

BMJ Open Quality indicators for in-hospital geriatric co-management programmes: a systematic literature review and international Delphi study

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ABSTRACT

Objective To find consensus on appropriate and feasible structure, process and outcome indicators for the evaluation of in-hospital geriatric co-management programmes.

Design An international two-round Delphi study based on a systematic literature review (searching databases, reference lists, prospective citations and trial registers).

Setting Western Europe and the USA.

Participants Thirty-three people with at least 2 years of clinical experience in geriatric co-management were recruited. Twenty-eight experts (16 from the USA and 12 from Europe) participated in both Delphi rounds (85% response rate).

Measures Participants rated the indicators on a nine-point scale for their (1) appropriateness and (2) feasibility to use the indicator for the evaluation of geriatric co-management programmes. Indicators were considered appropriate and feasible based on a median score of seven or higher. Consensus was based on the level of agreement using the RAND/UCLA Appropriateness Method.

Results In the first round containing 37 indicators, there was consensus on 14 indicators. In the second round containing 44 indicators, there was consensus on 31 indicators (structure=8, process=7, outcome=16). Experts indicated that co-management should start within 24 hours of hospital admission using defined criteria for selecting appropriate patients. Programmes should focus on the prevention and management of geriatric syndromes and complications. Key areas for comprehensive geriatric assessment included cognition/delirium, functionality/mobility, falls, pain, medication and pressure ulcers. Key outcomes for evaluating the programme included length of stay, time to surgery and the incidence of complications.

Conclusion The indicators can be used to assess the performance of geriatric co-management programmes and identify areas for improvement. Furthermore, the indicators can be used to monitor the implementation and effect of these programmes.

INTRODUCTION

Geriatric co-management programmes are emerging as a potential strategy to manage frail patients on non-geriatrics wards. These programmes are characterised by a shared

Strengths and limitations of the study

- Preliminary list of indicators developed based on a systematic literature review.
- Inclusion of experts from both Europe and the USA.
- Use of RAND/UCLA Appropriateness Method.
- Sample of experts consisted largely of geriatricians, low number of non-medical professionals.
- Lack of empirical evidence supporting the indicators.

decision-making and collaboration between non-geriatrics and geriatrics teams focusing on the prevention and management of geriatric-oriented problems and syndromes.¹ A promising aspect of this model is that geriatrics teams are directly involved in and have direct control over relevant medical issues, which is associated with improved effectiveness of the comprehensive geriatric assessment approach.^{2,3} Comprehensive geriatric assessment, a central component in geriatric co-management, is defined as a “multidimensional, interdisciplinary diagnostic process to determine the medical, psychological and functional capabilities of an older person with frailty, followed by the implementation of a coordinated and integrated plan for treatment and follow-up”.⁴

A recent systematic review identified a potential effect on better functional status, prevention of complications and reduced length of stay as a result of geriatric co-management, but the quality of evidence was low.⁵ Most notably, the high risk of bias in primary studies and low effect sizes across outcomes limited strong conclusions. Furthermore, the majority of studies were limited to effect evaluations in orthogeriatric populations, while process evaluations and qualitative data are needed to inform how co-management works and how it should be implemented.

Table 1 Structures identified in co-management programmes

Structure of co-management programmes	Reported by programmes
Patient population of interest	
Surgical	34/39 (87%)
Medical	4/39 (10%)
Hospital wide	1/39 (3%)
Team composition	
Geriatrician	38/39 (97%)
Geriatric nurse	8/39 (21%)
Physical therapist	25/39 (64%)
Occupational therapist	14/39 (36%)
Social worker	19/39 (49%)
Patient selection for co-management	
Age-based characteristics*	
Age <65 years†	10/39 (26%)
Age ≥65 years	18/39 (46%)
Age ≥70 years	5/39 (13%)
Age ≥75 years	3/39 (8%)
Geriatric-based characteristics	
Functional or cognitive impairment	2/39 (5%)
Multimorbidity, polypharmacy	1/39 (3%)
Screening tool	2/39 (5%)
Programme defined in a care pathway	15/39 (38%)
Evidence-based protocols available	13/39 (33%)
Standard geriatric order sets available	8/39 (21%)
Organisation of educational sessions	6/39 (15%)

*Data were missing for three studies.

†The category age <65 years refers to studies recruiting patients aged 26 years or older (n=1), 50 years or older (n=3), 55 years or older (n=1) and 60 years or older (n=5).

