Health benefits for health and social care clients attending an Integrated Health and Social Care day unit (IHSCDU): a before and after pilot study with a comparator group

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Sources of Funding. Hywel Dda Health Board Wales UK.
Conflicts of Interest. No conflicts of interest have been declared.

Abstract
It is thought that integrating health and social care provision can improve services, yet few evaluations of integrated health and social care initiatives have focused on changes in clinical outcomes and used comparator groups. The aim of this pilot study was to identify whether attendance at an integrated health and social care day unit (IHSCDU) affected selected
outcomes of functional mobility, number of prescribed medications and physical and psychological well-being. A secondary aim was to examine the utility of the tools to measure these outcomes in this context; the feasibility of the recruitment and retention strategy and the utility of the comparator group. A before-and after comparison design was used with non-randomised intervention and comparator arms. The intervention arm comprised 30 service users attending the IHSCDU and the comparator arm comprised 33 service users on a community nursing caseload. Measures of functional mobility (Barthel’s Index) and physical and psychological well-being (SF-12®) were taken from all participants in both arms at three data collection points: baseline, four and nine months later, between November 2010 and September 2012. Participants and outcomes were identified prospectively and in both arms, the individual was the unit of assignment. No significant changes were noted in functional mobility and psychological well-being and the number of medications prescribed increased in both arms. There was a trend towards a significant difference between study arms in the change in the SF-12® physical health outcome measure and this outcome measure could be usefully explored in future studies. The recruitment and retention strategy was feasible although our comparator group had some limitations in not being closely matched in terms of age, functional mobility and mental wellbeing.

Keywords (6) Integrated health and social care. Pilot study. Outcomes. Physical well-being. Barthel’s Index. SF-12®

What is known about this topic

- Integrating health and social care remains a significant aspect of the international and UK policy agenda.
- Integrated health and social care provision is thought to provide benefits for service users and the service.
There is concern that evaluations of integrated care initiatives do not focus on clinical outcomes.

**What this paper adds**

- Using SF-12® as a measure of physical well-being offers potential for future studies in this area.
- The comparator group were less well than the unit attendees and the background population, indicating that future work to determine the effectiveness and efficacy of integrated care requires a randomised design.

**Introduction**

This paper reports a pilot study to identify changes in selected outcome measures for older adults attending an integrated health and social care day unit (IHSCDU), compared with older adults on a community nursing caseload. The IHSCDU offered a range of health and social care interventions for adults provided by an on-site multi-disciplinary team in South Wales, United Kingdom (UK). The aim of the study was to identify whether attendance at the unit affected selected outcomes of functional mobility, number of prescribed medications, physical and psychological well-being. As a pilot study, a secondary aim was to examine the utility of the tools to measure these outcomes in this context; the feasibility of the recruitment and retention strategy and the utility of the comparator group.

**Background**

*Defining integrated care*

Integrated care is considered key to the development of efficient, effective and user-focused responsive services, internationally (Béland *et al.* 2006) and in the UK (Brown *et al.* 2003, Williams 2012). There are many models and several definitions of integrated care with not all authors clarifying what is involved and how this differs from inter-professional working.
The World Health Organization (WHO) defines integrated care as:

‘The management and delivery of health services so that clients receive a continuum of preventive and curative services, according to their needs over time and across different levels of the health system’ (WHO 2008 p.1).

The ‘idea’ of integration is to combine components, for example health and social care provision, into a single whole service with the aim of optimising care (Goodwin 2013). This might involve integration within health care systems such as the UK National Health Service (Shaw et al. 2011) or integration between different services such as health and social care (Cameron et al. 2012). As Shaw et al. (2011) describes, integration refers to all the tools, for example integrated care pathways; methods, such as shared systems of administration and processes, such as inter-professional working which may be required to provide and deliver integrated care. Furthermore, for successful integrated care provision, the service user and patient perspectives need to be a central focus in order that the integrated care provision achieves the goal of optimising care (Shaw et al. 2011).

Regardless of the various definitions and models of integrated care, it is possible to discern similar aims. These include better co-ordination of services, bringing care closer to the service user to provide continuity of care and more preventative care. Another aim is to identify and support those with the greatest needs thus reducing the need for hospital admissions (RAND Europe & Ernst Young 2012 p. iii).

Benefits of integrated care provision

If the above aims are achieved then there should be benefits for both the service user and the service. It was envisaged that integrated care would improve patient outcomes, reduce costs,
be more effective and efficient, and facilitate service user involvement in the planning of care to meet their own needs (Woods 2001, Shaw et al. 2011). Communication between agencies would be improved, services would be rationalised to avoid duplication and access for users to services would be increased. Unnecessary hospital admissions could be prevented (Sands et al. 2006, Young & Forster 2008) and individuals who are reliant on complex support could remain at home. In the international literature, those groups with complex needs such as older people and those with disabilities were seen as particular beneficiaries of integrated health and social care provision (Johri et al. 2003, Beland et al. 2006).

