Strengthening the evidence-base of integrated care for people with multi-morbidity in Europe using Multi-Criteria Decision Analysis (MCDA) – The SELFIE project

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Background: multi-morbidity (MM)

Barnett et al., Lancet 2012; 380(9836): 37-43
Need for a pro-active person-centered integrated approach

- Fragmentation in / duplication of services
- Provided by multiple professionals
- Working in different sectors
- Mostly following single-disease guidelines
- Conflicting treatment goals
- Unforeseen treatment interactions
- Overly demanding appeals on an individual’s self-management capability
Contribute empirical evidence about the impact of promising integrated care programmes for persons with MM using ‘multi-criteria decision analyses’ (MCDA).
Definition MCDA

- A method to aid decision-making that makes the impact that multiple criteria have on a decision, and their relative importance, explicit

- Engages stakeholders in a dialogue about decision criteria and their importance
Why MCDA

The complexity of integrated care programmes for MM

- Multiple, interacting, interventions in one programme
- Target multiple levels (individuals, groups, organisations, system)
- Context matters
- A variety of intended outcomes grouped by Triple Aim (Health, Experience, Costs)
- That are impacted by the behavior of those delivering and receiving the interventions
- Continuously adapted and improved

Need to adopt a more holistic, person-centered understanding of ‘value’ when evaluating the added benefit of these programmes
The 7 steps of MCDA

1. Understanding the programmes and the decision-context

2. Identify and structure decision criteria

3. Determine the performance on these criteria

4. Determine the weights of the criteria

5. Create an overall value score

6. Perform sensitivity analyses

7. Interpret results.
A comparative analysis of 17 integrated care programmes for multi-morbidity and their decision context – An overarching analysis

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The 7 steps of MCDA

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Thomas Czytponka
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Introduction: Background information WP2

• Aim of WP2 of SELFIE: **comprehensively describe** 17 programmes selected in WP1, guided by conceptual framework

• Methodological approach: **thick description**

• Information gathered by means of **two complementing approaches**:
  1. **Document analysis** of programme documents
  2. **Qualitative interviews** with 10-20 relevant stakeholders

• **Result**: **individual reports on the 17 programmes** prepared by SELFIE partners

| Programme manager(s) | Informal caregivers |
|----------------------|---------------------|
| Programme initiator(s) | Clients |
| Representatives of sponsor/payer organisations | Other stakeholders |
| Medical and social staff | |

SELFIE 2020
Introduction: Background information WP2

• Qualitative approach to investigate **implicit social practices**
• Origins in philosophy (Ryle, 1949) and anthropology (Geertz, 1973)
• Covers **several levels of depth of analysis**:

![Diagram showing surface, substructure, and thick description levels](source: IHS (2015))
## Introduction: Selected programmes

| Programme type                      | Programme name                                           | Country       |
|-------------------------------------|----------------------------------------------------------|---------------|
| Population health management        | Área Integral de Salut, Barcelona Esquerra (Ais-Be)       | Spain         |
|                                     | Gesundes Kinzigtal                                       | Germany       |
|                                     | Health Network Tennengau                                 | Austria       |
|                                     | **Salford Integrated Care Programme / Salford Together** | United Kingdom|
|                                     | South Somerset Symphony Programme                         | United Kingdom|
| Frail elderly                       | Badalona Serveis Assistencials                            | Spain         |
|                                     | Care Chain Frail Elderly                                 | Netherlands   |
|                                     | Casaplus                                                  | Germany       |
|                                     | GeroS                                                     | Croatia       |
|                                     | Learning Networks                                         | Norway        |
|                                     | **Proactive Primary Care Approach for Frail Elderly (U-PROFIT)** | Netherlands   |
| Palliative & oncology patients      | OncoNetwork                                               | Hungary       |
|                                     | Palliative Care Consult Service                           | Hungary       |
|                                     | Palliative Care System                                    | Croatia       |
| Persons with problems in multiple life domains | **Better Together in Amsterdam North (BSIN)**            | Netherlands   |
|                                     | Medically Assisted Rehabilitation Bergen                  | Norway        |
|                                     | Sociomedical Centre Liebenau                              | Austria       |
Salford Integrated Care Programme (SICP) / Salford Together, UK

- SICP is a **Primary and Acute Care Systems (PACS) Vanguard** site located in the North of England
- Aims to **better integrate care across care sectors** to **improve the physical, mental, social health and wellbeing** of the local population of **people 65+ with long-term conditions**
- Consists of **three broad interventions**:
  1. **Multidisciplinary groups (MDGs)** meetings once a month to discuss case management of the highest-risk patients; MDGs are composed of GPs, mental health professionals, social workers, geriatrists, nurses from the same neighbourhood
  2. **Community assets approach** involves utilising the knowledge and life experiences of older people in Salford; making their lives better by listening and valuing their views and enabling them to influence the improvement of services and build stronger communities; assets range from health resources, volunteers, parks and green spaces, churches, leisure centres and local clubs
  3. **Centre of contact (CoC)** is a centralised hub (predominantly for telephone callers) to support older people to manage their long-term conditions; it helps with navigating services, self-management, offers post discharge support, health coaching
- **Financing**: PACS Vanguard sites **received additional start-up funding** and recognition from NHS England from March 2015 as demonstrators of envisioned new models of care
Proactive Primary Care Approach for Frail Elderly (U-PROFIT), NL

