

Evidence Check

Psychiatric service delivery for older people with mental disorders and dementia in hospitals and residential aged care

An Evidence Check rapid review brokered by the Sax Institute
for The Royal Australian and New Zealand College of
Psychiatrists—December 2021



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This report was prepared by Dr Monica Cations, Ms Bethany Wilton-Harding, Professor Brian Draper, Associate Professor Kate Laver, Professor Henry Brodaty, and Professor Lee-Fay Low.

December 2021

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Enquiries regarding this report may be directed to the:

Manager
Knowledge Exchange Program
Sax Institute
www.saxinstitute.org.au
knowledge.exchange@saxinstitute.org.au
Phone: +61 2 9188 9500

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Executive summary

Background

Mental disorders are common among older people and carry a significant associated personal and public health burden. Neuropsychiatric symptoms (also known as behavioural and psychological symptoms of dementia), including behavioural disturbance (e.g. aggression, apathy, agitation, disinhibition) and psychiatric symptoms (e.g. psychotic symptoms), are also very common in dementia¹, with a profound effect on outcomes.²⁻⁴

Older people benefit from psychiatric treatments for mental disorders and neuropsychiatric symptoms in dementia.⁵ Although the delivery of community based psychiatric care has expanded over time, acute hospital treatment for severe symptoms remains an important component of the continuum of care.⁶ Psychiatrists also play a critical role in the management of neuropsychiatric symptoms in dementia, particularly where symptoms are severe.⁶ Efforts to reduce hospitalisation for neuropsychiatric symptoms in dementia have included the proliferation of psychiatric in-reach services to residential aged care and intermediate care models.⁷

This Evidence Check was commissioned by the Royal Australian and New Zealand College of Psychiatrists' Faculty of Psychiatry of Old Age (RANZCP FPOA) in July 2021 to identify the most effective models of psychiatry service delivery for older people. In particular, the RANZCP FPOA seeks an updated review of the effectiveness of psychiatric services delivered to older people and people with dementia in inpatient (hospital) settings and residential aged care settings. Evidence as to the relative effectiveness of 'ageless' and specialist psychiatric services for older people is needed to guide the alignment and commissioning of services. The effectiveness of community based old age psychiatry services has been reviewed recently⁸ and was therefore out of scope for this review.

Most levels of evidence quality were included and synthesised in this Evidence Check, recognising that gold-standard randomised controlled trial research is very difficult in this field for ethical and pragmatic reasons.^{9,10}

Evidence Check questions

This Evidence Check aimed to address the following questions:

Question 1: What is the effectiveness of dedicated older persons' mental health service models for older people with mental disorders or people with dementia, for four types of services:

- Acute hospital-based older persons' mental health care
- Acute hospital-based consultation-liaison psychiatry

-
- In-reach psychiatry services to residential aged care facilities
 - Psychogeriatric long-stay intermediate care models.

Question 2: How do the outcomes for older people compare if they are treated in dedicated older persons' mental health services or if they are treated in mainstream adult mental health services (e.g., "ageless services")?

Summary of methods

The Evidence Check authors addressed the research questions using a rapid review methodology of the peer-reviewed literature. We conducted a systematic search of four electronic databases (PsycINFO, MEDLINE, CINAHL and the Cochrane Library) in September 2021 to identify peer-reviewed literature reporting original evaluation of a mental health service including psychiatry input or oversight for older people or people with dementia in inpatient or residential aged care settings. English language papers from Australia, New Zealand, Canada or any European country published between June 2004 and September 2021 were eligible for inclusion.

Papers meeting the inclusion criteria were assigned a level of evidence based on their study design, according to the National Health and Medical Research Council's hierarchy of evidence. The risk of bias in each study was assessed using the Critical Appraisal Skills Programme (CASP) Randomised Controlled Trial Checklist, the CASP Cohort Studies Checklist (adapted), or the Cochrane Effective Practice and Organisation of Care criteria for interrupted time-series (ITS) studies.

Key findings

Thirty-four studies, reported across 37 papers, met the criteria for inclusion in this Evidence Check. They included studies examining the effectiveness of inpatient psychogeriatric wards ($n=11$), inpatient consultation and/or liaison services delivered by psychogeriatric services ($n=9$), in-reach psychogeriatric services delivered in residential aged care facilities ($n=8$), and long-stay psychogeriatric intermediate care units ($n=6$). Studies were conducted in Europe ($n=22$), Australia ($n=9$), New Zealand ($n=1$) and Canada ($n=2$).

Question 1: What is the effectiveness of dedicated older persons' mental health service models?

Inpatient older persons' mental health care wards

- Studies identified for this Evidence Check continue to support the conclusion that psychogeriatric inpatient care is effective in treating neuropsychiatric symptoms among people with dementia.
- There was consistent (albeit moderate-quality) evidence supporting the effectiveness of inpatient older adults' mental health wards for reducing symptoms of anxiety and depression and improving quality of life among patients with mental disorders.

-
- There is no existing randomised controlled trial examining the effectiveness of inpatient older persons' mental health care wards.

Inpatient consultation and/or liaison psychiatry services

- Our review found consistent evidence that specialist old age psychiatry consultation and/or liaison services can improve the quality of hospital care, reduce length of stay, improve uptake of recommendations, improve identification of delirium, reduce carer stress and improve patient satisfaction with care.
- However, most studies reported that consultation and/or liaison services were not associated with improved clinical symptoms or quality of life among older people with mental disorders or people with dementia.
- Further research to understand factors that affect adherence to consultation-liaison recommendations and the impact of recommendation adherence will help to clarify the true value of these services.

Psychiatric in-reach services to residential aged care

- There was consistent evidence from uncontrolled studies identified for this Evidence Check that psychogeriatric in-reach services to residential aged care are associated with improvements in neuropsychiatric symptoms over time. However, controlled studies did not report significant differences between those who did and did not receive in-reach services. This may be due to the confounding effect of attrition due to mortality.
- There is some high-quality evidence supporting the effectiveness of psychogeriatric in-reach services for reducing symptoms of depression among people with comorbid depression and dementia. This population appears to be best served by in-reach care models.
- Better understanding of the impact of in-reach services on facility staff confidence in implementing recommendations, psychotropic medicine deprescribing, resident and family experiences of care, and adverse events (e.g. injuries, property damage, death) is a priority for future research.

Long-stay intermediate psychogeriatric units

- Six studies included in this Evidence Check evaluated the effectiveness of emerging care models including specialised intermediate care units that combine some elements of traditional residential aged care with specialist design, staffing and models of care.
- Most studies did not report a significant effect of these uses on neuropsychiatric symptoms. However, the units are designed for people with severe and chronic symptoms that are resistant to treatment. Reduced care costs, fewer harms caused by the symptoms (e.g. property damage, injury), benefits for other residents of the facility from which the person has been transferred, and reduced sedative medication load may be more relevant goals. There was some (albeit low-quality) evidence available in the studies included in this review of positive effects on these outcomes.

Question 2: How do the outcomes for older people compare if they are treated in dedicated older persons' mental health services or if they are treated in mainstream adult mental health services (i.e., "ageless services")?

- We did not identify any studies that explicitly compared outcomes for older adults cared for in specialist psychogeriatric services with those in mainstream adult mental health services. Therefore, it is not possible to answer this research question with the available evidence. Some evidence from the included studies does support the provision of co-located or integrated psychogeriatric services as opposed to services delivered by psychiatric or geriatric services independently. Inpatient specialty psychiatric and geriatric services may be most effective where expertise is integrated.

Remaining gaps in the evidence

The highest quality studies included in this Evidence Check require replication to establish the robustness of their results and identify which outcomes are most likely from each service type. Researchers should consider carefully which outcomes to include in evaluations of psychiatric services for older people and people with dementia, given that clinical outcomes (e.g. neuropsychiatric symptoms, mood, anxiety) may be severe, chronic and affected by frailty and other contributors. People receiving secondary psychiatric care are generally highly complex. These factors contribute to treatment resistance. Outcomes including staff skill and confidence, length of stay, recommendation uptake, patient- and family-reported satisfaction, and 'negative' outcomes (injuries, property damage) are important in this context.

Where ethical and practical difficulties preclude randomised controlled trials, application of innovative and pragmatic study designs may help to bridge the gap. For example, hybrid implementation-effectiveness trials and multiphase optimisation strategy trials can assist in understanding the proximal effects of interventions (e.g. staff and patient acceptability, barriers) as well as their more distal effects (e.g. clinical outcomes). Qualitative research can shed light on what service elements patients and families prefer.

More research is required to establish the relative effectiveness of specialist and 'ageless' services and to identify which presentations are best suited to each type of care model. A fundamental omission from the available evidence is the absence of data on how specialist vs 'ageless' services influence negative outcomes that are most common in older people and those with cognitive impairment (e.g. falls, injuries).¹¹

Further research to understand factors that affect adherence to consultation-liaison and in-reach recommendations, and the impact of recommendation adherence, will help to clarify the true effect of these services.

Finally, the studies included in this Evidence Check were all conducted in high-income countries, and none focused on particular racial or cultural groups. The effectiveness of psychiatric models of care is likely to vary according to socioeconomic determinants, and these variances are particularly relevant in the Australian and New Zealand context where Aboriginal, Torres Strait Islander and Māori peoples

experience important disparities in mental health and wellbeing^{12,13} and unique care preferences.¹⁴ Further research evaluating service outcomes for these groups will be important.

Conclusion

Overall, there is consistent evidence supporting the effectiveness of inpatient older persons' mental health wards on clinical outcomes including neuropsychiatric symptoms, mood, anxiety and quality of life. Specialist psychogeriatric consultation and/or liaison services appear to be associated with improved quality of hospital care, reduced length of stay, improved uptake of recommendations, improved identification of delirium, reduced carer stress and improved patient satisfaction with care. However, evidence that these important effects can translate to improvements in neuropsychiatric and other clinical symptoms is limited. Similarly, further research is required with a focus on non-clinical outcomes to better understand the value of psychogeriatric in-reach services into residential care and long-stay intermediate care wards. Our Evidence Check suggests that any realignment of funding toward 'ageless' inpatient and residential aged care psychiatry services is not supported by existing evidence.

Background

Mental disorders are common among older people and carry a significant associated personal and public health burden. Up to 16% of people aged 60 years and over report clinically significant depressive symptoms¹⁵ and 6%–10% meet criteria for one or more anxiety disorders.¹⁶ Primary psychotic disorders (e.g. schizophrenia, schizoaffective disorder, delusional disorder) are less common in late life than in young adulthood, with a 12-month prevalence rate of 0.03%–0.5%.¹⁷ In Australia, men aged 85 years and over have the highest age-specific suicide rate of any group.¹⁸ Mental disorders are particularly common among people living in residential aged care. Recent Australian research reported that more than 57% of people living in residential aged care have at least one mental disorder, most commonly depression (46.2%); anxiety and traumatic stress disorders (14.9%); and psychosis (9.7%).¹⁹

Neuropsychiatric symptoms (also known as behavioural and psychological symptoms of dementia) are also very common, including behavioural disturbance (e.g. aggression, apathy, agitation, disinhibition), psychiatric symptoms (e.g. hallucinations or delusions) and mood changes (e.g. anxiety).¹ These symptoms have a profound impact on outcomes for people with dementia, including increased risk for falls, hospitalisation and mortality², worsened caregiver distress³ and increased care staff burnout and turnover.⁴ Both paid and unpaid (i.e. family) carers report difficulty managing neuropsychiatric symptoms, promoting an overreliance on sedating medications that have limited efficacy and potential adverse effects.²⁰ Comorbidity of dementia and mental disorders is also common: a recent meta-analysis of 120 studies reported that 25%, 14% and 4.4% of people with dementia reported clinically significant levels of depression, anxiety and post-traumatic stress disorder, respectively.²¹

Several medications have demonstrated efficacy for treating depression, psychosis, anxiety and other mental disorders in older adults.²² There is also ample evidence to support the effectiveness of common non-pharmacological treatment modalities for older people with mental disorders, including multidisciplinary case management, cognitive behaviour therapy and problem-solving therapy.²³ With adaptations, some of these treatments can be effective for people with comorbid dementia.²⁴

Psychiatry services are a central pillar of the care system for older people with mental disorders internationally. Old age psychiatry (also known as psychogeriatrics, geriatric psychiatry or older persons' mental health) evolved as a specialty in the 1950s in response to growing recognition of the unique needs of older people with mental disorders.²⁵ Although the delivery of community based psychogeriatric care has expanded, acute hospital treatment for severe symptoms remains an important component of the continuum of care.⁶ Psychiatrists have a critical role in the management of neuropsychiatric symptoms in people with dementia, particularly where symptoms are severe.⁶ Efforts to reduce hospitalisation for neuropsychiatric symptoms have included the proliferation of psychiatric in-reach services to residential aged care.⁷

A 2005 review of acute psychogeriatric treatment for older adults with mental disorders identified 46 studies reporting consistent evidence that hospital and residential aged care treatment by old age psychiatry services was effective.²⁶ However, the authors noted the overall low quality of the available

evidence and recommended further research to better establish the most appropriate treatment environments for different presentations. Similarly, a systematic review published in 2009 reported consistent beneficial effects of interventions for neuropsychiatric symptoms combining psychiatric care and traditional care in residential aged care settings.⁷ These reviews require updating. A broad capture of evidence is important given that gold-standard randomised controlled trial research in this field is very difficult for ethical and pragmatic reasons.^{9,10}

Changes to policy (particularly in the UK) since the publication of these reviews have had important implications for psychogeriatric service delivery. The Equality Act, enacted in the UK in 2010, specified that mental health services should be delivered on the basis of need rather than age. This was intended to ensure that older people with mental disorders were not disadvantaged from receiving timely and effective services because of their age. However, interpretation of the Act has triggered a realignment of services toward an ‘ageless’ model in which older people with mental disorders are routinely managed by general adult psychiatric services while older adult services focus on the management of neuropsychiatric symptoms in dementia.^{27,28} Concerns have been raised about the potential negative effects of this realignment of services^{28–30} particularly as the relative effectiveness of ageless services (compared with specialist services) is not clear. Indeed, one study comparing outcomes for older people with mental disorders demonstrated that unmet needs were less common among those who had received specialist old age psychiatry services compared with those managed by general adult psychiatry services.³¹ Differences in the delivery of dementia care between countries will also affect the appropriateness of service realignment, particularly in Australia where dementia is predominantly managed in geriatric medicine.