However, the variation in definitions and models of integrated care, client groups, types of interventions provided, the tools and different outcomes selected make conclusions as to the effectiveness of integrated care difficult (Armitage et al. 2009, Eklund & Wilhelmson 2009, Robertson 2011, Tivedi et al. 2013, Valentijn et al. 2013). A systematic review of the effectiveness of inter-professional working for older adults in community settings concluded that the evidence base for effectiveness including cost effectiveness were weak (Tivedi et al. 2013). Additionally, an evaluation of the English Integrated Care Pilot programme indicated that although staff felt there were improvements in the process of care giving, patient experience had not improved and there were limited improvements in clinical effectiveness and cost of services (RAND Europe & Ernst Young 2012). However, it is considered that inter-professional working and integrated care can have a positive effect on patient outcomes, improve care processes and help to reduce the use of hospitals and other forms of institutional care (Johri et al. 2003, Beland et al. 2006, Eklund & Wilhelmson 2009, Tivedi et al. 2013).

**The Welsh policy framework**

In this study, the integrated care provision was a purpose built integrated health and social care day unit established in 2007. It aims to offer support enabling adults to ‘remain within the community, in their own homes, living as independently as possible supported by local
services. Support is tailored to meet individual needs by the multi-disciplinary team of health and social care professionals who work collaboratively’ (Operational Policy Document 2009 p.3).

This is an example of integrated care provision which is close to that described by Rosen et al. (2011) in which characteristics of co-ordination and standardisation of care to individuals by a multi-professional team are evident. The unit operates within a wider strategic policy context in which the Welsh Government acknowledged the need for world class health and social care by 2015; this depends on effective partnership working with local government and voluntary organisations (WAG 2009, 2010, 2013). Although there is no single policy related to integrated care in Wales, it appears in several policy documents (Ham et al. 2013). For example, the Welsh National Service Framework for Older People (WAG 2006) emphasised that health and social care providers must ensure that services and care provision are person-centred, accessible, non-discriminatory and equitable. Similar national guidance was issued to Social Services (WAG 2007, 2011) identifying the need for collaborative services for all sectors of society and age groups to be developed towards the same principles of accessible, equitable and person-centred services. This was actioned within the local health board which has a commitment to integrated approaches to service delivery (SSIA & NLIA 2011). Thus there is joint funding between health and social services to finance this integrated care initiative. The unit provides integration between health and social care provision in a single location and offers integrated care in which the individual’s needs are assessed and both health and social care interventions provided.

Integrating care therefore has been a significant part of the international and UK policy agenda and has been characterised by numerous initiatives (Robertson 2011). As Ham et al. (2013) and Tivedi et al. (2013) note, there has been a lack of rigorous evaluations of integrated care initiatives especially in the UK. This is supported by the Nuffield Trust (Shaw
et al. 2011) in arguing, that evaluations should focus on patient outcomes and furthermore such evaluations should compare the intervention with a comparator group (Cameron et al. 2012).

Methods
This was a before-and-after comparison pilot study with non-randomised intervention and comparator arms. Participants and outcomes were identified prospectively (Higgins et al. 2011) and in both arms the individual was the unit of assignment.

Participants and setting
The study was conducted in a predominantly rural, community setting in South West Wales UK. This was an opportunistic sample in which the non-randomised intervention arm comprised all adults admitted to the IHSCDU between November 2010 and September 2012 who met the inclusion criteria detailed below. Participants were recruited by the unit staff. The comparator arm comprised service users of similar age and geographical location receiving community nursing services. The comparator arm participants were identified from community nurses’ caseloads in the same geographical area and recruited by the community nurses in their own homes.

The inclusion criteria for both arms were: aged over 18, willing and able to give informed consent and physically and psychologically fit enough to tolerate assessment using the data collection tools as assessed by the admitting health professional. Individuals on the intervention arm had to attend the unit at least one day a week and those on the comparator arm had to receive at least one visit a week from the community nursing services. Individuals who did not meet these criteria were excluded.

In the intervention arm those anticipated to be attending the unit for less than ten months were excluded. In the comparator, community nursing arm those receiving palliative care or were on the community nursing caseload for less than ten months were excluded.
In both arms it was not possible to blind individual participants or those collecting the data as to arm allocation. As this was an exploratory study, no formal sample size calculation was considered necessary (Thabane et al. 2010).

