

Effectiveness of multicomponent interventions in reducing functional difficulties and falls in community-dwelling older people

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CLINICAL SCENARIO

Statistics New Zealand predict a dramatic rise over 65 population, rising to one quarter by 2030 (Statistics NZ, 2006). Occupational therapists (OTs) have an important role in promoting 'ageing in place', enabling people to stay in their preferred environment as their abilities change (Wright-St Clair, 2008). Reduction in functional abilities and safety in the home are the main reasons people are unable to remain at home (Lewis, 2003). A key concern for older people is falling, leading to potentially serious injury, loss of independence, and increase in health care costs (Lewis, 2003).

In our fieldwork placements, multiple interventions were used with clients, in isolation or combined with other OT and multi-disciplinary interventions. This sparked our interest in the evidence around the effectiveness of multicomponent interventions. Multicomponent interventions combine more than one intervention technique, with different types of intervention offered by one or more professionals (Acton, 2011).

FOCUSSED CLINICAL QUESTION

In community-dwelling older people, are multicomponent home interventions involving occupational therapy effective in reducing falls and functional difficulties?

SUMMARY OF SEARCH, 'BEST' EVIDENCE' APPRAISED, AND KEY FINDINGS

The authors struggled to develop search terms and despite using a range of databases and hand-searching it was difficult to find literature specific to our focused clinical question. Refined search terms retrieved a small number of very relevant studies were located. Most of these were randomised control trials (RCTs).

Searches found there is strong evidence to suggest OT interventions are effective in reducing falls and functional limitations in older adults, however, articles using multicomponent interventions and addressing both falls and functional difficulties were limited.

The key findings suggest multicomponent interventions addressing both environment and behaviour are effective in improving functional difficulties and related concerns such as falls, fear of falling, poor self-efficacy, home hazards, and maintaining independence of community-dwelling older adults (Chase, Mann, Wasek, & Arbesman, 2012; Gitlin, Winter, Dennis, Corcoran, Schinfeld, & Hauck, 2006).

CLINICAL BOTTOM LINE

Current literature suggests that multicomponent interventions are effective in reducing falls and functional difficulties in community-dwelling older people.

LIMITATION OF THIS CAT:

This critical appraisal has been reviewed by one lecturer as part of an assignment. For assignment purposes only two articles have been critiqued.

SEARCH STRATEGY:

The authors conducted searches CINAHL, ProQuest, PubMed, Google Scholar and OT Seeker. The search terms used were: multicomponent OR multifactorial; occupational therap*; community; older adults OR older people; fall* prevent*; function*. Citation tracking of articles that appeared relevant was carried out.

INCLUSION CRITERIA

- Community-dwelling “older adults” or equivalent
- Multifactorial/multicontextual interventions
- Published in peer-reviewed journals
- Published post-2002

EXCLUSION CRITERIA

- Literature needing to be obtained by document delivery
- Not published in English
- Literature reviews, educational articles and opinion pieces
- Study participants with specific diagnoses
- Cochrane reviews

RESULTS OF SEARCH:

Study Design	Level of evidence (Taylor, 2007, p15)	Citation
Systematic review (SR)	1	Chase, et.al., (2012).
RCT	2	Gitlin, et.al.,(2006).
RCT	2	Gitlin, Hauck, Winter, Dennis & Schulz (2006).
RCT	2	Szanton, Thorpe, Boyd, Tanner, Leff & Agree (2011).
RCT	2	Markle-Reid, Browne, Gafni, Roberts, Weir, & Thabane (2010).

BEST EVIDENCE

The two articles selected for review represent different forms of evidence, an SR (Chase, et.al., 2012) and a RCT (Gitlin, et.al., 2006). The RCT was selected as it appeared to address our clinical question best of the numerous RCTs retrieved. The SR was selected as it represents a different type of literature, addresses the clinical question perfectly, and is extremely current.

SUMMARY OF BEST EVIDENCE

The follow reviews are based on Taylor's (2007) guidelines for appraising SR and RCT.