Despite the low level of evidence, co-management programmes are increasingly being implemented⁶ due to their high face validity and the limited impact of in-hospital geriatric consultation teams.^{1,7} However, some knowledge gaps remain. First, there is no evidence-based understanding of core interventions that should be implemented for all co-management programmes to have their desired effect.⁸ Second, there is no framework including both effect and process outcomes for evaluating co-management programmes.⁹

Indicators can inform how to organise in-hospital geriatric co-management programmes, detail the interventions that have to be implemented and define which components of the programme and its implementation that have to be evaluated.¹⁰ Structure indicators refer to ‘health system characteristics that affect the system’s ability to meet the health care needs of individual patients or a community’. Process indicators refer to ‘what the provider did for the patient and how well it was done’.

Table 2 Processes identified in co-management programmes

Processes of co-management programmes	Reported by programmes
In-hospital follow-up	26/39 (67%)*
Daily	15/26 (58%)
Thrice weekly	3/26 (12%)
Twice weekly	3/26 (12%)
Weekly or on request	4/26 (15%)
Participation in team meetings†	17/39 (44%)
Daily	2/17 (12%)
Thrice weekly	1/17 (6%)
Twice weekly	2/17 (12%)
Weekly	12/17 (71%)
Medical review/assessment‡	28/39 (72%)
Cognition	11/28 (39%)
Functional status	13/28 (46%)
Falls	9/28 (32%)
Medication	4/28 (14%)
Nutritional status	5/28 (18%)
Complications	13/28 (46%)
Rehabilitation§	30/39 (77%)
Discharge planning	27/39 (69%)
Transitional care¶	1/39 (3%)
Post-discharge follow-up	16/39 (41%)
Referral to community services or outpatient clinics	9/16 (56%)
Home visit	5/16 (31%)
Telephone contact	2/16 (13%)

*There was one missing data: study reported ‘rounds with staff’ but did not indicate the frequency.

†Team meetings were defined as case conferences or multidisciplinary meeting in which the geriatrician or geriatrics team interacts with the primary treating physician or other ward staff (eg, registered nurses, physical therapists) to discuss patients included in the co-management programme.

‡Medical review was defined as “the prevention of iatrogenic complications through assessment and delivery of interventions that addresses actual or potential problems identified in the assessment”.⁶⁸

§Rehabilitation was defined as “assessing the need for physical therapy and providing physical and occupational therapy to prevent or reverse functional decline”.⁶⁸

¶Transitional care was defined as “a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care in the same location”.⁶⁹

Outcome indicators refer to ‘states of health or events that follow care and that may be affected by health care’.¹⁰

In the absence of systematic evidence on how to organise and evaluate geriatric co-management programmes, expert opinion can be a first step to address this evidence gap.¹¹ We therefore aimed to find consensus on structure, process and outcome indicators that are appropriate and