*Ethical considerations*

The proposal was reviewed and a favourable opinion received by the Local Health Board research governance procedures and the UK National Health Service Local Research Ethics Committee. Informed, written consent was obtained from participants in both arms. Within the relevant Health Board, permission was obtained from the Clinical Governance and Audit Committee and the Health and Social care Joint Management Board. Senior nurse managers in the community nursing service were approached and permission granted to access the community nurses. No monetary incentives to participate were offered. We acknowledge that, as in much practitioner-led research, some participants and patients may have felt obliged to participate as the request came from members of their healthcare team. It was emphasised however that all participants could refuse to opt in, could opt out at any time and that this would not affect their care.

*Intervention*

The intervention was admission to a purpose built health and social care day facility to receive services provided there by a multi-disciplinary team of health and social care professionals: nurses, doctors, social workers, physiotherapists and occupational therapists. Referral routes were *via:* the individuals themselves, their families or health and social care professionals, such as general practitioners and social workers. Reasons for referral were that the individual required short term (less than 18 months) therapeutic support to live independently. Individuals were assessed by the unit staff as to their suitability to attend the unit for a minimum of one day per week between 9am and 4pm.
On admission, a comprehensive initial assessment of the client was carried out by a health professional. Depending on the needs identified, the client had access to an individually tailored programme of interventions. These could include assistance with activities of daily living such as personal cleansing, hair care, mobility and elimination, occupational therapy and physiotherapy as well as other nursing and social work interventions. If more specialist referrals were required such as to specialist nurses, dieticians, audiologists and podiatrists then this was actioned. A general practitioner visited the unit at least once weekly.

The interventions provided depended on the client’s individual needs, however optimum nutrition was emphasised for all. All clients received a two course lunch plus nutritious snacks in-between. If baseline weight and BMI were considered too low, clients were weighed at regular intervals and encouraged to eat the lunch and snacks provided. There was also awareness of the adverse effects of social isolation (Banerjee et al. 1996, Davey et al. 2005) and thus the unit offered a programme of activities such as music groups, choirs, bands, quizzes, bingo, raffles, shopping project, cooking groups, crafts and gardening. Social and calendar events such as Easter, Valentine’s Day, Royal Ascot, Wimbledon, Christmas and special events such as Royal Weddings were celebrated in the unit.

Clients could choose to participate in these if they wished and all attending had contact with staff and other attendees. No specific incentives to attend were offered but in keeping with normal practice, transport was provided.

The comparator group were those patients on a community nursing caseload. Community nurses provided nursing assessments and appropriate nursing interventions and could also action referrals to other health and social care agencies if required. The number and frequency of visits made by the District Nursing team depended on the patient’s health care needs. These might include three monthly visits to check bloods or more regular visits to
review medications and changes in the patient’s physical and psychological health. If necessary, the district nurse might refer to specialist services such as review of anticoagulation therapy and continence management.

**Objectives and outcome measures**

The primary aim was to identify whether attendance at the unit affected selected outcomes of functional mobility, number of prescribed medications and physical and psychological wellbeing. The primary outcome measures were changes in functional mobility (Barthel’s Index), changes in the physical health and mental health component scores on the SF-12® measure and number of prescribed medicines.

These outcomes were selected as preparatory, exploratory work with the staff of the unit identified that in their clinical judgement attendance at the unit could affect participant’s physical mobility, their mental health and their overall physical well-being.

As a pilot study is helpful in testing aspects of the design for a larger study (Arain et al. 2010), a secondary aim was to examine the utility of the selected tools to measure these outcomes in this context; the feasibility of the recruitment and retention strategy and the utility of the comparator group.

The tool used to ascertain functional mobility was the modified Barthel Scale [version 2. January 2009] (Mahoney & Barthel 1965), considered a reliable tool in the measure of functional ability (Collin et al. 1988, O’Sullivan et al. 2014) and is considered a reasonably reliable and valid indicator of the efficacy of rehabilitative treatment interventions in older adults (Bruun et al. 2014).

The tool to ascertain physical and psychological wellbeing was the SF-12® Health Survey [version 1.0]. The SF-12® Health Survey is a short form multi-purpose survey with 12 questions, designed to identify physical and psychological well-being and health related quality of life (Welsh Health Survey 2012). The SF-12® generates two summary scales
(physical and mental health), which have similar scoring systems (Singh et al. 2006). The scores range from 0 to 100, where the higher the score the higher the level of health. The SF-12® is a shortened version of the SF-36 and its utility in different clinical scenarios has been discussed (Rubenach et al. 2002, Müller-Nordhorn et al. 2004, Singh et al. 2006). As in other studies, the SF-12® interview followed the standardised format (Ware et al. 1998, Jordan et al. 2006).

