

# What is Comprehensive Geriatric Assessment (CGA)? An umbrella review

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## Abstract

**Background:** Comprehensive Geriatric Assessment (CGA) is now the accepted gold standard for caring for frail older people in hospital. However, there is uncertainty about identifying and targeting suitable recipients and which patients benefit the most.

**Objectives:** our objectives were to describe the key elements, principal measures of outcome and the characteristics of the main beneficiaries of inpatient CGA.

**Methods:** we used the Joanna Briggs Institute umbrella review method. We searched for systematic reviews and meta-analyses describing CGA services for hospital inpatients in the Cochrane Database of Systematic Reviews, Database of Reviews of Effectiveness (DARE), MEDLINE and EMBASE and a range of other sources.

**Results:** we screened 1,010 titles and evaluated 419 abstracts for eligibility, 143 full articles for relevance and included 24 in a final quality and relevance check. Thirteen reviews, reported in 15 papers, were selected for review. The most widely used definition of CGA was: ‘a multidimensional, multidisciplinary process which identifies medical, social and functional needs, and the development of an integrated/co-ordinated care plan to meet those needs’. Key clinical outcomes included mortality, activities of daily living and dependency. The main beneficiaries were people  $\geq 55$  years in receipt of acute care. Frailty in CGA recipients and patient related outcomes were not usually reported.

**Conclusions:** we confirm a widely used definition of CGA. Key outcomes are death, disability and institutionalisation. The main beneficiaries in hospital are older people with acute illness. The presence of frailty has not been widely examined as a determinant of CGA outcome.

**Keywords:** *Comprehensive Geriatric Assessment, umbrella review, hospital, inpatient, older people*

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## Introduction

Older people admitted for acute inpatient hospital care are at high risk of adverse events, long stays, readmission and long term care use. There is considerable evidence on assessment and co-ordination of care for older patients with complex needs using Comprehensive Geriatric

Assessment (CGA) [1–3]. However, there is continued uncertainty about how to identify those who will benefit most and deliver the service that they need, wherever they are in the hospital [4, 5], and the most appropriate, cost-effective form of CGA for different settings.

## Objectives

We aimed to provide an overview of existing systematic literature reviews. The principle objectives of this ‘umbrella’ [6, 7] review were to define (i) characteristics of the main beneficiaries of CGA, (ii) key elements of CGA, (iii) principal outcome measures and to summarise, (iv) evidence on the cost-effectiveness of models of delivery of CGA and (v) highlight gaps and weaknesses in the evidence base, across relevant inpatient clinical areas.

## Methods

We used the Joanna Briggs Institute Umbrella review method. The review protocol is published [8].

### Inclusion criteria

We included systematic reviews and meta-analyses which included randomised and other controlled evaluations and case studies and described the provision of CGA in patients over 65 years old in hospital. We included reviews in which CGA was compared to usual inpatient care, or CGA/usual care in an alternative setting.

### Selection of reviews

Five of the authors (P.M., S.P.C., S.G.P., H.R., K.P.) worked in pairs to review titles and abstracts and then the full text papers for selection which required agreement of both reviewers. Disagreements were arbitrated by another reviewer.

### Data sources and search strategy

Four databases were searched: Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews and Effects (DARE), MEDLINE and EMBASE (e.g. search strategy, see Appendix).

### Search restrictions

We limited the search to reviews published from 2005 to February 2017. Searches were restricted by the level of evidence (systematic review and meta-analysis, or other evidence syntheses), and in English.

### Methodological quality

Methodological quality/bias risk was recorded using the Joanna Briggs Institute critical appraisal checklist for Systematic Reviews and Research Syntheses [9] (see Appendix).

### Data collection and extraction

Data was extracted from the included reviews (not the primary studies included in the reviews) using the standardised JBI data extraction tool. Reviewers discussed and piloted its

use. Separate evidence tables were created for the definitions and key elements of CGA, the setting and staff, the key participants, outcome measures and costs, then used to produce summary tables and develop a narrative overview of the evidence.

## Results

We screened 1,010 titles and evaluated 419 abstracts for eligibility, 143 full articles were reviewed for relevance and 24 included in a final quality and relevance check. Thirteen reviews, reported in 15 papers [1–3, 10–21] were selected for review. The most recently conducted trial included in the reviews was reported in 2014, all other trials were reported between 1983 and 2012. The PRISMA flow chart is available in an Appendix.