Outcomes measured in geriatric co-management programmes

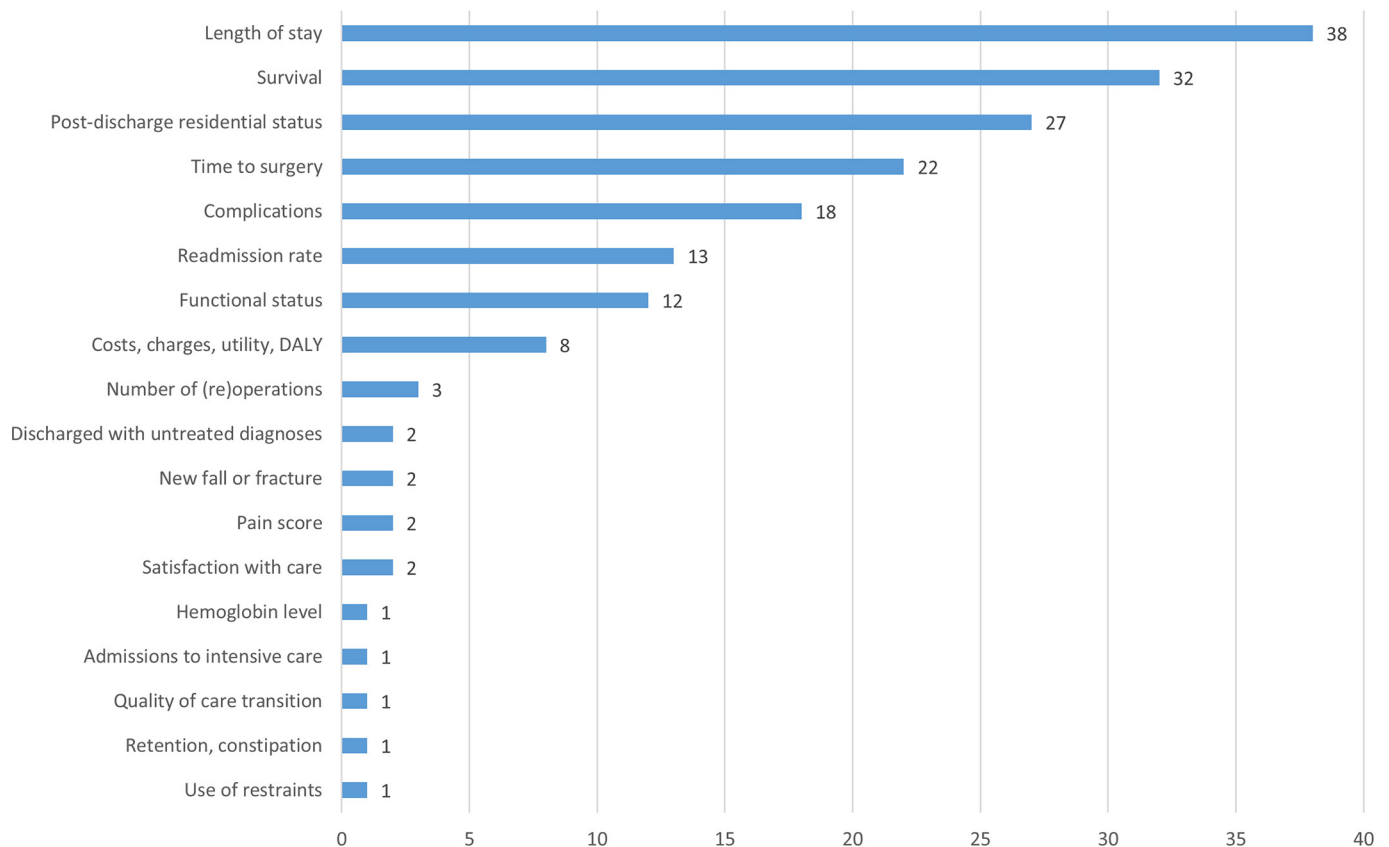


Figure 1 Outcomes reported by co-management programmes. The bar chart reports the number of programmes reporting a particular outcome. DALY, disability-adjusted life year.

feasible to use for the evaluation of geriatric co-management programmes.

METHODS

A two-round Delphi study based on a systematic literature review was performed in collaboration with international experts on geriatric co-management. A Delphi study involves several survey rounds in which experts are asked to answer a questionnaire anonymously. Results can include both quantitative data (eg, rating indicators on a numeric scale) and qualitative data (eg, comments explaining the rating or suggestions for new indicators), and these results are reported back to the participants. This iterative process aims to find group consensus in which participants can change their rating based on the feedback of previous survey rounds.¹¹

The first Delphi round was performed from December 2015 to January 2016; the second round from February to March 2016.

Systematic literature review

The study methodology and search strategy has been detailed elsewhere and is available in a review protocol in the PROSPERO database (CRD42015026033).^{5 12} We searched databases (MEDLINE, EMBASE, CINAHL and CENTRAL), reference lists, trial registers and PubMed

Central Citations from inception until October 2015. Evaluation studies were included if they reported at least one structure, process or outcome of an in-hospital geriatric co-management programme. Two investigators performed the selection process independently using Endnote and data were tabulated using standardised forms. Discrepancies were resolved using consensus discussion. Data were structured using the Donabedian model of the three dimensions of care: structure, process and outcomes (see the Introduction section for definitions).¹³

Selection of participants

Participants were required to have a minimum of 2 years of clinical experience with co-management for geriatric in-hospital patients in Europe or the USA. Recruitment strategies included using our own network, sending email invitations through national geriatrics societies, contacting authors who have published or presented on geriatric co-management, and contacting members of special interest groups on geriatric co-management. Potential participants were contacted via email, asked to complete their demographic (name, age, gender, country, state) and professional (affiliation, professional education) information, and to report their experience with co-management. The final participants were

Table 3 Characteristics of participants in Delphi study

Characteristics	Total sample	USA	Europe
Response rate, n (%)			
Round 1	30/33 (91)	16/16 (100)	14/17 (82)
Round 2	28/33 (85)	16/16 (100)	12/17 (71)
Age, median years (range)	43 (32–62)	40.5 (32–51)	46.5 (34–62)
Female gender, n (%)	16/30 (53)	9/16 (56)	7/14 (50)
Professional education, n (%)			
Medicine	25/30 (83)	15/16 (94)	10/14 (71)
Geriatric medicine	23/30 (77)	13/16 (81)	10/14 (71)
Medical doctor	1/30 (3)	1/16 (6)	0
Orthopaedic surgeon	1/30 (3)	1/16 (6)	0
Nursing	4/30 (13)	0	4/14 (29)
Management	1/30 (3)	1/16 (6)	0
Academic position, n (%)			
Professor	6/30 (20)	3/16 (19)	3/14 (21)
Research associate	1/30 (3)	0	1/14 (7)
Postdoctoral fellow	2/30 (7)	0	2/14 (14)
Doctoral student	1/30 (3)	0	1/14 (7)
Clinical instructor	13/30 (43)	12/16 (75)	1/14 (7)
No academic position	7/30 (23)	1/16 (6)	6/14 (43)
Co-management background, n (%)			
Clinical	29/30 (97)	16/16 (100)	13/14 (93)
Academic	22/30 (73)	12/16 (75)	10/14 (71)
Median years of experience with co-management (range)	5 (2–20)	4.5 (2–15)	8.5 (2–20)

