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POLICY SUMMARY 11

What is the evidence on the economic impacts of integrated care?

Ellen Nolte, Emma Pitchforth

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HEALTH POLICY

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What is the evidence on the economic impacts of integrated care?

Ellen Nolte, Emma Pitchforth

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What is the evidence on the economic impacts of integrated care?

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Executive Summary

The rising burden of chronic disease, and the number of people with complex care needs in particular, require the development of delivery systems that bring together a range of professionals and skills from both the cure (health-care) and care (long-term and social-care) sectors. Failure to better integrate or coordinate services along the care continuum may result in suboptimal outcomes and available evidence of integrated care programmes points to a positive impact on the quality of patient care and improved health or patient satisfaction outcomes. However, uncertainty remains about the relative effectiveness of different system-level approaches on care coordination and outcomes, with particular scarcity of robust evidence on the economic impacts of integrated care approaches.

This report provides a summary of published reviews on the economic impacts of integrated care approaches. Given the wide range of definitions and interpretations of the concept, we propose a working definition that builds on the goal of integrated care and which considers initiatives seeking to improve outcomes for those with (complex) chronic health problems and needs by overcoming issues of fragmentation through linkage or coordination of services of different providers along the continuum of care.

Based on a systematic search of Pubmed, Embase and the Cochrane Library, we identified a total of 963 references, of which 19 reviews were identified as eligible for inclusion. We analysed reviews for three economic outcomes: utilization, cost-effectiveness and cost or expenditure. The latter were combined because most studies used these interchangeably. For completeness, we also extracted data on core health outcomes such as health status, quality of life or mortality, as well as process measures.

None of the reviews identified by our searches explicitly defined 'integrated care' as the topic of review.

The most common concepts or terms were case management, care coordination, collaborative care or a combination of these; four reviews focused on disease management interventions. The majority of reviews considered a wide range of approaches and typically only about half of primary studies included in individual reviews could be considered as integrated care under our definition. Care initiatives frequently targeted the hospital-primary care or community services interface, while several reviews examined the coordination of primary care and community services, often, although not always, involving medical specialists, or extending further into social care services.

Utilization and cost were the most common economic outcomes assessed by reviews but reporting of measures was inconsistent and the quality of the evidence was often low.

The majority of economic outcomes focused on hospital utilization through (re)admission rates, length of stay or admission days and emergency department visits. Findings tended to be mixed within each review, which makes it difficult to draw firm conclusions. Also, results were commonly not quantified, making an overall assessment of the size of possible effects problematic. Seventeen reviews reported cost and/or expenditure data in some form, typically reporting cost in terms of health-care cost savings resulting from the intervention, most frequently in relation to hospital costs. There was some evidence of cost reduction in a number of reviews; however, findings were frequently based on a small number of original studies only, or studies that only used a before–after design without control, or both.

There is evidence of cost–effectiveness of selected integrated care approaches but the evidence base remains weak. Eight of the nineteen studies reported on cost–effectiveness.

There was some evidence from one review of approaches targeting frequent hospital emergency department users that found one trial to report the intervention to be cost-effective. Based on one economic evaluation, one other review concluded that there was little or no evidence of incremental QALY gain over usual care of structured home-based, nurse-led health promotion for older people at risk of hospital or care home admission. Six reviews reported on cost per QALY as a measure of cost–utility, suggesting increased cost associated with the integrated care approach in question in some studies but not others. Overall the evidence was difficult to interpret.

The majority of studies reviewed echo the concerns reported in earlier assessments of the evidence of integrated care interventions. Thus, it remains challenging to interpret the evidence from existing primary studies, which tend to be characterized by heterogeneity in the definition and description of the intervention and components of care under study. Variation in definitions and components of care, and failure to recognize these variations, might lead to inappropriate conclusions about programme effectiveness and the application of findings.

Based on the evidence presented here, there may be a need to revisit our understanding of what integrated care is and what it seeks to achieve, and the extent to which the strategy lends itself to evaluation in a way that would allow for the generation of clear-cut evidence, given its polymorphous nature. Fundamentally, it is important to understand whether integrated care is to be considered an intervention that, by implication, ought to be cost-effective and

support financial sustainability, or whether it is to be interpreted and evaluated as a complex strategy to innovate and implement long-lasting change in the way services in the health and social-care sectors are being delivered and that involve multiple changes at multiple levels. Evidence presented here and elsewhere strongly points to the latter, and initiatives and strategies underway will require continuous evaluation over extended periods of time enabling assessment of their impacts both economic and on health outcomes if we are to generate appropriate conclusions about programme effectiveness and the application of findings to inform decision making.

Key messages

- The rising burden of chronic disease and of the number of people with complex care needs require the development of delivery systems that bring together a range of professionals and skills from both the cure (health-care) and care (long-term and social-care) sectors.
- Evidence that is available points to a positive impact of integrated care programmes on the quality of patient care and improved health or patient satisfaction outcomes but uncertainty remains about the relative effectiveness of different approaches and their impacts on costs.
- This review of published reviews confirms earlier reports of shortage of robust evidence on economic impacts of integrated care.
- The term 'integrated care' is often not specifically examined; the most common concepts or terms were case management, care coordination, collaborative care or a combination of these.
- Utilization and cost were the most common economic outcomes assessed by reviews but reporting of measures was inconsistent and the quality of the evidence was often low.
- There is evidence of cost-effectiveness of selected integrated care approaches but the evidence base remains weak.
- There may be a need to revisit our understanding of what integrated care is and what it seeks to achieve, and the extent to which the strategy lends itself to evaluation in a way that would allow for the generation of clear-cut evidence.
- It is important to come to an understanding as to whether integrated care is to be considered an intervention or whether it is to be interpreted, and evaluated, as a complex strategy to innovate and implement long-lasting change in the way services in the health and social-care sectors are being delivered and that involve multiple changes at multiple levels.

1 Background

The rising burden of chronic disease in Europe has been considered the greatest challenge to the goal that the European Union has set itself of contributing to the achievement of an increase of 2 years in the number of years spent in good health by the population in the EU, by 2020 (Council of the European Union 2011). Achieving this ambition will require effective measures of disease prevention (Novotny, 2008), while also ensuring that those with established illness will be able to participate in society.

Of particular concern is the rapid rise of those with multiple health and care needs, which tend to be more common among older people, the proportion of whom is also increasing rapidly in the population (European Commission, 2012). An estimated two-thirds of those who have reached pensionable age have at least two chronic conditions (van den Akker et al., 1998; Barnett et al., 2012). The complexity of needs arising from the nature of multiple chronic conditions, in combination with increasing frailty at old age, involving physical, developmental or cognitive disabilities, with or without related chronic illnesses or conditions, requires the development of delivery systems that bring together a range of professionals and skills from both the cure (health-care) and care (long-term and social-care) sectors to meet those needs (Nolte & McKee, 2008a).

Yet, service delivery has developed in ways that have tended to fragment care, both within and between sectors, through for example structural and financial barriers dividing providers at the interfaces of primary/secondary care and health/social care; distinct organizational and professional cultures and differences in terms of governance and accountability (Glasby, Dickinson & Peck, 2006). Failure to better integrate or coordinate services along the care continuum may result in suboptimal outcomes, such as potentially preventable hospitalization, medication errors or adverse drug events (Vogeli et al., 2007).

Depending on the context, interventions to integrate care are sometimes driven by a need to contain cost, sometimes by the need to improve care, and often by both. Central to the further development of integrated care is an expectation that it might support achievement of the so-called 'Triple Aim' approach – a simultaneous focus on improving health outcomes, enhancing patient care experience and cost reduction (Berwick, Nolan & Whittington, 2008). Available evidence points to a positive impact of integrated care programmes on the quality of patient care (Ouwens et al., 2005; Mattke, Seid & Ma, 2007), and Powell Davies et al. (2006, 2008), in a review of strategies seeking to enhance care coordination in selected high-income countries, demonstrated that more than half of the 80 studies assessed provided evidence of improved health or patient satisfaction outcomes. However, there is still uncertainty about the relative effectiveness of different system-level approaches in relation

to care coordination, outcomes and economic impact (Ouwens et al., 2005; Coleman et al., 2009; de Bruin et al., 2011). This is in part because of the lack of a common understanding of what is being referred to as care integration or coordination, alongside inconsistencies in describing component interventions (Ouwens et al., 2005; Coleman et al., 2009). Importantly, there remains a relative lack of scientifically rigorous evaluations that would allow for sound conclusions of effect given the frequently complex and multicomponent nature of related interventions (Suhrcke, Fahey & McKee, 2008).