### Overlap of review evidence

A total of 95 original articles were cited 166 times. And 26 original articles were cited more than once (a table of citation counts for these articles is included as an Appendix). The most highly cited articles included Landefeld 1995 [22], Asplund 2000 [23] (7 citations each) and Counsell 2000 [24] (6 citations). Removing all except one of the reviews [2, 13] which cited these three most highly cited papers did not significantly affect our conclusions with regard to the population characteristics, intervention definition, settings and comparisons and clinical outcomes. Some health economics detail was lost in this sensitivity analysis.

### Population

All of the reviews included participants over 65 years of age. Minimum age for inclusion varied from 55+ years to 75+ years (Table 1). In most studies frailty was not explicitly identified as a characteristic of CGA recipients, however, one review [23], (which included the majority of the most highly cited trials) attempted to stratify trials by frailty. Some reviews included the presence of a specific diagnosis, such as cancer or hip fracture (Table 1).

### Intervention

The most widely used definition of CGA was: ‘a multidimensional, multidisciplinary process which identifies medical, social and functional needs, and the development of an integrated/co-ordinated care plan to meet those needs’. Dimensions of CGA reported consistently included Medical/Physical Psychological/Psychiatry, Socio-economic, Function and Nutritional assessment (Table 1).

### Settings and comparisons

The bulk of the reviews used essentially the same body of literature extending back to 1983 to examine some aspect of CGA in the hospital setting. Reviews citing literature which was predominantly outside of this highly cited core

**Table I.** CGA description and definition and components, participants and types of admissions

	First author and publication year													
	Bazta'n 2009 [1]	Conroy 2011 [10]	Deschodt 2013 [3]	Ellis 2011 [2], Ellis 2011 [11]	Fealy 2009 [12]	Fox 2012 [13], Fox 2013 [14]	Kammerlander 2010 [15]	Linertova 2011 [16]	Tremblay 2012 [17]	Van Craen 2010 [18]	Hickman <i>et al.</i> 2015 [19]	Ekdahl <i>et al.</i> 2015 [20]	Pilotto <i>et al.</i> 2017 [21]	
<b>CGA definition</b>														
Multidimensional Multidisciplinary process—identifies medical, social and functional needs		•	•	•					•	•		•	•	
Acute inpatient setting in which multidimensional assessment and management takes place	•					•						•	•	
Consistent with a multidisciplinary approach							•	•						
No clear explicit definition					•		•	•			•			
<b>CGA description</b>														
Provision of CGA in a dedicated acute patient environment	•						•							
A specialised team working on a specialised ward, such as inpatient Geriatric Evaluation and Management Unit				•										
Descriptions of complex care collaborations involving multidimensional assessment and management				•										
- including both inpatient and outpatient components								•						
- at the interface between hospital and community care		•												
- a hospital inpatient consultant team			•											
<b>Components of CGA</b>														
Medical/physical assessment	•			•			•	•		•	•	•		
Psychological/psychiatry assessment				•			•	•		•	•	•		
Socio-economic assessment				•			•			•	•	•		
Function assessment			•	•			•		•	•	•	•		
Nutritional assessment				•			•			•	•	•		
Mobility and falls assessment		•	•							•	•	•		
Care planning				•										
Goal setting							•							
Treatment/rehabilitation				•			•							
Discharge planning							•							
Follow up				•						•				
<b>Participants</b>														
Older person									•	•				
Frail older person		•	•	•										
Frail elderly person				•										

*Continued*

Table 1. Continued

	First author and publication year												
	Bazian 2009 [1]	Conroy 2011 [10]	Deschodt 2013 [3]	Ellis 2011 [11], Ellis 2011 [11]	Fealy 2009 [12]	Fox 2012 [13], Fox 2013 [14]	Kammerlander 2010 [15]	Linertova 2011 [16]	Tremblay 2012 [17]	Van Craen 2010 [18]	Hickman <i>et al.</i> 2015 [19]	Ekdahl <i>et al.</i> 2015 [20]	Pilotto <i>et al.</i> 2017 [21]
Age specified:													
55+													
60+													
65+													
70+													
75+													
Type of admission													
Emergency													
Excluded condition specific interventions													
Inclusion of specific conditions													
- acute illness or injury													
- cancer													
- hip fracture													

included a review of interface care [12], gerontologically informed nursing assessment and referral [14], and multi-disciplinary team interventions [21].