This Evidence Check was commissioned by the Royal Australian and New Zealand College of Psychiatrists’ Faculty of Psychiatry of Old Age (RANZCP FPOA) in July 2021 to identify the most effective models of psychiatry service delivery for older people. The RANZCP FPOA is seeking an updated review of the effectiveness of psychiatric services delivered to older people and people with dementia in acute (i.e. hospital) settings and in residential aged care settings. The effectiveness of community based old age psychiatry services was reviewed recently⁸ and was therefore out of scope for this Evidence Check, which also seeks to identify features of the service delivery model that result in better outcomes. Evidence regarding the relative effectiveness of ‘ageless’ and specialist psychiatric services for older people is needed to guide the alignment of services.

This Evidence Check will inform RANZCP FPOA policy and advocacy regarding the funding and design of effective mental health services for older people in Australia and New Zealand.

It seeks answers to two questions:

1. What is the effectiveness of dedicated older persons’ mental health service models for older people with mental disorders or people with dementia, for four types of services:
 - Acute hospital-based older persons’ mental health care
 - Acute hospital-based consultation-liaison psychiatry
 - In-reach psychiatry services to residential aged care facilities
 - Psychogeriatric long-stay intermediate care models.
2. How do the outcomes for older people compare if they are treated in dedicated older persons’ mental health services or if they are treated in mainstream adult mental health services (e.g., “ageless services”)?

Methods

The authors addressed the Evidence Check questions using a rapid review methodology of the peer-reviewed literature. We reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.³²

Search strategy

We developed a rapid review protocol to identify studies evaluating outcomes of psychiatric services delivered to older people with mental disorders or people with dementia in inpatient or residential aged care settings. The search strategy was developed based on the Evidence Check proposal devised by the RANZCP FPOA and revised and finalised on discussion.

We piloted the search strategy using one database (PsycINFO) and validated it to ensure it identified studies that met all the inclusion criteria we had located during initial scoping. The final search strategy (see Appendix A) combined concepts related to the intervention (mental health service including psychiatry input, governance or oversight), the setting (inpatient or residential aged care), the population (older people with mental disorders or people with dementia) and the outcome (effectiveness, cost, service use, experiences, satisfaction).

The search was conducted in September 2021 in PsycINFO, MEDLINE, CINAHL and the Cochrane Library. Reference lists of all included studies and reviews were hand-searched for additional records.

Eligibility criteria

This Evidence Check included studies published since June 2004 (to capture studies published since searches were conducted for the last published review of psychogeriatric services²⁶) and in English, reporting original research or evaluation of a mental health service including psychiatry input or oversight for older people or people with dementia in inpatient or residential aged care settings.

Inclusion criteria were:

- **Study type:** Randomised trials, non-randomised trials, controlled before-and-after studies, interrupted time-series studies, service evaluations or case series with pre-test/post-test outcomes, and qualitative studies. All review articles (including systematic reviews and narrative reviews) were screened to identify additional original studies for inclusion.
- **Service type:** Inpatient psychiatric services including dedicated older persons' mental health units, inpatient consultation-liaison psychiatry services, other inpatient medical settings where psychiatry is delivered to older people, inpatient psychiatry services delivered via telehealth, psychiatry in-reach services to residential aged care, other psychiatry services delivered in residential aged care and in-reach services delivered via telehealth. Several examples of

'emerging models' of intermediate psychiatric care for people with neuropsychiatric symptoms in dementia were identified during the search and these were retained and reported as a separate service type.

- **Population:** People aged 60 years or older with a diagnosed mental disorder, or Aboriginal and/or Torres Strait Islander or Māori people aged 50 years or older with a diagnosed mental disorder, or people with dementia of any age.
- **Outcomes:** Clinical mental health outcomes, service use outcomes, costs and cost-effectiveness, safety, patient and family experience and satisfaction.
- **Language:** English only.
- **Countries:** Australia, New Zealand, Canada, any European country (including the UK).

Where papers could not be located in English, study authors were emailed a request to forward an English-language copy where available. Studies were excluded if they evaluated a psychiatric service delivered to people living in the community. Studies from only a small group of countries were included as these countries were considered to have comparable healthcare systems. Where cognitive function was included as an outcome, results are not reported here.

Full details of the review inclusion and exclusion criteria are presented in Appendix B.

Study screening and data extraction

One reviewer (BW-H) screened all titles and removed clearly irrelevant papers. Two reviewers (BW-H and MC) screened abstracts and full texts for eligibility using an eligibility checklist based on the criteria described above (see Appendix C). Disagreements about inclusion were resolved via discussion between the reviewers, and a third reviewer (BD) was consulted where consensus could not be reached.

Two reviewers (BW-H and MC) extracted the data using a data extraction spreadsheet that was piloted with five studies before being finalised and used with the remaining studies. Data extraction was cross-referenced for accuracy. Extracted data included the study first author and year of publication, design, setting, intervention, number and demographic features of participants, outcomes and conclusions.

Any data presented in the included studies regarding the effect of specific service features were extracted and reported narratively. This narrative synthesis also included data from studies reviewed in full text that did not report on the effectiveness of the service but otherwise met all inclusion criteria and reported the effect of specific service features.

Evidence grading

One author (MC) assigned each study a level of evidence rating as per the National Health and Medical Research Council (NHMRC) hierarchy of evidence (Table 1)³³, based on its study design. A second author (KL) checked these assignments and disagreements were resolved on discussion.

Table 1—NHMRC (2009) levels of evidence³³

Level of evidence	Study design
I	A systematic review of Level II studies
II	A randomised controlled trial
III-1	A pseudo-randomised controlled trial
III-2	A comparative study with concurrent controls
III-3	A comparative study without concurrent controls
IV	Case series with either post-test or pre-test/post-test outcomes

The quality of each study was assessed by one author (BW-H) and checked by a second author (MC) to examine the risk of bias within the results. We chose the tool used for quality assessment to suit the study design. Randomised and non-randomised controlled trials were evaluated using the Critical Appraisal Skills Programme (CASP) Randomised Controlled Trial Checklist³⁴ and case series with pre–post data were evaluated using an adapted version of the CASP Cohort Studies Checklist.³⁵ Both checklists include 11 questions to assess the validity of the results, their contribution to existing knowledge and their applicability to other populations or settings. We assessed historical cohort and interrupted time-series designs using the Cochrane Effective Practice and Organisation of Care criteria for interrupted time-series studies.³⁶ These criteria assess whether there are compelling arguments that the results may have occurred independently of the intervention, the standardisation of data collection, intervention blinding and selective outcome reporting. All studies were assigned a ranking of low, moderate or high risk of bias on quality assessment. For this Evidence Check, we presented overall ranks for each study.

Following quality assessment, the body of evidence for each service type was evaluated by two authors (KL and MC) and charted using the NHMRC ‘evidence statement matrix’³³, which provides an overall summary of the quality of the evidence based on:

- The number of studies, level of evidence and risk of bias
- The consistency of findings between studies
- The clinical significance of effects and generalisability to the wider population
- The applicability of the results to the Australian and New Zealand healthcare setting.

We constructed evidence statement matrices separately for the outcomes most consistently reported across studies: (a) neuropsychiatric symptoms, (b) depression and anxiety symptoms, and (c) quality of life. Additional matrices were constructed where there was sufficient comparable evidence. All Evidence Check authors provided feedback on the matrices until we reached consensus.

Findings

Included studies

We retrieved 11,093 unique records from the databases and identified a further 49 by searching reference lists of included studies and from reviews. In total, 34 studies met the criteria for inclusion in this Evidence Check, reported across 37 papers. This included studies examining the effectiveness of inpatient psychogeriatric wards ($n=11$), inpatient consultation and/or liaison services delivered by psychogeriatric services ($n=9$), in-reach psychogeriatric services delivered in residential aged care facilities ($n=8$), and long-stay psychogeriatric intermediate care units ($n=6$). Studies were conducted in Europe ($n=22$), Australia ($n=9$), New Zealand ($n=1$) and Canada ($n=2$). A flowchart of the literature selection process is included in Appendix D and characteristics of the included studies are presented in Appendix E.

After assigning a level of evidence³³ based on study design, we found five studies were Level II (randomised controlled trials), five were Level II-2 (comparative studies with concurrent controls), seven were Level III-3 (historical control studies) and 17 were Level IV (case series with pre-test/post-test outcomes) (Table 2). At quality assessment, we considered four studies had a low risk of bias, 23 had a moderate risk of bias and seven studies had a high risk of bias. The most common potential source of bias across studies was the lack of a control group and/or inadequate management of potential confounding factors.

Table 2—Summary of included studies, by NHMRC level of evidence³³

Level of evidence	Study design	Number of included studies			
		Inpatient psychogeriatric units	Inpatient consultation and/or liaison	RACF in-reach	Long-stay units
I	A systematic review of Level II studies	N/A	N/A	N/A	N/A
II	A randomised controlled trial	0	2	2	1
III-1	A pseudo-randomised controlled trial	0	0	0	0
III-2	A comparative study with concurrent controls	1	1	1	2*
III-3	A comparative study without concurrent controls	2	3	1	1
IV	Case series with either post-test or pre-test/post-test outcomes	8	3	4	2

*One of these studies included three components with three separate designs (III-2, III-3, and IV).³⁷
Abbreviations: RACF = residential aged care facility

Question 1: What is the effectiveness of dedicated older persons' mental health service models?

I. Inpatient older persons' mental health care wards

Summary of evidence

We identified 11 studies published since June 2004 in our included countries that assessed the effectiveness of a specialist inpatient older persons' mental health care ward. A summary of outcomes is presented in Table 3 and full data can be found at Appendix F.

Table 3—Overview of outcomes of studies assessing effectiveness of inpatient psychogeriatric units

First author (year)	Level of evidence	Population	Outcome							
			NPS	Depression	Anxiety	Quality of life	ADLs	Length of stay	Restraint use	Psychotropic medications
Alanen (2015)	IV	Dementia	✓				✓			✗
Bjørkløf (2018)	IV	Psychiatric		✓						
Cheung (2007)	IV	Both	✓ ^b							
Chiu (2009)	III-2	Both	✓ ^b					✓		
Clignet (2021) ^a	IV	Psychiatric (depression)		✓	✓					
Ekiz (2020)	IV	Dementia	✓							
Harper (2007)	IV	Dementia	✗							
Helvik (2016)	IV	Psychiatric				✓				
Lu (2009)	III-3	Both (with delirium)							✗	
Maier (2007)	III-3	Both						✓		
Pitkänen (2018,19)	IV	Dementia	✓				✓			✗

Abbreviations: NPS = neuropsychiatric symptoms; ADLs = activities of daily living

✓ Included, service effective; ✗ Included, service not effective or outcome worsened; Blank indicates outcome was not included in study

^a Preprint, ^b Psychosocial functioning as measured by the Health of the Nation Outcome Scales for Elderly People

Neuropsychiatric symptoms

The most common outcome reported across studies was global neuropsychiatric symptoms ($n=6$). One non-randomised controlled trial with a high risk of bias (Level III-2) and four single group pre–post studies with a moderate risk of bias (Level IV) all reported reduced neuropsychiatric symptoms with specialist inpatient care. Chiu et al.³⁸ (Level III-2) compared outcomes for older adults with mental disorders or dementia cared for within a co-located psychogeriatric and geriatric hospital ward with outcomes for those cared for in other hospitals with psychogeriatric services and reported greater improvements in psychosocial functioning from admission to discharge in the co-located unit.

Two single-group pre–post studies with a moderate risk of bias^{39–41} and one with high risk of bias⁴² reported global improvements in neuropsychiatric symptom severity on the Neuropsychiatric Inventory among people with dementia from admission to discharge in a specialised older persons' mental health inpatient ward. Results of one of these, however, represent only approximately 13% of admissions and those with a longer stay overall.⁴²

Cheung et al.⁴³ reported improvement in both global psychosocial functioning and the neuropsychiatric subscales of the Health of the Nation Outcome Scales (HoNOS) from admission to discharge from a specialised older persons' mental health inpatient ward among both people with dementia and older people with a mental disorder (Level IV).

Only one single-group pre–post study with high risk of bias (Level IV) reported that there was no change in the frequency of 'challenging behaviour' after three weeks of inpatient admission in a specialised psychogeriatric ward.⁴⁴ However, the authors acknowledged that floor effects limited the reliability of their results (that is, very few patients demonstrated any of the behaviours under observation).

Overall, there is consistent but low-to-moderate quality evidence that inpatient older persons' mental health wards are effective at treating neuropsychiatric symptoms, particularly in those with dementia (Table 4).

Table 4—NHMRC evidence statement matrix summarising evidence for the impact of inpatient older persons' mental health care wards on neuropsychiatric symptoms

Question: Do inpatient psychogeriatric units result in reduced neuropsychiatric symptoms?		
Component	Rating	Description
Evidence base	C	One Level III study with a high risk of bias
Consistency	C	Most studies consistent in findings: positive effect
Clinical impact	C	Moderate reductions in symptoms reported in most studies
Generalisability	A	Populations studied in the evidence are the same as the population of interest in this Evidence Check
Applicability	C	Studies conducted in Europe or Canada

Depression and anxiety

Two single-group pre–post studies with a moderate risk of bias (Level IV), including older people with any mental disorder⁴⁵ or specifically depression⁴⁶, reported improvements in depressive symptoms from admission to follow-up (one year and eight weeks, respectively) in an inpatient older persons' mental health ward. Clignet et al.⁴⁶ reported similar improvements in anxiety symptoms and that improvements at eight weeks post-admission were maintained at six months. Note, however, that this study is currently only available as a preprint and has not yet undergone peer review. Overall, there is low-quality evidence that inpatient older persons' mental health wards are effective at treating symptoms of depression and anxiety (Table 5).

Table 5—NHMRC evidence statement matrix summarising evidence for the impact of inpatient older persons' mental health care wards on depression

Question: Do inpatient psychogeriatric units result in reduced levels of depression?		
Component	Rating	Description
Evidence base	D	Two Level IV studies
Consistency	A	Both studies consistent in findings: positive effect
Clinical impact	C	Moderate reduction in symptoms reported in both studies
Generalisability	C	Population had psychiatric condition
Applicability	C	Studies conducted in Europe

Quality of life

One single-group pre–post study with a moderate risk of bias (Level IV) including people with mental disorders reported significantly improved self-reported quality of life from admission to 12 months later⁴⁷ (Table 6).