- Nurse-led intervention for frail elderly (>60) living at home
- Overarching aims: transitioning from reactive to proactive elderly care, preserving daily functioning, improving quality of care and health to reduce costs
- Care process consists of two steps:
  1. Screening that makes use of routinely collected data in EMRs (U-PRIM) – allows to identify potentially frail elderly on the basis of polypharmacy, multi-morbidity and/or lack of GP consultations
  2. Elderly care nurse-led programme (U-CARE) – individualised care plan based on holistic assessment and preferences of the patient, care provided in collaboration with GP and other relevant disciplines
- Main role in programme: primary care centres collaborating with home-care organisations, nursing homes and municipality (currently 8 primary care centres)
- Elderly care nurses in primary care centres: background as practice nurse or district nurse, special training to act as case managers and care coordinators
- Financed via 3 sources: (1) implementation grant from Organisation for Health Research Development, (2) health insurance Zilveren Kruis Achmea, (3) internal investments by primary care centers
OncoNetwork, HU

- **Local hospital-based initiative** in Somogy county aimed at **improving clinical outcomes for cancer patients** via timely access to quality-assured, unfragmented healthcare

- Hungarian healthcare system characterised by **severe coordination deficits** – OncoNetwork seeks to overcome these deficits

- Focus on **timely diagnosis and therapy initiation**: diagnostics must be completed within 30 days upon entry, therapy must be initiated within a further 2 weeks

- **OnkoNetwork administrators**: non-physician assistant or administrator background, coordinating role, take on administrative tasks from department physicians

- **Supervisor physicians**: mediating role between OnkoNetwork administrators and department physicians

- **Tailored IT system** for individual patient path monitoring and management has been developed as part of OnkoNetwork

- **Financing**: no specific coverage or reimbursement from external sources – low operational costs are financed from hospital’s budget
Better Together in Amsterdam North (BSiN), NL

- Targets persons with complex needs in multiple life domains in a socio-economically deprived area
- Alliance of 12 providers from primary healthcare, secondary healthcare, mental health services, welfare and social security sectors
- Providers from involved organisations identify potential clients – needs assessment using Self-Sufficiency Matrix (domains: finances, daily activities, housing, relationships at home, mental health, physical health, addiction, activities of daily living, social network, social participation, justice)
- Development of individualised care plan together with client, progress routinely monitored by case manager – typical case management trajectory takes six months to one year
- Case manager: professionals from different organisations and sectors who receive specific training
- Entire process is supported by ICT portal that includes documents and tools for enrolment, triage and case management
- Financing: structural financing via predominant health insurer in the region (Zilveren Kruis Achmea) and municipality of Amsterdam
Results of overarching analysis

Some of the themes that emerged in overarching analysis:

- Assessment of clients’ needs
- Holistic care approach
- Continuity of care
- Client involvement
- Self-management
- Communication between professionals
Results of overarching analysis

Assessment of clients’ needs

• For persons with complex needs, comprehensive needs assessment is particularly crucial
• Different forms of assessment (standardised questionnaires, home visits etc.) – importance of personal contact was stressed

Holistic care approach

• Care should be person-centred rather than condition-centred
• Holistic approach recognises interconnectedness of physical health, mental health and social situation

BSiN:
“[…] that you have a forty year old woman in the practice who has three children and visits the practice with all kinds of vague complaints, asthma, headaches, tired, not well, worries. And the case manager visits her and then it turns out that [she] lives there with her mother and her sister and two children in house that is way too small and actually the big problem is the living situation. How do you solve that? And in addition to all the other things. But then it crystallizes into one action point, housing needs to be worked on.” [case manager]

U-PROFIT:
“…the GP saw my mother during an office visit, but at that consultation my mother is a different woman than when she’s at home, at home you see the chaos…” [programme manager quoting informal caregiver]

OncoNetwork:
“The whole individual is treated and not only the cancer disease.” [non-physician staff]
Results of overarching analysis

**Continuity of care**

- Continuous caring relationship with professionals and seamless service provision particularly important for persons with complex needs
- Existence of a single contact point is highly valued
- In many programmes, non-physician professionals play central role for patients

U-PROFIT:

“[…] patients are open in a really different way towards the nurses than towards us [GPs]. Often much more is said, they dare to say much more, because then you don’t bother the GP even though you [the GP] think they can really say more, they just don’t.” [physician]

South Somerset:

“It doesn’t matter what is wrong with me, I can discuss it with them. If I need a doctor’s appointment, they can make one at the surgery for me and they can...if it’s something to do with, say, the diabetes and they think I need a review, they will arrange all of that for me. So it is, as they have said, one body of people I can go to that has access to everything I need.” [client]
Results of overarching analysis

Client involvement

• Involvement of clients in all stages of the care process, so that clients actively contribute to (planning of) treatment

• Shared decision-making and joint goal-setting as central aspects

South Somerset:
“So, I guess it’s about, [...] what are their goals, are their goals realistic. So, say you’ve got somebody that’s got COPD, and they used to do aerobics, you know, is that still feasible, or actually, do they need to set some new goals. And then, it’s about working with them on how they can achieve those goals.” [physician]

U-PROFIT:
 “[Living at home longer is] what everyone essentially wants. That’s what the government really wants, but most older people too. And that only works if you link up with what someone finds important.” [project manager]
Results of overarching analysis

Self-management

• Persons with complex needs face particular challenges when managing their conditions and navigating through the care system

• Self-management considered a means of empowerment, but patients’ abilities and personal situation have to be taken into account

South Somerset:

“What we have to make sure we don’t do is become another service that people become reliant on. So we don’t want to create dependency, we want to create people that learn to manage their conditions...and what we’ve had to be careful of is that this new model, and this service, doesn’t try and plug gaps. And then, you know, plug gaps in other services that aren’t there, or they don’t have the provision there, and then we become another service which is overwhelmed and can’t cope.” [project manager]