**Outcomes**

The main clinical outcomes included mortality (12/13 reviews), activities of daily living (13/13), cognitive functioning (9/13) and dependency (6/13). Key operational outcomes were length of stay (11/13) and readmissions (12/13). ‘Destinational’ outcomes included living at home (7/13) and institutionalisation (11/13). Resource use and costs were considered in four reviews. Patient related outcomes (such as health related quality of life, wellbeing or participation) were not usually reported (Table 2).

**Health economic synthesis**

Relatively few studies look at costs. None took a broader view to include direct costs (staff and resources), subsequent costs (such as community health and social care costs), costs to patients and wider society. Further, the multiple intervention configurations which (broadly) deliver CGA, were mostly not standardised. One exception was the review by Fox *et al.* (2012) [13]. After removal of one outlier study the result of meta-analysis demonstrated that the costs of acute geriatric unit care were significantly less than those of usual care (weighted mean difference was = \$245.80, 95% CI = \$446.23–\$45.38; *P* = 0.02). Two studies [1, 2] concluded that many of the hospital based services showed a reduction in costs associated with CGA. In a review of trials of various ACE model components, there was little cost evidence available to differentiate and compare relative effectiveness between components of the ACE model.

**Discussion**

These reviews concerned the provision of CGA in older patients who were hospital inpatients. The main target group in this context were older people with acute illness.

There was a degree of consistency between the reviews on the definition of CGA which importantly includes both assessment of needs in multiple domains, and the development of a plan to meet those needs. The most consistently reported assessment domains were medical, psychological, social and functional.

The settings included dedicated inpatient wards, but also services which delivered CGA across the hospital, at the interface between acute and community care, and by nurse led and multidisciplinary teams.

Death, disability and institutionalisation were the key outcomes for recipients and reduced length of stay and readmissions were the key operational goals.

The impact of frailty as a determinant of CGA outcome was not widely examined in these reviews. The one review

**Table 2.** Outcomes described in reviews of CGA for hospital inpatients

	First author and publication year												
	Bazta'n 2009	Conroy 2011	Deschodt 2013	Ellis 2011, Ellis 2011	Fealy 2009	Fox 2012, Fox 2013	Kammerlander 2010	Linertova 2011	Tremblay 2012	Van Craen 2010	Hickman <i>et al.</i> 2015	Ekdahl <i>et al.</i> 2015	Pilotto <i>et al.</i> 2017
<b>Clinical outcomes</b>													
Mortality (includes composite outcome 'death or dependence')	•	•	•	•	•		•	•	•	•	•	•	•
Activities of daily living (ADL)	•	•	•	•	•	•	•			•	•	•	•
Cognitive functioning (including delirium)		•		•	•	•					•	•	•
Dependency				•	•	•				•			•
<b>Other psychosocial outcomes</b>													
Health status		•											
Quality of life		•										•	
Satisfaction		•											
Carer strain/burden		•										•	
Falls													
Delirium						•					•		
Iatrogenic/other complications of hospitalisation						•							•
<b>Operational outcomes</b>													
Length of stay	•		•	•	•	•	•				•	•	•
Readmission	•	•	•	•	•	•		•		•	•	•	•
ED visits							•						
<b>Destinational outcomes</b>													
Living at home	•			•	•	•				•	•	•	•
Institutionalisation	•	•		•	•	•				•	•	•	•
Poor discharge destination								•					
Discharge destination						•							
<b>Economic outcomes</b>													
Resource use	•			•		•							
Costs	•	•		•		•							

that attempted this concluded that for frail patients, ward based CGA may reduce institutionalisation rates.

Notably, despite CGA being a patient centred process, few studies have examined the role of patient reported outcome measures (PROMs). PROMs measure outcomes that are important to the patient such as health or quality of life and the use of PROMs may lead to CGA being re-focussed on patient's priorities.

There has only been limited economic evaluation which suggests that CGA may save on hospital costs.