There is a particular scarcity of robust evidence on the economic impacts of integrated care approaches. For example, in a review of systematic reviews of the effectiveness of integrated care programmes, Ouwens et al. (2005) reported that of the seven (out of 13) systematic reviews that had performed economic analyses, four pointed to financial benefits but the related evidence was based on only a small number of studies. Similarly, the review by Powell Davies et al. (2006) identified evidence of positive economic impacts of integrated care strategies in fewer than 20 per cent of studies reviewed. More recently, De Bruin et al. (2011) reviewed the evidence of the impact of disease management programmes on health-care expenditures for patients with diabetes, depression, heart failure or chronic obstructive pulmonary disease (COPD). Of 21 studies that had examined cost, 13 showed evidence of cost savings but these were typically not statistically significant or not tested for statistical significance. The authors highlighted that studies varied substantially with regard to the interventions, the economic evaluative approach adopted, the type of direct health-care costs and cost categories considered, alongside a lack of reporting on reliability of estimates, highlighting the need for higher quality studies. The work by De Bruin et al. (2011) used a broad definition of disease management, which built on the chronic care model (Wagner, 1998) and focused on programmes that contained two or more chronic care interventions such as care or case management, self-management support or reminder systems and which could be considered as approximating what others might refer to as 'integrated care' as we shall see below. However, as the work focused on interventions for a selected set of health conditions, it did not consider studies that examined the economic impact of integrated care approaches that target a broader spectrum of service user needs.

This report provides a rapid review of the published evidence on the economic impacts of integrated care approaches. We begin by providing a conceptualization and working definition of 'integrated care' that will serve as a guide to delineate interventions considered as integrated care approaches in the evidence review; this will be followed by a brief discussion of key considerations of economic evaluation in the context of integrated care. We then describe the methodological approach we used to undertake the review, followed by an overview of our findings. We close with a set of observations

and discuss the extent to which the available evidence permits derivation of robust conclusions on the economic impacts of integrated care approaches.

2 Conceptualizing ‘integrated care’

As we have shown previously (Nolte & McKee, 2008b; Nolte, Knai & McKee, 2008), integrated care is a concept that has been widely but variously used in many ways in different health systems. Here we focus our discussion of integrated care in relation to chronic illness and multiple care needs although it is important to recognize that it is a much broader concept that applies to many other areas such as urgent care, maternity and child health care and public health, among others.

A key challenge remains the lack of common definitions of underlying concepts; as a consequence there is a plethora of terminologies that have variously been described as ‘integrated care’, ‘coordinated care’, ‘collaborative care’, ‘managed care’, ‘disease management’, ‘case management’, ‘health/social care service user-centred care’, ‘chronic care’, ‘continuity of care’, ‘seamless care’ and others. While these may differ conceptually, the boundaries between them often remain unclear (Kodner & Spreuwenberg, 2002), and there is a general absence of a sound analytical framework through which to examine processes of integration (Goodwin et al., 2004; Godwin, 2010). This very much reflects the polymorphous nature of a concept that is applied from several disciplinary and professional perspectives and is associated with diverse objectives (Nolte & McKee, 2008b). Similarly, given the nature of the health-care ‘production’ process with its imprecise boundaries between stages, the way service users progress through the system, and the often probabilistic nature of the treatment process, providers need to be able to address uncertain demand at each stage (Simoens & Scott, 1999). Thus, integration in health care is not likely to follow a single path and variations will be inevitable.

In an attempt to develop a typology of integration in health care that enables systematic assessment of the structures and processes involved, their prerequisites and their effects on health-care organization, delivery and outcomes, analysts have identified different dimensions of integration, most commonly differentiating the *type*, *breadth*, *degree* and *process* of integration (Nolte & McKee, 2008b).

Examining first the *types* of integration, we can identify four main forms (Shortell, Gillies & Anderson, 1994; Simoens & Scott, 1999; Delnoij, Klazinga & Glasgow, 2002):

- *Functional*: integration of key support functions and activities, such as financial management, strategic planning and human resource management;

- *Organizational*: for example, creation of networks, mergers, contracting;
- *Professional*: for example, joint working, group practices, contracting or strategic alliances of health-care professionals within and between institutions and organizations;
- *Clinical*: integration of the different components of clinical processes, such as coordination of care services for individual health-care service users or care pathways.

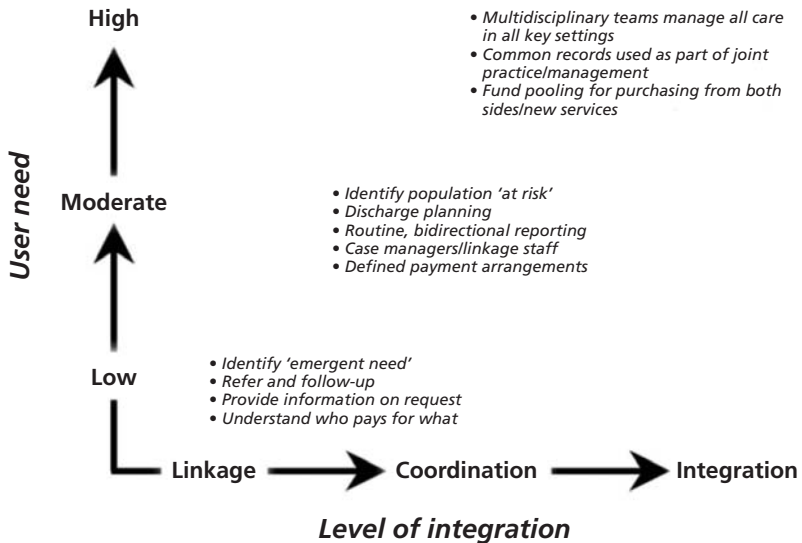
These types can occur in ways that have been described as horizontal integration or vertical integration (also referred to as *breadth* of integration) (Shortell, Gillies & Anderson, 1994; Simoens & Scott, 1999). Horizontal integration links services that are on the same level in the process of health care, for example general practice and community care, that facilitates organizational collaboration and communication between providers. Vertical integration brings together organizations at different levels of a hierarchical structure under one management umbrella, for example primary and secondary or specialist care.

Furthermore, integrated care can be realized on a continuum of integration, referred to as the *degree* of integration (Leutz, 1999; Goodwin et al., 2004; Ahgren & Axelsson, 2005). The degree can range from full integration in which the integrated organization is responsible for the full continuum of care, including funding, to collaboration, which describes separate structures in which organizations retain their own service responsibility and funding criteria. Leutz (1999), drawing on an analysis of initiatives to integrate health and social services in the United States and the United Kingdom in the 1990s, proposed an 'integration framework' that described three levels of integration that he set against dimensions of service users' need to enable a comprehensive approach that responds to the varied needs of all persons with chronic or disabling conditions. The three levels were identified as:

- *Linkage*: operates through the separate structures of existing health and social services systems, with organizations retaining their own service responsibilities, funding and eligibility criteria, and operational rules.
- *Coordination*: as linkage but involves additional explicit structures and processes, such as routinely shared information, discharge planning and case managers, to coordinate care across the various sectors.
- *Full integration*: the integrated organization/system assumes responsibility for all services, resources and funding, which may be subsumed in one managed structure or through contractual agreements between different organizations.

Leutz (1999) placed service user need at the core of the integrated care initiative, arguing that people with low levels of need as defined, for example, by the stability and severity of the condition, duration of illness, scope of services required and the user's capacity for self-direction, might not require a fully integrated system, while more integrated approaches should be targeted at those with highest need (Fig. 1).

Fig. 1 Levels of integration and user need as described by Leutz (1999).



Source: Nolte & McKee (2008b).

An alternative approach to classifying integrated care builds on the actual processes of integration. Thus, Fulop, Mowlem & Edwards (2005) distinguished *normative* integration, in which shared values play a core part in coordinating and securing collaboration in the delivery of care, from *systemic* integration, where rules and policies are coherently implemented at the various levels of the organization. A similar notion was proposed by Fabbriotti (2007). At the same time it is important to highlight that the process of integration typically requires simultaneous action at different levels, involving different functions and, importantly, develops in distinct phases (Minkman, 2011).

Meanwhile, in an attempt to further structure the field of research on integrated care, the *International Journal of Integrated Care* has described four broad categories of research activity (Schrijvers & Goodwin, 2010):

- Integration of health and social services;
- Integration between primary health care and hospital care;
- Integrated care within one sector (for example, mental health services);
- Integration between preventive and curative services.

These attempts towards developing a typology provide important tools for the systematic assessment of integrated care. However, as noted earlier, the way in which the integration terminology is currently being employed in practice varies considerably. Therefore, in order to undertake a review of the available evidence of impact it will be crucial to adopt a more pragmatic working definition of integrated care.

We propose a working definition that builds on the goal of integrated care and which can be described as:

Initiatives seeking to improve outcomes for those with (complex) chronic health problems and needs by overcoming issues of fragmentation through linkage or coordination of services of different providers along the continuum of care.

We use the terms 'initiative' or 'approach' to highlight the fact that efforts to integrate care typically involve a complex set of multiple interventions acting at different levels and, as noted earlier, evolving and adapting over time. Where we use the term 'intervention', we take this to mean 'complex intervention' to emphasize the complexity of the integrated care efforts. We recognize that the working definition neglects integration efforts within provider organizations such as the implementation of clinical pathways or the use of specialist nurses within organizations.