“Perhaps some people who are in the last few months of life, it’s not the best time to start changing and shifting from a culture of dependency and biomedical to trying to encourage self-management, but for some people, it’s exactly the right thing in the last few months of life. They finally get some control over something, so it’s really difficult to do any sweeping generalisations.” [programme initiator]
Results of overarching analysis

Communication between professionals

- Integrated care typically involves multi-disciplinary teams, so communication between professionals is highly important (e.g. case conferences, “huddles”)

- Communication between different professions can be challenging

**South Somerset:**
“[...] and that’s where they discuss all their patients who are ten on the Symphony scale so the ones they’re most worried about. [...] so they tend to be discussed on a daily basis. [...] So the huddle is a key thing and tends to happen early in the day.”  [programme initiator]

**OncoNetwork:**
“There was a need for administrators who overview the full care process, with a supportive role but also with some power; and it became evident early that communication between non-physicians and physicians is not ideal in this context, so we need a supervisor physician role also.”  [programme initiator]
Conclusions of overarching analysis

• Several **common topics** can be identified among the programmes, and **insights** about these gained by the means of thick description

• Aspects of **personal relationships** between clients and professionals/among professionals are central to success

• **Person-centeredness** emphasised in all programmes – manifests itself in various ways

• Identified aspects and experiences can be **valuable for future implementation efforts**

• Insights can be harnessed to **formulate the decision context for MCDA**
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Importance of Triple Aim outcome measures: do patients, partners, professionals, payers and policy makers differ in opinion?

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EuhEA Maastricht, 11-14 July 2018
1. Understanding the programmes and the decision-context
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The 7 steps of MCDA

Willemijn Looman
Aim

To investigate if different stakeholders think differently about the importance of outcomes used to measure the impact of integrated care.

- Patients with multi-morbidity
- Partners (informal caregivers)
- Professionals
- Payers
- Policy makers
Value-based method of MCDA

Integrated care
- Measure performance

Usual care
- Measure performance

Elicit weights
- Patients
- Partners
- Professionals
- Payers
- Policy makers

Overall value score

Overall value score
Core set of outcomes covering the Triple Aim

- Physical functioning
- Psychological well-being
- Social relationships & participation
- Enjoyment of life
- Resilience
- Person-centeredness
- Continuity of care
- Total health- and social care costs
## Programme-specific outcomes

| Health & well-being | Population health management | Frail elderly | Palliative and oncology | Problems in multiple life domains |
|---------------------|------------------------------|---------------|-------------------------|----------------------------------|
| Activation & engagement | Autonomy                   | Mortality     | Financial independence |
| Experience          | Burden of medication        | Compassionate care |
|                     | Burden of informal caregiving | Timely access to care |
|                     | Preferred place of death    |                |
|                     | Burden of informal caregiving |                |
| Costs               | Ambulatory care sensitive hospital admission | Long-term institution admissions |
|                     | Contacts with the justice system |
|                     | Hospital re-admissions      | Falls leading to hospital admissions |
|                     |                              |                |
Weight-elicitation methods

• MCDA method:
  • Multi-Attribute Value-based Method: weights for criteria are determined separately from performance

• Weight-elicitation method:
  • Discrete Choice Experiment (DCE): Core set of outcomes
  • Swing Weighting (SW): Core set of outcomes + programme-specific outcomes
Weight-elicitation methods (1): DCE

- **Discrete Choice Experiment:**
  - Comparing two integrated care programmes
  - No opt-out

- Core set of outcomes

- 8 countries, 5 stakeholder groups = 40 DCEs
- N=150 per stakeholder group
Weight-elicitation methods (1): DCE

• **Design:**
  • Bayesian D-efficient design
  • 8 criteria, 3 levels → attribute level overlap (4/3/3 criteria overlap)
    • Best level enjoyment of life and worst level psychological well-being were never presented together
  • 3 blocks of 6 choice tasks
  • 10 different sub-designs
  • Questionnaire was pilot-tested with persons with multi-morbidity
  • Priors based on literature for first 50 respondents > then design update

• **Analysis:**
  • Conditional logit, scale heterogeneity multinomial logit, mixed logit, Bayesian mixed logit
Discrete Choice Experiment to elicit weights for core set of outcomes

| Physical functioning | Care programme A | Care programme B |
|----------------------|------------------|------------------|
|                      | Severely limited in physical functioning | Severely limited in physical functioning |

| Psychological well-being | Care programme A | Care programme B |
|--------------------------|------------------|------------------|
| Seldom or never being stressed, worried, listless, anxious, and down | Always or mostly being stressed, worried, listless, anxious, and down |

| Social relationships & participation | Care programme A | Care programme B |
|-------------------------------------|------------------|------------------|
| Having a lot of meaningful connections with others | Having some meaningful connections with others |

| Enjoyment of life | Care programme A | Care programme B |
|-------------------|------------------|------------------|
| Having some pleasure and happiness in life | Having some pleasure and happiness in life |

| Resilience | Care programme A | Care programme B |
|------------|------------------|------------------|
| Fair ability to recover, adjust, and restore equilibrium | Fair ability to recover, adjust, and restore equilibrium |

| Person-centeredness | Care programme A | Care programme B |
|---------------------|------------------|------------------|
| Not or barely person-centred | Somewhat person-centred |

| Continuity of care | Care programme A | Care programme B |
|--------------------|------------------|------------------|
| Fair collaboration, transitions, and timeliness | Fair collaboration, transitions, and timeliness |

| Total health- and social care costs | Care programme A | Care programme B |
|------------------------------------|------------------|------------------|
| 8500 euros per participant per year | 5000 euros per participant per year |