Table 6—NHMRC evidence statement matrix summarising evidence for the impact of inpatient older persons' mental health care wards on quality of life

Question: Do inpatient psychogeriatric programs result in improved quality of life?		
Component	Rating	Description
Evidence base	D	One Level IV with a moderate risk of bias
Consistency	N/A	Only one study assessing outcome
Clinical impact	C	Level IV evidence of moderate improvement in quality of life in people with a psychiatric condition
Generalisability	B	The study involved people with a psychiatric condition
Applicability	C	Study conducted in Europe

Service outcomes

One non-randomised controlled trial with a high risk of bias (Level III-2) and one historical control trial with a moderate risk of bias (Level III-3) including both people with dementia and mental disorders recorded a shortened length of stay with integrated psychogeriatric and geriatric inpatient treatment when compared with acute wards delivered by non-integrated services.^{38,48} This suggests integrated psychogeriatric and geriatric services may be associated with reduced length of stay when compared with services run by these specialties independently (Table 7).

Table 7—NHMRC evidence statement matrix summarising evidence for the impact of inpatient older persons' mental health care wards on length of stay

Question: Do inpatient psychogeriatric programs result in reduced length of stay?		
Component	Rating	Description
Evidence base	B	Two Level III studies with moderate-to-high risk of bias
Consistency	C	Both studies consistent in findings when compared with non-integrated services: positive effect
Clinical impact	C	Moderate reduction in length of stay
Generalisability	B	Population studied had dementia and/or a psychiatric condition
Applicability	B	Studies conducted in Australia or Europe

One historical control study with a moderate risk of bias (Level III-3) reported that people with comorbid mental health conditions (including dementia) and delirium were less likely to be restrained and to abscond during admission to a specialised older persons' mental health ward than during their time on a general medical ward prior to specialist ward admission.⁴⁹

Other outcomes

In their single-group pre–post studies with moderate risk of bias (Level IV), both Pitkänen et al.^{39,41} and Alanen et al.⁴⁰ reported significant increases in the overall mean dose of antipsychotic and anxiolytic medications from admission to discharge from a specialised older persons' mental health ward among people with dementia. Both studies also reported a significant increase in functional impairments (i.e. competence in activities of daily living) from admission to discharge. None of the included studies reported on adverse events (e.g. falls, mortality).

Service features associated with effectiveness

Some studies that were not eligible for inclusion in our Evidence Check because they did not report on the overall effectiveness of the service did nonetheless describe ward features that were associated with improved or worsened outcomes. For example, Adlington et al.⁵⁰ reported in their single-group pre–post study (Level IV) that daily management rounds where all patient needs were

discussed by a multidisciplinary team, as well as a team focus on longer stayers, was associated with reduced length of stay and occupied bed days.

Bone et al.⁵¹ conducted a pilot case series study (Level IV) to implement a Dementia Care Mapping intervention in acute older persons' mental health wards involving staff education and support, allocating keyworkers to increase 'human connection', increased detail in personal information on resident files, assisting staff to understand participants' needs and behaviours, making this information accessible for new staff, engaging volunteers to support and assist with identified personal occupation needs, adapting the environment to facilitate communication and stimulation, increasing group activities, implementing individual behaviour interventions for specific needs, and introducing activity boxes personalised for each resident with tactile exterior and familiar objects inside such as photos. The intervention was associated with reduced neuropsychiatric symptoms.⁵¹

Zieschang et al.⁵² similarly reported from their single-group pre–post feasibility study (Level IV) that weekly multidisciplinary meetings, twice-weekly music therapy, access to physiotherapy, behaviour, and speech therapy, access to a social worker, non-limited visiting hours and intensive mandatory staff training were associated with improved neuropsychiatric symptoms and reduced functional impairments among psychogeriatric inpatients with dementia.

Finally, Mazzei et al.⁵³ conducted a historical control study (Level III-3) and reported that changes to the physical environment within acute older persons' mental health wards, including camouflage murals in exits, a circular wandering path, private bedrooms and an outdoor patio area, were associated with reduced pacing among patients with dementia.

II. Inpatient consultation and/or liaison psychiatric services

Summary of evidence

We identified nine studies published since June 2004 in our included countries that assessed the effectiveness of an inpatient psychiatric consultation and/or liaison service for older people with mental disorders or people with dementia. A summary of outcomes is presented in Table 8 and full data can be found at Appendix G.

Table 8—Overview of outcomes of studies assessing effectiveness of inpatient psychiatric consultation and/or liaison services

First author (year)	Level of evidence	Population	Outcome												
			NPS	Depression	Suicide	ADLs	Quality of life	Carer wellbeing	Delirium	Psychotropic medications	Response time	Survival	Satisfaction	Length of stay	
Cole (2006)	II	Psychiatric		x	x	x	x						x		x
Cullum (2007)	II	Psychiatric		x			x							✓	
Lang (2012)	IV	Both								✓					
McCarthy (2021)	III-3	Both									✓ ^a			✓ ^{a,b}	
Mujic (2018)	IV	Both	✓ ^c												
Sheehan (2013)	IV	Dementia				✓ ^a	x	✓							
Singh (2013)	III-3	Both									✓ ^a				✓ ^a
Tabet (2005)	III-2	Both							✓						
Whelan (2007)	III-3	Both									x		x		✓ ^a

Abbreviations: NPS = neuropsychiatric symptoms; ADLs = activities of daily living

✓ Included, service effective; x Included, service not effective or outcomes worsened; Blank indicates that outcome was not included in study

^a Results of significance testing not reported; ^b Clinician and referrer satisfaction; ^c Psychosocial functioning as measured by the Health of the Nation Outcome Scales for Elderly People

Neuropsychiatric symptoms

One single-group pre–post study with a moderate risk of bias (Level IV) examined the effectiveness of a specialist liaison old age psychiatry service for older adults with mental disorders or dementia in a large UK hospital and reported significant improvements in psychosocial functioning from hospital admission to discharge⁵⁴ (Table 9).

Table 9—NHMRC evidence statement matrix summarising evidence for the impact of inpatient consultation and/or liaison services on neuropsychiatric symptoms

Question: Do inpatient consultation and/or liaison services result in reduced neuropsychiatric symptoms?		
Component	Rating	Description
Evidence base	D	One Level IV study
Consistency	N/A	Only one study assessing outcome
Clinical Impact	C	Moderate reduction in symptoms
Generalisability	B	Population included people with dementia and psychiatric conditions
Applicability	C	Study conducted in Europe

Depression and anxiety

Two randomised controlled trials with a low risk of bias (Level II) examined the impact of a psychiatric consultation-liaison service for older people with mental disorders in hospital compared with care as usual.^{55,56} In one of these studies, the service was delivered by a general psychiatrist (i.e. not a specialist old age psychiatrist)⁵⁵, while the other was delivered by a psychiatric nurse supervised by a specialist old age psychiatry service.⁵⁶ Both reported that the service had no significant impact on depressive symptoms or the prevalence of major depression at follow-up (six months and 16 weeks, respectively) (Table 10). One of these studies also reported that the service had no effect on subsequent death by suicide or suicide attempt.⁵⁵

Table 10—NHMRC evidence statement matrix summarising evidence for the impact of inpatient consultation and/or liaison services on depression symptoms

Question: Do inpatient consultation and/or liaison services result in reduced levels of depression?		
Component	Rating	Description
Evidence base	B	Two Level II studies with low risk of bias
Consistency	B	Both studies showed consistent results: lack of effect
Clinical impact	D	Limited impact on symptoms
Generalisability	C	Population had psychiatric conditions
Applicability	C	Studies conducted in Canada or UK

Quality of life

The two randomised controlled trials with low risk of bias (Level II) described above also reported that a specialised consultation-liaison service had no significant impact on the quality of life for older hospitalised people with mental disorders.^{55,56} Similarly, one single-group pre–post study with a moderate risk of bias (Level IV) reported that the implementation of a specialist old age psychiatry liaison service was not associated with a change in the quality of life from admission to 12-month follow-up among people with dementia and mental disorders⁵⁷ (Table 11).

Table 11—NHMRC evidence statement matrix summarising evidence for the impact of inpatient consultation and/or liaison services on quality of life

Question: Do inpatient consultation and/or liaison services result in improved quality of life?		
Component	Rating	Description
Evidence base	B	Two Level II studies with low risk of bias
Consistency	B	Both studies showed consistent results: lack of effect
Clinical impact	D	Limited impact on symptoms
Generalisability	B	Population had psychiatric conditions or dementia
Applicability	C	Studies conducted in Canada or the UK

Service outcomes

One randomised controlled trial with a low risk of bias (Level II) reported no difference in length of stay or readmission rates between older people with mental disorders who received consultation-liaison services from a general (non-specialist) psychiatrist and those who did not.⁵⁴

However, two historical control studies with moderate risk of bias (Level III-3) supported the effectiveness of consultation-liaison services for reducing length of stay among people with dementia and older people with mental disorders. One of these studies assessed a multidisciplinary consultation-liaison service that included both a general (non-specialist) psychiatrist and a specialist old age psychiatrist, and demonstrated improved length of stay compared with a prior service that included a nurse-only consultation-liaison service.⁵⁸ The other study compared an onsite specialist old age psychiatry consultation-liaison service with a previous consultation-liaison service provided via in-reach by community older persons' mental health teams.⁵⁹ Neither study reported the statistical significance of their reported differences, but one⁵⁸ did report that the difference equated to an annualised bed-day saving of 44 bed-days.

Overall, some lower-quality evidence suggests specialised old age psychiatry consultation-liaison services effectively reduce length of stay. Consultation-liaison provided by general psychiatry services may not have similar effectiveness (Table 12).

Table 12—NHMRC evidence statement matrix summarising evidence for the impact of inpatient consultation and/or liaison services on length of stay

Question: Do inpatient consultation and/or liaison services result in reduced length of stay?		
Component	Rating	Description
Evidence base	B	One Level II study with a low risk of bias
Consistency	C	Some inconsistency, reflecting genuine uncertainty
Clinical impact	D	Level II evidence suggesting limited impact of general psychiatry consultation-liaison on length of stay, but Level III-3 evidence suggesting reduced length of stay with specialist old age psychiatry consultation-liaison
Generalisability	B	Population had psychiatric conditions or dementia
Applicability	C	Studies conducted in Canada or UK

One historical control study with a moderate risk of bias (Level III-3) reported that a multidisciplinary consultation-liaison service including both a general (non-specialist) psychiatrist and a specialist old age psychiatrist was associated with improved response time compared with a nurse-only consultation-liaison service.⁵⁸ A second historical control study with high risk of bias (Level III-3) reported that an in-hospital specialist old age psychiatry liaison service improved response time compared with an external consultation service provided via in-reach.⁶⁰ However, neither study reported the statistical significance of this difference and in one case the change was only minor (half a day).⁶⁰

Two historical control studies (Level III-3) also reported that in-hospital specialist old age psychiatry consultation and/or liaison services more often resulted in recommendations being implemented.^{59,60}

Other outcomes

One randomised controlled trial with a low risk of bias assessing a consultation-liaison service delivered by a general (non-specialist) psychiatrist to older people with mental disorders (Level II) and one historical control study with a moderate risk of bias assessing a specialist old age psychiatry consultation-liaison service that included both people with mental disorders and people with dementia (Level III-3) failed to demonstrate an effect on mortality at six months⁵⁵ and one year⁵⁹, respectively.

One single-group pre–post study with a moderate risk of bias (Level IV) reported that consultation-liaison services delivered in partnership by a geriatrician and general (non-specialist) psychiatrist were associated with significant improvements in prescribing quality from admission to discharge, including reducing the prescription of potentially inappropriate medication and the prevalence of prescribing omissions.⁶¹ However, a historical control study with a moderate risk of bias (Level III-3) reported that a specialist old age psychiatry consultation-liaison service was associated with higher rates of polypharmacy when compared with an offsite in-reach service.⁵⁹

One randomised controlled trial with a low risk of bias (Level II) reported that, although a consultation-liaison service delivered by a psychiatric nurse supervised by a specialist old age psychiatry service did not significantly influence clinical outcomes when compared with care as usual, it was associated

with high patient satisfaction with care.⁵⁶ Similarly, McCarthy et al.⁶⁰ reported that hospital clinician and referrer satisfaction improved with the implementation of an in-hospital specialist old age psychiatry liaison service when compared with the prior offsite in-reach consultation service. However, the authors did not report the statistical significance of this change.

Functional impairments (i.e. competence with activities of daily living) in older people with mental disorders were not significantly affected by a consultation-liaison service delivered by a general (non-specialist) psychiatrist in one randomised controlled trial with a low risk of bias (Level II).⁵⁵ A single-group pre–post study with a moderate risk of bias (Level IV) reported that functional impairments worsened over 12 months among those receiving specialist old age psychiatry liaison services, but did not report the statistical significance of this change.⁵⁷ The same study nonetheless reported significant improvement in carer stress over the 12-month follow-up period.

Finally, one non-randomised cluster control trial with a high risk of bias (Level III-2) reported that a specialist old age psychiatry consultation-liaison service was associated with improved identification and management of delirium.⁶²

Service features associated with effectiveness

Two studies included in this Evidence Check suggest the availability of in-hospital consultation and/or liaison services, as opposed to services located offsite and delivered via in-reach, are associated with better outcomes.^{59,60} One of these provides evidence in favour of a liaison model over a consultation model.⁶⁰

A randomised controlled trial with a low risk of bias (Level II) by Goldberg et al.^{63,64} assessed the medical care provided for people with acute confusion on an integrated ward with both geriatric and general psychiatric services and compared it with that delivered on geriatric or general medicine wards without psychiatry input. This study was not eligible for inclusion in our Evidence Check because psychiatric care was not the intervention being evaluated. The addition of psychiatry services was associated with higher family-rated satisfaction with care but did not have any significant effect on neuropsychiatric symptoms, quality of life, length of stay, mortality, carer strain, discharge destination or readmission rate.