In addition, baseline physiological observations of blood pressure (BP) and body mass index (BMI), diagnoses and prescription items which were part of the routine admission process were recorded along with limited demographic information such as age, gender, smoking habits and whether participants lived alone. Data on outcomes such as hospitalisation, new serious illness and prescribed medications were also collected.

Data were collected from all available participants in both arms at three time points: at baseline, four months and nine months. For the intervention arm, baseline was when the participant first started to attend the unit. For the comparator arm, baseline was at the beginning of the study from November 2010.

SF-12® population data for the relevant county and the whole country were available from the Welsh Health Survey by personal communication (Griffiths 2012). The quality of life outcome measures (SF-12®) of both study arms were compared with population norms using ExcelTM Tables and internet software (Uitenbroek 1997).

Analysis

Data were entered into IBM SPSS Statistics Version 19 (IBM Corp., 2010). Initial data entry was checked by double data entry and extreme values explored against recorded data.

Since the participants were not allocated at random, baseline comparisons were undertaken (Roberts & Torgerson 1999) (Table 1). For each participant, differences in key variables (SF-
12®, Barthel’s Index, and number of prescribed medicines) between start and completion of the intervention (baseline and 9 months) were calculated as summary measures, and tested for distribution with the Shapiro-Wilk test (Altman 1991). Effect at end of study was taken as a measure of efficacy (Altman 1991). Findings were treated as distribution-free ordinal data and subjected to non-parametric tests, as these are as effective in detecting genuine differences as their parametric equivalents. Analysis was repeated using parametric tests. Effect sizes were calculated in Excel using standard formulae (Pallant 2013). Equivocal findings were checked using repeated measures ANOVA and examining the differences between baseline and four months, and between four and nine months. SF-12® scores were compared with population norms. We did not impute missing data. Analysts were blinded as to study arm allocation.

Results
In the intervention arm, of the 48 unit service users who met the inclusion criteria, 30 agreed to participate. During the same time period in the comparator arm, 33 patients on the community nurses’ caseload participated (Figure 1). Typically, clients attended at least once a week.

No adverse events attributable to the intervention were reported.

Participant flow
Twenty seven of the 30 intervention participants and 25 of the 33 community nurse participants were retained at nine months (Figure 1).

Insert Figure 1 here

Baseline data
Variables were normally distributed at baseline, with the exception of Barthel’s Index scores, numbers of clinical problems and prescribed medicines.
At recruitment, there were significant differences between intervention and comparator arms in: age, SF-12®, mental health score, and Barthel Index scores. There were no statistically significant differences in other variables, including smoking, living alone, prescriptions and physical health score. In the intervention arm, 11/30 (36.7%) were male, similar to the comparator arm, 10/33 (30.3%) (Table 1).

Insert Table 1 here

Functional mobility

Barthel Index scores for the intervention arm were high at baseline, leaving little room for improvement over the subsequent points in data collection (Table 2). The Barthel Index scores for the comparator arm were lower than the intervention arm at baseline and failed to significantly improve over the course of the nine months (baseline mean 13.58 SD 4.71; four months mean 13.52 SD 5.05; nine months mean 13.80 SD 4.90) (Table 2). Insert Table 2 here
The changes between baseline and nine months were not normally distributed. No significant differences were identified for changes in total Barthel’s Index score (Table 3).

Insert Table 3 here

Physical well-being

Weight and BMI

The mean weight (kg) at baseline for the intervention arm (76.37 [SD 21.86]) decreased at four months (75.87 [SD 22.49]), before increasing at nine months (77.99 [SD 22.00]). A similar pattern was observed for the comparator arm (Table 2).

Clinical problems and prescribed medications

The number of current clinical problems for both arms remained stable, reflecting their chronic nature (Table 2).

The number of medicines prescribed increased in both arms between baseline and nine months (Table 3). This increase was significant (Wilcoxon Signed rank test: z = -2.63,
p=0.009, r = -0.38). The change in number of prescribed medicines was not normally distributed and was more marked in the comparator, community nurse arm, but the difference between arms did not reach statistical significance (Table 3).