Article One:

Systematic Review of the Effect of Home Modification and Falls Prevention Programs on Falls and the Performance of Community-Dwelling Older Adults.

1. Objective of SR: To answer “what is the evidence for the effect of home modification and falls prevention programs on the performance of community-dwelling older adults?” (Chase, et.al., p.284).

Study Design: Systematic review

Search Strategy: This SR is part of an American Occupational Therapy Association (AOTA) project on successful aging. The SR does not include detailed description of search strategy or methodology but refers to an article (Arbesman & Lieberman, 2012) on the four SRs in the project. In order to carry out this critical appraisal, the authors considered both articles.

Medline, PsycInfo, CINAHL, Ageline, OT Seeker, Campbell Collaboration and Cochrane were searched for articles published between 1990 and 2008. The keywords developed by AOTA staff appear appropriate and thorough. More recent articles were considered for inclusion if recommended by an expert in the field. The bibliographies of selected articles were hand-searched to identify relevant articles (Arbesman & Lieberg, 2012; Chase, at.al., 2012).

Inclusion criteria: Studies published post-1990, peer-reviewed English literature, interventions which fell within scope of OT practice (not necessarily implemented by an OT) and included fall prevention or home modification.

Exclusion criteria: “presentations, conference proceedings, non-peer reviewed literature, dissertations and theses...participants in hospitals, skilled care facilities and hospices...older adults with major diagnoses” (Arbesman & Lieberman, 2012, p.274).

Setting: Community-dwelling older people.

Method: 33 of 828 articles were selected for inclusion. The project consultant eliminated the first articles on the basis of citation and abstract. The lead author and two

graduate students reviewed each article to decide on inclusion. Conflict was resolved by group discussion until consensus reached.

Results: Results were categorised by the interventions used in the studies and presented in narrative form.

Multifactorial interventions: All studies which included multifactorial interventions provided strong evidence supporting their effectiveness reducing falls and difficulties with instrumental activities of daily living (IALDs) and activities of daily living (ADLs). Three studies found multifactorial interventions decreased falls by 31-36%. Other studies reported increased time between falls, improved ADL performance, self-efficacy, decreased fear of falling (FoF), and decreased home hazards as a result of multifactorial intervention.

Physical activity interventions: “Mixed, but overall positive results” (Chase, et.al, 2012, p.286-287) indicated improvements in a variety of areas including balance, flexibility, FoF, incidence of falls, and rate of physical decline. However, while some studies found strong statistical significance of results, others found none.

Home assessment and modifications: Studies found that participants who received home modifications were less likely to experience decline in physical function and ADL/IADLs, had fewer falls, and had increased satisfaction with home environment and/or performance. However, a number of studies did not attribute improvements to intervention.

Original Authors’ Conclusions: “The strength of evidence for physical activity and home modification programs provided individually was moderate” (Chase, et.al, 2012, p.284). In contrast, intervention involving exercise, education, home modifications and assistive technology is supported by “the best evidence” (Chase, et.al, 2012, p.289) and is proven to reduce falls, FoF, and maintain independence of community-dwelling older adults.

Critical Appraisal:

Are the results valid?

This SR articulated a clear clinical question, albeit broad. The presentation of results suggests the clinical question was broken into subsidiary questions focussing on the effect of multifactorial, physical activity and home modification interventions. However, this is not explicitly stated.

The second outcome measure in the focus question, “effect on performance” (Chase, et.al, 2012, p.284), is extremely broad. It is later stated this SR looks at outcomes such as rate of functional decline, self-efficacy, FoF, and ADL/IADL performance. Due to the breadth of the clinical question, articles with different outcome measures are reviewed.

The SRs search for literature appears comprehensive. Searches were carried out by a medical research librarian with SR experience, who refined strategies and ensured the

most thorough search possible. The search was further refined by a filter base developed by McMaster University (Arbesman & Lieberman, 2012). As grey-literature was not considered in the study, relevant information may have been overlooked. However, including only high-end literature suggests only reliable studies were included (Carter, Lubinsky & Domholdt, 2011).