3 Conceptualizing economic impact in integrated care

Initiatives to integrate care are frequently driven by a need to contain cost; yet, investing in integrated care does not necessarily imply an economic gain (Vondeling, 2004). This will depend on the part of the cost associated with the disease burden or level of need that can be averted or reduced through the intervention set against the cost of carrying out the initiative in question (Suhrcke, Fahey & McKee, 2008). This is what is being assessed in the context of a full economic evaluation, defined as 'the comparative analysis of alternative courses of action in terms of both the costs and consequences' (Drummond et al., 2005).

From an economic perspective, primary benefits that may be derived from integrated care approaches, in addition to improved health and related outcomes as experienced by the service user as the core impacts, include short

and long-term cost savings. These may be achieved through, for example, avoidance of complications, reduced health-care utilization and health-care cost, and labour productivity gains where the working age population is concerned, or wider benefits achieved through participation in society, reduced carer burden, and others (Sepucha, Fowler & Mulley, 2004; Suhrcke, Fahey & McKee, 2008; Lewis, 2009). The range of costs and benefits derived from a given initiative will depend on the perspective taken, such as whether the evaluative information is aimed at informing resource allocation decisions within a given agency (for example, a health insurer or local health authority), within a particular system (for example the health and social care systems), or within the wider economy or society (societal perspective) (Knapp, 2007). The perspective taken will then determine the range of measures to be considered in the economic evaluation, both in terms of costs and benefits.

One of the key challenges to assessing the economic impact (or indeed ‘intervention’ effect more generally) of complex interventions such as integrated care approaches is the requirement of a controlled design or robust comparison strategy to isolate effects that can be attributed to the intervention from those that would have occurred without it (the counterfactual) (Craig et al., 2008). Thus, full economic evaluations such as cost–effectiveness analysis (CEA), cost–utility analysis (CUA) and cost–benefit analysis (CBA) require the presence of an alternative strategy – typically, usual care – to enable assessment of costs and benefits of a given intervention (Table 1) (Villalba van Dijk et al., 2012).

Table 1 Types of economic analysis

Type of analysis	Description
Cost–offset study, cost analysis	Compares costs incurred with (other) costs saved; does not consider alternative use of resources elsewhere
Cost-minimization analysis	As cost analysis but compares two or more interventions or programmes; assumes outcomes of different programmes to be broadly equivalent
Cost–consequence analysis (CCA)	Compares the costs and consequences of two or more alternatives, but does not aggregate or synthesize costs and consequences, and all health outcomes are left in natural units
Cost–effectiveness analysis (CEA)	Relates costs to a (typically single) common outcome between alternative interventions/programmes (which can also involve no intervention)
Cost–utility analysis (CUA)	Relates costs to utilities as a measure of programme effect; results of CUA are typically expressed in terms of cost per health year of cost per QALY gained
Cost–benefit analysis (CBA)	Economic evaluation that values all costs and benefits in the same (monetary) value; results of CBA are typically expressed as a ratio of costs to benefits or a sum representing the net benefit (or loss) of one programme over another

Source: Adapted from Drummond et al. (2005) and Kelly et al. (2005).

Cost-effectiveness and cost-utility analysis are the most commonly used methods in health-care economic evaluations. They express the benefits of a given intervention in terms of natural units (cost-effectiveness), such as life years gained, reduction in blood pressure, or in a synthetic overall health measure (cost-utility), such as quality adjusted life years (QALYs), assuming that the core benefits of the intervention occur exclusively or primarily in health terms. By contrast, cost-benefit analyses (CBA) adopt a societal perspective and seek to place a monetary value on all (measurable) costs and benefits.

Other forms of economic analysis, frequently not referred to as 'economic evaluation', focus only on the appraisal of costs, with the range of costs determined by the perspective taken. Such an analysis is typically chosen when outcomes of a given intervention are either already established or are not (yet) measurable (Kelly et al., 2005). Examples include the cost-offset study, which compares costs incurred with (other) costs saved. It does not consider other approaches or alternative use of resources, which is typically the subject of cost-minimization analyses (see Table 1).

As noted above, one core challenge in undertaking a full economic evaluation is the need to identify a comparison strategy. Other challenges include consideration of the types of cost that may be relevant, the data sources that can provide information appropriate to such measures and the availability of actual data to enable cost estimation. Costing methodology generally distinguishes direct, indirect and intangible costs, although these have been conceptualized in different ways (Johnston et al., 1999). Direct costs typically refer to costs of health-care services as they relate to the prevention, diagnosis and treatment of a given condition, such as inpatient or outpatient care, rehabilitation, community health services and pharmaceuticals; direct costs may also include social care costs where relevant (Suhrcke, Fahey & McKee, 2008). Indirect costs typically refer to productivity losses to society because of ill health or its treatment, or more broadly the resources lost due to any condition or disease that might have occurred in the absence of the intervention (Koopmanschap et al., 1995). Intangible costs generally describe the psychological burden placed on patients and their carers including pain, bereavement, anxiety and suffering (Knapp, 2007; Suhrcke, Fahey & McKee, 2008).

It is important to consider that a given intervention may be found to be cost-effective but not necessarily cost saving. This will for example be the case where a given intervention that was found to be cost-effective identifies substantial unmet need and so, at least in the short to medium-term, increases costs associated with meeting this need. In addition, where cost savings are considered as an outcome measure, there is a need to ensure complete accounting of all relevant costs, that is direct and indirect health and non-health-care costs as described above. For example, in the field of disease

management, existing evaluations tend to focus on actual expenditure incurred by the funder of the intervention (for example, health insurer) (Linden & Adams, 2007). Yet, especially in the context of initiatives that seek to integrate care across providers, it will be important to adopt a broader view, in particular where costs are dispersed across health and social services (Vondeling, 2004). At the same time, indirect impact on, for example productivity among those receiving the intervention, might be less relevant where integrated care activities target older populations, while impact on their informal caregivers in terms of, for example loss of income as they cannot work, may be important (Bolin, Lindgren & Lundborg, 2008; Lilly, Laporte & Coyte, 2010).

4 Methods

The rapid evidence review presented here principally follows the approach by Ouwens et al. (2005) who presented a review of systematic reviews of the effectiveness of integrated care programmes for the chronically ill. Extending this approach, our review focuses on economic impacts of integrated care approaches.

We undertook a limited search of PubMed, the National Library of Medicine's Medline and pre-Medline database, Embase and the Cochrane Library. We identified studies using medical subject headings (MeSH) or the Embase equivalent Emtree (Elsevier's Life Science Thesaurus) with the following headings ('/' indicating 'or'): 'Delivery of health care, integrated/regional health planning/patient care management/ disease management' in combination with 'Cost control/costs and cost analysis/efficiency/cost-benefit analysis/patient admission'. We limited our search to studies classified as systematic review or meta-analysis that were published from 2004 onwards, as the review by Ouwens et al. (2005) covered systematic reviews and meta-analyses published from 1996 to May 2004.

We included reviews of original studies that focused on integrated care approaches, chronic care interventions and disease management programmes but excluded those that examined single interventions only, such as patient education, physician education or nurse-led counselling. However, we did consider case management approaches where these involved linking two or more different providers (for example, planned hospital discharge). We did not formally assess the quality of reviews but excluded those that did not explicitly state the search strategy, inclusion and exclusion criteria, the analytical approach taken or did not describe whether studies were assessed for quality.

Studies were analysed using a data extraction template, describing information on the study design, the stated definition of the integrated care intervention/s

under review, and the core outcomes considered. We distinguished three basic cost outcomes, which we conceptualized as follows:

- Utilization: the level of use of a particular service over time, such as physician visits; emergency room/accident and emergency department (ED) visits; hospital (re-) admissions; length of hospital stay; hospital days;
- Cost-effectiveness: benefits of the intervention in terms of natural units (cost-effectiveness), such as life years gained, reduction in blood pressure, or in a synthetic overall health measure (cost-utility), such as quality adjusted life years (QALYs);
- Cost and/or expenditure:
 - cost: cost of providing a particular service (health, nursing, social care), including the costs of procedures, therapies, and medications where applicable;
 - expenditure: amount of money paid for the services, and from fees, which refers to the amount charged, regardless of cost;
 - avoided cost: costs caused by a health problem or illness which are avoided by a given intervention.

We recognise that the terms 'cost' and 'expenditure' are conceptually different; however, most studies reviewed here used these terms interchangeably and we therefore considered these together.

For completeness, we also extracted data on core health outcomes such as health status, quality of life and mortality, as well as process measures. The effect of the intervention was summarized by statistical significance: was there a positive (or negative) trend in the majority of studies reviewed or was no statistically significant effect or trend observed?