The main strength of an umbrella review is to provide a broad overview in a specific topic area. The corresponding weakness may be a paucity of detail relevant to a particular service or context. Such detail is available in the primary reviews and trials that are included in the overview. While largely of good methodological quality by standard critical appraisal criteria (see Appendix), most of the included reviews did not include a robust assessment of sources of bias. Further, while it has been suggested that umbrella review methodology may reduce the bias associated with excluding non-English language articles, it is not completely eliminated and remains a concern [25].

More work needs to be done on targeting and identifying beneficiaries of CGA. Further trials are justified and should be stratified by frailty, use patient related outcome measures and collect sufficient economic data to determine cost effectiveness. Such trials will need careful process evaluations embedded within them in line with current research frameworks for the evaluation of complex interventions [26, 27].

## Conclusions

As elements of CGA become increasingly embedded in general hospital care, with the development of new and emerging settings and services [28], this review highlights a degree of consistency in definition, essential content, key target group and outcomes of CGA. We hope that this can be used to inform the development of hospital wide services by developing evidence based implementations and incorporating them into multidimensional assessment processes, which include competence in common clinical syndromes (falls, confusion, immobility, continence), multiprofessional co-ordination and management.

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## Key points

- Comprehensive Geriatric Assessment (CGA) is a multi-disciplinary process which includes assessment and management of assessed need.
- Key outcomes are death, disability and institutionalisation.
- The main beneficiaries of Comprehensive Geriatric Assessment (CGA) are older hospital inpatients.
- Patient related outcomes of Comprehensive Geriatric Assessment (CGA) are not widely reported.

- The relationship between frailty and Comprehensive Geriatric Assessment (CGA) requires further clarification.

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## Supplementary Data

Supplementary data mentioned in the text are available to subscribers in *Age and Ageing* online.

## Conflict of interest

None.

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## References

1. Baztan JJ, Suarez-Garcia FM, Lopez-Arrieta J, Rodriguez-Manas L, Rodriguez-Artalejo F. Effectiveness of acute geriatric units on functional decline, living at home, and case fatality among older patients admitted to hospital for acute medical disorders: meta-analysis. *Br Med J* 2009; 338: b50.
2. Ellis G, Whitehead M, O'Neill D, Langhorne P, Robinson D. Comprehensive geriatric assessment for older adults admitted to hospital. *Cochrane Database Syst Rev* 2011. DOI:10.1002/14651858.CD006211.pub2.
3. Deschodt M, Flamaing J, Haentjens P, Boonen S, Milisen K. Impact of geriatric consultation teams on clinical outcome in acute hospitals: a systematic review and meta-analysis. *BMC Med* 2013; 11: 48.
4. Graf CE, Giannelli SV, Herrmann FR *et al*. Can we improve the detection of old patients at higher risk for readmission after an emergency department visit? *J Am Geriatr Soc* 2012; 60: 1372–3.
5. Carpenter CR, Avidan MS, Wildes T, Stark S, Fowler SA, Lo AX. Predicting geriatric falls following an episode of emergency department care: a systematic review. *Acad Emerg Med* 2014; 21: 1069–82.
6. Grant MJ, Booth A. A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Info Libr J* 2009; 26. 10.1111/j.1471-1842.2009.00848.x.
7. Aromataris E, Fernandez R, Godfrey C, Holly C, Khalil H, Tungpunkom P. *Methodology for JBI umbrella reviews*. Joanna Briggs Institute Reviewers' Manual: 2014 edition/Supplement (pp. 1–34). Australia: The Joanna Briggs Institute 2014.
8. McCue P, Parker S, Conroy S, Bardsley M, Roberts H, Kennedy S. *How Best to Deliver Comprehensive Geriatric Assessment (CGA) on a Hospital Wide Basis: An Umbrella Review*. PROSPERO 2015:CRD42015019159. Available at <http://>