The review states that it included studies which focussed on “older adults living in the community” (Chase, et.al, 2012, p.285), but did not define this further, which leaves room for swaying of results based on each studies definition of ‘older adult’. The SR authors identified the differing definition of falls in included studies as a limitation (Arbesman & Lieberman, 2012).

To minimize inclusion/exclusion bias, three researches were required to agree on inclusion. It was not clear whether the reviewers received training, and how inter-rater bias was minimized.

Carter et.al. (2011) state that SR methodologies need to be “explicit and reproducible” (p.368). It is not clear how data extraction occurred after articles were selected for inclusion, which limits the ability of a third-party to successfully reproduce the SR.

31/33 studies included in the SR were identified as Level I (Sackett, Rosenburg, Muir Gray, Haynes, & Richardson, 1996) RCTs, which would suggest the methodological quality is high (Carter, et.al., 2011). However, the SR does not state how or if studies were checked for bias and rigour. It is important the therapist implementing evidence-based practice is confident the literature practice is based on is sound (Kielhofner, 2006). Examination of the methodologies of included studies would provide better assurance to readers that results of SR are valid.

What are the results?

The included studies looked at the effect of interventions on various aspects of occupational performance; thus measured outcomes differently. Due to the level of heterogeneity it was not feasible to combine or synthesise results. The findings were displayed in narrative style, identifying interventions used and descriptive results of studies. The review would have been enhanced by tables or other visual displays that clearly summarised and compared results.

Statistical details are provided for some studies, but most results are generalised: “results...indicated participants had less difficulty with ADLs and IADLs” (Chase, et.al, 2012, p.286). As studies which both support and negate effectiveness of interventions are discussed the authors are confident a range of evidence has been studied, which increases the articles weight.

Taylor (2007) cautions that reviewers can often get over-zealous about the strength and nature of their findings and the reader needs to be careful to ensure recommendations are based on findings. Chase et.al. (2012) state “regardless of...setting, OTs can

incorporate fall prevention and home modification strategies throughout the OT process” (p.289) There is no literature provided to suggest that settings other than community have found multifactorial interventions beneficial. This assertion is not based on findings and appears to be an opinion of reviewers.

How will this help me work with clients?

The outcomes and range of studies used in this review are extremely broad, but the reviewers have succeeded in providing a holistic review of the various interventions. The review affords future research around the effectiveness of the individual components of multifactorial interventions, thus giving insight into the most useful combinations of interventions.

The review asserts that multifactorial interventions are by far the most effective in preventing falls. Common sense suggests that multifactorial interventions for elderly clients will ultimately save significantly on health care costs, but as costing is not discussed in the article assertions cannot be made.

Article two:

A Randomised Trial of a Multicomponent Home Intervention to Reduce Functional Difficulties in Older Adults.

Aim: “To test the efficiency of a multicomponent intervention to reduce functional difficulties, fear of falling and home hazards to enhance self-efficacy and adaptive coping in older adults with chronic conditions” (Gitlin, et.al., 2006, p. 809).

Study Design: RCT.

Setting: Community-living older people who received intervention at home.

Participants: This study included 319 community-dwelling older adults aged ≥ 70 . Participants were approached by an area agency on ageing or responded to advertisements. Participants were telephone screened and deemed suitable if they were English speaking and determined cognitively intact by a score of >23 in the Mini-Mental State Examination. Participants reported difficulty with two IADLs, or ≥ 1 ADLs, and were not receiving any home care.

Method: Participants were broken into four stratified groups (white, non-white, living alone and living with others) and then randomised to form a control and intervention group. Analyses of Covariance (ANCOVA) was used to “compare experimental and control participants on baseline characteristics” (Gitlin, et.al, 2006, p.812). A t-test was completed prior to intervention and showed there was not a significant difference between characteristics of the intervention and control group.

