Supplementary materials

A trial-based cost-utility analysis of a medication optimization intervention versus standard care in older adults

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Table S1 Characteristics of the IMMENSE study population (n=480) and the CUA population (n=285)

	Full IMMENSE study population (n=480)		Total CUA population (n=285)	
	Intervention group (n=244)	Control group (n=236)	Intervention group (n=148)	Control group (n=137)
Age when included, years mean (SD)	83.2 (6.4)	83.0 (6.3)	82.8 (6.0)	82.1 (5.9)
Gender, n (%)[a]				
Female	152 (62.3)	127 (53.8)	98 (66.2)	74 (54.0)
Level of education, n (%)[a]				
Low (≤12 years)	133 (57.1)	128 (58.2)	75 (52.8)	73 (54.1)
High (>12 years)	100 (42,9)	92 (41.8)	67 (47.2)	62 (45.9)
Missing	11 (4.5)	16 (6.8)	6 (4.1)	2 (1.5)
Living status at admission, n (%)[a]				
Home dwelling	204 (83.6)	208 (88.1)	137 (92.6)	129 (94.2)
Living alone	141 (58.3)	145 (62.3)	86 (58.5)	82 (59.9)
Discharged home	151 (62.1)	132 (56.7)	113 (76.4)	101 (74.3)
Need for assistance, n (%)[a]				
Home care services	124 (50.8)	141 (59.8)	75 (50.7)	77 (56.2)
Multidose adherence aid	73 (30.5)	89 (39.2)	43 (29.0)	48 (35.0)
Handling own medications	94 (38.5)	80 (34.0)	77 (52.0)	64 (46.7)
Medication use, mean (SD)				
Number of medications regular use	6.7 (3.8)	7.3 (3.9)	6.6 (4.0)	7.4 (4.0)
Number of medications total	9.0 (5.1)	9.6 (5.3)	8.7 (5.1)	9.6 (5.4)
Comorbidities in admission notes, n (%)[a]				
Hypertension	125 (51.2)	113 (47.9)	75 (51.0)	69 (50.4)
Asthma or COPD	55 (22.5)	53 (22.5)	44 (29.7)	38 (27.7)
Atrial fibrillation	67 (27.5)	65 (27.5)	37 (25.0)	42 (30.7)
Diabetes	50 (20.5)	52 (22.0)	28 (18.9)	31 (22.6)
Heart failure	40 (16.4)	36 (15.3)	24 (16.2)	21 (15.3)
Renal failure	34 (13.9)	34 (14.4)	24 (16.2)	21 (15.3)
Anxiety / depression	27 (11.1)	18 (7.6)	17 (11.5)	11 (8.0)
Dementia	34 (13.9)	32 (13.6)	7 (4.7)	4 (2.9)
Study ward, n (%)[a]				
Ward 1	198 (81.2)	191 (80.1)	117 (79.1)	103 (75.2)
Ward 2	46 (18.9)	45 (19.1)	31 (21.0)	34 (24.8)
Died during the study period, n (%)[a]	48 (19.7)	46 (19.5)	14 (9.5)	12 (8.8)
EQ-5D utility score at discharge	NA	NA	0.531	0.487
EQ-5D utility score at 1 month follow-up	NA	NA	0.555	0.554
EQ-5D utility score at 6 months follow-up	NA	NA	0.567	0.512
EQ-5D utility score at 12 months follow-up	NA	NA	0.492	0.486
Patients with prolonged hospital stays $\geq$ 14 days, n (%)[a]	43 (17.6)	22 (9.3)	31 (20.9)	14 (10.2)
Total healthcare costs in previous year, NOK mean (95% CI)[b]	247,165 (219,481-280,094)	267,235 (234,176-2397,986)	212,949 (181,212-244,270)	216,973 (181,570-252,329)

[a]Percentages were rounded.

[b]Confidence intervals were bias corrected using bootstrap.

Abbreviations: COPD, Chronic Obstructive Pulmonary Disease; SD, standard deviation; CI, confidence interval.

CHEERs 2022 Checklist

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Consolidated Health Economic Evaluation Reporting Standards (CHEERS) 2022 Checklist

The CHEERS 2022 statement replaces the 2013 CHEERS statement, which should no longer be used. The CHEERS 2022 checklist contains 28 items with accompanying descriptions. Checklist users should indicate the section of the manuscript where relevant information can be found. The authors recommend using a section heading with a paragraph number. If an item does not apply to a particular economic evaluation, checklist users are encouraged to report "Not Applicable." If information is otherwise not reported, checklist users are encouraged to write, "Not Reported." Users should avoid the term "Not Conducted" as CHEERS is intended to guide and capture reporting. Additional information on CHEERS 2022 can be found here.

Title

1. Title

Identify the study as an economic evaluation and specify the interventions being compared.

Cost-effectiveness of a medication optimization intervention against standard care in older adults: economic evaluation of a randomized controlled trial

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Abstract

2. Abstract

Provide a structured summary that highlights context, key methods, results, and alternative analyses.

Abstract is provided

Introduction

3. Introduction: Background and Objectives

Give the context for the study, the study question, and its practical relevance for decision making in policy or practice.