Which care programme do you prefer?
Weight-elicitation methods (2): SW

- Swing weighting:
  - Core set of outcomes + programme-specific outcomes
  - SMARTER

- Worst to best
  - Number of criteria differs per country

- Rank Order Centroid
Swing weighting to elicit weights for core set + programme-specific outcomes

“*If you could change one outcome from worst to best, which would that be?*”

Continue doing so for all outcomes, until none are left.
Response online DCE questionnaire currently analysed

| Country         | Patients | Partners | Professionals | Payers | Policy makers |
|-----------------|----------|----------|---------------|--------|---------------|
| Austria         | 168      | 188      | 142           | ...    | ...           |
| Croatia         | 173      | 172      | ...           | ...    | ...           |
| Germany         | 166      | 215      | 179           | ...    | ...           |
| Hungary         | 192      | 166      | 168           | ...    | ...           |
| The Netherlands | 159      | 161      | 156           | 100    | 151           |
| Norway          | 158      | 161      | 91            | 122    | 185           |
| Spain           | 150      | 151      | 139           | ...    | ...           |
| United Kingdom  | 164      | 235      | 161           | 181    | ...           |

... = recruitment ongoing
Comparing relative DCE weights between Dutch stakeholders

![Bar chart showing relative weights for Physical functioning across different stakeholders: Patients, Partners, Professionals, Payers, and Policy makers. The y-axis represents the weight ranging from 0 to 0.25, and the x-axis represents Physical functioning.]
Comparing relative DCE weights between Dutch stakeholders
Comparing relative DCE weights between German stakeholders

![Bar chart comparing relative DCE weights between German stakeholders](chart.png)

- Physical functioning
- Psychological well-being
- Social relations & participation
- Enjoyment of life
- Resilience
- Person-centeredness
- Continuity of care
- Total costs

Legend:
- Patients
- Partners
- Professionals
Comparing weights of Patients between countries
Comparing weights of Professionals between countries?
## DCE vs SW Patients Croatia

| Ranking DCE weights       | Ranking SW weights                  |
|---------------------------|-------------------------------------|
| Enjoyment of life         | Physical functioning                |
| Continuity of care        | Autonomy                            |
| Resilience                | Psychological well-being            |
| Psychological well-being  | Pain and other symptoms             |
| Person-centeredness       | Enjoyment of life                   |
| Social relations & participation | Resilience                  |
| Physical functioning      | Timely access to care               |
| Total costs               | Person-centeredness                 |
|                           | Social relations & participation    |
|                           | Continuity of care                  |
|                           | Burden of medication                |
|                           | Compassionate care                  |
|                           | Burden of informal caregiving       |
|                           | Total costs                         |
|                           | Long-term institution admissions    |
|                           | Preferred place of death            |
|                           | Falls                               |

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**Core set criterion outside top 8**

**Programme-type specific criterion in top 8**
## DCE vs SW Patients Germany

| Ranking DCE weights                  | Ranking SW weights                  |
|--------------------------------------|-------------------------------------|
| Enjoyment of life                    | Physical functioning                |
| Resilience                           | Autonomy                            |
| Continuity of care                   | Psychological well-being            |
| Physical functioning                 | Enjoyment of life                   |
| Psychological well-being             | Activation & engagement             |
| Social relations & participation     | Resilience                           |
| Person-centeredness                  | Social relations & participation     |
| Total costs                          | Burden of medication                |
|                                      | Continuity of care                  |
|                                      | Burden of informal caregiving       |
|                                      | Person-centeredness                 |
|                                      | Avoidable hospital admissions       |
|                                      | Hospital re-admissions              |
|                                      | Long-term institution admissions    |
|                                      | Falls                               |
|                                      | Total costs                          |

*Core set criterion outside top 8
Programme-type specific criterion in top 8*
**Top 3 Patient preferences across countries: DCE vs SW**

| Core set                          | AU | DE | HR | HU | NL | NO | ES | UK |
|-----------------------------------|----|----|----|----|----|----|----|----|
| **DCE**                          |    |    |    |    |    |    |    |    |
| **SW**                           |    |    |    |    |    |    |    |    |
| Physical functioning              | 2  | 1  | 1  | 1  | 2  | 3  | 1  | 2  |
| Psychological well-being         | 2  | 3  | 3  | 2  | 3  | 3  | 1  | 2  |
| Social relationships & participation |    |    |    |    |    |    |    |    |
| Enjoyment of life                | 1  | 3  | 1  | 1  | 1  | 2  | 1  | 3  |
| Resilience                       | 3  | 2  | 3  | 3  | 1  | 3  | 2  | 1  |
| Person-centeredness              |    |    |    |    |    |    |    |    |
| Continuity of care               | 3  | 2  | 1  |    |    |    |    |    |
| Total costs                      |    |    |    |    |    |    |    |    |
| **Prog-spec**                     |    |    |    |    |    |    |    |    |
| Autonomy                         | 2  | 2  |    |    |    |    |    |    |
| Pain and other symptoms          |    |    |    |    |    |    |    |    |
| Life expectancy                  |    |    |    |    |    |    |    |    |

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**Note:**
- DCE: Discrete Choice Experiment
- SW: Standard Work

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Conclusions and implications

- Most stakeholders valued enjoyment of life as very important and costs as much less important.
- More than 2-fold difference in weights between stakeholders in some outcomes (e.g. costs in NL, patient-centeredness in Germany).

Underlines relevance MCDA from different perspectives to explicate the impact of these differences on the overall value scores of Integrated Care and Usual Care.

- In most countries the patients’ top-3 in the DCE usually includes enjoyment of life, physical functioning and either resilience or psychological wellbeing.
- In Croatia, Germany, and Hungary continuity of care enters the patients’ top-3.
- Of the programme-specific outcomes, autonomy, was in the patients’ top 3 of most important outcomes in 2 of the 3 countries that included it in the weight-elicitation study.