5 Findings

Our search identified a total of 963 references across the three databases, and after removal of duplicates, we accepted 70 references for further screening. Of these, 19 articles were identified as eligible for inclusion. There were eleven systematic reviews (Gilbody, Bower & Whitty, 2006; Chiu & Newcomer, 2007; Smith & Newton, 2007; Brink-Huis, van Achterberg & Schoonhoven, 2008; Maciejewski, Chen & Au, 2009; Steuten et al., 2009; Pimouguet et al., 2010; van Steenbergen-Weijenburg et al., 2010; Althaus et al., 2011; de Bruin et al., 2011; Smith et al., 2012b), six systematic reviews and meta-analyses (Neumeyer-Gromen et al., 2004; Phillips et al., 2004; Langhorne et al., 2005; Shepperd et al., 2008; Steffen et al., 2009; Tappenden et al., 2012) and two studies not explicitly labelled as systematic reviews but which were included

as they met our basic criteria (Oeseburg et al., 2009; Simoens et al., 2011). Two studies (Shepperd et al., 2009; Smith et al., 2012a) identified by our search were based on Cochrane reviews and we therefore retrieved and included the relevant full review for further assessment (Shepperd et al., 2008; Smith et al., 2012b). One further review identified by our search (Langhorne & Holmqvist, 2007) presented an update of an earlier meta-analysis that comprised the full set of economic outcomes assessed in that review (Langhorne et al., 2005); for this reason, we included the earlier review only. Two recent reviews considered of potential relevance had to be excluded as they were available in abstract format only, with the full review yet to be published (Boland et al., 2012; Goossens et al., 2012).

Table 2 provides an overview of the key characteristics and evidence of effect of integrated care approaches identified.

Table 2 Key characteristics and evidence of integrated care approaches

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Althaus et al. (2011)	Systematic review (n=11 studies: 3 randomized controlled trials, 8 before–after studies of which 6 without control)	Frequent hospital ED users	No explicit definition Most interventions reviewed involved case management (7), involving coordination of multidisciplinary care by case manager; locus of intervention generally not limited to the hospital, often extending to the community	Reduced alcohol and drug use (2/3 studies) and significantly decreased social problems (3)	N/R
Brink-Huis et al. (2008)	Systematic review (n=12 studies: 2 quasi-experimental, 5 before–after without control, 3 observational; 2 studies classified as ‘expert opinion’ of low quality evidence)	Pain (adult cancer patients)	Organizational models integrating processes Distinguished 3 types: 1. Institutionalization of pain management strategies (principles and activities incorporated into patterns of daily practice) (3) 2. Clinical pathways (focus on pain assessment and treatment; interdisciplinary approach; continuity of care) (4) 3. Pain consultation (‘tailor made’; interdisciplinary approach; care coordination at core) (5)	Pain intensity and pain relief: Clinical pathway and pain consultation models showed significant decrease in pain intensity and improvements in pain relief (5) Institutionalization models showed no significant improvement (1)	N/R

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
No change (1)	Inconclusive (1)	N/R	Reduction in ED visits (1/3 RCTs; 6 before-after); although significant increase in 1 Inconclusive evidence for use of other health services (e.g. admissions, hospital days, outpatient visits)	Report of cost-effectiveness of intervention in 1 RCT on basis of improved clinical and social outcomes at similar cost to usual care (not quantified); Perspective: hospital	Significant reduction in ED costs (3) Median reduction per patient of \$2406 after intervention (from \$21 022 to \$14 910) for all hospital services costs and median reduction in ED costs per patient of \$1938 from \$4124 to \$2195 reported in 1 before-after study Perspective in all 3 studies: hospital
Satisfaction with pain management: Some evidence of increased patient satisfaction within institutionalization and clinical pathway models (2)	N/R	Improvements in pain assessment (2) and pain treatment (3)	Reduction in unscheduled readmissions for uncontrolled pain from 4.4–4% in one year (1)	N/R	Reduction in hospital cost by \$2mIn (1)

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Chiu & Newcomer (2007)	Systematic review (n=15 studies reported in 16 articles; 14 RCTs, 1 quasi-experimental study)	Older patients requiring discharge from hospital to other settings	<p>Nurse-assisted interventions intended to improve transition of older patients from hospitals to other settings (excluded psychiatric patients)</p> <p>Common elements included home visits and telephone contact, about one-third of interventions studied involved liaison and coordination with the patient's physician and other care providers</p>	N/R	N/R
de Bruin et al. (2011)	Systematic review (n=31 studies: 18 RCTs, 3 quasi-experimental, 3 cross-sectional, 2 descriptive, 2 before-after, 2 prospective observational studies, 1 longitudinal analysis of paid claims)	Diabetes (14), depression (4), heart failure (8), COPD (5)	Interventions that contained two or more components of the CCM (self-management support, delivery system design, decision support, clinical information system, health-care system, community resources and policies)	N/R	N/R

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
N/R	No change (2)	N/R	<p>Unplanned readmissions:</p> <p>No significant difference (7), significantly fewer readmissions (8), up to 1/3 fewer (measured up to 6 months post discharge)</p> <p>Hospital days:</p> <p>Significant reductions in the number of hospital days or length of stay (7)</p> <p>ED visits:</p> <p>Limited evidence of reduction (3)</p>	N/R	<p>Hospital expenditure significantly reduced with intervention (6)</p> <p>Limited evidence from studies of heart failure care of reduced total cost or hospital cost and intervention cost (3)</p>
N/R	N/R	N/R	<p>Diabetes: Inconclusive evidence of impact on health-care utilization (hospitalizations, physician visits, inpatient days) (14)</p> <p>Depression: no significant difference in utilization (1)</p> <p>Heart failure: significant reduction in hospitalization (3) and ED visits (2). Less conclusive evidence on (re) admission (2)</p> <p>COPD: Significant reduction in (re) admission (2/3), hospitalization (1) and ED visits (1). Less conclusive evidence on length of stay (1/2)</p>	<p>Incremental cost per QALY:</p> <p>\$34 248–69 027 per QALY (1) (diabetes)</p> <p>\$2518–66 686 per QALY (1) (depression)</p> <p>\$17 747–156 655 per QALY (2) (heart failure)</p> <p>N/R (COPD)</p>	<p>Avoided health-care cost:</p> <p>\$5200 per patient (1) (diabetes)</p> <p>Incremental health-care cost per patient per year ranged from:</p> <p>\$3305 to \$16 996 (all disease groups)</p> <p>\$828 to \$2533 (diabetes)</p> <p>\$589 to \$863 (depression)</p> <p>\$3305 to \$4970 (heart failure)</p> <p>\$9 to \$16,996 (COPD)</p>

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Gilbody et al. (2006)	Systematic review of economic evaluations (n = 11 cost-effectiveness studies of RCTs)	Depression	Enhanced primary care that could include range of organizational interventions Majority of studies set in the US (9/10); 6 (US) involved collaborative care models linking primary and specialist care, frequently including non-medical care coordinator such as social worker, mental health worker, psychologist	Significant improvement in SCL score (5) although not always sustained (1)	Inconclusive evidence on HRQoL (4)
Langhorne et al. (2005)	Systematic review and meta-analysis (n = 12 RCTs, 1659 patients included in meta-analysis)	Stroke	ESD – defined as services that aim to accelerate patient's discharge home and provide an equivalent level of rehabilitation input in the patient's own home as in conventional hospital care and discharge arrangements. In 7/12 trials, a single multidisciplinary ESD team co-ordinated hospital discharge and provided rehabilitation at home	E/R	No significant difference for subjective health status or mood for carers or patients

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
Increased (3)	N/R	Significant improvements in adequacy of anti-depressant dosage (5) and concordance (2)	N/R	<p>Enhanced care programmes for newly diagnosed depression:</p> <p>Cost per depression free day £7–13 (2)</p> <p>Cost per QALY ranged from £8190 to £19 483 depending on intervention and method of calculating QALYs.</p> <p>Enhanced care for treatment-resistant depression:</p> <p>£19 per depression free day (total health-care cost)</p> <p>Enhanced care to prevent relapse in recurrent depression:</p> <p>£0.5 per depression-free day (total health-care costs) but little significant confidence</p>	N/R
<p>Increased satisfaction among patients</p> <p>No significant difference among carers</p>	<p>Those receiving ESD significantly less likely to be dead or dependent (median 6-month follow-up)</p> <p>No significant difference for mortality alone</p>	N/R	<p>Length of hospital stay significantly reduced, on average by 8 days</p> <p>No significant difference in readmission rates</p>	N/R	<p>Potential cost savings reported (5). Median 20%, range 4–30%</p>

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Maciejewski et al. (2009)	Systematic review (n=29 studies based on 27 studies: 5 RCTs, 7 before-after with control, 3 after-only with control, 12 before-after without control)	Asthma	Disease management (excluded solely patient education or self-management). All interventions had multiple components	Clinical outcomes (symptoms, peak expiratory flow, forced expiratory volume) Limited evidence from RCTs of significant effect (3/8 assessments)	Asthma-related quality of life, days off work/school Very limited evidence from RCTs of effect on patient-reported outcomes (2/12)
Neumeyer-Gromen et al. (2004)	Systematic review and meta-analysis (n=10 RCTs) Meta-analysis included: 3928 patients, 10 RCTs for depression severity; 1077 patients, 4 RCTs for patient satisfaction; 3618 patients, 8 RCTs for adherence to treatment)	Depression (adults aged 18+)	No explicit definition 'Complete DMP' comprising use of evidence-based guidelines, patient self-management education, provider education, collaborative care, reminder systems, monitoring	Significant improvement: depression severity (10)	Significant improvement (4)
Oeseburg et al. (2009)	Literature review (n=9 RCTs)	Case management for chronic illness (elderly, frail)	Not stated but eligible studies analysed patient advocacy case management model and evaluated service use and costs	N/R	N/R