purposely selected with an aim to achieve a balanced sample based on profession, experience, gender, age and region. All participants were offered the opportunity to receive a voluntary reimbursement for their participation.

Developing the Delphi questionnaire

A preliminary set of indicators was drafted based on the systematic literature review. First, a long list of quality indicators was drafted, structured according to their typology (ie, pertaining to the structure, process or outcome of co-management programmes) and duplicates were removed. Two investigators experienced in geriatric research (BVG, MD) independently scored these indicators as ‘relevant’, ‘relevant after rephrasing’ or ‘not relevant’ for inclusion in the Delphi questionnaire. A consensus meeting decided which indicators were included and how indicators were rephrased. A questionnaire was drafted in English and piloted by four independent experts (KF, KM, JF, MD) in geriatric research and medicine (who did not participate in the Delphi rounds) to evaluate the face and content validity. A consensus meeting between investigators (BVG, KM, JF, MD) decided the final inclusion of indicators in the Delphi questionnaire.

Finding consensus among participants (Delphi rounds)

Participants were contacted via an email explaining the aim and procedure of the Delphi study. In round one, participants were asked to rate the indicators on a nine-point scale for their (1) appropriateness and (2) feasibility to use the indicator for the evaluation of geriatric co-management programmes. If implemented, appropriate indicators are likely to provide a net benefit to patients and improve patient outcomes.¹⁴ Feasibility refers to the measurement of the indicator in clinical practice (and not the feasibility of implementing the indicator). Participants could suggest additional indicators based on their experience and knowledge. These suggested indicators were reviewed by the researchers for their relevance and included in the second round questionnaire based on a group consensus. In round two, participants were presented with quantitative and qualitative feedback on the rating of the indicators using summary statistics at the group level and anonymous qualitative quotes by individual participants. Participants were again asked to rate the appropriateness and feasibility of the indicators for which there was no consensus after round one and the new