Programmes that improve these outcomes get a higher value score.
Thanks for your attention!

Questions?

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Quasi-experimental studies and natural experiments to evaluate the performance

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The 7 steps of MCDA

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7. Interpret results.
Outline of the Presentation

Step 2: Identification and Decision criteria in Selecting of SELFIE Outcomes
- Core outcomes
- Programme-specific outcome
- Instruments used to measure outcomes

Step 3: Measuring performance
Statistical Analyses: Quasi-experimental approaches
- Examples of SELFIFE Programmes Study designs
  - Difference-in-Differences (Diff-in-Diff)
  - Regression Discontinuity (RD)
  - Matching methods-propensity score matching (PSM)
Step 2: Identify and structure decision criteria

A long-list of potentially relevant outcomes obtained from four sources:

- Literature review
- National workshops
  - with representatives from the 5P’s in the eight countries
- Eight focus groups with individuals with multi-morbidity
  - one in each country
- Review of outcomes currently being used in the 17 selected programmes
| Country   | The programme                                                                 |
|-----------|-------------------------------------------------------------------------------|
| Austria   | Health Network Tennengau (HNT)                                               |
|           | Sociomedical Centre Liebenau (SMC)                                           |
| Croatia   | Palliative Care Model                                                          |
|           | GeroS Model                                                                   |
| Germany   | The GK model                                                                  |
|           | The Casaplus program                                                          |
| Hungary   | The OnkoNetwork                                                               |
|           | The palliative care consult service (PCCS)                                    |
| The Netherlands | U-PROFIT                  |
|           | The Care Chain for Frail Elderly (CCFE)                                       |
|           | The BSiN programme                                                            |
| Norway    | The Learning Network                                                          |
|           | MAR Bergen                                                                    |
| Spain     | Barcelona-Esquerra (AISBE)                                                    |
|           | Badalona Serveis Assistencials (BSA)                                          |
| The UK    | Salford Integrated Care Programme (SICP)                                      |
|           | The ‘South Somerset Symphony Programme’                                       |
Step 2: Decision criteria

- **Relevance to multi-morbidity** in different contexts and population groups
- **Relevance across the 17 integrated care programmes**
- **Non-redundancy,**
  - i.e., there is little overlap between them;
- **Preference independence**
  - i.e., the weight of one outcome can be elicited independently from the performance score of another outcome;
- **Operationalisability**
  - e.g., preferring original, and widely accepted performance measures over
- **Self-constructed scales**, avoiding proxies;
- **Sensitivity to short-term intervention effect**
Core set of outcomes covering the Triple Aim

- Physical functioning
- Psychological well-being
- Social relationships & participation
- Enjoyment of life
- Resilience
- Person-centeredness
- Continuity of care
- Total health- and social care costs

This selection was largely driven by focus groups in patients with multi-morbidity in 8 countries. Focus group paper: Leijten et al, BMJ Open (forthcoming)
| Programme-specific outcomes | Programme-type specific outcomes |
|-----------------------------|----------------------------------|
| Population health management |                                  |
| Activation & engagement     |                                  |
| Ambulatory care sensitive hospital admission | |
| Hospital re-admissions      |                                  |
# Programme-specific outcomes

| Programme-type specific outcomes | Population health management | Frail elderly |
|----------------------------------|-----------------------------|--------------|
| Health & well-being              | Activation & engagement     | Autonomy     |
| Experience                       |                             |              |
| Costs                            | Ambulatory care sensitive hospital admission | Long-term institution admissions |
|                                  | Hospital re-admissions      | Falls leading to hospital admissions |
# Programme-specific outcomes

| Programme-type specific outcomes | Population health management | Frail elderly | Palliative and oncology |
|----------------------------------|-----------------------------|---------------|-------------------------|
| **Health & well-being**          | Activation & engagement     | Autonomy      | Mortality               |
|                                  |                             |               | Pain and other symptoms |
| **Experience**                   | Burden of medication        | Compassionate care |
|                                  | Burden of informal caregiving | Timely access to care |
|                                  | Preferred place of death    |               |
|                                  | Burden of informal caregiving |               |
| **Costs**                        | Ambulatory care sensitive hospital admission | Long-term institution admissions |
|                                  | Hospital re-admissions      | Falls leading to hospital admissions |
### Programme-specific outcomes

| Programme-specific outcomes | Population health management | Frail elderly | Palliative and oncology | Problems in multiple life domains |
|----------------------------|------------------------------|--------------|-------------------------|----------------------------------|
| Health & well-being        | Activation & engagement      | Autonomy     | Mortality               | Financial independence           |
|                            |                              |              | Pain and other symptoms |                                  |
| Experience                 |                              | Burden of medication | Compassionate care       |                                  |
|                            |                              | Burden of informal caregiving | Timely access to care |                                  |
|                            |                              | Burden of informal caregiving | Preferred place of death |                                  |
| Costs                      | Ambulatory care sensitive hospital admission | Long-term institution admissions | Contacts with the justice system |                            |
|                            | Hospital re-admissions       | Falls leading to hospital admissions |                          |                                  |
In quasi-experimental studies comparing intervention group with control group
### Instruments recommended to measure the core set of outcomes

| Outcome                          | Instrument                                      |
|----------------------------------|-------------------------------------------------|
| Physical functioning             | SF-36 (physical functioning domain) or Katz-15 for ADL |
| Psychological well-being         | MHI-5                                           |
| Social participation/relationships| IPA (social life and relationships domain)       |
| Resilience                       | BRS                                             |
| Enjoyment of life                | ICECAP-O (item on enjoyment and pleasure) or Q-LES-Q (item on life satisfaction) |
| Person-centeredness              | P3CEQ (experience of person-centered care domain) |
| Continuity of care               | NCQ (Team and cross boundary continuity domain)  |
|                                  | + CPCQ (item on waiting for appointment/treatment) |
| Costs                            | Based on iMTA Medical Consumption Questionnaire  |
Study Design: Population Health Management

Salford Integrated Care Programme (SICP) / Salford Together

Service delivery: MDG = Multi-disciplinary group; CoC = Centre of Contact; CA = Community Assets; CCH = Complex Care Hub; EPC = Enhanced Primary Care.