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
N/R	N/R	Measures included: inhaler technique, use of peak-flow metre, use of action plan	ED visits, hospitalization: Limited evidence from RCTs of effect on economic outcomes (6/17 assessments) although nature of economic effect not specified	N/R	N/R
Significant improvement (4)	N/R	Significant improvement: adherence to treatment (4)	N/R	Lower incremental cost per successfully treated case compared to usual care Cost utility ratios ranged between \$9051 and \$49 500 per QALY	DMP associated with increased costs in comparison to usual care Some evidence of cost offset – lower cost per successfully treated patient in intervention (2)
N/R	N/R	N/R	Inconclusive evidence on hospital admissions reporting increases (1) and decreases (1) Limited evidence of reduction in length of stay (1) Clinically relevant reduction in ED visits (1) No effect on nursing home admissions (3)	N/R	Inconclusive evidence: savings from decrease in nursing home, hospital and community health service costs (1); increased costs (not significant) reported in one other study

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Phillips et al. (2004)	Systematic review and meta-analysis (n=19 reports of 18 RCTs, n = 3304 patients for meta-analysis)	Congestive heart failure (older people, mean age >55)	Comprehensive discharge planning plus post-discharge support for older inpatients	N/R	Significant improvement in quality of life scores of intervention patients (6)
Pimouguet et al. (2010)	Systematic review (n=13 studies, based on 12 RCTs)	Dementia	Case management as 'any intervention involving interaction between a case manager and patient-caregiver dyads and providing continuity and advocacy over time, support, information about community services, care and disease evolution, financial and legal advices'	N/R	N/R

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
N/R	Trend towards lower all-cause mortality (14)	N/R	Significantly fewer readmissions or cause-specific readmissions (pooled data from 18 studies) Non-significant reduction in length of stay (10)	N/R	Pooled cost difference favoured intervention patients -\$359 in non-US trials and -\$536 in US trials Average cost of treatment \$80.76 per patient per month for trials in US and \$55.76 per patient per month in non-US trials
N/R	N/R	N/R	Delay in nursing home admission with intervention (3) Nursing home admission rate: reduction (2), no change (2) No significant effect on hospitalization rate or emergency room visits (6)	N/R	No difference in cost (3) One estimate of saving of \$90 000 for 1.5 days delay in nursing home admission (1)

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Shepperd et al. (2008)	Systematic review and meta-analysis (10 RCTs; n=850 individual patients from 5 RCTs for meta-analysis)	Patients aged 18 years and over	'Hospital at home' defined as 'a service that can avoid the need for hospital admission by providing active treatment by health care professionals in the patient's home for a condition that otherwise would require acute hospital in-patient care, and always for a limited time period. In particular, hospital at home has to offer a specific service to patients in their home requiring health-care professionals to take an active part in the patients' care'	<p>Non-significant differences in functional ability on a variety of measures (5)</p> <p>Reduction in problems with sleep, agitation and aggression, and feeding among patients with dementia in one study</p> <p>Mixed evidence on cognitive function and psychological well-being (5)</p> <p>Fewer patients reported bowel or urinary complications (1)</p> <p>Mixed evidence on range of other clinical outcomes</p>	<p>Non-significant differences in quality of life measures (SF36) (3)</p>
Simoens et al. (2011)	Review (n=8 studies, 7 reporting outcomes, 6 cost-effectiveness analyses, 1 cost utility analysis and 1 study using cost-effectiveness and cost-utility analysis)	Patients in transition between ambulatory care (including nursing homes) and hospital care	No explicit definition Medication management as a component of seamless care defined as, 'the continuity of care delivered to the patient in the health care system across the spectrum of care givers and health care settings'.	<p>Limited evidence</p> <p>No difference in anxiety symptoms, depressive symptoms, somatic symptoms or number of side-effects for study of medication error among patients with major depressive episode</p>	<p>Limited evidence</p> <p>No difference in QoL (1)</p>

Outcome measures (number of studies)		Cost measures (number of studies)			
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
Significantly higher levels across a range of conditions (4)	Significant reduction in mortality at six months follow-up	No significant difference in GP's satisfaction with service (1) Mixed significant (1) and non-significant (2) risk of living in an institutional setting	Non-significant increase in admissions (pooled across 5 studies) Mixed evidence, with increases and decreases in hospital length of stay Increased referrals for social support for COPD patients (1) and increased use of informal care for those recovering from stroke (1)	N/R	<i>Medical condition</i> Mean difference in cost per day ranged from -\$293 to £72.98 (2) <i>Stroke</i> Limited evidence of significant reduction in cost per day (\$163.0 vs \$275.6) <i>COPD and community-acquired pneumonia</i> Significantly reduced costs per patient, NZ\$ 398.4 (1) and per bed day, -£1798, (1)
Limited evidence of impact on satisfaction Higher satisfaction among patients receiving phone call (1) and for those receiving counselling at home (1)	Limited evidence Some evidence that extensive medication review and drug counselling had no impact on mortality (1)	Mixed evidence on medication adherence: improved (2), no difference (1)	Fewer hospital admissions (3), ED visits (1) and length of stay (1) Some evidence of higher primary care follow-up rate (1)	Limited evidence Pharmacist-led reconciliation in prevention of medication, €13 000 per QALY (1)	Evidence of savings associated with prevention or reduction in hospital utilization (ranging from €109 to €699 saving per patient) Limited evidence of reduction in medication costs (€20.7)

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Smith & Newton (2007)	Systematic review (n=60 studies: 39 analytic, 21 descriptive)	Mental illness/ psychiatry	Case management The majority of studies assessed ACT or ICM (55)	Symptoms (not specified): no change (5), decreased (1) Social function: Mixed evidence: increased (2), no change (3)	Mixed evidence: increased (3), no change (3)
Smith et al. (2012b)	Systematic review (n=6 RCTs) ¹	People or populations with co-existence of two or more chronic conditions	No explicit definition Interventions designed to improve outcomes in patients with multimorbidity in primary care and community care settings. Focused on 'organizational interventions', which were predominantly case management, care coordination or enhancement of skill mix in interdisciplinary teams	Mixed evidence of significant result on physical health outcomes. Some significant improvement in blood pressure (2), mixed evidence of impact on HBA1c in the case of diabetes (2). No significant improvement in patient reported outcomes, e.g. pain, energy, shortness of breath, symptom scores (2) Mental health: significant improvements in depression (2/3) but not in one other study	Mixed evidence on psychosocial outcomes One out of 4 studies reported statistically significant improvement HEQoL

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
Increased (3), no change (1)	Limited evidence of no change (1)	Adherence: Increase (1)	<p>Number of admissions: mixed evidence: decreased (2), no change (3), increased (1)</p> <p>Admission days: mixed evidence: decreased (4), no change (3), increased (2)</p>	N/R	<p>Limited and mixed evidence: costs decreased (1), cost no change (1)</p> <p>Costs not specified</p>
Limited evidence of improved satisfaction with treatment and service provision (2)	<p>Limited evidence on mortality</p> <p>One study reported and showed reduced mortality among intervention group</p>	<p>Limited evidence of impact on medication use and adherence: significant improvement anti-depressant and anti-hypertension medication adherence (1)</p> <p>Evidence of improvements in provider behaviour –patient measure of quality of care, chronic disease management score, preventive care score, prescribing (3)</p>	<p>Mixed evidence on health service use</p> <p>Significant improvements in number of hospital admissions and length of stay (2), no significant difference in admission related outcomes (4)</p>	N/R	<p>Limited evidence of cost savings among programmes with improved outcomes for patients (2)</p> <p>\$90 per intervention patient for a SeniorCareConnections intervention (excludes costs of implementing intervention and additional savings from fewer physician visits)</p> <p>Very limited evidence on expenditure. Mean medical costs relating to TeamCare intervention reported to be \$1224 per patient</p>

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Steffen et al (2009)	Systematic review and meta-analysis (n=11: 6 RCTs, 3 controlled clinical trials, 2 cohort studies)	Adult (>18 years) patients in mental health care	<p>Discharge planning, defined as 'multifaceted or single interventions established prior to hospital discharge, involving personal contact between the patient and hospital staff, aiming at preventing, facilitating or solving anticipated problems in subsequent outpatient care'</p> <p>Six studies focused on patient education and communication. The remainder included management/ coordination (2), transitional discharge model (2), pre-discharge planning (1)</p>	Evidence of improvement in mental health status (4), pooled effect size significant	Limited and inconclusive evidence of improved QoL (4), pooled effect size not significant
Steuten et al. (2009)	Systematic review (n=20 studies on 17 interventions)	Adults with mild, moderate, severe or very severe COPD	Programmes consisting of more than one component of disease management as defined by the DMAA or CCM	<p>Evidence of limited impact on outcomes (lung function, dyspnoea, physical functioning and mental functioning)</p> <p>Limited evidence of improved lung function (2), physical functioning (3) and mental functioning (3)</p>	Evidence of short-term improvement in HRQoL but evidence of no difference at 12 month follow-up (16)