Bacground and Objectives are provided

Methods

4. Health economic analysis plan

Indicate whether a health economic analysis plan was developed and where available.

An economic analysis plan was developed before the analysis was carried out. The plan is provided a supplement.

5. Study population

Describe characteristics of the study population (such as age range, demographics, socioeconomic, or clinical characteristics).

This is described in Table 1.

6. Setting and location

Provide relevant contextual information that may influence findings.

Two internal medicine wards at the University Hospital of North Norway (UNN); one geriatric ward and one general medicine ward.

7. Comparators

Describe the interventions or strategies being compared and why chosen.

A cost-utility alanysis was conducted alongside a randomized controlled trial of a 5-step integrated medicines management intervention compared to standard care.

8. Perspective

State the perspective(s) adopted by the study and why chosen.

A healthcare perspective was chosen. The included patients were above retirement age and after an acute hospitalization they were expected to have high healthcare utilization and costs. A healthcare perspective therefore was considered more relevant than a societal perspective.

9. Time horizon

State the time horizon for the study and why appropriate.

The time horizon for the RCT was 12-months follow-up, an hence this was used in the CEA.

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10. Discount rate

Report the discount rate(s) and reason chosen.

No discounts were used as the time horizon was 12 months.

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11. Selection of outcomes

Describe what outcomes were used as the measure(s) of benefit(s) and harm(s).

Health benefit was measured in QALYs

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12. Measurement of outcomes

Describe how outcomes used to capture benefit(s) and harm(s) were measured.

EuroQol 5 dimension 3 level instrument (EQ-5D-3L) was used. Utility values were derived using the United Kingdom time-trade-off societal value set.

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13. Valuation of outcomes

Describe the population and methods used to measure and value outcomes.

Utility values were derived using the United Kingdom time-trade-off societal value set.

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14. Measurement and valuation of resources and costs

Describe how costs were valued.

Individual-level resource use and costs were collected from health registries and linked with data collected during the trial using each patient's national identity number.

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15. Currency, price date, and conversion

Report the dates of the estimated resource quantities and unit costs, plus the currency and year of conversion.

Costs in NOK were collected from from registries starting one year before inclusion and for the 12-month study period. Costs were converted to 2021 NOK and Euros.

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16. Rationale and description of model

If modeling is used, describe in detail and why used. Report if the model is publicly available and where it can be accessed.

NA

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17. Analytics and assumptions

Describe any methods for analyzing or statistically transforming data, any extrapolation methods, and approaches for validating any model used.

Costs were analyzed using linear regression. QALYs were analyzed using mixed model regression.

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18. Characterizing heterogeneity

Describe any methods used for estimating how the results of the study vary for subgroups.

A sub-group analysis was performed for patients with a hospitalization ≥14 days (long stayers), and those with no such extended hospitalizations (non-long stayers).

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19. Characterizing distributional effects

Describe how impacts are distributed across different individuals or adjustments made to reflect priority populations.

NA

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20. Characterizing uncertainty

Describe methods to characterize any sources of uncertainty in the analysis.

Uncertainty of the ICER was assessed by pairwise bootstrapping of 1000 ICERs plotted in a cost-effectiveness plane (CE-plane) scatter diagram and a cost-effectiveness acceptability curve (CEAC) for several willingness-to-pay thresholds.

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21. Approach to engagement with patients and others affected by the study

Describe any approaches to engage patients or service recipients, the general public, communities, or stakeholders (eg, clinicians or payers) in the design of the study.

NA

Results

22. Study parameters

Report all analytic inputs (eg, values, ranges, references) including uncertainty or distributional assumptions.

Costs are reported in 2021 Euros and NOK. Incremental costs are reported as difference in mean cost per person with bootstrapped bias corrected confidence intervals. Incremental QALYs are reported with bootstrapped confidence intervals.

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23. Summary of main results

Report the mean values for the main categories of costs and outcomes of interest and summarize them in the most appropriate overall measure.

Mean costs and QALYs are tabulated along with ICERs.

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24. Effect of uncertainty

Describe how uncertainty about analytic judgments, inputs, or projections affects findings. Report the effect of choice of discount rate and time horizon, if applicable.

NA

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25. Effect of engagement with patients and others affected by the study

Report on any difference patient/service recipient, general public, community, or stakeholder involvement made to the approach or findings of the study.

NA

Discussion

26. Study findings, limitations, generalizability, and current knowledge

Report key findings, limitations, ethical, or equity considerations not captured and how these could impact patients, policy, or practice.

Reported in Discussion

Other Relevant Information

27. Source of funding

Describe how the study was funded and any role of the funder in the identification, design, conduct, and reporting of the analysis.

The IMMENSE study was supported by the Northern Norway Regional Health Authority grant number HST1314-16. The funding body has supported expenses to cover pharmacist salary and study running costs. They had no part in the collection, management, analysis, or interpretation of the data, nor in writing and reporting study conclusions.

28. Conflicts of interest

Report authors' conflicts of interest according to journal or International Committee of Medical Journal Editors requirements.

The authors report no conflict of interest.