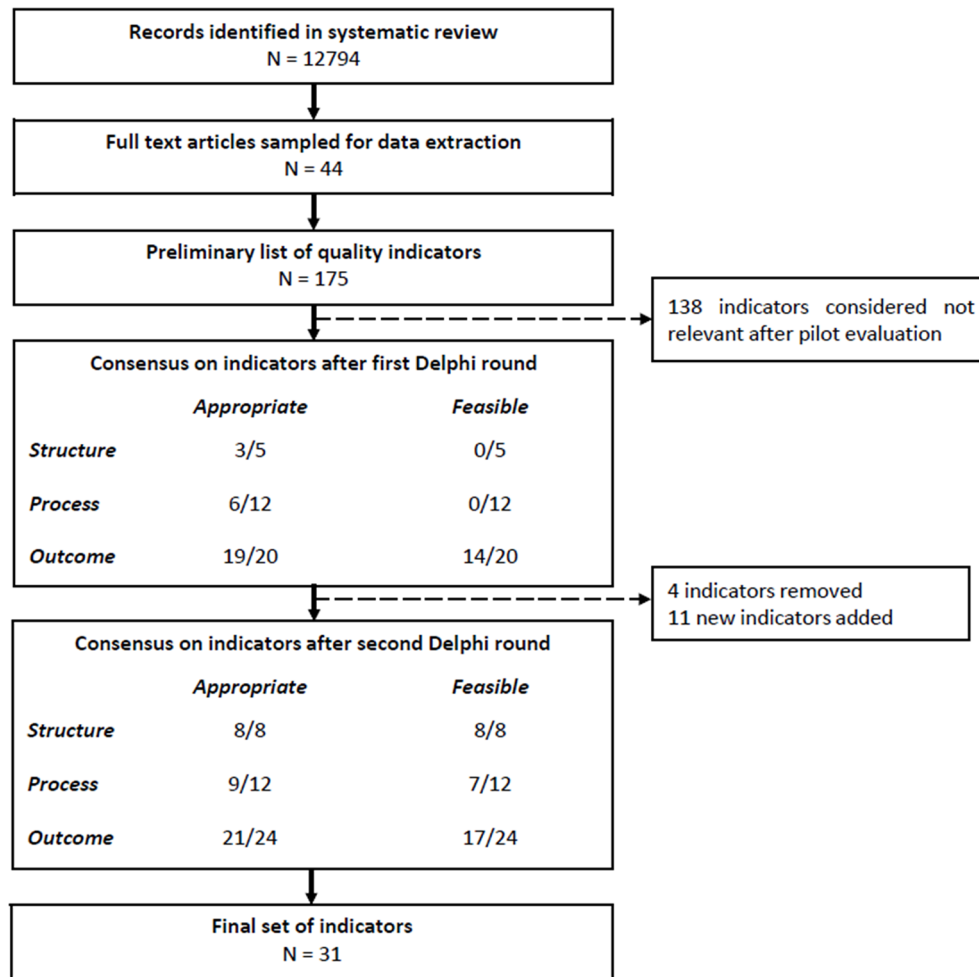


Figure 2 Flowchart of Delphi process. Consensus was determined based on the level of agreement using the RAND/UCLA Appropriateness Method. Indicators were rated on a scale of 1 to 9, and considered appropriate and feasible based on a medium score of 7 or higher. Of the 17 outcome indicators that were considered feasible, 16 were also considered appropriate.

indicators suggested by the participants. For both rounds, reminders were sent to participants.

Analysis

Descriptive statistics were used to report the structure, processes and outcomes identified in the literature and participants' characteristics and their rating of the indicators. Indicators were considered appropriate and feasible based on a median score of seven or higher. Consensus was based on the level of agreement using the RAND/UCLA Appropriateness Method.¹⁵ In short, agreement is observed if the interpercentile range is smaller than the interpercentile range adjusted for asymmetry. We explored descriptive differences in the level of agreement between experts from the USA and Europe. Data were analysed using SPSS V.20 (SPSS, Chicago, Illinois, USA).

Ethics

All participants consented to participate in the study via email. Approval by a local ethics committee was not required as a Delphi study with healthcare professionals is

not considered an experiment (Belgian law dated 7 May 2004 related to experiments on human people).

RESULTS

Systematic literature review

A total of 12 794 titles and abstracts were independently screened by two authors. A total of 335 full-text articles were independently assessed for eligibility by two authors. A final 44 manuscripts were included for data extraction. Studies were excluded because they did not report the evaluation of an in-hospital co-management programme (n=248), were an abstract (n=66), letter to the editor (n=6) or published in another language (n=3).

A total of 39 programmes were identified in 44 publications.^{16–59} The majority of programmes included hip fracture or orthopaedic patients (87%)^{16–19 21–29 31–37 39–49 52–59} (see online supplementary table S1), including patients aged 65 years or older (74%)^{16–20 23–27 31–36 38 39 42 43 47–51 53 55–59} (see table 1). Only a minority of programmes used care pathways (38%),^{16 17 19 20 22 23 25 26 29 32 37–40 42 43 45 48 53} protocols (33%),^{22–26 29 30 33 34 37–40 48 49 53} standard order

Table 4 Structure indicators for geriatric co-management programmes

Indicators	Median score (IQR)	
	Aprpr	Feas
<i>All structure indicators were appropriate and feasible*</i>		
<i>A geriatrician, treating physician of the ward, registered nurse or nurse practitioner with geriatric expertise, nursing staff of the ward, physical therapist, occupational therapist and social worker/discharge or case manager is a core member of the geriatric co-management programme.</i>	7.8 (1.5)†	8 (2)
A member of the geriatrics team is available on a daily basis for patients included in the geriatric co-management programme.	8 (1)	8 (1.8)
Team meetings for reviewing the performance on indicators associated with the geriatric co-management programme are organised at least once yearly with the aim of evaluating the current performance and formulating strategic improvement plans.	8 (1)	8 (1)
An educational programme or sessions are organised or facilitated at induction of every new staff member, and at least once a year for all current hospital staff participating in a geriatric co-management programme, focusing on the identification and management of geriatric syndromes.	8 (2)	8 (2)
A validated screening tool or objective criteria to select patients for the geriatric co-management programme is available to all hospital staff.	8.5 (1)	8 (2.8)
A multidisciplinary care pathway is available detailing the roles and responsibilities of all hospital staff participating in the geriatric co-management programme.	9 (1)	8 (1.8)
Evidence-based protocols for the prevention and/or management of <i>cognitive impairment, delirium, depression, hospital-acquired infections, pressure ulcers, incontinence, urinary retention, constipation, pain, palliative care, polypharmacy, malnutrition, falls, osteoporosis, sleep deprivation, functional impairment/mobility and frailty</i> are available to hospital staff participating in the geriatric co-management programme.	8.3 (1.6)†	8 (1)
Standard geriatric order sets (eg, laboratories, technical investigations) are available to hospital staff participating in the geriatric co-management programme.	9 (3)	8 (1)

*Appropriateness and feasibility was determined by a disagreement index: see online appendix for all indicators that were considered not appropriate or feasible.