A single-group pre–post study by Babu et al.⁶⁵ (Level IV) was not eligible for inclusion in the Evidence Check because only a conference abstract could be located describing its results. Nonetheless, the abstract noted the addition of a geriatric specialist to weekly multidisciplinary team meetings within a specialist old age psychiatry consultation-liaison service resulted in reduced polypharmacy, a 58% reduction in hospital transfers and a 90% reduction in specialty referrals.⁶⁵

In their retrospective audit study (Level IV), Barra et al.⁶⁶ reported that every 10% increase in time from admission to referral to a general (i.e. not old age specialist) psychiatric consultation-liaison service was associated with a 5.7% longer hospital stay.

Finally, although not included in our Evidence Check because the service did not include psychiatry oversight, some studies report improved outcomes (e.g. diagnosis of dementia or fewer depressive symptoms at follow-up) with a nurse-only liaison service.^{67,68}

III. Psychiatric in-reach services to residential aged care

Summary of evidence

We identified eight studies published since June 2004 in our included countries that assessed the effectiveness of a psychiatric in-reach service for residential aged care. A summary of outcomes is presented in Table 13 and complete data can be found at Appendix H.

Table 13—Overview of outcomes of studies assessing the effectiveness of in-reach psychiatric services to residential aged care facilities

First author (year)	Level of evidence	Population	Outcome							
			NPS	Depression	Quality of life	Psychotropic medications	Staff burden	Health service use	Restraint	Hospitalisation
Bird (2007)	III-2	Dementia	x			✓	x			
Davison (2007)	IV	Dementia	✓				✓	✓		
Depla (2006)	IV	Psychiatric	✓		✓					
Doyle (2016)	IV	Both	✓ ^a							
Hirst (2009)	III-3	NR				✓ ^a				✓ ^a
Koekkoek (2016)	IV	Both	✓							
Kotynia-English (2005)	II	Both	x	x	x	x			x	
McSweeney (2012)	II	Dementia (with depression)		✓						

Abbreviations: NPS = neuropsychiatric symptoms

✓ Included, service effective; x Included, service not effective or worsened; Blank indicates that outcome was not included in study

^a Results of significance testing not reported

Neuropsychiatric symptoms

Six studies examined the effect of a psychiatric in-reach service on neuropsychiatric symptoms in residential aged care facilities (RACF). One randomised controlled trial with a low risk of bias (Level II) reported a psychiatric in-reach service had no effect on neuropsychiatric symptoms compared with care as usual in people with dementia or mental disorders.⁶⁹ This was true when symptoms were measured using both the Neuropsychiatric Inventory and the Health of the Nation Outcome Scales. Bird et al.⁷⁰ also found no effect on neuropsychiatric symptoms in their non-randomised controlled trial (III-2), which compared psychiatric in-reach focusing on non-pharmacological strategies with psychiatric in-reach with a predominantly pharmacological approach.

In contrast, three single-group pre–post test studies with moderate risk of bias (Level IV) all reported a psychiatric in-reach service delivered improved neuropsychiatric symptoms from referral through to discharge.^{71–74} Depla et al.⁷² also reported that the availability of mental health workers within residential aged care was associated with reduced agitation among people with mental disorders.

Overall, evidence regarding the effect of in-reach psychiatric services in residential aged care is mixed for neuropsychiatric symptoms. While the existing uncontrolled studies report improvement in symptoms over time, existing controlled studies do not report significant differences between groups (Table 14).

Table 14—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric in-reach services on neuropsychiatric symptoms

Question: Do in-reach to RACF services result in reduced neuropsychiatric symptoms?		
Component	Rating	Description
Evidence base	B	One Level II study with a low risk of bias
Consistency	C	Some inconsistency, reflecting genuine uncertainty
Clinical impact	C	Level IV evidence of a moderate reduction in symptoms, but higher-quality studies did not show any effect
Generalisability	B	Population had psychiatric conditions or dementia
Applicability	B	Studies conducted in Australia or Europe

Depression and anxiety

One randomised controlled trial with a low risk of bias (Level II) reported a psychiatric in-reach service had no effect on depressive symptoms at 12 months compared with care as usual in people with dementia or mental disorders.⁶⁹ However, one cluster randomised controlled trial with a low risk of bias (Level II) reported improved depressive symptoms from a psychiatric in-reach service after 15 weeks for people with comorbid depression and dementia.⁷⁵ People with dementia may benefit most from psychiatric in-reach services for depressive symptoms, particularly in the short term (Table 15).

Table 15—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric in-reach services on depressive symptoms

Question: Do in-reach to RACF services result in reduced depressive symptoms?		
Component	Rating	Description
Evidence base	B	Two Level II studies with low risk of bias
Consistency	C	Inconsistency, reflecting genuine uncertainty
Clinical impact	C	Level II evidence of moderate reduction in symptoms in people with comorbid depression and dementia after 15 weeks
Generalisability	B	Population had psychiatric conditions or dementia and comorbid depression
Applicability	A	Both studies conducted in Australia

Quality of life

One randomised controlled trial with a low risk of bias (Level II) reported a psychiatric in-reach service had a limited effect on self-rated physical or mental health at 12 months compared with care as usual in people with dementia or mental disorders.⁶⁹ However, the authors did not report the measure they used to collect this data. In contrast, Depla et al.⁷² reported that the availability of mental health workers within a residential aged care facility was associated with improved resident self-rated quality of life among people with mental disorders (Table 16).

Table 16—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric in-reach services on quality of life

Question: Do in-reach to RACF services result in improved quality of life?		
Component	Rating	Description
Evidence base	B	One Level II study with a low risk of bias
Consistency	C	Some inconsistency, reflecting genuine uncertainty
Clinical impact	D	Level II evidence demonstrating limited impact on symptoms
Generalisability	C	Population had psychiatric conditions
Applicability	B	Studies conducted in Australia or Europe

Medication use

Three studies reported on the effect of psychiatric in-reach services on psychotropic medication use. Kotynia-English et al.⁶⁹ (Level II) found no difference in psychotropic medication use over 12 months between those receiving psychiatric in-reach services and those receiving usual care. In contrast, one small historical control study (Level III-3, high risk of bias) reported “*less antipsychotic medication use, reduced length of stay on acute mental health wards, and fewer readmissions to acute mental health wards*” after the implementation of a psychiatric in-reach service, but did not report further details on these outcomes.⁷⁶ Bird et al.⁷⁰ (Level III-2) reported that psychotropic medications were more likely to

be reduced over five months with a psychiatric in-reach service focused on non-pharmacological approaches, compared with psychiatric in-reach using a predominantly pharmacological approach.

In-reach psychiatry services may be most effective for reducing psychotropic medication prescribing where this is the explicit priority of the service (Table 17).

Table 17—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric in-reach services on psychotropic medication use

Question: Do in-reach to RACF services result in reduced use of psychotropic medications?		
Component	Rating	Description
Evidence base	B	One Level II study with a low risk of bias
Consistency	C	Some inconsistency, reflecting genuine uncertainty
Clinical impact	D	Level II evidence of limited impact on psychotropic medication use, but lower quality evidence demonstrates effectiveness especially where reduced psychotropic medication use is the priority of the service
Generalisability	B	Population had psychiatric conditions or dementia
Applicability	B	Studies conducted in Australia or Europe

Service outcomes

Davison et al.⁷¹ reported that the availability of psychiatric in-reach services was associated with reduced need for primary health care use among people with dementia and with reduced care staff stress (Level IV). However, Kotynia-English reported that psychiatric in-reach was not associated with reduced use of physical restraint compared with care as usual (Level II).⁶⁹

Service features associated with effectiveness

A single-group pre–post study by Haddad et al.⁷⁷ (Level IV) examined the effect of environmental changes in a residential care facility in which residents had consistent access to in-reach psychogeriatric care. The study was not eligible for inclusion in this Evidence Check because it did not report the overall effectiveness of the service, but it did report that relocation to a new, larger residential aged care facility, which included natural light sources, indoor ambulation and rest areas, and increased accessibility to outdoor areas, was associated with reduced neuropsychiatric symptoms.

IV. Long-stay intermediate psychogeriatric units

Summary of evidence

We identified six studies published since June 2004 in our included countries that assessed the effectiveness of a long-stay intermediate care psychogeriatric unit. A summary of outcomes is presented in Table 18, and full data can be found at Appendix I.

Table 18—Overview of outcomes of studies assessing the effectiveness of long-stay psychiatric intermediate care units

First author (year)	Level of evidence	Population	Outcome								
			NPS	Quality of life	ADLs	Carer stress	Staff burden	Psychotropic medications	Length of stay	Cost	Discharge to home
Anderson (2016)	IV	Both	x and ✓ ^a					✓			
	III-3							✓ ^b			
	III-2								✓ ^b		
Bakker (2013)	II	Dementia	x	x		x					
Depla (2005)	III-2	Psychiatric	x								
Gresham (2021)	IV	Dementia	x and ✓ ^c		x			✓			
Hernandez (2020)	IV	Dementia						✓			
Koskas (2011)	III-3	Dementia	x						x		x

Abbreviations: NPS = neuropsychiatric symptoms; ADLs = activities of daily living

✓ Included, service effective; x Included, service not effective or worsened; Blank indicates outcome was not included in study

^a No significant effect of service on overall score on Cohen-Mansfield Agitation Inventory (short form), but significantly lower frequency of behavioural incidents with intervention; ^b Results of significance testing not reported; ^c No significant effect of service on Cohen-Mansfield Agitation Inventory or Care Planning Assessment Tool, but significant improvement on Health of the Nation Outcome Scales Behavioural Disturbance subscale

Neuropsychiatric symptoms

One randomised controlled trial with a low risk of bias (Level II) reported improved neuropsychiatric symptoms in people with dementia at 12 weeks among those cared for in a psychiatric long-stay unit compared with usual care at home or in residential aged care.⁷⁸ However, a re-analysis at six months using an intention-to-treat approach demonstrated no difference from usual care.⁷⁹ One non-randomised controlled trial with a high risk of bias (Level III-2) similarly reported that there was no significant difference in neuropsychiatric symptoms between older people with a mental disorder cared for in a specialist long-stay ward and those in residential aged care facilities.⁸⁰

Two single-group pre–post studies with moderate risk of bias (Level IV) both reported no change in neuropsychiatric symptoms as measured by the Cohen-Mansfield Agitation Inventory among people with dementia from admission to discharge from a psychiatric long-stay unit.^{37,81} However, one of these did report that the long-stay unit was associated with fewer dangerous behavioural incidents³⁷ and the other reported improved symptoms on the behavioural disturbance subscale of the Health of the Nation Outcome Scales.⁸¹ A fifth study, using a historical control design with a moderate risk of bias (Level III-3), reported reduced agitation, night-time disturbance and aberrant motor behaviour over eight months among people with dementia admitted to a psychiatric long-stay unit compared with those cared for in an inpatient psychogeriatric hospital ward.⁸²

Overall, evidence regarding the effectiveness of psychogeriatric long-stay units on neuropsychiatric symptoms is mixed. The highest level of evidence did not support the effectiveness of these services, but there is lower-quality evidence to suggest that dangerous behaviour, agitation, night-time disturbance and aberrant motor behaviour may respond better to this approach than to inpatient care (Table 19).

Table 19—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric long-stay units on neuropsychiatric symptoms

Question: Do psychiatric long-stay units result in reduced neuropsychiatric symptoms?		
Component	Rating	Description
Evidence base	B	One Level II study with a low risk of bias
Consistency	C	Some inconsistency, reflecting genuine uncertainty
Clinical impact	C	Moderate reduction in symptoms in some lower-quality studies
Generalisability	B	Population had dementia
Applicability	B	Studies conducted in Australia or Europe

Depression and anxiety

No studies identified in our search looked at the effect of psychiatric long-stay units on symptoms of depression or anxiety.

Quality of life

One randomised controlled trial with a low risk of bias reported a psychiatric long-stay unit had no effect on quality of life compared with care as usual at home or in residential aged care⁷⁹ (Table 20).

Table 20—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric long-stay units on quality of life

Question: Do psychiatric long-stay units result in improved quality of life?		
Component	Rating	Description
Evidence base	B	One Level II study with a low risk of bias
Consistency	N/A	Only one study assessed outcome
Clinical impact	D	Limited impact on symptoms
Generalisability	B	Population had dementia
Applicability	C	Study conducted in Europe

Medication use

In their single-group pre–post study with moderate risk of bias (Level IV), Gresham et al.⁸¹ reported reduced dose of antipsychotic and anxiolytic medications from admission to discharge from a psychiatric long-stay unit. Similarly, Hernandez et al.⁸³ reported improved appropriateness of medication treatments and reduced anticholinergic burden from admission to discharge from a psychiatric long-stay unit (Level IV).

Koskas and colleagues (Level III-3) compared psychotropic medication prescribing over eight months among people with dementia admitted to a psychogeriatric long-stay unit compared with those cared for in an inpatient psychogeriatric hospital ward, and found no difference between the two groups⁸² (Table 21).

Table 21—NHMRC evidence statement matrix summarising evidence for the impact of psychiatric long-stay units on psychotropic medication use

Question: Do psychiatric long-stay units result in reduced psychotropic medication use?		
Component	Rating	Description
Evidence base	C	One Level III-3 study with a moderate risk of bias
Consistency	C	Some inconsistency, reflecting differences in study design
Clinical impact	C	Moderate reduction in psychotropic medication use reported in most studies, though not when compared with inpatient care
Generalisability	B	Population had dementia
Applicability	B	Studies conducted in Australia or Europe

Service outcomes

Anderson et al.³⁷ reported reduced care staff stress from patient admission to discharge in a new psychiatric long-stay unit in their single-group pre–post study with a moderate risk of bias (Level IV). These authors also compared length of stay in the unit over 12 months with care provided in psychiatric units with little psychogeriatric oversight in the 12 months prior to the new services being implemented (Level III-3). They reported a major reduction in length of stay (average 406 days reduced to average 77 days), but did not report the statistical significance of this change.³⁷ They compared costs for the unit with those for acute psychiatric wards in the same region, and calculated an annualised saving of AU\$3.81 million.³⁷

Other outcomes

In their randomised controlled trial with a low risk of bias (Level II), Bakker et al.⁷⁹ reported that a psychiatric long-stay unit was associated with improved family caregiver sense of competence but did not significantly influence their sense of emotional distress or burden. Finally, Gresham et al.⁸¹ reported that a psychiatric long-stay unit had no effect on functional impairments from admission to discharge (Level IV). None of the included studies reported on adverse events (i.e. falls, mortality). These outcomes are very important to examine given that most people living in these facilities have severe and chronic (i.e. potentially intractable) neuropsychiatric symptoms.