Organisational: ICO = Integrated Care Organisation; IP Ltd = formation of a Ltd company of Integrated GP Practices. * = Vanguard status awarded to both sites.
**Study Design: Population Health Management**

**Part 1: GP Patient surveys (GPPS) data**

**Intervention and control group**
- **Intervention group:** multimorbid individuals living in Salford (N=5,305)
- **Control group:** multimorbid individuals living in England outside of Salford (N=742,473).

**Period**
- Pre-period covers survey years 2012 to the first semester of 2015.
- Post-period includes the surveys from the 2nd semester of 2015 and year 2016.

**Statistical analysis**
- Use a difference-in-difference (DiD) approach to allow drawing causal inference of SICP on the health and healthcare outcomes.

**Part 2: HES data**

**Intervention and control group:** same as Part 1

**Period**
- Pre period financial year 2009/2010 to 2014/2015.
- Post-period is the financial year 2015/2016.

**Statistical analysis**
- Adopt a lagged dependent variable (LDV) approach
  - does not require assumptions of parallel trends (as required for DiD)
Study Design: Frail elderly: Proactive Primary Care Approach for Frail Elderly (U-PROFIT)

**Intervention group:**
Frail elderly ≥ 75 living at home, identified by screening with U-PRIM who participate in U-PROFIT care programme.

**Control group**
Frail elderly just below 75 from the same GP practices living at home, identified by screening with U-PRIM who do not participate in U-PROFIT.

### Time

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|------|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| 2016 |     |     |     |     |     |     |     |     |      |     |     |     |
| 2017 |     |     |     |     |     |     |     |     |      |     |     |     |
| 2018 |     |     |     |     |     |     |     |     |      |     |     |     |

- **T0 Intervention**
- **T1 Intervention**
- **T0 Control**
- **T1 Control**

### Number of respondent

|                   | Intervention group | Control group |
|-------------------|--------------------|---------------|
| Baseline          | 322                | 134           |
| 12 months follow-up | 177               |               |
Study Design 1: Prospective – Regression Discontinuity (RD)

- Statistical analysis:
  - Graphical analyses
  - Local linear regression
Study design 2: Re-analysis cluster-RCT + claims data

Claims data will be available:

- 2 years before trial (Q4 2008 - Q3 2010)
- Year of trial (Q4 2010 - Q4 2011)
- 3 years after trial (Q1 2012 - Q4 2015)

Linear mixed models – intention-to-treat
- Intervention
- Time
- Intervention*Time
with 35 GP practices as clusters.

Number of respondents:

|                | Intervention 1: U-PRIM | Intervention 2: U-PRIM & U-CARE | Control group |
|----------------|------------------------|--------------------------------|---------------|
| Baseline - 2010| 790                    | 1446                           | 856           |
| Estimated n in 2015# | 545                   | 1033                           | 597           |
Study Design: **Palliative and Oncology: Onko Network**

**Population**

- The target population of OnkoNetwork consists of adult patients with new suspect or new diagnosis of solid tumours in the catchment area of the Kaposi Mór General Hospital at Kaposvár.

**Intervention Group**

**Prospective Quasi-experimental Design:**

- Newly admitted to the hospitals that implemented OnkoNetwork.
- Patients with a new “C” or “D” ICD code were identified and contacted at hospital admission for their informed consent to study inclusion.

**Before-After Design**

- Cohort of individuals suspected of solid tumour in the year after implementing OnkoNetwork.
- All patients with a new “C” or “D” ICD code (except for haematology codes) were identified in the medical system of the hospital and enrolled into the retrospective analysis.
Study Design

Prospective sub-study

Prospective quasi-experimental study

- Propensity score matching (PSM) follow-up with 3 measurements
- PSM based on T0 data demographics
- Mixed effect repeated measures analysis of the matched populations

Prospective sub-study: outcome data by time points

| Program | Currently available (digitized, to be cleaned) | Expected by Sept 2018 |
|---------|-----------------------------------------------|-----------------------|
| T0      | 297                                           | 297                   |
| T1      | 154                                           | 154                   |
| T2      | 62                                            | ~100                  |

Control

| T0      | 358                                           | 358                   |
| T1      | 229                                           | 229                   |
| T2      | 75                                            | ~100                  |

Retrospective sub-study

- Timeliness of care criteria is covered
- Life expectancy at 3 months: by cancer types (lung, stomach, pancreas)
- Comparison of cohort before and cohort after Onkonetwork
- No follow-up data
- PSM and multivariate regression analyses

Retrospective sub-study: outcome data by time points

| MCDA criteria            | Subgroup  | Cohort | Total N | N after exclusions | N after PSM |
|--------------------------|-----------|--------|---------|--------------------|-------------|
| Timeliness of care       | All cancers | Program | 3535 | --- | --- |
|                          | All cancers | Control | 3908 | --- | --- |
| Life expectancy at 3     | Lung       | Program | 539   | --- | --- |
| months                   | Lung       | Control | 698   | --- | --- |
|                          | Stomach    | Program | 105   | --- | --- |
|                          | Stomach    | Control | 98    | --- | --- |
|                          | Pancreas   | Program | 123   | --- | --- |
|                          | Pancreas   | Control | 85    | --- | --- |
Study Design: Problems in multiple life domains