†Scores have been averaged for all response options (see text in italic for the different response options): see online appendix for the raw scores.

Aprpr, appropriateness; Feas, feasibility.

sets (21%)^{19 25 26 29 37 40 42 48 49 53} or educational sessions (15%)^{20 29 36 39 40 48 59} to support their implementation. The majority of programmes integrated medical review (72%),^{16-21 23-27 29 30 32 35-42 44-46 48-53 56} discharge planning (69%),^{18 20 23 24 27-31 33-40 42 45 47-54 56 59} and rehabilitation (77%)^{16-21 23 24 27-32 35-40 42 45 47-56 59} as intervention components (see [table 2](#)). Daily follow-up was provided in 58% of the programmes,¹⁶¹⁷²³²⁵²⁶²⁹³²⁻³⁴³⁶³⁷⁴⁰⁴²⁴⁶⁴⁸⁻⁵¹⁵³⁵⁶ and 44% participated in multidisciplinary team meetings.^{18-21 23-26 31 36 37 41 50-52 54 56 59} The five most reported outcomes were length of stay, survival, discharge disposition and post-discharge residential status, time to surgery and complications (see [figure 1](#)).

Delphi study

A total of 63 individuals expressed their interest to participate. Based on a purposive selection of participants, 33 experts were selected, 16 from the USA and 17 from Europe. The majority of participants were medical doctors specialised in geriatric medicine having both clinical and academic experience in co-management (see [table 3](#)). Only four nurses and one manager could be included. Participants had a median of 5 years of experience with geriatric co-management, ranging between 2 and 20 years.

The first round contained 37 indicators. There was consensus on 14 indicators, partial consensus on 14 indicators and no consensus on 5 indicators based on a 90.9% response rate (n=30 experts). Based on the qualitative responses, 4 indicators were removed and 11 new indicators were added to the questionnaire (see online supplementary tables S2 and S3). These new indicators were suggested by the Delphi participants. The second round contained 44 indicators and was sent to the 30 responders of round one. A final consensus on 31 indicators was observed based on an overall response rate of 84.8% (n=28 experts) (see [figure 2](#)).

Structure indicators

All eight structure indicators were considered appropriate and feasible (see [table 4](#)). Geriatric co-management programmes should include at least a geriatrician, treating physician of the ward, registered nurse or nurse practitioner with geriatric expertise, nursing staff of the ward, physical therapist, occupational therapist and social worker. At least one geriatrics team member should be available on a daily basis. The roles and responsibilities of all professionals

Table 5 Process indicators for geriatric co-management programmes

Indicators	Median score (IQR)	
	Appr	Feas
<i>Process indicators considered appropriate and feasible with agreement*</i>		
For patients included in the geriatric co-management programme, co-management starts preoperatively or within 24 hours of hospital admission.	9 (1)	8 (2)
Daily patient rounds are performed by a member of the geriatric team participating in the geriatric co-management programme.	8 (1)	8 (1)
Collaborative interdisciplinary meetings with the primary treating hospital staff participating in the geriatric co-management programme and a member of the geriatric team are organised to discuss patients included in the geriatric co-management programme at least twice a week.	7 (1)	8 (2)
Percentage of patients included in the geriatric co-management programme who had a screening or assessment focusing on <i>delirium, dementia, functional status, fall risk, social aspects and environment, comorbidity, pressure ulcer risk, pain, nutritional status, incontinence, urinary tract infection, bowel movement, hearing, vision, sleeping disorder, medication use, frailty and advanced care plans</i> using a validated tool within 24 hours of hospital admission.	8.5 (1.6)†	8 (1.8)
Percentage of patients included in the geriatric co-management programme who had their care preferences documented in an advance care plan or advanced directive.	9 (1)	8 (1.8)
Percentage of patients included in the geriatric co-management programme who have a discharge plan documented in their patient record.	9 (0.3)	8 (1)
Percentage of patients included in the geriatric co-management programme who have a summary of their hospital care and post-discharge instructions send to their primary care practitioner and/or care facility.	9 (0)	8 (2)

*Appropriateness and feasibility was determined by a disagreement index: see online appendix for all indicators that were considered not appropriate or feasible.

†Scores have been averaged for all response options (see text in italic for the different response options): see online appendix for the raw scores.