**SF-12® scores**

In both arms, the changes in SF-12® physical composite scale (pcs) scores were normally distributed allowing t tests to be used to compare changes. The changes in the mental health composite scale (mcs) scores were not normally distributed in the comparator arm. There were no statistically significant differences between baseline and four months and four months to nine months (data not shown). When the changes in pcs between baseline and nine months were compared, a t test indicated a borderline significant difference between the arms (mean difference 5.31, 95%CI 0.01-10.60), and a small effect size. However, non-parametric tests (Table 3) and repeated measures ANOVA indicated a borderline significant trend (Wilks’ lambda 0.90 F 2.41 [2, 46] p 0.10). While pcs improved a little in the intervention arm, it deteriorated in the comparator arm, widening the difference (Table 2).

**SF-12® mcs changes** in the 2 arms were not significantly different (Table 3).

The pcs scores of both arms were significantly lower than those of the populations of Wales (all ages and over 65), and the relevant county. The mcs scores of the community nursing caseload were significantly lower, while those of the intervention arm were comparable (Table 4).

Insert Table 4 here

**Discussion**

It has been recognised that there is a lack of rigorous evaluations of integrated care initiatives especially in the UK (Ham *et al.*2013, Tivedi *et al.*2013). Furthermore, it has been recommended that evaluations of such initiatives should focus on patient outcomes (Shaw *et
al. 2011) and comparisons made between intervention and comparator groups (Cameron et al. 2012). This pilot study was designed therefore to address these two issues in identifying outcomes and selecting a comparator group. In designing the pilot study we also wished to test the tools used for their utility, the feasibility of the recruitment and retention strategy and the utility of the comparator group (NETSCC 2015).

In terms of outcomes, changes were examined in a number of parameters and found a trend towards a difference between the two arms in the change in the SF-12® physical health outcome measure. Despite no differences at baseline, there was a small improvement in the intervention arm but the comparators declined. The community nursing patients, the comparators, were slightly older, of lower functional mobility at baseline, and had poorer mental health scores than both the intervention participants and the local and national population. The finding that there was a trend towards a significant difference between study arms in the change in the SF-12® physical health outcome measure during the 10 months of the study gives some indication that this is an outcome measure that could be explored in future studies.

A component of physical well-being is optimum body weight. The BMI and weight of all the participants increased over the duration of the study. In the UK there was concern that older adults are not receiving adequate nutrition (DOH 2010). Thus those assessed by the nurses as being at nutritional risk as indicated by low weight, were subject to appropriate referral and intervention by both the IHSCDU staff and the community nurses, which may explain the parallel increase.

The number of medicines prescribed increased in both arms. As noted elsewhere (Jordan et al. 2014), the presence of nurses in the IHSCDU may have meant that unresolved and long standing health problems were identified and referred to the general practitioner on site. This may have accounted for the increase in prescribed medications. The alleviation of health
problems by appropriate interventions including pharmacotherapy may also have contributed to the maintenance in physical well-being. Despite the intervention arm having more current clinical problems noted, the community nurses’ patients had more prescribed medicines and devices throughout. This may reflect their regular contact with their community nurses, and their greater need to access equipment for maintaining continence and wound care dressings.

The outcome of functional mobility as measured by the Barthel Index tool was less clear as over the nine months there were no significant differences in the changes in the aggregated Barthel scores. Brown et al. (2003) in evaluating integrated health and social care teams for older adults, also found little difference in functional ability between those receiving integrated health and social care and a comparator group. More broadly, in terms of overall activities of daily living including mobility, Montgomery & Fallis (2003) also indicated no overall improvement. In contrast, Bernabei et al. (1998) noted a significant difference between the intervention (integrated social and medical care) and the control group (conventional care) in terms of their functional ability. These differences in findings might reflect the difficulties in comparing different models of integrated care provision and also reflects the fact that in this study the intervention group had relatively high Barthel Index scores to begin with.

Psychological well-being as measured by the mental health dimension of the SF-12® did not change in those attending the unit over the nine months. The mean mental component summary score on the SF-36 for Wales is 49.7[10.5] with the region under study having a slightly higher age-standardised score (Public Health Wales Observatory 2012). With age, scores fall on the physical health component scores and rise on the mental health component.
scores (Utah Department of Health 2001); although only the former is observed in Wales (Public Health Wales Observatory 2012).