Better Together in Amsterdam North (BSiN)

**Intervention**

6 months intensive case management:

- 1-1-1 one person, one plan, and one case manager
- Plan based on: goals, action points, and evaluations
- Case manager co-ordinates with other care providers
- Case managers attend monthly meetings with each other

**Intervention group**

- Residents of Amsterdam with limited self-sufficiency in multiple life domains referred for participation in BSiN.
- Persons with a score of three or lower on at least three of the 11 life domains of the Self Sufficiency Matrix (SSM) are assigned to case management

**Control group**

- Individuals with low self-sufficiency identified from “Amsterdam health monitor”

**Sample size**

 Interviews held at 3 time points
- Every 6 months
- **Intervention**
  - T0: 60
  - T1: 56
  - T2:---
- **Control**
  - T0: 167
  - T1: 97
  - T2:---
Methods - analysis

- Mixed effects model (weighed by propensity score – no covariate adjustment)

* Graphic designed by TNO
Methods - PSM

- Propensity score matching with Kernel weighting

![Diagram showing probability of being in intervention group given background with trimmed weights at 0.1 and 10.]

Probability of being in intervention group given background

Weights trimmed at 0.1 and 10
Discussion

- Generating scientifically rigorous evaluation is particularly challenging for complex interventions.

- 17 SELFIE programmes use **eight core-sets of outcomes** obtained from **four sources**.

- Most SELFIE programmes identify comparable control groups and outcomes and they are usually measured at least twice over time.

- For causal inference, SELFIE use **quasi-experimental study design** such as, Diff-in-Diff, RD, PSM.

- Several evaluations apply **IPW in which the PS are used to weigh the outcomes** estimated by repeated measurements regression equations.
Multi-criteria Decision Analysis (MCDA) of integrated care

Maureen Rutten-van Mölken, Apostolos Tsiachristas, Maaike Hoedemakers, Milad Karimi, Willemijn Looman, Kamrul Islam, Jan Erik Askildsen, on behalf of the SELFIE consortium

EuHEA, Maastricht, July 11-14, 2018
The 7 steps of MCDA

1. Understanding the programmes and the decision-context
2. Identify and structure decision criteria
3. Determine the performance on these criteria
4. Determine the weights of the criteria
5. Create an overall value score
6. Perform sensitivity analyses
7. Interpret results.

Maureen Rutten-van Mölken
Methods

- Multi-attribute value-based method of MCDA
- Calculate overall weighted value score for both groups
Measuring outcomes

In quasi-experimental studies comparing intervention group with control group
Estimate performance score

- Estimate treatment effect model on IPW weighted data

\[ y = \beta_0 + \beta_1 \text{(time)} + \beta_2 \text{(treatment)} + \beta_3 \text{(time} \times \text{treatment)} + \beta_4 \text{(covariates)} + e \]

- Predict absolute performance scores for both groups

- Standardise performance to same scale (e.g. 0-1)

\[ S_{aj} = \frac{y_{aj}}{(y_{aj}^2 + y_{bj}^2)^{1/2}} \]

- \( y = \) predicted mean performance score on natural scale
  - \( a = \) alternative \( a \) (i.e. integrated care)
  - \( b = \) alternative \( b \) (i.e. control group)
  - \( j = \) criterion/outcome
Performance integrated care vs usual care

| Instrument | Scale                  | Unstandardized | Standardized |
|------------|------------------------|----------------|--------------|
| **Health/wellbeing**                                                                 |
| SF-36 Phys | 0-100 (best)           | 65             | 0.68         |
| MHI-5      | 0-100 (best)           | 60             | 0.77         |
### Performance integrated care vs usual care

| Instrument | Scale            | Unstandardized | Standardized |
|------------|------------------|----------------|--------------|
| **Health/wellbeing** |                  |                |              |
| SF-36 Phys | 0-100 (best)     | 65             | 0.68         |
| MHI-5      | 0-100 (best)     | 60             | 0.77         |
| IPA        | 0-28 (worst)     | 15             | 0.34         |
| ICECAP-O   | 1-4 (best)       | 4              | 0.80         |
| BRS        | 6-30 (best)      | 25             | 0.78         |
| **Experience** |                |                |              |
| P3CEQ      | 0-18 (best)      | 16             | 0.85         |
| NCQ + CPCQ | 1-5 (best)       | 5              | 0.78         |
| **Cost**   |                  |                |              |
| iMCQ       | 8000             | 6000           | 0.20         |

*Note: Scale values are based on the best and worst possible scores.*
Estimate relative weights
## Relative DCE weights from different stakeholders

|                      | Weight | Weight |
|----------------------|--------|--------|
|                      | Patients | Payers |
| **Health/wellbeing** | 0,16   | 0,14   |
|                      | 0,17   | 0,18   |
|                      | 0,09   | 0,10   |
|                      | 0,23   | 0,24   |
|                      | 0,15   | 0,12   |
| **Experience**       | 0,08   | 0,06   |
|                      | 0,10   | 0,08   |
| **Cost**             | 0,04   | 0,07   |
Combine performance and weights in a linear additive model