Appr, appropriateness; Feas, feasibility.

participating in the programme should be defined in a care pathway, and their work should be supported by geriatrics order sets and evidence-based protocols for the prevention and management of geriatric syndromes. A screening tool or criteria should be available for including patients into the programme. A geriatrics education programme should be available for all new healthcare professionals at induction and could be repeated yearly for all professionals participating in the co-management programme. Lastly, team meetings should be organised for reviewing the performance of the programme and formulating strategic improvement plans.

Experts from Europe did consider that using geriatric order sets was appropriate, but there was no consensus within this subgroup.

Process indicators

Seven out of 12 process indicators were considered appropriate and feasible (see table 5). Two indicators were also appropriate but not feasible. Geriatric co-management programmes should start preoperatively or within 24 hours of hospital admission, followed by a geriatric assessment also within 24 hours of hospital admission. A member of the geriatrics team should perform daily patient rounds to see patients in the programme if indicated, and interdisciplinary

meetings with the co-management staff should be organised at least twice a week. Patients should have their care preferences documented in an advance care plan and should have a discharge plan documented in their patient record. On hospital discharge, a summary of the hospital care and post-discharge instruction should be sent to the primary care practitioner and/or care facility.

Experts from the USA agreed that verbally communicating the findings of the geriatric assessment, recommendations and care plan to other professionals in the co-management programme is both appropriate and feasible. Experts from Europe considered this appropriate, but not feasible.

Outcome indicators

Sixteen out of 24 outcome indicators were considered appropriate and feasible (see table 6). Five indicators were also appropriate but not feasible. The highest scoring outcome indicators were length of stay, time from admission to surgery, patient satisfaction with hospital care, institutionalisation and the incidence of delirium and wound infections.

Experts from Europe did consider that length of stay was appropriate, and monitoring physical restraints was feasible, but the level of agreement was insufficient to indicate consensus.

Table 6 Outcome indicators for geriatric co-management programmes

Indicators	Median score (IQR)	
	Appr	Feas
<i>Indicators considered appropriate and feasible with agreement**†</i>		
Mean length of stay in the hospital	9 (1.3)	9 (1)
Mean time spent in the emergency department‡	7 (3)	8 (2)
Mean time from hospital admission to surgery§	9 (1.5)	9 (1.3)
Readmission rate within 30 days and 3 months of hospital discharge	8 (2)¶	8 (2)
Patient satisfaction with hospital care	9 (1)	7 (3)
Caregiver satisfaction with hospital care provided for patients included in the geriatric co-management programme	8.5 (2)	7 (3)
Percentage of patients who were physically restrained during their hospital stay	9 (2)	8 (3)
In-hospital mortality rate	9 (2)	9 (0.3)
Percentage of patients admitted to a nursing home on hospital discharge	9 (1)	9 (1)
Percentage of patients who declined in functional status between hospital admission and hospital discharge	8 (2)	7 (3)
Percentage of patients who developed delirium	9 (1)	8 (2)
Percentage of patients who developed a urinary tract infection	9 (2)	9 (2)
Percentage of patients who developed a wound infection	9 (1.3)	9 (1.3)
Percentage of patients who developed a pneumonia	9 (2)	8 (2)
Percentage of patients who developed a sepsis	9 (2.3)	9 (2)
Percentage of patients who developed a pressure ulcers	9 (2)	8 (2)

*Appropriateness and feasibility was determined by a disagreement index: see online appendix for all scores.

†The denominator relates to patients admitted in the co-management programme.

‡The denominator only includes patients admitted through the emergency department.

§The denominator only includes patient included in a surgical co-management programme.

¶Scores have been averaged for all response options (see text in italic for the different response options): see online appendix for the raw scores.

Appr, appropriateness; Feas, feasibility.

Online supplementary table S4 details the results for all indicators, including those considered not appropriate or feasible or indicators without consensus.

DISCUSSION

This study aimed to find consensus on structure, process and outcome indicators that are appropriate and feasible to use for the evaluation of geriatric co-management programmes using a two-round Delphi study and systematic literature review. We included 33 participants from Europe and the USA and observed consensus on 31 indicators that are considered both appropriate and feasible.

Experts indicated the importance of providing proactive care to frail patients by geriatric care professionals within 24 hours of hospital admission. A central focus of these programmes is the comprehensive geriatric assessment aiming to identify, prevent or manage geriatric syndromes and complications. There was a strong consensus that co-management should focus on areas related to delirium, functional status, falls, pressure ulcers, medication use, comorbidity, nutrition, pain, advance care planning and discharge planning and its communication.