Pilot studies can be used to see whether all the parts of a proposed study will work (NETSCC 2015). The recruitment and retention strategy in both the intervention and comparator arms appeared to be workable. In terms of recruitment, participants were approached by members of their healthcare team and this appeared to be a reasonable strategy as in the intervention arm 30 of the 48 participants approached agreed to participate and 33 of the 37 participants in the comparator arm agreed. The numbers of participants retained throughout the duration of the study was also good. Over the 10 month period 27 from 30 in the intervention group and 25 of the 33 in the comparator group remained until the end of the study. The main reasons for non-participation were that the participant had died or had been hospitalised. Although the comparator arm was recruited and was well matched in terms of geographical location, respondents were not individually matched: they differed in terms of age, Barthel Index score and mental health scores, and low numbers precluded multivariate analysis. The comparator arm usefully illustrated the tendency for physical health to decline and weight to increase, but the low Barthel Index Score and SF-12® mental health scores indicated that patients on the community nursing caseload had decreased mobility and psychological wellbeing compared to the intervention group and population norms. Those attending an integrated health and social care service deteriorated less than a comparator group of district nurses’ patients. These differences between the intervention arm and the comparator arm highlighted the limitations of using patients from a community nursing caseload as a comparator group. The comparator group were less well than the unit attendees and the background population,
indicating that future work to determine the effectives and efficacy of integrated care requires a randomised design.

**Limitations**

Limitations of this pilot study preclude any claims that the intervention made a difference. Key outcomes were identified but it is acknowledged that the interventions provided to individuals were not standardised because they were designed to meet the individual needs of the participant. This meant we could not fully isolate the factors which may or may not have made a difference. Those attending the unit might have received not just one intervention but several and from several different members of the multi–disciplinary team, therefore the research design might not have captured the complexity of the intervention (Campbell *et al.* 2000). A mixed method approach by adding in a qualitative component in which participant and staff experiences and perspectives could be identified would have added an extra dimension to the evaluation, but would have required further funding (Ritchie *et al.* 2013).

In addition, the study was designed as a single site, exploratory study of volunteers and thus findings might not be generalisable to other settings or those less willing to engage with nurses (Jordan *et al.* 2013). Population comparisons suggested that the sample had relatively poor physical health, limiting generalisability outside the restricted population of those receiving services. The sample size was also too small to detect all but large differences.

**Conclusion**

The drive to provide integration between health and social care provision is topical and there remains a need to evaluate clinical outcomes in those receiving care from integrated health and social care programmes. This pilot study evaluated those attending an IHSCDU unit on four main outcomes, functional mobility, number of prescribed medicines, physical well-being and psychological wellbeing. A comparison between an intervention and a comparator
arm was used. Physical well-being improved slightly in those attending the unit, whilst it deteriorated in the comparator arm. A focus on physical well-being using the SF-12® offers potential in future studies. The recruitment and retention strategy appeared feasible although the use of a comparator group drawn from a community nursing caseload although useful in part had some limitations. The limitations of the study design in evaluating such a complex intervention are acknowledged.

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Figure 1. Participant flow chart

INTERVENTION ARM
Attending unit n=207

Meet inclusion criteria n=48

Consented n=30

Baseline n=30

Four months n=29

1 residential care

Nine months n=27
(24 completed SF-12® [1 client had stopped attending, 1 declined, 1 information was incomplete])

COMPARATOR ARM
On community nursing caseload n=74

Meet inclusion criteria n=37

Consented n=33

Baseline n=33

Four months n=29

3 deceased
1 residential care

2 deceased
2 hospitalised

Nine months n=25
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<th></th>
<th>Comparator (n=33)</th>
<th>Intervention (n= 30)</th>
<th>t (df)</th>
<th>P value</th>
<th>Mean Difference (95% CI)</th>
<th>Standard error</th>
<th>Effect size, as eta squared*</th>
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<td>134.47 [22.74]</td>
<td>0.59</td>
<td>0.56</td>
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<td>Comparator (n=33)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Mental health component score</strong></td>
<td>Comparator (n=33)</td>
<td>42.37 [13.47]</td>
<td>-2.04</td>
<td>0.05</td>
<td>-6.14 (-12.18-0.11)</td>
<td>3.02</td>
<td>0.064</td>
</tr>
<tr>
<td>Intervention (n= 30)</td>
<td>48.52 [10.05]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of current clinical problems</strong></td>
<td>Comparator (n=33)</td>
<td>3 [2-3]</td>
<td>28.9</td>
<td>393.0</td>
<td>-1.71</td>
<td>0.09</td>
<td>0.21 (0.04)</td>
</tr>
<tr>
<td>Intervention (n= 30)</td>
<td>3 [3-3]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of medicines prescribed</strong></td>
<td>Comparator (n=33)</td>
<td>10 [6-15]</td>
<td>34.6</td>
<td>377.0</td>
<td>-1.44</td>
<td>0.15</td>
<td>0.18 (0.03)</td>
</tr>
<tr>
<td>Intervention (n= 29)</td>
<td>7 [6-10.5]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Comparator (n=33)</td>
<td>69.85 [57.44-88.91]</td>
<td>31.5</td>
<td>479.0</td>
<td>-0.22</td>
<td>0.83</td>
<td>0.28 (0.08)</td>
</tr>
<tr>
<td>Intervention (n= 30)</td>
<td>71.65 [56.35-92.50]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td>Comparator (n=33)</td>
<td>25.76 [22.83-34.50]</td>
<td>29.8</td>
<td>422.0</td>
<td>-0.58</td>
<td>0.56</td>
<td>0.07 (0.01)</td>
</tr>
<tr>
<td>Intervention (n= 28)</td>
<td>27.38 [24.87-33.06]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barthel Index scores</td>
<td>Comparator (n=33)</td>
<td>16 [9.5-17.0]</td>
<td>24.4</td>
<td>244.0</td>
<td>-3.48</td>
<td>&lt;0.001</td>
<td>0.44 (0.19)</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------</td>
<td>---------------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-----------</td>
</tr>
<tr>
<td>Intervention (n=30)</td>
<td>18 [15.75-20.00]</td>
<td>40.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*effect sizes: large = 0.14; medium = 0.06; small = 0.01 Calculated in Excel™ using the equation (Pallant, 2013 p.251) $t^2 / t^2 + (N1+N2-2)$.