Standardised self-report rating scales were used to take baseline, six-month and 12-month measures of primary outcomes; “functional difficulties, self-efficacy and FoF,

and secondary outcomes including adaptive strategy use and observed home hazards” (Gitlin, et.al, 2006, p.811). Adjusted mean differences from baseline to 6 months ascertained if treatment was successful

Over six months, intervention participants saw an OT five times, physiotherapist (PT) once and received three telephone calls by the OT to reinforce intervention and generalise strategies. “Interventions were standardised in that each participant received four treatment components...for specific targeted functional areas” (Gitlin, et.al., 2006, p.811.) The control group received no intervention and only contact was assessments.

Results:

Statistical significance was achieved in 6 months of intervention in all areas except mobility (P=0.15). At six months intervention participants demonstrated decreased FoF (P=0.001), greater confidence in managing ADL’s (P=0.02) and used more control-orientated strategies (P=0.009) and had reduced home hazards (P=0.005).

Adjusted mean differences from baseline to 12 months to evaluate if treatment remained successful. It did, and results show continued improvements in FoF (P=0.008) and control oriented strategies (0.01)

Original Authors’ Conclusions: Community-dwelling older people with functional difficulties benefit from a multicomponent intervention. Interventions that address both environmental and behavioural factors can improve functional difficulties and associated concerns such as falls, FoF, poor self-efficacy and home hazards.

Critical Appraisal:

Are the results valid?

The aim of this RCT is clearly stated and target population clearly identified. Clear explanation of how outcomes were assessed were included and justification for assessments given. Perceived rating scales were used to gather data. Reported difficulty is subjective and the article did little to explain how inconsistency in actual function was avoided. The conclusion suggests that objective functional capacity was increased, but this was assessed by perceived difficulty which is misleading.

The article stated that baseline interviews and brief telephone screens were completed, but did not elaborate on what these involved. Inclusion/exclusion criteria for participants were clearly explained.

Intervention was explained, including detailed explanation of OT and PT sessions, treatment implementation and outcomes. No evidence is given as to why each intervention was included in the multicomponent intervention. Little information was provided regarding the processes around the control group, which leaves readers unclear and limits the ability of the RCT to be reproduced.

Randomisation of participants into different groups is crucial in completing a reliable RCT as it attempts to minimise bias (Taylor, 2007). ANCOVA is also important in obtaining accurate results as it ensures variation in results was not due to bias of different participants in each group (Sim & Wright, 2000). A table included in the article provides evidence group variation was not statistically significant.

Participants were accounted for throughout the study, which is important as it ensures participants and results are not manipulated by the researchers (Taylor, 2007).

To confirm the effect of intervention, RCTs must maintain a strict control group who do not receive intervention. Participant's behaviour may be influenced by interaction with researchers, known as the Hawthorne effect (Bailey, 1997). The researchers identify this as a potential bias as members of the control group's behaviour may have been influenced by leading questions asked in screening and assessment. Attention bias accounting for some changes in the intervention group cannot be ruled out as the control group had little contact with health professionals.

For ethical reasons participants must be informed they are part of a trial, however, it is possible to conduct a study without participants knowing which group they are in (Tereskerz, 2012). This RCT did not state whether participants were informed which group they were in, however due to the nature of the study it is likely to have been apparent as some participants received no treatment.

The RCT states written informed consent was obtained for participation in the study. Taylor (2007) outlines the importance that ensuring participants are not withheld treatment or put in a position of risk. It is not clear how the control group were managed as the study states controls were not to have support from outside health professions during the trial. They did receive written information after the study, which avoids neglecting their needs entirely.

All assessments and interventions were carried out by professionals not part of the research team, minimising the Rosenthal effect which is when researchers influence the results (Bailey, 1997). It is important the person implementing intervention is blinded to the research, (Bailey, 1997). Details on this are not given in the article. To eliminate discrepancies in the interventions provided, interventionists received training, and on-going treatment implementation was monitored in supervision to ensure practices were standardised and audited.

What are the results?