Service features associated with effectiveness

We did not identify any other studies that could inform understanding of service-level features that influence patient outcomes for long-stay psychiatric intermediate care units in the literature screened for this Evidence Check.

Question 2: How do the outcomes for older people compare if they are treated in dedicated older persons' mental health services or if they are treated in mainstream adult mental health services (i.e., "ageless services")?

We did not identify any studies in our search that explicitly compared outcomes of specialist old age psychiatry services with those delivered in mainstream adult mental health services in inpatient or residential aged care settings, and it is therefore not possible to answer this research question with the available evidence.

Some evidence from the included studies does support the provision of co-located or integrated psychogeriatric services when compared with services delivered by psychiatry or geriatric services independently. For example, Chiu et al.³⁸ (Level III-2) compared outcomes for older adults with mental disorders or dementia cared for within a co-located psychogeriatric and geriatric hospital ward with those cared for in other hospitals with psychogeriatric services. They reported greater improvements in psychosocial functioning from admission to discharge in the co-located unit. Similarly, Maier et al.⁴⁸ (Level III-3) reported shortened length of stay with integrated psychogeriatric and geriatric inpatient treatment when compared with acute wards delivered by non-integrated services.

A single-group pre–post study by Babu et al.⁶⁵ (Level IV) was not included in this Evidence Check because only a conference abstract could be located describing its results. Nonetheless, the conference abstract noted that the addition of a geriatric specialist to weekly multidisciplinary team meetings within a psychiatry consultation-liaison service resulted in reduced polypharmacy, a 58% reduction in hospital transfers and a 90% reduction in specialty referrals among older people with mental disorders.⁶⁵

Anderson and colleagues³⁷ compared length of stay in a psychogeriatric long-stay intermediate care unit over 12 months to care provided in psychiatric units with little psychogeriatric oversight in the 12 months prior to the new services being implemented (Level III-3). They reported a major reduction in length of stay (average 406 days reduced to average 77 days) and an annualised saving of AU\$3.81 million.³⁷

Taken together, these results support the suggestion that inpatient psychiatric and geriatric services may be most effective where their expertise is integrated. This is consistent with evidence from a UK study in which older people who had received care from a specialist psychogeriatric service reported fewer unmet needs than those who had received services from mainstream adult services. However, this study did not specify whether participants were cared for in acute, residential or community settings.³¹ The relative value of co-located psychogeriatric and geriatric services compared with mainstream psychiatric and geriatric services has not yet been established.

Discussion

This Evidence Check identified 34 studies published since June 2004 in Australia, New Zealand, Canada and Europe evaluating the effectiveness of psychiatric services for older adults with mental disorders or people with dementia. We identified at least one high-quality, randomised controlled trial for three of the four service types included in this review (inpatient consultation and/or liaison services, psychiatric in-reach to residential aged care and long-stay intermediate care units, but not inpatient older persons' mental health care wards), in addition to several studies using other designs.

Summary of evidence and implications

Inpatient older persons' psychiatry services

Since the publication of the last review of inpatient older persons' psychiatry services in 2005²⁶, studies identified for this Evidence Check continue to support the conclusion that psychogeriatric inpatient care is effective in treating neuropsychiatric symptoms among people with dementia. There was also consistent evidence for the effectiveness of inpatient older persons' mental health wards for reducing depression and anxiety symptomology and improving quality of life among older adults with mental disorders. These results reinforce earlier evidence²⁶ and can increase confidence that investments in these services are warranted for treating affective and anxiety disorders.

While there remains no randomised controlled trial evidence to support the effectiveness of inpatient psychogeriatric wards, it is important to recognise that trials of this type are difficult to execute in practice both for ethical and pragmatic reasons. Stringent inclusion and exclusion criteria are required to ensure safety, and patient and family preferences can limit the feasibility of randomisation.¹⁰ Randomised controlled trials of complex interventions are also vulnerable to fidelity errors as care staff have practical difficulties maintaining distinctions between the intervention and control groups.⁹ Comparing wards in different hospitals can be equally challenging as this introduces additional confounders. In this context, lower-quality evidence plays an important role in guiding decision-making about service provision.

Future research in this area should pay attention to a selection of outcomes and comparison groups, given that older people with mental disorders and dementia in hospital may be very frail and reaching the end of their life.⁸⁴ Given this, clinical improvements may be less important than patient and family experiences of care. This is consistent with the increasing use of broader definitions of service quality recognising that subjective wellbeing can be an essential marker of care quality.⁸⁵ Trials comparing specialist inpatient wards with other care settings (e.g. residential aged care, intermediate care wards) will be helpful for establishing their relative effectiveness more firmly.

Inpatient psychiatric consultation and/or liaison services

The last review of specialist inpatient consultation and/or liaison services for older people with mental disorders and people with dementia noted there was limited evidence supporting their effectiveness.²⁶ Results of this Evidence Check varied according to the type of service, study design and outcome. Two randomised controlled trials (Level II) reported that these services were not associated with improvement in mood, anxiety or quality of life among older people with mental disorders or people with dementia. A recent review of 38 studies of mental health consultation-liaison services across age groups concluded these services yielded a small positive effect on symptoms of depression and anxiety, particularly in the short term (within days or weeks), but noted heterogeneity in outcomes between studies and that effects tended not to be sustained in the longer term.⁸⁶ The long follow-up time used for studies included in this review (up to 12 months) may help to explain why the highest-quality studies included in our Evidence Check did not demonstrate a significant effect on clinical symptoms.

Nonetheless, there was consistent evidence in our review that specialist old age psychiatry consultation and/or liaison services can improve the quality of hospital care, reduce length of stay, improve uptake of recommendations, improve identification of delirium, reduce carer stress and improve patient satisfaction with care. This theme was also mentioned in the prior review.²⁶ Indeed, evidence suggests referrals for general psychiatric consultation-liaison services for older people have increased over time⁸⁷ suggesting that these services are valued by hospital staff even where they do not influence clinical outcomes. Regardless of the age of the patient, consultation-liaison psychiatrists face the ongoing challenge that the effectiveness of their recommendations relies on ward staff implementing them.⁸⁸ Work to improve the implementation of psychogeriatric consultation-liaison recommendations may help to bridge the gap between service quality and clinical outcomes.

Psychogeriatric in-reach to residential aged care

There was consistent evidence from uncontrolled studies identified for this Evidence Check that psychogeriatric in-reach services to residential aged care were associated with improvements to neuropsychiatric symptoms over time. However, higher-quality controlled studies did not report significant differences between those who did and did not receive in-reach services.

The only existing prior review of residential care in-reach services, published in 2009, reported that integrated multidisciplinary approaches combining medical, psychiatric and nursing interventions were generally effective at reducing neuropsychiatric symptoms in people with dementia living in residential aged care facilities.⁷ As such, results of our review may reflect that the effectiveness of psychiatric in-reach services is limited without integration with other specialties.

However, outcomes may also be affected by the often severe and chronic neuropsychiatric symptoms reported by people referred for in-reach services and other factors that contribute to treatment resistance. The high risk for mortality of patients in these trials may provide a bias towards the null hypothesis. For example, people in an intervention group with severe neuropsychiatric symptoms may be less likely to die (than those in the control group) over follow-up because of the provision of specialist psychiatric oversight, leaving an uneven proportion of those with severe symptoms between groups. This phenomenon was a hypothesised contributor to the null results reported by authors of one randomised controlled trial included in our Evidence Check.⁶⁹

It is also relevant that, as with consultation and/or liaison services, the effectiveness of recommendations made by psychiatric in-reach services is dependent on staff within a residential aged care facility to implement them. These facilities are prone to high levels of staff turnover and nursing staff overreliance on sedating medications to manage neuropsychiatric symptoms.⁸⁹ In this context, the neuropsychiatric symptoms themselves may not be the most appropriate outcome in studies examining the effectiveness in these services. Outcomes such as facility staff confidence in implementing recommendations, psychotropic medicine deprescribing, resident and family experiences of care, and adverse events (e.g. injuries, property damage, death) may be more appropriate. Some (low-quality) evidence identified for our Evidence Check did suggest that in-reach services can improve the quality of medication prescribing and reduce the need for primary care services.

Notwithstanding the limited evidence demonstrating the effectiveness of in-reach services for neuropsychiatric symptoms in dementia, there is high-quality evidence supporting their effectiveness for reducing depressive symptoms among people with comorbid depression and dementia.⁷⁵ This population appears to be well suited to in-reach models of care.

Long-stay intermediate psychogeriatric units

The perennial challenge of providing appropriate care for people with dementia and severe neuropsychiatric symptoms has prompted the development of a variety of ‘emerging’ care models including specialised intermediate care units that combine some elements of traditional residential aged care with specialist design, staffing and care models.⁹⁰ Six studies included in this Evidence Check evaluated the effectiveness of these units, with most demonstrating no significant effects on neuropsychiatric symptoms. However, whether a reduction in neuropsychiatric symptomology is a realistic goal for this population remains an active matter of debate given the chronicity and severity of the symptoms.⁸¹ Reduced care costs, fewer harms caused by the symptoms (e.g. property damage, injury), benefits for other residents of the facility from which the person has been transferred and reduced sedative medication load may be more relevant goals. There was some (albeit low-quality) evidence of positive effects on these outcomes available in the studies included in this review.

Remaining evidence gaps and recommendations for future research

Most of the service types included in this Evidence Check have now been subject to high-quality randomised controlled trials examining their effectiveness. However, the effectiveness of inpatient older persons’ mental health wards has not been established using a randomised controlled trial methodology. Where trials exist, these studies require replication to establish the robustness of their results and identify which outcomes are most common for each service type. Where ethical and practical difficulties preclude randomised controlled trials, application of innovative and pragmatic study designs may help to bridge the gap. For example, hybrid implementation-effectiveness trials and multiphase optimisation strategy trials can allow for understanding the proximal effects of interventions (e.g. staff and patient acceptability, barriers) as well as their more distal effects (e.g. clinical outcomes). Qualitative research can shed light on what service elements are associated with a better care experience for patients and families.

Researchers should consider carefully which outcomes to include in evaluations of psychiatric services for older people and people with dementia, given that clinical outcomes (e.g. neuropsychiatric symptoms, mood, anxiety) may be very severe, chronic, and affected by frailty and other contributors. These factors contribute to treatment resistance. Outcomes including staff skill and confidence, length of stay, recommendation uptake, patient- and family-reported satisfaction, and negative outcomes (i.e. injuries, property damage) are important in this context.

Further research comparing care settings (e.g. inpatient settings to residential aged care, intermediate care wards, intensive community treatment) will help to answer the fundamental question of which mental disorders are best treated in which setting. This question remains difficult to answer based on the available evidence.

Referrals to inpatient psychogeriatric consultation and/or liaison services and residential aged care in-reach services continue to be made despite difficulty establishing their effect on clinical outcomes, suggesting that these services are valued by hospital staff. Needs-based studies that establish what hospital clinicians (particularly geriatricians) seek from psychogeriatric consultation-liaison services will help to uncover the major perceived benefits of these services. Research that examines the effectiveness of strategies to improve uptake of consultation and/or liaison recommendations may also help to bridge the gap between service quality and clinical effectiveness.

We did not identify any studies in our search that explicitly compared outcomes of specialist services with those delivered in mainstream adult mental health services in inpatient or residential aged care settings. There is some evidence supporting the suggestion that specialty psychiatric services may be most effective where their expertise is integrated with geriatric and other expertise, and where they provide liaison services (rather than consultation alone). Importantly, a fundamental omission from the available evidence is the absence of data on negative outcomes. That is, it is not clear how treatment by mainstream psychiatry services affects falls, injuries, abuse and other negative outcomes compared with specialised services.

Our Evidence Check suggests the realignment of funding towards 'ageless' inpatient and residential aged care psychiatry services that has been particularly promoted in the UK^{27,28} is not supported by evidence. Further research is required to establish the relative effectiveness of specialist and 'ageless' services, and to identify which presentations are best suited to each type of care model. Patient preferences are also important to consider given that some older and non-frail adults, particularly those who have been treated by working-age adult services for many years ('graduates'), may also prefer continuity of care rather than a transfer of care to specialist older adult teams.

Community based psychogeriatric care services were out of scope for this Evidence Check because these services have been reviewed recently.⁸ However, the inclusion criteria for that review were narrow (e.g. intervention duration >12 weeks, multidisciplinary intervention). As such, an updated review with broader inclusion criteria is warranted.

Finally, the studies included in this Evidence Check were all conducted in high-income countries and none focused specifically on particular racial or cultural groups. The effectiveness of psychiatric models of care is likely to vary according to socioeconomic determinants, and these variances are particularly relevant in the Australian and New Zealand context where Aboriginal, Torres Strait Islander and Māori peoples experience important disparities in mental health and wellbeing¹² and unique care preferences.¹⁴ Further research evaluating service outcomes for these groups will be important.

Limitations of this Evidence Check

The conclusions drawn from this Evidence Check should consider some important methodological limitations. The rapid review methodology involves single-reviewer title screening and a limited search that did not extend to grey literature. Our quality appraisal process was critical and rigorous but may still be subject to bias given how rapidly it was conducted. Quantitative meta-analysis of study results was beyond the scope of this review but may be warranted where there are sufficiently comparable data. Finally, an updated review of community based psychogeriatric services was beyond our scope but is an important priority for future research given the expanding reach of these services.

Conclusion

The 34 studies included in this rapid review provide an updated assessment of the effectiveness of psychiatric services delivered to older people with mental disorders and people with dementia in inpatient and residential settings. Overall, there is consistent evidence supporting the effectiveness of inpatient older persons' mental health wards on clinical outcomes including neuropsychiatric symptoms, mood, anxiety and quality of life. Specialist psychogeriatric consultation and/or liaison services appear to be associated with improved quality of hospital care, reduced length of stay, improved uptake of recommendations, improved identification of delirium, reduced carer stress and improved patient satisfaction with care. However, evidence that these important effects can translate to improvements in neuropsychiatric and other clinical symptoms is limited. Similarly, further research is required with a focus on non-clinical outcomes to better understand the impact of psychogeriatric in-reach services into residential care and long-stay intermediate care wards. Our Evidence Check suggests that the proposed realignment of funding toward 'ageless' inpatient and residential aged care psychiatry services is not supported by existing evidence. Older adult psychiatric services remain an important resource. Further replication of the high-quality studies included in this Evidence Check will help clarify which presentations are best treated with which service model.