**effect sizes: large = 0.5; medium = 0.3; small = 0.1. $r=Z/\sqrt{N}$, taken from Pallant (2013) p.238 and internet sources.
Table 2. Functional mobility, physical and psychological wellbeing at baseline, four and nine months

<table>
<thead>
<tr>
<th>Interval Variable</th>
<th>Baseline</th>
<th>Four months</th>
<th>Nine months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Intervention (n=30)</td>
<td>Comparator (n=33)</td>
</tr>
<tr>
<td>Barthel's Index score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>30</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td>full range</td>
<td>9-20</td>
<td>2-20</td>
<td>11-20</td>
</tr>
<tr>
<td>Weight (kgs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>30</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td>median [IQR]</td>
<td>71.65 [56.35-92.50]</td>
<td>69.85 [57.44-88.91]</td>
<td>71.50 [54.70-93.60]</td>
</tr>
<tr>
<td>full range</td>
<td>49.60-127.10</td>
<td>31.75-151.05</td>
<td>48.50-122.50</td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>28</td>
<td>33</td>
<td>27</td>
</tr>
<tr>
<td>full range</td>
<td>20.20-41.50</td>
<td>14.69-61.28</td>
<td>20.96-40.00</td>
</tr>
<tr>
<td>No. of current clinical problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>30</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td>mean [SD]</td>
<td>2.87 [0.73]</td>
<td>2.55 [0.75]</td>
<td>2.83 [0.71]</td>
</tr>
<tr>
<td>full range</td>
<td>1-4</td>
<td>1-3</td>
<td>1-3</td>
</tr>
<tr>
<td>No. of prescribed medications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>33</td>
<td>27</td>
</tr>
<tr>
<td>full range</td>
<td>2-20</td>
<td>0-24</td>
<td>3-21</td>
</tr>
<tr>
<td>No. of prescription items</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *IQR = Interquartile Range
### Notes to table

PCS relates to the Physical Health Component score of the SF-12®.

MCS relates to the Mental Health Component Score of the SF-12®.

IQR - the 25th and 75th centiles are quoted, to give a complete picture of the data.

BMI was not recorded for all participants, and height was never recorded alone.

At nine months, data other than the SF-12® and current medicines was available for participants who did not complete the SF-12®.

<table>
<thead>
<tr>
<th>n</th>
<th>mean [SD]</th>
<th>median [IQR]</th>
<th>full range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-12® PCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>8.79 [4.25]</td>
<td>8 [6.5-10.5]</td>
<td>2-20</td>
</tr>
<tr>
<td>33</td>
<td>11.70 [6.69]</td>
<td>10 [7.5-17.5]</td>
<td>1-26</td>
</tr>
<tr>
<td>27</td>
<td>10.07 [7.70]</td>
<td>8 [6-12]</td>
<td>3-42</td>
</tr>
<tr>
<td>SF-12® MCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>28.11 [6.90]</td>
<td>27.67 [23.05-29.86]</td>
<td>15.95 – 43.98</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>n</th>
<th>mean [SD]</th>
<th>median [IQR]</th>
<th>full range</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-12® PCS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>48.15 [10.02]</td>
<td>48.18 [40.85-56.30]</td>
<td>29.90–64.09</td>
</tr>
<tr>
<td>29</td>
<td>41.84 [12.88]</td>
<td>43.65 [26.78-54.63]</td>
<td>18.82 – 59.73</td>
</tr>
<tr>
<td>29</td>
<td>46.66 [12.95]</td>
<td>45.24 [38.86-57.83]</td>
<td>16.61 – 68.34</td>
</tr>
<tr>
<td>29</td>
<td>45.07 [11.52]</td>
<td>43.88 [40.03-53.47]</td>
<td>16.61 – 68.34</td>
</tr>
<tr>
<td>24</td>
<td>49.12 [11.95]</td>
<td>48.02 [37.47-60.45]</td>
<td>27.62-65.95</td>
</tr>
<tr>
<td>25</td>
<td>45.57 [10.9]</td>
<td>47.19 [39.50-54.15]</td>
<td>15.87-59.71</td>
</tr>
</tbody>
</table>
Table 3. Changes in Barthel’s Index score, number of prescribed medications, physical health component score and mental health component score between baseline and nine months