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
N/R	Probability of adherence 25% greater in intervention group but high heterogeneity	N/R	Relative risk of reduction in readmission rates was 35% in favour of intervention	N/R	Non-significant reduction in costs associated with reduction in hospital and emergency room services (1)
N/R	Relative risk of mortality ranged from 0.31 to 1.20 with intervention but none were statistically significant (14)	Limited impact on prescribing patterns (4) Significant increase in patient education (5)	Relative risk of hospitalization varied from 0.64 to 1.5 Relative risk of ED visits ranged from 0.28 to 2.28, both favouring the intervention Evidence of limited impact on GP, specialist or nurse visits (6) Limited evidence of greater utilization (2)	Based on changes in HRQoL and survival, a societal WTP of €30 000 per QALY would mean programme cost-effective if incremental cost does not exceed €7680 per patient over his/her lifetime (6.7 years) (1 study)	No studies reported significant savings in costs Some evidence that programmes would have to be cost-saving to be cost-effective One study reported reduced prescription costs associated with intervention

Study	Design (number of studies)	Condition(s) or populations targeted	Definition integrated care (number of studies)	Outcome measures (number of studies)	
				Functional status and clinical outcomes	Quality of life
Tappenden et al. (2012)	Systematic review of clinical effectiveness (n=11), Meta-analysis (8 studies) and systematic review of cost-effectiveness (3)	Older people (>75 years) at risk of admission to hospital, residential or nursing care	Structured home-based, nurse-led health promotion Interventions included treatment and other related activities Considerable heterogeneity in interventions; 6 involved nurse/health visitor-led care management, liaison with other health and social-care professionals and care coordination	Trend of non-significant reduced number of falls in intervention group (pooled estimate) Limited evidence of greater independence in intervention group (2) but further evidence inconclusive (2)	Limited (1) and non-significant evidence of impact on QoL
van Steenberg-Weijnenburg et al (2010)	Systematic review (n=8; 4 cost-effectiveness analysis; 4 cost-effectiveness and cost-utility analysis)	Patients diagnosed with major depressive disorder	'Collaborative care', defined as having meeting at least 3 of following criteria: 1. Include role of care manager 2. Network formed around patient of at least 2 or 3 different professionals 3. Process and outcome of treatment monitored 4. Evidence-base treatment provided interventions including coordinated/ collaborative care (5), conjunction between primary and secondary care (1)	Reduction in depression-free days measured through Hamilton Rating Scale (4) and SCL (2) Statistically significant improvement not always maintained over time (1)	Evidence that collaborative care more effective than usual care (4)

¹ This study also reported on four 'patient-oriented' interventions, which we have excluded as they are largely patient education and not relevant for this review.

Notes: N/R: not reported; RCT: randomized controlled trial; CCM: chronic care model; SCL: symptom checklist; HRQoL: health-related quality of life; QALY: quality-adjusted life year; ED: emergency department; ESD: early supported discharge; ACT: assertive community treatment; ICM: intensive case management; COPD: chronic obstructive pulmonary disease; DMAA: Disease Management Association of America; WTP: willingness to pay.

Outcome measures (number of studies)			Cost measures (number of studies)		
Patient satisfaction	Mortality	Process	Utilization	Cost-effectiveness	Cost/expenditure
N/R	Evidence that intervention significantly reduced risk of death (8)	N/R	Non-significant impact on number of individuals moving into residential care (1) or admissions to hospital (1)	<p>Inconclusive evidence from cost-utility analysis of an early discharge and rehabilitation service compared with usual care</p> <p>High likelihood of cost savings but little or no incremental QALY gain (1)</p>	<p>Cost savings of approximately £600 per patient associated with early discharge and integrated care protocols for patients admitted to hospital with acute exacerbations of COPD (1)</p> <p>Cost consequence of community-based nursing for patients with Parkinson's disease showed initial cost increase while mean increase in cost over 2 years was £266 lower (1)</p>
N/R	N/R	N/R	N/R	<p>Evidence that collaborative care effective but usually more expensive (7)</p> <p>Highest cost per depression-free day \$24</p> <p>Cost-utility studies showed cost per QALY range from \$21 478 to \$49 500 (4)</p>	<p>Increment in intervention related costs (primary direct medical cost) ranged from \$519 to \$1,974 (3)</p> <p>Limited evidence (1) that travelling expenses greater for intervention group (\$1636 compared to \$1337)</p>

Reviews considered here assessed a wide range of interventions or initiatives that targeted a diverse group of people or populations, including:

- older people in the community who were considered frail (Oeseburg et al., 2009) or with (long-term) medical or social care needs (Tappenden et al., 2012), with specific chronic conditions such as heart failure (Phillips et al., 2004) or who were about to be discharged from hospital (Chiu & Newcomer, 2007);
- frequent users of emergency departments (Althaus et al., 2011), hospitalized patients (Simoens et al., 2011) or those about to be hospitalized (Shepperd et al., 2008);
- adults with dementia or memory loss (Pimouguet et al., 2010), with severe mental health problems (Smith & Newton, 2007) or who received mental health care services (Steffen et al., 2009);
- adults with specific chronic conditions such as pain (Brink-Huis, van Achterberg & Schoonhoven, 2008), depression (Neumeyer-Gromen et al., 2004; Gilbody, Bower & Whitty, 2006; van Steenbergen-Weijenburg et al., 2010), stroke (Langhorne et al., 2005), asthma (Maciejewski, Chen & Au, 2009), COPD (Steuten et al., 2009), diabetes (De Bruin et al., 2011) or a combination of these;
- populations with multimorbidity (Smith et al., 2012b).

None of the reviews identified by our searches explicitly defined ‘integrated care’ as the topic of review. The most common concepts or terms used included case management (Smith & Newton, 2007; Oeseburg et al., 2009; Pimouguet et al., 2010), care coordination (Langhorne et al., 2005; Chiu & Newcomer, 2007), collaborative care (Gilbody, Bower & Whitty, 2006; Brink-Huis, van Achterberg & Schoonhoven, 2008; van Steenbergen-Weijenburg et al., 2010) or a combination of these (Phillips et al., 2004; Shepperd et al., 2008; Steffen et al., 2009; Althaus et al., 2011; Smith et al., 2012b; Tappenden et al., 2012), alongside notions such as interdisciplinary care (Brink-Huis, van Achterberg & Schoonhoven, 2008) or seamless care (Simoens et al., 2011). Four reviews focused on disease management interventions, building on multicomponent approaches such as the Chronic Care Model (Neumeyer-Gromen et al., 2004; Maciejewski, Chen & Au, 2009; Steuten et al., 2009; de Bruin et al., 2011).

Initiatives or approaches studied frequently targeted the interface between hospital and primary care or community services, most often in the context of discharge planning or care transition (Phillips et al., 2004; Langhorne et al., 2005; Chiu & Newcomer, 2007; Steffen et al., 2009; Althaus et al., 2011; Simoens et al., 2011). Several reviews examined initiatives that sought to

coordinate primary care and community services, often, although not always, involving medical specialists (Gilbody, Bower & Whitty, 2006; Brink-Huis, van Achterberg & Schoonhoven, 2008; van Steenberg-Weijnenburg et al., 2010; Smith et al., 2012b) or extending further into social care services (Smith & Newton, 2007; Oeseburg et al., 2009; Pimouguet et al., 2010; Tappenden et al., 2012). The latter tended to target older people with multiple care needs, those with dementia or with mental health problems. However, it is important to note that, typically, reviews considered original studies that were set in different health and social care system contexts and which varied in their definitions of 'community services' or 'social care'. Therefore, it will be difficult to generalize the extent of integration across sectors from different studies.

For those reviews that examined disease management specifically it was difficult to determine the degree to which original studies from individual reviews would meet our working definition of 'integrated care'. At the same time, as we highlight in Table 2, the majority of reviews included here considered a wide range of approaches and only about half of primary studies included in individual reviews could be considered 'integrated care' in line with our working definition.

For example, Althaus et al. (2011) analysed initiatives seeking to reduce the number of ED visits by frequent users. Seven of the eleven studies reviewed involved some form of case management as a means to coordinate multidisciplinary care although the overall nature and scope of interventions varied. Similarly, Chiu & Newcomer (2007) examined nurse-assisted interventions intended to improve transition of elderly patients from hospital to other settings. Interventions varied in scope, with common elements including home visits and telephone contact, while one-third of studies involved liaison and coordination with the patient's physician and other care providers.

Reviews considered a wide range of health and economic outcomes. As noted earlier, we included health outcomes for completeness; however in the following we comment on economic outcomes only.