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Appendices

Appendix A—Final search strategy (PsycINFO)

Table A1—Final search strategy applied to PsycINFO

Population	Older adults OR people with dementia	Geriatric Patients/ OR Older Adulthood/ OR Geriatrics/ OR (“Late adulthood” or ageing or aging or “Senior Citizen” or Old* or Elderly or Geriatric or senescent or “older person” or “older persons” or “older-person*”) or Dementia/ or Dementia with Lewy Bodies/ or Presenile Dementia/ or Semantic Dementia/ or Senile Dementia/ or Vascular Dementia/ or Alzheimer* Disease/ or Corticobasal Degeneration/ or Progressive Supranuclear Palsy/ or (dementia or Alzheimer* or “frontotemporal dementia” or “vascular dementia” or “Lewy body disease” or “Dementia with Lewy Bodies” or “primary progressive aphasia” or “corticobasal degeneration” or “progressive supranuclear palsy”) or (“behavioural and psychological symptoms of dementia”) or (dementia adj4(behaviour or behavior))
Intervention	Mental health services	Mental Health Service*/ or (Psychiat* or Psychoger*)
Setting	Inpatient OR Residential aged care	Hospitals/ or Psychiatric Hospitals/ or Hospitali#ed Patients/ or Psychiatric Patients/ or Psychiatric Hospitalization/ or Hospitalisation/ or (“In*patient” or inpatient or hospital or ward or “consultation-liaison” or consultation or acute) or Residential Care Institution*/ or Elder Care/ or Nursing Home*/ or (in*reach or consulta* or out*reach) or (“nursing home*” or “residential aged care” or “long*term care”)
Outcome	Effectiveness	Treatment Effectiveness Evaluation/ or Patient Outcome Assessment/ or Treatment Outcome*/ or Outcome Assessment/ or Patient Reported Outcome Measures/ or (eval* or efficacy or effectiveness or effect* or useful* or utility or value or outcome* or experienc* or cost* or satisfac*)
Year	June 2004–current	Limit to June 2004-current

NOTE: Terms with a “/” suffix indicate MESH terms

Appendix B—Full study inclusion and exclusion criteria

Table B1—Detailed inclusion and exclusion criteria

Included	Excluded
Study design	Study design
Randomised trials (including randomised controlled trials and cluster randomised controlled trials)	Descriptive studies (including case studies/series with post-intervention data only)
Non-randomised trials	Commentaries/editorials
Controlled before-and-after studies	Non-systematic reviews
Interrupted time-series studies	Conference abstracts
Service evaluations or case series with pre-test/post-test outcomes (>5 cases)	Case studies/series with <5 cases
Qualitative studies	
Systematic reviews screened to identify additional studies for inclusion	
Service type	Service type
<u>Inpatient psychiatric services including:</u>	Mental health services without a psychiatry component (e.g. delivered by another profession without psychiatric clinical governance)
<ul style="list-style-type: none"> Dedicated older persons' mental health units (i.e. psychogeriatric hospital units) Inpatient consultation-liaison psychiatry provided by old age psychiatrists Other inpatient medical settings where psychiatry is delivered to older people (Including combined psychogeriatric and geriatric medical wards) Inpatient services delivered via telehealth 	Mental health services for people residing in the community
<u>Psychiatric services delivered in residential aged care settings, including:</u>	Primary care collaborations
<ul style="list-style-type: none"> Old age psychiatry in-reach services to residential aged care Other psychiatry services delivered in residential aged care In-reach services delivered via telehealth 	Disability services
	Geriatric services and services that are geriatrician-led
	Private psychiatric and other mental health services
	Inpatient long-stay rehabilitation (non-mental health) settings
	Day hospitals

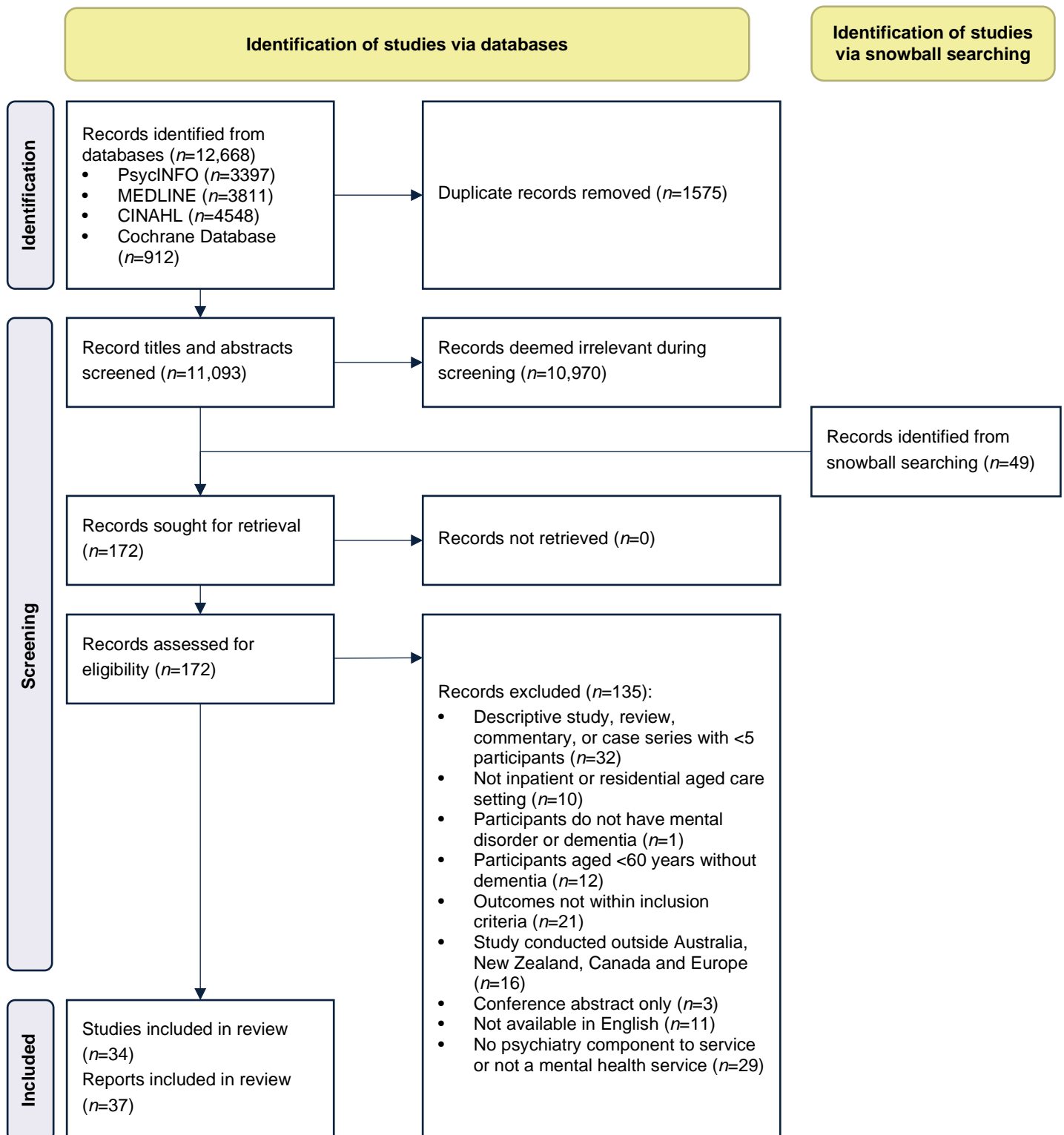
Included	Excluded
Long-stay intermediate care settings (i.e. between acute settings and residential aged care settings)	
Patient group	Patient group
People aged ≥60 years (OR ≥50 if Aboriginal and Torres Strait Islander) with a diagnosed mental disorder People diagnosed with dementia at any age	People aged <60 years (or <50 years if Aboriginal and Torres Strait Islander) with a diagnosed mental disorder People without a diagnosed mental disorder or dementia
Outcomes of interest	Outcomes of interest
Clinical outcome measures (mental health only) including mortality and functional impairment Service use outcomes including occupied bed days, readmission rates Cost-effectiveness Safety Carer and/or family-rated satisfaction	Non-mental health outcomes Cognitive function
Study language	Study language
English	Languages other than English
Study country	Study country
Australia United Kingdom New Zealand Canada Any European country	All other countries
Study year	Study year
Published June 2004 or later	Published prior to June 2004

Appendix C—Study eligibility checklist

Table C1—Inclusion/exclusion screening checklist

#	Question	Yes	No	Unsure
1	Was the study published after June 2004?	Continue to Q.2	EXCLUDE	Discuss
2	Is the study an RCT, non-randomised trial, controlled before and after study, interrupted study, service evaluation with pre- and post-test data, or a qualitative study?	Continue to Q.3	EXCLUDE	Discuss
3	Was the study performed in an inpatient or residential aged care setting?	Continue to Q.4	EXCLUDE	Discuss
4	Do participants have a diagnosed mental disorder or dementia?	Continue to Q.5	EXCLUDE	Discuss
5	Is the participant group 60+ years old (50+ for Aboriginal and Torres Strait Islander), or diagnosed with dementia?	Continue to Q.6	EXCLUDE	Discuss
6	Does the study report the service-level effects of the service, rather than a specific intervention or therapy within the service?	Continue to Q.7	EXCLUDE	Discuss
7	Is there a psychiatry component to the service and does the study assess this psychiatry component?	Continue to Q.8	EXCLUDE	Discuss
8	Does the study report effectiveness outcomes including clinical outcomes, safety, cost-effectiveness, or patient/family/carer satisfaction?	Continue to Q.9	EXCLUDE	Discuss
9	Is the study from Australia, New Zealand, the United Kingdom, Canada or any European Country?	Continue to Q.10	EXCLUDE	Discuss
10	Does the study contain original data?	Proceed to data extraction	EXCLUDE	Discuss

Appendix D—PRISMA flowchart of study selection



Appendix E—Included study characteristics

Table E1—Included study characteristics

First author (year)	Country	Service description	Study design	Comparison group	Participants				Level of evidence, risk of bias
					Type	<i>n</i>	% female	Age \bar{x} (SD)	
Inpatient psychogeriatric units									
Alanen (2015)	Finland	Acute psychogeriatric ward	Single group pre–post	N/A	Dementia	89	61.8	77.7 (8.1)	IV, Mod
Bjørkløf (2018)	Norway	Acute psychogeriatric ward	Single group pre–post	N/A	Psychiatric	122	71.3	75.4 (7.2)	IV, Mod
Cheung (2007)	New Zealand	Acute psychogeriatric ward	Single group pre–post	N/A	Both	130	60.0	77.9 (10.6) (dementia), 75.1 (6.7) (psychiatric)	IV, Mod
Chiu (2009)	Australia	Co-located acute psychogeriatric and geriatric ward	Non-randomised controlled trial	State average (8 other hospitals with PG services)	Both	221 (int), 670 (con)	NR	77.9 (6.5) (int), 77.3 (7.5) (con)	III-2, High
Clignet (2021) ^{a,b}	Netherlands	Acute psychogeriatric ward	Single group pre–post	N/A	Psychiatric (depression)	55	61.8	73 (7.78)	IV, Mod
Ekiz (2020)	Netherlands	Treatment in acute psychogeriatric ward tailored to personality type	Single group pre–post	N/A	Dementia	40	60	73.8 (8.49)	IV, Mod
Harper (2007)	Canada	Acute psychogeriatric ward for people with dementia and severe neuropsychiatric symptoms	Single group pre–post	N/A	Dementia	75	40.0	64-97 ^d	IV, Mod
Helvik (2016)	Norway	Acute psychogeriatric ward	Single group pre–post	N/A	Psychiatric	108	71.3	75 (6.6)	IV, Mod
Lu (2009)	Australia	Co-located acute psychogeriatric and geriatric ward	Historical control	Care as usual in other hospital wards prior to ward admission	Both (with delirium)	59	54	79.3 (7.3)	III-3, Mod
Maier (2007)	Germany	Acute ward divided into geriatric (<i>n</i> =42), psychogeriatric (<i>n</i> =54) and interdisciplinary beds (<i>n</i> =64)	Historical control	Acute wards run independently by psychiatry or geriatrics	Both	2158	NR	NR	III-3, Mod
Pitkänen (2018, 2019) ^b	Finland	Acute psychogeriatric ward	Single group pre–post	N/A	Dementia	175	54.9	77.8 (8.3)	IV, Mod
Inpatient consultation and/or liaison									
Cole (2006)	Canada	Consultation-liaison	Randomised controlled trial	Care as usual	Psychiatric	78 (int), 79 (con)	69.2 (int), 69.6 (con)	77.5 (6.7) (int), 78.5 (6.6) (con)	II, Low
Cullum (2007)	UK	Consultation-liaison	Randomised controlled trial	Care as usual	Psychiatric	62 (int), 59 (con)	53 (int), 64 (con)	79.7 (8.0) (int), 80.1 (8.1) (con)	II, Low
Lang (2012)	Switzerland	Consultation-liaison	Single group pre–post	N/A	Both	150	69.3	80.0 (8.1)	IV, Mod
McCarthy (2021)	Ireland	Liaison (in-hospital)	Historical control	Off-site in-reach consultation service	Both	88 (pre), 67 (post)	38 (pre), 65 (post)	78 (67-91 ^d) pre, 80 (65-96 ^d) post	III-3, High
Mujic (2018)	UK	Liaison	Single group pre–post	N/A	Both	230	NR	NR	IV, Mod