The ability of comprehensive geriatric assessment to improve outcomes has been associated with the ability to implement the treatment plan by the multidisciplinary team.³ There was a strong consensus that co-management programmes should be multidisciplinary and include a geriatrician, treating physician of the non-geriatrics ward, a nurse with geriatrics expertise, physical therapist and social worker. There seems a value for daily co-management, yet experts argued that the frequency should be based on the severity of a specific patient case. Nonetheless, this reflects one of the hallmarks of co-management: shared decision-making with daily communication.⁶⁰

A standard set of outcome parameters for the evaluation of orthogeriatric co-management programmes was previously developed based on a review of orthogeriatric co-management evaluation studies⁶¹ and a consensus development conference.⁶² Likewise to our results, length of stay, time to surgery, incidence of complications, institutionalisation, readmission rate and mortality were considered important outcomes. However, our Delphi results disagreed with the panellist of the consensus development conference on post-discharge follow-up of outcomes, which were generally not considered

feasible by our experts. Furthermore, the appropriateness of post-discharge follow-up declined the longer the endpoint after hospitalisation was defined. This indicates that in-hospital co-management may not be expected to have long-term effects without appropriate follow-up interventions after hospital discharge. Despite long-term follow-up being a key component of comprehensive geriatric assessment,⁴ this likely reflects a challenge of implementing transitional care in routine practice as there are often no formal relationships between care settings, no financial incentives, inadequate resources and communication, and a lack of time.⁶³

Indeed, many effective interventions in healthcare fail to be implemented in practice.⁸ Or alternatively, many routine practices are not (as) effective as defined.⁶⁴ The results from this Delphi study can be used to address this challenge. First, the indicators can be used to measure the current performance of geriatric co-management programmes and identify areas for improvement.⁶⁵ Second, the indicators can be used to start a new geriatric co-management programme. The structure and process indicators can be considered good geriatric care for frail patients. However, their implementation should be tailored to the local context of the health system, hospital and co-management programme. Third, the indicators can be used to monitor both the effect and the implementation of the programme.⁶⁶ We therefore advise to monitor both process and outcome indicators when evaluating geriatric co-management programmes. This should be a continuous process and should be followed by strategic improvement plans and re-evaluations.

Methodological considerations

Some considerations should be noted. First, the abstraction of data in the systematic literature review was dependent of the quality of reporting in the primary studies. A recent meta-analysis on geriatric co-management programmes observed a high risk of bias and poor reporting of study methodology in published manuscripts.⁵ This may result in under-reporting or missing information about particular structures and processes. For example, detailed information about the implementation strategy or process data on the actual delivery of interventions were missing. Second, the results are based largely on the views of medical doctors as we could only recruit four nurses and one manager. The selection of participants was based on those experts who responded to an email invitation. We did not specifically select medical doctors trained in geriatric medicine. For our strategies, we used author lists from publications and abstracts and special interest groups focusing on geriatric co-management. However, it is very likely that geriatricians are more interested in geriatric co-management and therefore more likely to respond to an invitation. The indicators may therefore not fully reflect the interdisciplinary nature of co-management or the economics of implementing geriatrics care models (eg, no economic indicators have been defined). No patients were included because of

the technical nature of the indicators and the focus on system characteristics. Nonetheless, patients' views on the acceptability of implementing indicators should be considered. If not acceptable, the indicators will unlikely result in improved outcomes. Third, because the majority of evidence on geriatric co-management originates from North America and Europe, the results of this study may only be valid for these regions. Furthermore, it should be noted that despite the differences between countries in organising their health systems, there were only minimal differences in appropriateness between regions. Validation of the indicators in other countries is recommended. Fourth, the observed consensus is based on a specific sample of 33 motivated experts, and it is unclear if the same results would have been produced with a different sample of experts. However, a systematic review concluded that RAND/UCLA Appropriateness Method has moderate to very good reliability and good construct and predictive validity.⁶⁷ Fifth, we did not define any threshold standards that should be met when evaluating the indicators, and for many indicators these thresholds are not available. Finally, these indicators are based on expert opinion in the absence of clinical trial data. The strength of the evidence should therefore be considered very low and requires further testing for validity and reliability.¹⁴

CONCLUSION

This Delphi study identified 31 indicators for the evaluation of geriatrics co-management programmes. Patient selection, early inclusion and interdisciplinary care with geriatric expertise based on a comprehensive geriatric assessment are considered key elements of co-management programmes. The indicators can be used to assess the performance of co-management programmes, identify areas for improvement and monitor the implementation and effect of these programmes. Future research should focus on the development of post-discharge outcomes that are feasible to measure, multicentre studies, cluster randomisation and process evaluation to support the scaling up of effective co-management programmes.

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