Integrated care

Measure performance

Elicit weights

Usual care

Measure performance

Overall value score

Patients
Partners
Professionals
Payers
Policy makers
### Partial value score

|                      | Standardized | Weight | Partial value |
|----------------------|--------------|--------|---------------|
|                      | Integrated   | Usual  | Patients      |
| Health/wellbeing     | 0.68         | 0.73   | 0.16          |
|                      | 0.77         | 0.64   | 0.17          |
|                      | 0.77         | 0.64   | 0.17          |
|                      | 0.80         | 0.60   | 0.23          |
|                      | 0.80         | 0.60   | 0.23          |
|                      | 0.78         | 0.62   | 0.15          |
|                      | 0.78         | 0.62   | 0.15          |
|                      | 0.78         | 0.62   | 0.15          |

Total value score: 0.71
## Total value score

|                  | Standardized | Weight | Partial value |
|------------------|--------------|--------|---------------|
|                  | Integrated   | Usual  | Patients      | Integrated | Usual  |
| **Health/wellbeing** |              |        |               |            |        |
| ![Health Icon]    | 0.68         | 0.73   | 0.16          | 0.11       | 0.12   |
| ![Health Icon]    | 0.77         | 0.64   | 0.17          | 0.13       | 0.11   |
| ![Health Icon]    | 0.34         | 0.25   | 0.09          | 0.03       | 0.02   |
| ![Health Icon]    | 0.80         | 0.60   | 0.23          | 0.18       | 0.14   |
| ![Health Icon]    | 0.78         | 0.62   | 0.15          | 0.12       | 0.09   |
| **Experience**    |              |        |               |            |        |
| ![Experience Icon]| 0.85         | 0.53   | 0.08          | 0.06       | 0.04   |
| ![Experience Icon]| 0.78         | 0.62   | 0.10          | 0.08       | 0.07   |
| **Cost**          |              |        |               |            |        |
| ![Cost Icon]      | 0.20         | 0.40   | 0.04          | 0.01       | 0.01   |
| **Total value score** |          |        |               | **0.71**   | **0.59** |
Repeat with weights from different stakeholders

| Health/wellbeing | Weight Integrated | Weight Usual | Weight Integrated | Weight Usual | Partial value Patients | Partial value Payers | Partial value Patients | Partial value Payers |
|------------------|-------------------|--------------|-------------------|--------------|------------------------|----------------------|------------------------|----------------------|
| Health/wellbeing | 0.68              | 0.73         | 0.16              | 0.14         | 0.11                   | 0.12                 | 0.10                   | 0.10                 |
|                  | 0.77              | 0.64         | 0.17              | 0.18         | 0.13                   | 0.11                 | 0.14                   | 0.12                 |
|                  | 0.34              | 0.25         | 0.09              | 0.10         | 0.03                   | 0.02                 | 0.03                   | 0.03                 |
|                  | 0.80              | 0.60         | 0.23              | 0.24         | 0.18                   | 0.14                 | 0.19                   | 0.14                 |
|                  | 0.78              | 0.62         | 0.15              | 0.12         | 0.12                   | 0.09                 | 0.09                   | 0.07                 |
| Experience       | 0.85              | 0.53         | 0.08              | 0.06         | 0.06                   | 0.04                 | 0.05                   | 0.03                 |
|                  | 0.78              | 0.62         | 0.10              | 0.08         | 0.08                   | 0.07                 | 0.06                   | 0.05                 |
| Cost             | 0.20              | 0.40         | 0.04              | 0.07         | 0.01                   | 0.01                 | 0.01                   | 0.03                 |
| Total value score|                  |              |                   |              | 0.71                   | 0.59                 | 0.68                   | 0.57                 |
## SA: Swing Weights instead of DCE weights

|                      | Standardized | DCE weight | Swing weight | Partial value | Partial value |
|----------------------|--------------|------------|--------------|---------------|---------------|
|                      | Integrated   | Usual      | Patients     | Integrated    | Usual         |
| Health/wellbeing     | 0.68         | 0.73       | 0.16         | 0.23          | 0.11          | 0.12          | 0.16          | 0.17          |
|                      | 0.77         | 0.64       | 0.17         | 0.17          | 0.13          | 0.11          | 0.13          | 0.11          |
|                      | 0.34         | 0.25       | 0.09         | 0.11          | 0.03          | 0.02          | 0.04          | 0.03          |
|                      | 0.80         | 0.60       | 0.23         | 0.17          | 0.18          | 0.14          | 0.14          | 0.10          |
|                      | 0.78         | 0.62       | 0.15         | 0.12          | 0.12          | 0.09          | 0.09          | 0.07          |
| Experience           | 0.85         | 0.53       | 0.08         | 0.08          | 0.06          | 0.04          | 0.07          | 0.04          |
|                      | 0.78         | 0.62       | 0.10         | 0.07          | 0.08          | 0.07          | 0.06          | 0.05          |
| Cost                 | 0.20         | 0.40       | 0.04         | 0.05          | 0.01          | 0.01          | 0.01          | 0.02          |
| Total value score    | 0.71         | 0.59       | 0.69         | 0.59          |               |               |               |               |
PSA: Estimate joint uncertainty

- In outcomes and weights
- By bootstrapping or Monte-Carlo simulations
Conditional Multi-attribute Acceptability Curve (CMAC)

P(intervention) acceptable:

- Diff in overall value > 0
- Size target population x mean costs pp < available budget
Discussion MCDA

**Advantage:**
- Better evidence-informed decision making
- Wider range of outcomes
- Multiple perspectives
- Improve transparency, consistency and accountability of decisions
- As costs are traded off against the other criteria in the analysis, it makes their relative contribution to the decision making process explicit

**Disadvantage:**
- New composite measure of benefit
- Comparable across disease/interventions?
- As costs are traded off against the other criteria, we don’t have an estimate of opportunity costs of one unit of additional benefit
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