<table>
<thead>
<tr>
<th>Distribution of data, Shapiro-Wilk P value</th>
<th>Mean difference between arms</th>
<th>Standard error of the difference</th>
<th>95% Confidence Interval of the Difference</th>
<th>t (df)</th>
<th>Sig. (2-tailed)</th>
<th>Effect size Eta squared*</th>
<th>U</th>
<th>Asymp. Sig. (2-tailed)</th>
<th>Effect size (r)** (and r²)</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barthel’s Index score change</td>
<td>Comparator 0.01 Intervention 0.02</td>
<td>-0.50</td>
<td>0.48</td>
<td>-1.46 to 0.47</td>
<td>-1.03 (50)</td>
<td>0.31</td>
<td>0.02</td>
<td>306</td>
<td>0.12</td>
<td>0.12 (0.01)</td>
</tr>
<tr>
<td>Change in number of prescribed medicines baseline</td>
<td>Comparator &lt;0.001 Intervention 0.004</td>
<td>1.53</td>
<td>0.89</td>
<td>-0.27 to 3.33</td>
<td>1.72 (49)</td>
<td>0.10</td>
<td>0.06</td>
<td>206</td>
<td>0.12</td>
<td>0.23 (0.05)</td>
</tr>
<tr>
<td>Change in Physical health component score SF-12®</td>
<td>Comparator 0.97 Intervention 0.07</td>
<td>5.31</td>
<td>2.63</td>
<td>0.01-10.60</td>
<td>2.02 (47)</td>
<td>0.05</td>
<td>0.08</td>
<td>206</td>
<td>0.06</td>
<td>0.27 (0.07)</td>
</tr>
<tr>
<td>Change in Mental health component score SF-12®</td>
<td>Comparator 0.001 Intervention 0.46</td>
<td>-1.87</td>
<td>3.53</td>
<td>-8.97-5.23</td>
<td>-0.53 (47)</td>
<td>0.60</td>
<td>0.006</td>
<td>292</td>
<td>0.87</td>
<td>0.02 (0.04)</td>
</tr>
</tbody>
</table>

*Calculated in Excel™ using the equation (Pallant, 2013 p.251) \( \frac{t^2}{t^2 + (N1+N2-2)} \).

**Calculated in Excel™ using the equation (Pallant, 2013 p.238) \( r = Z/\sqrt{N} \).
Table 4. Comparisons between population data and the two study arms at baseline

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean (SD)</th>
<th>95% CI</th>
<th>Comparison with intervention arm P value*</th>
<th>Comparison with control arm P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical health component score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention arm</td>
<td>30</td>
<td>30.54 [7.70]</td>
<td>27.79-33.30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparator arm</td>
<td>33</td>
<td>31.69 [8.62]</td>
<td>28.75-34.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Wales</td>
<td>15,999</td>
<td>49.1 [12.0]</td>
<td>48.91-49.29</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>All Wales aged &gt;65</td>
<td>4,196</td>
<td>39.1 [13.5]</td>
<td>38.69-39.51</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Study region</td>
<td>1,276</td>
<td>49.2 [11.7]</td>
<td>48.56-49.84</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Mental health component score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention arm</td>
<td>30</td>
<td>48.52 [10.05]</td>
<td>44.92-52.12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparator arm</td>
<td>33</td>
<td>42.37 [13.47]</td>
<td>37.77-46.97</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Wales</td>
<td>15,999</td>
<td>49.7 [10.5]</td>
<td>49.54-49.86</td>
<td>0.27</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>All Wales aged &gt;65</td>
<td>4,196</td>
<td>49.6 [11.2]</td>
<td>49.26-49.94</td>
<td>0.30</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Study region</td>
<td>1,276</td>
<td>50.7 [10.0]</td>
<td>50.15-51.25</td>
<td>0.12</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Data for study region for over 65s was not released, due to low numbers.

*P values from a one sample t test.