- [www.crd.york.ac.uk/PROSPERO/display\\_record.asp?ID=CRD42015019159](http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015019159)
9. Joanna Briggs Institute. *Checklist for Systematic Reviews and Research Syntheses*. [http://joannabriggs.org/assets/docs/critical-appraisal-tools/JBI\\_Critical\\_Appraisal-Checklist\\_for\\_Systematic\\_Reviews2017.pdf](http://joannabriggs.org/assets/docs/critical-appraisal-tools/JBI_Critical_Appraisal-Checklist_for_Systematic_Reviews2017.pdf)
  10. Conroy SP, Stevens T, Parker SG, Gladman JR. A systematic review of comprehensive geriatric assessment to improve outcomes for frail older people being rapidly discharged from acute hospital: 'interface geriatrics'. *Age Ageing* 2011; 40: 436–43.
  11. Ellis G, Whitehead MA, Robinson D, O'Neill D, Langhorne P. Comprehensive geriatric assessment for older adults admitted to hospital: meta-analysis of randomised controlled trials. *Br Med J* 2011; 343: d6553.
  12. Fealy G, McCarron M, O'Neill D *et al*. Effectiveness of gerontologically informed nursing assessment and referral interventions for older persons attending the emergency department: systematic review. *J Adv Nurs* 2009; 65: 934–5.
  13. Fox MT, Persaud M, Maimets I *et al*. Effectiveness of acute geriatric unit care using acute care for elders components: a systematic review and meta-analysis. *J Am Geriatr Soc* 2012; 60: 2237–45.
  14. Fox MT, Sidani S, Persaud M *et al*. Acute care for elders components of acute geriatric unit care: systematic descriptive review. *J Am Geriatr Soc* 2013; 61: 939–46.
  15. Kammerlander C, Roth T, Friedman SM *et al*. Ortho-geriatric service—a literature review comparing different models. *Osteoporos Int* 2010; 21: S637–646.
  16. Linertova R, Garcia-Perez L, Vazquez-Diaz JR, Lorenzo-Riera A, Sarria-Santamera A. Interventions to reduce hospital readmissions in the elderly: in-hospital or home care. A systematic review. *J Eval Clin Pract* 2011; 17: 1167–75.
  17. Tremblay D, Charlebois K, Terret C, Joannette S, Latreille J. Integrated oncogeriatric approach: a systematic review of the literature using concept analysis. *BMJ Open* 2012; 2: e001483.
  18. Van Craen K, Braes T, Wellens N *et al*. The effectiveness of inpatient geriatric evaluation and management units: a systematic review and meta-analysis. *J Am Geriatr Soc* 2010; 58: 83–92.
  19. Hickman LD, Phillips JL, Newton PJ, Halcomb EJ, Abed NA, Davidson PM. Multidisciplinary team interventions to optimise health outcomes for older people in acute care settings: a systematic review. *Arch Gerontol Geriatr* 2015; 61: 322–9.
  20. Ekdahl AW, Sjostrand F, Ehrenberg A *et al*. Frailty and comprehensive geriatric assessment organized as CGA-ward or CGA-consult for older adult patients in the acute care setting: a systematic review and meta-analysis, 2015.
  21. Pilotto A, Cella A, Pilotto A *et al*. Three decades of comprehensive geriatric assessment: evidence coming from different healthcare settings and specific clinical conditions. *J Am Med Dir Assoc* 2017; 18: 192.e1–192.e11.
  22. Landefeld CS, Palmer RM, Kresevic DM, Fortinsky RH, Kowal J. A randomized trial of care in a hospital medical unit especially designed to improve the functional outcomes of acutely ill older patients. *N Engl J Med* 1995; 332: 1338–44.
  23. Asplund K, Gustafson Y, Jacobsson C *et al*. Geriatric-based versus general wards for older acute medical patients: a randomized comparison of outcomes and use of resources. *J Am Geriatr Soc* 2000; 48: 1381–8.
  24. Counsell S, Holder C, Liebenauer L *et al*. Effects of a multi-component intervention on functional outcomes and process of care in hospitalized older patients: a randomized controlled trial of acute care for elders (ACE) in a community hospital. *J Am Geriatr Soc* 2000; 48: 1572–81.
  25. Morrison A, Polisena J, Husereau D *et al*. 'The effect of English-language restriction on systematic review-based meta-analyses: a systematic review of empirical studies. *Int J Technol Assess Health Care* 2012; 28: 138–44.
  26. Craig P, Dieppe P, Macintyre S *et al*. Developing and evaluating complex interventions: the new Medical Research Council guidance. *Br Med J* 2008; 337: a1655.
  27. Moore GF, Audrey S, Barker M *et al*. Process evaluation of complex interventions: Medical Research Council guidance. *Br Med J* 2015; 350: h1258.
  28. Parker SG, McLeod A, McCue P *et al*. New horizons in comprehensive geriatric assessment. *Age Ageing* 2017. <https://doi.org/10.1093/ageing/afx104>.

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