The RCT provides a clear description of how results were measured. Assessment tools were standardised which suggest reliability of tools used. Rating scales were used to measure almost all the desired outcomes, but each appeared to have a different scale. This makes results hard to compare and it difficult to draw correlation between the scale (Gordon, 2002). It may also have been confusing for participants.

Raw data was statistically analysed appropriately. Mean values \pm 1SD and probability (p) of change occurring by chance between baseline and six-month measures were given. The difference in adjusted means was given for six and twelve months, and the 95% confidence interval. Visual data was provided in tables and graphs. Bailey (1997) states it is important readers have an accurate portrayal of the results for clear understanding. Visual data presented in tables and graphs was difficult to interpret without comprehensive statistical knowledge.

Statistical significance was found in all outcomes of the control except mobility and transfers in the baseline to six-month period. There was particularly strong statistical significance for the change in self-efficacy. At the six month to twelve month bracket, changes in performance were only statistically significant in the self-efficacy and control orientated strategy use.

The results of this RCT suggest that multicomponent interventions are effective in decreasing the perceived functional difficulties of older people. However, there is no evidence to suggest multicomponent interventions are more effective than interventions used in isolation.

These results confirm the initial hypothesis: research participants reported less difficulty with ADLs/IADLs, increased self-efficacy, FoF, and better use of adaptive strategies than the control group.

How will this help me work with clients?

One limitation of the study was voluntary participation; volunteers are more likely implement changes than non-volunteers (Gitlin, et.al, 2006). This limits the ability of the study to be generalised to other populations, but provides a good baseline piece of research. As the control group were volunteers, small positive changes could be accounted for in this way.

The study identified the cost of the multicomponent intervention as \$1,222 for a six-month programme. Further research needs to be done on the subject before multicomponent interventions can be justified as there is no evidence in this RCT to suggest they are more effective.

Overall, this article provides clear evidence to support multicomponent interventions in increasing perceived functional performance and decreasing home hazards in community-dwelling older people. It clearly follows the structure of an RCT, attempted to minimise bias, and identified its own limitations.

IMPLICATIONS FOR PRACTICE and FUTURE RESEARCH

- OTs never treat a person in isolation; the interaction between all aspects of the person, the environment and their chosen occupation (POE) is seen as a dynamic balance and considered in treatment (Hagedorn, 2000). Multicomponent interventions appear to fit seamlessly within this model of client care, as often more than one aspect of the POE needs adjusting (Kielhofner, 2009). It is for this reason the authors believe OTs should continue to research multicomponent interventions as they may offer exciting changes in health care provision.
- Although validity of the studies cannot be 100% ascertained, this critical review still provides useful information for practicing OTs and is a base for future research.
- This review suggests multicomponent interventions are effective in increasing function and decreasing falls in community-dwelling older adults. However, the authors suggest future research should explore what intervention combinations are most effective in multicomponent approaches.
- It is necessary to ascertain whether some populations of older adults benefit more from multicomponent intervention than others (Gitlin et.al., 2006; Chase, et.al., 2012).
- Both studies reviewed state that client-centred interventions are most effective in positive outcomes for clients. Craik (1999) states that client-centred practice is “clearly at the heart of the [OT] profession” (p.ix). OTs should consider how multicomponent interventions can be ensured to be client-centred. Further research is suggested around this.
- Research needs to be done on the cost-efficiency of multicomponent interventions and how this weighs up with positive outcomes.
- Future research is suggested around more specific, objective outcome measures (Gitlin, et.al., 2006; Chase, et.al., 2012), perhaps around specific ADL or IADL performance. Our clinical question was very broad, and we support more specific research.
- Although this review suggests that multicomponent interventions may be more effective than other interventions, New Zealand OTs should be mindful and exercise caution when applying results as that both studies are American and the ability to generalise to NZ population is has not been ascertained. The authors suggest OTs use these findings as a basis for intervention, but use clinical reasoning and judgement to decide what interventions best suit their areas of practice and client groups.

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