5.1 Utilization

Seventeen of the nineteen reviews reported impact on utilization (Phillips et al., 2004; Langhorne et al., 2005; Gilbody, Bower & Whitty, 2006; Chiu & Newcomer, 2007; Smith & Newton, 2007; Brink-Huis, van Achterberg & Schoonhoven, 2008; Shepperd et al., 2008; Maciejewski, Chen & Au, 2009; Oeseburg et al., 2009; Steffen et al., 2009; Steuten et al., 2009; Pimouguet et al., 2010; Althaus et al., 2011; de Bruin et al., 2011; Simoens et al., 2011; Smith et al., 2012b; Tappenden et al., 2012). The majority focused on hospital utilization as measured by (re)admission rates, length of stay or number of admission days, and ED visits. Impact on nursing home admissions was also

reported in two reviews of case management in dementia care (Pimouguet et al., 2010) and management of chronic illness among older or frail people (Oeseburg et al., 2009). Shepperd et al. (2008), in their systematic review of 'hospital at home', reported on referrals to social care. The studies that did not report on utilization were a review and meta-analysis of disease management (Neumeyer-Gromen et al., 2004) and a review and meta-analysis of collaborative care (van Steenberg-Weijnenburg et al., 2010), both targeted at adults with depression.

There was inconsistency in reporting on numbers and rates of admissions; however, when considered, the studies documented direction and whether or not an observed effect was statistically significant. Overall, findings tended to be mixed within each review, which makes it difficult to draw firm conclusions. For example, the review by Smith & Newton (2007) found that among six studies that analysed hospital admissions, two reported a decrease in the number of admissions with case management for mental illness, three reported no change and one an increase. However, the authors did not provide any further information as to the size of the change, where it occurred or the likelihood of observed changes being statistically significant.

Four meta-analyses pooled patient data (Phillips et al., 2004; Langhorne et al., 2005; Shepperd et al., 2008) or results across studies for utilization (Steffen et al., 2009). Of these, three examined early supported discharge or discharge planning and reported on readmission rates. Langhorne et al. (2005) did not find evidence of a significant change in readmissions in a study of early supported discharge for stroke patients, while Phillips et al. (2004), analysing data on discharge planning for older people with congestive heart failure, reported significantly lower readmission rates compared to usual care (relative risk (RR) 0.75; 95% CI 0.64, 0.88) as did Steffen et al. (2009) in their study of adult patients in mental health care (readmission to in-patient mental health; RR 0.66; 95% CI 0.51, 0.84). Shepperd et al. (2008) analysed studies of a 'hospital at home' service that sought to avoid admission to hospital; however, their meta-analysis of patient data pooled from five original studies found a non-significant increase in admissions (adjusted hazard ratio (HZ) 1.49; 95% CI 0.96, 2.33). It may be worth noting that their analysis also showed a significant reduction in mortality at six months among those receiving the intervention (adjusted HR 0.62; 95% CI 0.45, 0.87). Two meta-analyses also reported on length of hospital stay. Phillips et al. (2009) were unable to demonstrate significant change in length of stay with comprehensive discharge planning for congestive heart failure while Langhorne et al. (2005) reported a significant reduction in length of hospital stay for early supported discharge for stroke patients by, on average, 8 days.

As indicated above, there was limited evidence on nursing home admissions; evidence on case management suggested a beneficial effect on delaying admission to nursing home (Pimouguet et al., 2010) but evidence of impact on number of admissions was mixed (Oeseburg et al., 2009; Pimouguet et al., 2010).

Emergency room visits were commonly reported across systematic reviews (Chiu & Newcomer, 2007; Oeseburg et al., 2009; Steuten et al., 2009; Pimouguet et al., 2010; Althaus et al., 2011; de Bruin et al., 2011; Simoens et al., 2011). Where this measure was considered, the evidence tended to be weak. For example, Althaus et al. (2011), analysing interventions specifically targeted at frequent emergency room (ED) users, reported that only one out of three randomized controlled trials identified in their review showed a significant reduction in utilization among those receiving the intervention. In contrast, six of the eight before–after studies reported a significant reduction in ED use and one found a significant increase. However, these findings are difficult to interpret because they lacked a controlled design. Similarly, Steuten et al. (2009), in their review of chronic care programmes for patients with COPD, found only limited supportive evidence, reporting six controlled studies of which only two showed a significant reduction in ED use among those receiving the intervention. Overall, findings were commonly not quantified, making an overall assessment of the size of possible effects problematic.

5.2 Cost–effectiveness

Eight of the nineteen studies reported on cost–effectiveness (Neumeyer-Gromen et al., 2004; Gilbody, Bower & Whitty, 2006; Steuten et al., 2009; van Steenberg-Weijnenburg et al., 2010; Althaus et al., 2011; de Bruin et al., 2011; Simoens et al., 2011; Tappenden et al., 2012). Althaus et al. (2011) reported on one trial looking at case-management approaches, which found that targeting frequent hospital ED users was cost-effective because the intervention led to improved clinical and social outcomes at a similar cost to usual care. Based on three economic studies, Tappenden et al. (2012) concluded that while there was a high likelihood of cost savings associated with structured home-based, nurse-led health promotion for older people at risk of hospital or care home admission, one study suggested that there was little or no evidence of incremental QALY gain over usual care.

The remaining six studies reported quantitative findings, using cost per QALY as a measure of cost–utility. Two reviews that analysed studies of care approaches for people with depression also reported cost per depression-free day (Gilbody, Bower & Whitty, 2006; van Steenberg-Weijnenburg et al., 2010). Cost–effectiveness studies considered by reviews related to a wide range of initiatives; a common feature was the adoption of a health services perspective. Most evidence was for condition-specific approaches, focusing on

depression (four reviews) (Neumeyer-Gromen et al., 2004; Gilbody, Bower & Whitty, 2006; van Steenberg-Weijnenburg et al., 2010; de Bruin et al., 2011), COPD (two reviews) (Steuten et al., 2009; de Bruin et al., 2011), diabetes (one review) (de Bruin et al., 2011) and heart failure (one review) (de Bruin et al., 2011). With regard to depression, the reported incremental cost per QALY varied greatly within reviews but there was some similarity in the range across different forms of care approaches: disease management conceptualized on the basis of the Chronic Care Model (\$2518–66 686 per QALY) (de Bruin et al., 2011); enhanced primary care involving collaborative care models (£8190–19 483 per QALY; cost per depression-free day, £0.5–19) (Gilbody, Bower & Whitty, 2006); collaborative care (\$21 478–49 500 per QALY; highest cost per depression free day, \$24) (van Steenberg-Weijnenburg et al., 2010); and comprehensive disease management (\$9051–49 500) (Neumeyer-Gromen et al., 2004). The upper estimate of cost per QALY for disease management conceptualized on the basis of the Chronic Care Model for diabetes was similar to depression (\$34 238–69 027) but was considerably higher for heart failure (\$17 747–156 655) (de Bruin et al., 2011).

Steuten et al. (2009) undertook an assessment of cost-effectiveness based on societal willingness to pay. They concluded that disease management for COPD would be cost-effective (assuming a willingness to pay €30 000 per QALY) if incremental cost per patient did not exceed €7680 over their lifetime. Their study also provided illustrative examples of the short-term potential of disease management of COPD, with one example of a randomized controlled trial of home care of COPD patients in Australia (Hermiz et al., 2002). The trial reported a non-significant increase in hospital admissions of 27% and a reduction in ED visits. Using these figures, Steuten et al. (2009) estimated that home care may be cost-effective if the incremental cost was lower than AUS\$171.36 per patient per year. This means that to achieve a return on investment, savings generated would need to more than offset the additional costs of hospitalization.

Regarding non-condition specific interventions, Simoens et al. (2011) reported on the cost-effectiveness of medication management as part of seamless care for patients in transition between ambulatory and hospital care (€13 000 per QALY), although this was based on only one study within the review (Simoens et al., 2011).

5.3 Cost and/or expenditure

Seventeen reviews reported cost and/or expenditure data in some form (Neumeyer-Gromen et al., 2004; Phillips et al., 2004; Langhorne et al., 2005; Chiu & Newcomer, 2007; Smith & Newton, 2007; Brink-Huis, van Achterberg & Schoonhoven, 2008; Shepperd et al., 2008; Oeseburg et al., 2009; Steffen

et al., 2009; Steuten et al., 2009; Pimouguet et al., 2010; van Steenberg-Weijnenburg et al., 2010; Althaus et al., 2011; de Bruin et al., 2011; Simoens et al., 2011; Smith et al., 2012b; Tappenden et al., 2012). Reviews varied widely in the way they reported costs. In particular, as indicated in the methods section, original studies included in reviews tended to use terms that are conceptually different, such as cost, expenditure, cost saving and cost avoided interchangeably, which makes it difficult to draw comparisons by target area or intervention type.

