplementary data associated with this article can be found in the online version at <https://doi.org/10.1016/j.jval.2022.04.1728>.

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