First author (year)	Country	Service description	Study design	Comparison group	Participants				Level of evidence, risk of bias
					Type	n	% female	Age x (SD)	
Sheehan (2013)	UK	Liaison	Single group pre–post	N/A	Dementia	112 (60 at 12m)	76	85.3 (65.9 ^e)	IV, Mod
Singh (2013)	UK	Consultation-liaison	Historical control	Prior nurse-only psychiatric liaison service	Both	339	60	82.1 (8.04)	III-3, Mod
Tabet (2005)	UK	Consultation-liaison	Non-randomised cluster control trial	Care as usual	Both	122 (int) 128 (con)	53 (int), 52 (con)	81.4 (NR) (int) 79.3 (NR) (con)	III-2, High
Whelan (2007)	UK	Consultation-liaison (in-hospital)	Historical control	Off-site in-reach consultation-liaison service	Both	27 (pre), 46 (post)	65 (pre), 63 (post)	84.3 (6.3) (pre), 82.1 (7.1) (post)	III-3, Mod
Residential aged care in-reach									
Bird (2007)	Australia	In-reach with non-pharmacological behaviour management approach	Non-randomised controlled trial	In-reach with pharmacological behaviour management approach	Dementia	33 (int), 22 (con)	66 (int), 68 (con)	79.6 (9.2) (int), 80 (6.9) (con)	III-2, High
Davison (2007)	Australia	In-reach	Single group pre–post	N/A	Dementia	31	67.7	81.5 (6.9)	IV, Mod
Depla (2006)	Netherlands	In-reach	Single group cross-sectional	N/A	Psychiatric institutionalised for >6 months	73	82.8	75.5 (6)	IV, High
Doyle (2016)	Australia	Telehealth in-reach	Single group pre–post	N/A	Both	18	NR	NR	IV, Mod
Hirst (2009)	UK	In-reach	Historical control	Care as usual in 12 months prior to in-reach service implementation	NR	NR	NR	NR	III-3, High
Koekkoek (2016)	Netherlands	In-reach	Single group pre–post	N/A	Both	71	56.3	74.3 (14.1)	IV, Mod
Kotynia-English (2005)	Australia	In-reach	Randomised controlled trial	Care as usual	Both	53 (int), 53 (con)	64.1 (con), 69.8 (int)	82.9 (6.3) (int), 84.6 (8.1) (con)	II, Mod
McSweeney (2012)	Australia	In-reach	Cluster randomised controlled trial	Care as usual	Dementia (with depression)	44	84.1	86.5	II, Low
Long-stay 'emerging models'									
Anderson (2016)	Australia	Long-stay psychogeriatric intermediate care unit	Single group pre–post	N/A	Both	118	NR	74.5 (9.8)	IV, Mod
			Historical cohort	Care as usual in units prior to service implementation, with less PG oversight					III-3, High
Bakker (2011a, 2011b, 2013)	Netherlands	Specialised psychiatric-skilled nursing home, oversight provided by psychogeriatrician	Non-randomised controlled trial	Care in inpatient psychiatric wards	Dementia	168	66.7 (int), 62.1 (con)	79.8 (6.1) (int), 81.5 (7.1) (con)	III-2, Mod
			Randomised controlled trial	Usual care at home (25.3%), at home with out-reach or psychogeriatric day care (15.7%), in assisted-living home (7.2%), or in nursing home (51.8%)					II, Low
Depla (2005)	Netherlands	Long-stay psychogeriatric intermediate care unit	Non-randomised controlled trial (retrospective)	People living in residential aged care facilities	Psychiatric institutionalised for >6 months	78 (int), 96 (con)	72 (int), 80 (con)	73 (5) (int), 76 (6) (con)	III-2, High
Gresham (2021)	Australia	Long-stay psychogeriatric intermediate care unit	Single group pre–post	N/A	Dementia	80	29.8	72.3 (8.2)	IV, Mod

First author (year)	Country	Service description	Study design	Comparison group	Participants			Level of evidence, risk of bias	
					Type	<i>n</i>	% female		Age \bar{x} (SD)
Hernandez (2020)	Spain	Long-stay psychogeriatric intermediate care unit	Single group pre–post	N/A	Dementia	65	60	84.9 (6.7)	IV, Mod
Koskas (2011)	France	Long-stay psychogeriatric intermediate care unit	Historical control	Patients admitted to Inpatient psychogeriatric units prior to long-stay unit implementation	Dementia	94 (pre), 35 (post)	3:1 ^f	83 (8)	III-3, Mod

^a Preprint; ^b These studies tested a specific intervention within an inpatient psychogeriatric setting. Results of interest to this Evidence Check pertain to outcomes reported for the whole sample over time; ^c interquartile range; ^d range;

^e likely error in original paper; ^f female:male ratio

Abbreviations: con=control group; int=intervention group; Mod=Moderate; NR=not reported; N/A=not applicable; PG=psychogeriatrics; SD=standard deviation; UK=United Kingdom

Appendix F—Outcomes of studies assessing inpatient older persons’ mental health care wards

Table F1—Outcomes of studies assessing inpatient older persons’ mental health care wards

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results
Alanen (2015)	Admission (T1) to discharge (T2) (x=44 days, SD=32.9 days)	Neuropsychiatric symptoms	Neuropsychiatric inventory	T1 x=34.6 (SD=NR), T2 x=19.5 (SD=NR), <i>p</i> <0.0001
		Activities of daily living	Barthel Index & ADCS-ADL Scale	T1 x=32.2 (SD=NR), T2 x=21.7 (SD=NR), <i>p</i> <0.0001
		Antipsychotics overall mean dose	Medical records	Barthel no change (figures NR)
		Antipsychotics >50mg/day		T1 x=46.8 mg/day (SD=NR), T2 x=80.8 mg/day (SD=NR), <i>p</i> =0.0001
		Anxiolytic overall mean dose		T1 30.3%, T2 48.3%, <i>p</i> =NR
		Anxiolytics/hypnotics >3mg/day		T1 x=3.5 mg/day (SD=NR), T2 x=6.0 mg/day (SD=NR), <i>p</i> <0.0001
Antidepressant prescribed	T1 30.3%, T2 49.4%, <i>p</i> =NR			
Antidementia prescribed	T1 29%, T2 17%, <i>p</i> =0.61			
Bjørkløf (2018)	Admission (T1) to 1 year later (T2)	Depressive symptoms	Montgomery and Asberg Depression Rating Scale	T1 x=26.1 (SD=8.8), T2 x=11.3 (SD=9.2), <i>p</i> =0.002
Cheung (2007)	Admission (T1) to discharge (T2) (psychiatric x=37.6, SD=40.2 days; dementia x=24.3, SD=19.8 days)	Psychosocial functioning	Health of the Nation Outcome Scales	Dementia T1 x=16.45 (SD=6.82), T2 x=12.34 (SD=7.28), <i>p</i> <0.01 Psychiatric T1 x=14.00 (SD=6.15), T2 x=8.76 (SD=6.44), <i>p</i> <0.001
Chiu (2009)	Admission (T1) to discharge (T2) (x=28.3, SD=19.6 days)	Psychosocial functioning	Health of the Nation Outcome Scales	Intervention change x=-12.2 (SD=5.9), control change x=-7.9 (SD=7.0), <i>p</i> <0.001
		Length of stay	Medical records	Intervention x=28.3 (SD=19.6), control x=33.4 (SD=22.7), <i>p</i> <0.001
Clignet (2021) ^a	During admission (T1), 8 weeks after T1 (T2), 6 months after T1 (T3)	Depression	Beck Depression Inventory	T1 to T2 <i>p</i> =0.01; T2 to T3 no significant change
		Anxiety	Hospital Anxiety Depression Scale (Anxiety subscale)	T1 to T2 <i>p</i> =0.02; T2 to T3 no significant change
		Mastery	Pearlin Mastery Scale	T1 to T2 <i>p</i> =0.02; T2 to T3 no significant change
Ekiz (2020)	Admission (T1) to discharge or 10 weeks if sooner (T2)	Neuropsychiatric symptoms	Neuropsychiatric Inventory	Overall score T1 Median=8, T2 Median=6.5, <i>p</i> =0.001, Effect size=0.56 Severity T1 x=12.95 (SD=5.58), T2 x=6.53 (SD = 2.84), <i>p</i> =0.000
			Cohen-Mansfield Agitation Inventory	Overall score T1 Median=44, T2 Median=37.5, <i>p</i> =0.009, Effect size =0.45 Frequency T1 x=46.71 (SD=12.02), T2 x=36.52 (SD=5.38), <i>p</i> =0.002
Harper (2007)	First two weeks (T1) vs third week (T2)	Change in percentage of patients not displaying behavioural disturbance	Behaviour Severity Scale Observation Record (adapted)	T1-T2 change: day shift 6.01% (range=4.13-8.49%), evening shift 7.26% (range=3.89-8.44%), night shift 7.26% (range=0.99-8.55%), all <i>p</i> >0.05
Helvik (2016)	Admission (T1) and 12-months after T1 (T2) (x=418, SD=48.2 days)	Quality of life	EuroQol Group EQ-5D	T1 x=0.7 (SD=0.1), T2 x=0.8 (SD=0.1), <i>p</i> <0.05
			EQ-Visual Analog Scale	T1 x=42.0 (SD=18.6), T2 x=56.9 (SD=20.6), <i>p</i> <0.05
Lu (2009)	NR	Restraint use during stay Absconding during stay	Medical records	Intervention 33.9%, control 50.8%, <i>p</i> =0.05 Intervention n=0, control n=3, <i>p</i> =NR
Maier (2007)	Three months pre (T1) vs three months post (T2)	Length of stay	Medical records	T1 x=22 days (SD=NR), T2 x=18 days (SD=NR), <i>P</i> <0.001
Pitkänen (2018, 2019)	Admission (T1) and discharge (T2) (x=45, SD=30.4 days)	Neuropsychiatric symptoms	Neuropsychiatric Inventory	T1 x=33.9 (SD=23.0), T2 x=18.2 (SD=17.3), <i>p</i> <0.001
		Activities of daily living	ADCS-ADL Scale	T1 x=31.7 (SD=18.2), T2 x=20.9 (SD=13.6), <i>p</i> <0.001
		Antipsychotic prescribed	Medical records	T1 56.1%, T2 76.5%, <i>p</i> =0.004

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results
		Antipsychotic overall mean dose		T1 \bar{x} =40.2 mg/day (SD=61.1 mg/day), T2 \bar{x} =73.0 mg/day (SD=73.0 mg/day), $p<0.001$

^a Preprint; ^b Intervention used as comparison group

Abbreviations: ADCS-ADLS=Alzheimer's Disease Cooperative Study—Activities of Daily Living Scale; CI=confidence interval; HR=hazard ratio; IQR=interquartile range; NR=not reported; mg=milligrams; OR=odds ratio; RC=relative change; SD=standard deviation; T1=time 1; T2=time 2; T3=time 3; WHO=World Health Organisation

Appendix G—Outcomes of studies assessing psychogeriatric inpatient consultation and/or liaison services

Table G1—Outcomes of studies assessing psychogeriatric inpatient consultation and/or liaison services

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results
Cole (2006)	Baseline (T1), 3 months after T1 (T2), 6 months after T1 (T3)	Depressive symptoms	Hamilton Depression Rating Scale	Intervention change T1-T3 \bar{x} =-6.3 (SD=NR), Control change T1-T3 \bar{x} =-5.0 (SD=NR), \bar{x} difference=-1.3 (95%CI=-4.9-2.2)
		>50% decrease in depressive symptoms		Intervention 28.1%, control 20.0%, difference=8.1 (95%CI=-13.3-29.3)
		Major depression at T2		Intervention 45.5%, control 56.7%, difference=-11.2 (95%CI=-35.8-13.3)
		Self-rated mental health	SF-36 Mental Component	Intervention change T1-T3 \bar{x} =9.4 (SD=NR), Control change T1-T3 \bar{x} =-9.2 (SD=NR), \bar{x} difference=0.2 (95%CI=-8.7-8.9)
		Self-rated physical health	SF-36 Physical Component	Intervention change T1-T3 \bar{x} =-2.9 (SD=NR), Control change T1-T3 \bar{x} =-2.7 (SD=NR), \bar{x} difference=-0.2 (95%CI=-5.4-5.0)
		Basic activities of daily living	Older Americans Resources and Services tool	Intervention change T1-T3 \bar{x} =-1.0 (SD=NR), Control change T1-T3 \bar{x} =-0.8 (SD=NR), \bar{x} difference=-0.2 (95%CI=-1.6-1.3)
		Instrumental activities of daily living		Intervention change T1-T3 \bar{x} =-1.4 (SD=NR), Control change T1-T3 \bar{x} =-1.0 (SD=NR), \bar{x} difference=-0.4 (95%CI=-2.0-1.3)
		Length of stay		Intervention Median=12.0 (SD=NR), control Median=10.0 (SD=NR), difference=2.0 (95%CI=-6.5-6.5)
		Readmission	Medical records	Intervention 39.4%, control 29.0%, difference=10.4 (95%CI=-21.3-23.5)
		Suicide or suicide attempt		Intervention 3.2%, control 3.3%, difference=0.1 (95%CI=-9.8-9.4)
Emergency department visit	Intervention 45.5%, control 41.9%, difference=3.6 (95%CI=-24.5-24.7)			
Mortality	Intervention 23.1%, control 22.8%, difference=0.3 (95%CI=-12.5-13.1)			
Cullum (2007)	Admission (T1) and 16 weeks after T1 (T2)	Depressive symptoms	Geriatric Depression Scale	Intervention change T1-T2 \bar{x} =-4.6 (SD=3.85), Control change T1-T2 \bar{x} =-3.6 (SD=3.61), OR=0.04, 95%CI=-1.1-1.9, p =0.59
		Prevalence of depression at follow up	Geriatric Depression Scale	Intervention 60%, control 46%, OR=0.4, 95%CI=0.2-1.4, p =0.10
		Quality Adjusted Life Weeks in study period	EuroQol Group EQ-5D	Intervention 9.9 (SD=3.96), control 8.4 (SD=5.47), OR=1.0, 95%CI=-0.1-2.0, p =0.07
		Patient satisfied with service	Satisfaction scale designed for study	Intervention 93%, control 67%, OR=7.7, 95%CI=1.9-31.4, p <0.01
Lang (2012)	Admission (T1) and discharge (T2) (\bar{x} =32.0, SD=16.5 days)	Prevalence of potentially inappropriate medications	STOPP and START criteria applied to medical records	T1 77.3%, T2 18.6%, p <0.0001
		Number of potentially inappropriate medications prescribed		T1 \bar{x} =1.8 (SD=1.7), T2 \bar{x} =1.5 (SD=0.7), p <0.0001
		Prevalence of prescribing omissions		T1 64.7%, T2 11.2%, p <0.0001
		Number of prescribing omissions		T1 \bar{x} =1.3 (SD=1.3) vs T2 \bar{x} =1.1 (SD=0.3), p <0.0001
McCarthy (2021)	3 months pre (T1) vs 3 months post (T2)	Referrals followed up	Medical records	T1 44%, T2 99%, p =NR
		Time from referral to assessment		T1 \bar{x} =2.9 days (range=0-9 days), T2 \bar{x} =2.4 days (range 0-5 days), p =NR
		Clinician and referrer satisfaction		Clinician and referrer satisfaction improved in T2; figures NR