Keeping these limitations in mind, most studies reported cost in terms of health-care cost savings resulting from the care initiative under review, most frequently in relation to hospital costs. Avoided costs or cost savings were typically derived from reduced hospital and emergency room utilization. There was some evidence of cost reduction in a number of reviews. However, findings were frequently based on a small number of original studies, or studies that used a before–after design without control, or both (Phillips et al., 2004; Chiu & Newcomer, 2007; Brink-Huis, van Achterberg & Schoonhoven, 2008; Shepperd et al., 2008; Steffen et al., 2009; Althaus et al., 2011; Simoens et al., 2011). Neumeyer-Gromen et al. (2004) and van Steenberg-Weijnenburg et al. (2010), both reporting on care approaches for depression, reported an increase in costs associated with the intervention, albeit with some evidence of lower cost per successfully treated patient. Oeseburg et al. (2009), in their review of studies of case management for frail older people or those with chronic illness, distinguished between costs accruing to nursing homes, hospitals and community health services but found the evidence to be inconclusive.

When reported quantitatively, costs were commonly reported as cost per patient or cost per day or month. One study reported cost savings as a percentage, with a median saving of 20% (range 4–30%) associated with early supported discharge for stroke (Langhorne et al., 2005). Philips et al. (2004) highlighted the impact of health system setting on costs, demonstrating how pooled cost differences for comprehensive discharge planning for heart failure patients ranged from -\$359 compared to usual care in non-US based trials to -\$536 in US trials. Tappenden et al. (2012), in a review of structured home-based, nurse-led health promotion, further highlighted the importance of differentiating between initial and longer term costs. Thus, they reported how a community-based nursing programme for patients with Parkinson's disease had initially increased costs in the intervention arms, but over two years costs were lower.

6 Discussion

In this report we have reviewed the recent evidence base on the economic impacts of care initiatives that can broadly be considered under the heading of 'integrated care'. We show that the evidence was rather mixed and overall

very difficult to interpret. This is perhaps not surprising, given the range of approaches and target groups considered.

Before discussing our observations in further detail it is important to consider some of the limitations of the review presented here. One main limitation is that our study includes reviews only. We did not formally assess the reviews for quality although we only considered those that quality assessed the original studies in individual reviews. However, basing our evidence review on existing systematic reviews and meta-analysis implies that, of necessity, we have had to rely on authors' reporting of the original studies. This limits objective assessment in particular where observations from original studies were not quantified. We noted above how reviews tended to report qualitatively on selected measures such as utilization or cost, noting for example 'significant change' without documenting actual effect sizes and confidence intervals; this makes it difficult to independently evaluate reported findings. A related limitation is that even the most recent reviews will not reflect original work published over the past 12 months or so, which might have given additional insights into our review. However, this was not possible within the time available for this work.

More importantly perhaps, we note how none of the reviews explicitly defined 'integrated care' as the topic of review. Reviews considered here studied a wide range of very varied interventions and care approaches. These included elements of integration but of varied complexity that were then subsumed under a broad label such as, for example, case management (Oeseburg et al., 2009; Pimouguet et al., 2010; Althaus et al., 2011). Individual care approaches were not necessarily equivalent or comparable in the nature and degree of integration, the type of service model, or the health system context within which they were embedded, as highlighted earlier. Therefore, it is difficult for us to draw conclusions on the potential differential impacts of approaches evaluated in individual studies. While this can be seen as a reflection of the 'polymorphous nature' of the concept of integrated care, it also means that all-encompassing conclusions will be difficult to draw. This challenge has been highlighted by others. For example, in a recent commentary on the review by Pimouguet et al. (2010) of dementia case management, Koch et al. (2012) noted how different understanding and interpretation of what constitutes case management will make drawing conclusions of primary studies problematic. These concerns echo those reported by Ouwens et al. (2005) and others. Thus, it remains a challenge to interpret the evidence from existing primary studies, which tend to be characterized by heterogeneity in terms of the definition and description of the intervention and components of care.

Furthermore, it is important to highlight that our discussion has centred on economic impacts of studies that have evaluated integrated care approaches.

However, this evidence needs to be set in the context of health and other outcomes of the interventions, which we have not specifically discussed here. This will be particularly important where evaluations of individual interventions show an increase in cost while reducing, say, mortality. In order to interpret these findings it is important to consider the context in which they have been observed.

Previously we have argued how the interpretation of evaluation findings has to be placed in the broader context of programme implementation specifically and issues around evaluation generally (Nolte et al., 2012). For example, where an evaluation finds improvements in health outcomes but not in economic impacts, this might be because the period of evaluation was not sufficient to demonstrate economic gain. Likewise, an evaluation might find that a given care approach improved outcomes for a subgroup of participants only; this might indicate that the intervention was suboptimal or not sufficiently targeted at those who would benefit most. Also, intervention effect will differ by target population and, importantly, the setting, in particular where initiatives involve a complex interplay of different actors as in integrated care approaches.

Against this background, and with a focus on economic impact, it is particularly important to understand the quality of the available evidence in order to 'make sense' of the substantial variation in findings on utilization and costs. Several reviews assessed here highlighted the quality of existing economic evaluations as the main impediment to arriving at a robust evidence base that is suitable to inform decision making. For example, Tappenden et al. (2012), in their review of home-based, nurse-led health promotion in the UK identified only a small number of economic studies that varied widely in terms of methodological approach and measures of impact chosen. We have noted above how Althaus et al. (2011), reviewing initiatives targeted at frequent users of the emergency department, had to rely on before–after studies without appropriate control, thus reducing the ability to attribute observed cost reductions to the actual intervention. While lack of a comparator to enable attribution of impact is problematic in itself, Chiu et al. (2007) further highlighted the added challenge of suitability of study design. For example, in their review of nurse-assisted case management to improve hospital discharge, six of eight studies that reported non-significant findings with regard to readmission rates were based on samples of fewer than 100 people per group or lower than 90% retention rates. Likewise, de Bruin et al. (2011), in their systematic review of chronic care interventions, reported how studies varied substantially with regard to the economic evaluative approach adopted, the type of health-care costs and cost categories considered, alongside lack of reporting on reliability of estimates, highlighting the need for higher quality studies.

Reviewing economic evaluations of collaborative care models for depression in primary care settings, Gilbody et al. (2007) also noted that none of the 11 studies eligible for inclusion in their review considered costs beyond the actual health-care system, such as unemployment benefits or lost earnings as a consequence of illness. This may be an important point to consider as interventions targeted at depression tended to be associated with higher costs (Neumeyer-Gromen et al., 2004; van Steenbergen-Weijenburg et al., 2010), which might be offset when considering the wider societal costs associated with depression in the working-age population.

However, beyond the specific challenges posed by the nature and quality of the existing research evidence as it relates to economic outcomes, there is the broader question as to whether the concept of 'integrated care' lends itself to evaluation in a way that would allow for clear-cut or definitive evidence, given its polymorphous nature. Indeed, if we interpret integrated care initiatives in the context of complex health and social care needs as a means to improve outcomes by overcoming fragmentation through linkage or coordination of services along the continuum of care, related initiatives will have to be targeted to the needs of a given population, which in turn will be highly context dependent. Therefore, while it may not be possible to generate clear-cut evidence as to the effectiveness of diverse and complex programmes such as integrated care, there is potential for transferable lessons to be learned across different studies to identify core elements that will support better outcomes.

Also, to support this process, there may be a need to revisit the way in which evidence is being generated in the field of integrated care to advance our understanding of 'what works'. At the core remains the clear definition of what constitutes effectiveness (or 'success') and, perhaps more critically, the hypothesized mechanism(s) of expected effect(s), which requires good theoretical understanding of how the intervention causes change and of the links within the causal chain (Craig et al., 2008). Much of the available evidence on outcomes rests on explicitly quantitative methods. However, as Cretin, Shortell & Keeler (2004) have suggested in the context of chronic care, the complexity and variability of related interventions and programmes calls for the use of mixed-method research methods. While there is an increasing body of work in this field, there is relatively little research on methodological, analytical or conceptual aspects of the use of qualitative approaches in the evaluation of complex care programmes. Recently, there has been a move towards emphasizing 'realistic evaluation' (Pawson & Tilley, 1997), which uses pluralistic quasi-experimental methods for evaluating complex interventions with high contextual influence, such as integrated care. Realistic evaluation involves understanding what works for whom under what circumstances, and places equal emphasis on external validity, generalizability and cumulative learning.

There may also be a need to revisit our understanding of what integrated care is. Earlier sections of this paper have provided an overview of different ways of conceptualizing integrated care. Fundamentally however, it is important to come to an understanding as to whether integrated care is an intervention that, by implication, ought to be cost-effective and support financial sustainability, or whether it is a complex strategy to innovate and implement long-lasting change in the way services in the health and social-care sectors are being delivered and that involve multiple changes at multiple levels. Evidence presented here and elsewhere strongly points to the latter, and initiatives and strategies underway will require continuous evaluation over extended periods of time that will enable assessment of their impacts on both economic and health outcomes. This will mean investment in research alongside support of the development and implementation of integrated care initiatives to ensure that evaluation will inform service development in particular (Goodwin et al., 2012) if we are to generate appropriate conclusions about programme effectiveness and the application of findings to inform decision-making.

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9. Matching form to function: designing organizational models to support knowledge brokering in European health systems
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10. Addressing needs in the public health workforce in Europe
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