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results
Mujic (2018)	Admission and discharge (LOS NR)	Psychosocial functioning	Health of the Nation Outcome Scales	T1 \bar{x} =14.65 (SD=3.92), T2 \bar{x} =11.80 (SD=4.60), $p<0.001$, Mean Difference 95%CI=2.30-3.42
Sheehan (2013)	During admission (T1), 6 months after T1 (T2), 12 months after T1 (T3)	Quality of life	QOL-AD proxy version	T1 \bar{x} =24.5 (SD=54.8), T2 \bar{x} =24.7 (SD=54.7), T3 \bar{x} =24.3 (SD=5.3), p =NR
		Carer stress	General Health Questionnaire	T1 \bar{x} =15.7 (SD=6.2), T2 \bar{x} =12.3 (SD=6.2), T3 \bar{x} =11.6 (SD=5.6), T1-T3 \bar{x} difference=3.98 (SD=5.51), $p=0.000$
		Activities of daily living	Instrumental and Physical Activities of Daily Living Scales (Instrumental scale)	T1 \bar{x} =1.6 (SD=1.7 ^a), T2 \bar{x} =0.4 (SD=0.09 ^a), T3 \bar{x} =0.4 (SD=0.9 ^a), p =NR
Singh (2013)	4 months pre (T1) vs 4 months post (T2)	Response time <24 hours	Medical records	T1 10%, T2 93-100%, p =NR
		Length of stay		T1 \bar{x} =35 days (SD=19.77 days), T2 \bar{x} =21.54 days (SD=NR), p =NR
		Annualised bed-day savings		44 days
Tabet (2005)	Admission to 9 months later	Point prevalence of delirium	Abbreviated Mental Test Score & Modified Delirium Rating Scale	Intervention 9.84%, control 19.84%, OR=0.45, 95%CI=0.21-0.94
		Recognition of delirium by ward staff	Medical record review after discharge	Intervention 8/12, control 6/23, $p=0.001$
		Completion of recommendations		T1 66.7%, T2 100%, p =NR
Whelan (2007)	1 year pre (T1) vs 1 year post (T2)	Recommended drug changes implemented	Medical records	T1 60%, T2 94.3%, p =NR
		Length of stay		T1 \bar{x} =35 days (range=14-105 days). T2 \bar{x} =29 days (range 2-165 days), p =NR
		Number of medications at discharge/death		T1 \bar{x} =5.5 (SD=3.0), T2 \bar{x} =6.2 (SD=2.9), p =NR
		Mortality		T1 15.4%, T2 27%, $p>0.05$

Abbreviations: CI=confidence interval; NR=not reported; OR=odds ratio; QOL-AD=Quality of Life in Alzheimer's Disease Scale; SD=standard deviation; START=Screening Tool to Alert Right Treatment; STOPP=Screening Tool of Older Persons' Prescriptions; T1=time 1; T2=time 2; T3=time 3.

Appendix H—Outcomes of studies assessing psychiatric in-reach services in residential aged care

Table H1—Outcomes of studies assessing psychiatric in-reach services in residential aged care

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results
Bird (2007)	Baseline (T1), 2 months after baseline (T2), 5 months after baseline (T3)	Neuropsychiatric symptoms	Dementia Behaviour Disturbance Scale	Time x group interaction $p=0.36$
		Degree of disruption caused by neuropsychiatric symptoms	Problem Severity Scale	Time x group interaction $p=0.55$
		Care staff burden	Carer Stress Scale	Time x group interaction $p=0.23$
		Antipsychotic medications prescribed	Medical records	Intervention T1-T2 change=-15.6%, $p=0.048$
Davison (2007)	Referral (T1) to discharge (T2) (Median=90, range=47-231 days)	Neuropsychiatric symptoms	Cohen-Mansfield Agitation Inventory	T1 $\bar{x}=80.7$ (SD=0.8), T2 $\bar{x}=68.6$ (SD=20.0), difference $\bar{x}=-12.04$, $p=0.008$
		Care staff burden	Burden Interview	T1 $\bar{x}=24.5$ (SD=8.9), T2 $\bar{x}=20.2$ (SD=8.3), difference $\bar{x}=-4.24$, $p=0.03$
		Health service use	Medical records	T1 $\bar{x}=1.19$ per 2 weeks (SD=0.95), T2 $\bar{x}=0.61$ per two weeks (SD=0.68), difference $\bar{x}=-0.58$, $p<0.001$
Depla (2006)	During admission	Agitation	Philadelphia Geriatric Centre Moral Scale	Availability of mental health workers: $\beta=0.48$, $p<0.001$
		Attitude towards own ageing	Scale	Availability of mental health workers: $\beta=0.11$, $p>0.05$
		Quality of life	Manchester Short Assessment of Quality of Life	Availability of mental health workers: $\beta=0.15$, $p>0.15$
Doyle (2016)	Referral (T1) to discharge (T2) (length NR)	Clinician-rated problematic neuropsychiatric symptoms at T2	Questionnaire designed for study	11% (no further details reported)
		Clinician-rated improvement in neuropsychiatric symptoms T1-T2		72% (no further details reported)
Hirst (2009)	1 year pre (T1) vs 1 year post (T2)	Admission to acute mental health wards	Not reported	Pre $n=24$, post $n=6$, $p=NR$
		Antipsychotic medication use		"Less antipsychotic medication use, reduced length of stay on acute mental health wards, fewer readmission to acute mental health wards"; figures NR
		Length of stay on acute mental health wards		
Koekkoek (2016)	Baseline (T1) and 6-8 weeks after baseline (T2)	Readmission rates		
		Neuropsychiatric symptoms	Neuropsychiatric Inventory	T1 $\bar{x}=46.4$ (SD=22.5), T2 $\bar{x}=28.2$ (SD=16.1), $p=0.001$, effect size=0.70
Kotynia-English (2005)	Baseline (T1), 6 months after baseline (T2), 12 months after baseline (T3)	Psychotropic medication prescribed during study	Medical records	Intervention 74.2%, Control 68.4%, $p=0.60$
		PRN medication used during study		Intervention 86.1%, Control 97.4%, $p=0.07$
		Number of medications increased T1-T3		Intervention 48.8%, Control 60.5%, $p=0.31$
		Use of physical restraint during study		Intervention 22.2%, Control 15.4%, $p=0.45$
		Self-rated poor physical health at T3	NR	Intervention 11.1%, Control 4.8%, $p=0.43$
		Self-rated poor mental health at T3	NR	Intervention 4.8%, Control 3.7%, $p=0.86$
		Psychosocial functioning at T3	Health of the Nation Outcome Scales	Intervention $\bar{x}=15.3$ (SD=NR), Control $\bar{x}=14.4$ (SD=NR) $p=0.51$
		Depressive symptoms at T3	Geriatric Depression Scale	Intervention $\bar{x}=5.1$ (SD=2.9), Control $\bar{x}=3.9$ (SD=3.1) $p=0.10$
McSweeney (2012)	Baseline (T1), 6 weeks after baseline (T2), 15 weeks after baseline (T3)	Neuropsychiatric symptoms T3	Neuropsychiatric Inventory	Intervention $\bar{x}=22.4$ (SD=20.3), Control $\bar{x}=16.0$ (SD=14.2) $p=0.29$
		Depressive symptoms	Cornell Scale for Depression in Dementia	Intervention T3 $\bar{x}=9.47$ (SD=5.57), control T3 $\bar{x}=14.23$ (SD=4.60), time x intervention effect $p=0.01$, partial $\eta^2=0.16$
		Depression at T3		Intervention 23.5%, control 50%, $p=0.11$

Abbreviations: NR=not reported; SD=standard deviation; T1=time 1; T2=time 2; T3=time 3

Appendix I—Outcomes of studies assessing long-stay psychogeriatric intermediate care units

Table I1—Outcomes of studies assessing long-stay psychogeriatric intermediate care units

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results	
Anderson (2016)	2 weeks after admission (T1) vs 2 weeks prior to discharge (T2)	Neuropsychiatric symptoms	Cohen-Mansfield Agitation Inventory short form	T1-T2 $p=0.83$, $\eta^2=0.01$	
		Number of behavioural incidents	Questionnaire designed for study	T1-T2, $p=0.01$, $\eta^2=0.36$	
		Staff stress		T1-T2 $p=0.02$, $\eta^2=0.10$	
	1 year pre (T1) vs 1 year post (T2)	Length of stay	Medical records	T1 $\bar{x}=405.5$, T2 $\bar{x}=77.4$, $p=NR$	
	12 months	Cost-effectiveness	Medical records	Net saving AU\$3,808,509.84	
Bakker (2011a, 2011b, 2013)	Baseline (T1), end of intervention (13 weeks; T2), 6 months after T2 (T3)	Neuropsychiatric symptoms	Neuropsychiatric inventory	T1-T2 \bar{x} group difference=-1.31, SD=2.47, Cohen's $d=-0.53$, $p=0.003$ T1-T3 intervention \bar{x} change=-2.43, control \bar{x} change=-1.39, RR=0.82, 95%CI=2.98, $p>0.05$	
		Caregiver emotional distress		T1-T2 \bar{x} group difference=-3.75, SD=8.51, Cohen's $d=-0.44$, $p=0.013$ T1-T3 intervention \bar{x} change=-8.47, control \bar{x} change=-4.73, RR=0.77, 95%CI=2.73, $p>0.05$	
		Caregiver burden		T1-T2 \bar{x} group difference=-17.69, SD=28.1, Cohen's $d=-0.63$, $p=0.001$ T1-T3 intervention \bar{x} change=-23.66, control \bar{x} change=-1.79, RR=0.95, 95%CI=4.14, $p>0.05$	
		Caregiver competence		T1-T2 \bar{x} group difference=6.26, SD=10.31, Cohen's $d=0.61$, $p=0.001$ T1-T3 intervention \bar{x} change=11.73, control \bar{x} change=5.2, RR=1.07, 95%CI=4.62, $p<0.05$	
		Self-rated wellbeing		SF-20	T1-T2 \bar{x} group difference=0.97, SD=13.14, Cohen's $d=0.07$, $p=0.60$
		Quality of life		EuroQol Group EQ-5D	T1-T2 \bar{x} group difference=0.05, SD=0.30, Cohen's $d=0.16$, $p=0.38$
Depla (2005)	6 month or 12 month lookback period	Adjustment of medication due to exacerbation of symptoms in previous 12 months	Clinician report	OR=2.0 (95%CI=NR), $p>0.05$ ^b	
		Psychotic symptoms in previous 6 months	WHO Composite International Diagnostic Interview (Psychotic Symptoms section)	OR=1.1 (95%CI=NR), $p>0.05$ ^b	
Gresham (2021)	Admission (T1) and discharge (T2) ($\bar{x}=433.9$, SD=382.8 days)	Neuropsychiatric symptoms	Cohen-Mansfield Agitation Inventory Health of the Nation Outcome Scales ('Behavioural Disturbance' subscale) Care Planning Assessment Tool ('Behaviour', 'Confusion' and 'Psychiatric' subscales)	No change (figures NR) T1-T2 change $p=0.02$ No change (figures NR)	
		Activities of daily living	Care Planning Assessment Tool	No change on any subscale (figures NR)	
		Daily dose of regular antipsychotics		T1 $\bar{x}=195.5$ (SD=165.2), T2 $\bar{x}=109.7$ (SD=120.6), Cohen's $d=0.6$, $p<0.001$	
		Daily dose of PRN antipsychotics		T1 $\bar{x}=100.0$ (SD=67.0), T2 $\bar{x}=34.7$ (SD=41.3), Cohen's $d=0.8$, $p=0.004$	
		Daily dose of anxiolytics		T1 $\bar{x}=20.4$ (SD=46.8), T2 $\bar{x}=4.5$ (SD=4.3), Cohen's $d=0.3$, $p=0.03$	
		Daily dose of PRN anxiolytics	Medical records	T1 $\bar{x}=25.3$ (SD=22.7), T2 $\bar{x}=12.8$ (SD=25.0), Cohen's $d=0.8$, $p=0.01$	
		Daily dose of opiates		T1 $\bar{x}=50.9$ (SD=67.9), T2 $\bar{x}=11.6$ (SD=19.2), Cohen's $d=0.5$, $p=0.40$	
	Daily dose of PRN opiates		T1 $\bar{x}=2.7$ (SD=0.6), T2 $\bar{x}=1.7$ (SD=1.6), Cohen's $d=0.6$, $p=0.10$		

First author (year)	Timepoints	Outcomes reported	Outcome measures	Results
Hernandez (2020)	Admission (T1) and discharge (T2) (x=58.8 days, SD NR)	Medications per patient	Medical records	T1 \bar{x} =9.0 (SD=3.1), T2 \bar{x} =9.0 (SD=3.0), $p=0.41$
		Appropriateness of drug treatments	Medication Appropriateness Index	T1 \bar{x} =4 (SD=4.6), T2 \bar{x} =0.5 (SD=2.5), $p<0.001$
		Anticholinergic burden	Drug Burden Index	T1 \bar{x} =1.38 (SD=40.7), T2 \bar{x} =1.08 (SD=0.7), $p<0.016$
Koskas (2011)	8 months pre (T1) vs 8 months post (T2)	No change in neuropsychiatric symptoms T1–T2 (overall)	Clinical Global Impression of Change	T1 13%, T2 14%, $p<0.05$
		No agitation/aggression		T1 51%, T2 20%, $p\leq 0.0015$
		Night-time disturbance	Neuropsychiatric Inventory	T1 27%, T2 63%, $p\leq 0.0015$
		Aberrant motor behaviour		T1 24%, T2 63%, $p\leq 0.0015$
		Ratio of psychotropic medication prescription at T1:T2	Medical records	T1 \bar{x} =0.35 (SD=1.34), T2 \bar{x} =0.28 (SD=1.31), $p>0.05$
		Discharged to home		T1 35%, T2 29%, $p>0.05$

Abbreviations: CI=confidence interval; NR=not reported; RR=risk ratio; SD=standard deviation; T1=time 1; T2=time 2; T3=time 3.