Lessons learned from a multidisciplinary fall-prevention programme: The occupational-therapy element

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Abstract
Objective: To gain insight into the contribution of the occupational-therapy part of a multidisciplinary fall prevention programme towards the reduction of falls and functional decline. Design: A descriptive and exploratory study. Methods: Data were collected in the context of a randomized controlled trial that found no effect of a multidisciplinary fall prevention programme. The study population comprised 166 participants, two occupational therapists (OTs), and one official from each of the five participating municipalities. Data were collected on the recommendations arising from the OT part of the programme, the extent to which those recommendations were implemented and what OTs did to stimulate implementation of behaviour change. Results: The occupational-therapy programme resulted in 457 recommendations; 65% of the recommendations regarding services and assistive devices were implemented. It took on average six months to implement recommended home modifications. Advice on behaviour change predominantly comprised recommendations to reduce risky behaviour. Conclusion: To improve the occupational-therapy programme more rapid implementation of recommendations is suggested. Second, participants should be supported to achieve recommended changes. Furthermore, occupational therapists should use theory-based techniques to stimulate behaviour change and use follow-up visits to promote maintenance of the desired behaviour.

Key words: Elderly, fall prevention, home modifications

Introduction
Falls and their consequences have been recognized as a great strain on the well-being of older people. Each year, approximately 30% of people aged 65 years and older who are living in the community sustain a fall [1–5]. Several studies have shown that the occurrence of falls is associated not only with intrinsic factors but also with extrinsic factors such as environmental hazards [6–11]. It thus seems sensible to include home assessments followed by environmental modifications in fall-prevention programmes [12]. However, there is no clear evidence for the effectiveness of home assessment and modification in preventing falls [3,13–19]. Despite the ambiguous evidence, assessing and addressing environmental hazards has
been embedded in numerous multifaceted fall prevention programmes for elderly people living in the community [1,14–18,20–22]. Lord et al. [19] stated in their review that home hazard reduction is an effective strategy to prevent falls, provided it is aimed at older people with a history of falls and mobility impairments, but not for the general population of elderly people. They also stated that the effectiveness of home hazard modification depends mainly on behaviour change.

Recently, we evaluated the effectiveness of a multidisciplinary fall prevention programme in the Netherlands in a randomized controlled trial (RCT) [1]. We assessed whether this programme was more effective than usual care in preventing falls and functional decline in community-dwelling elderly people who attended an accident and emergency department (A&E department) after a fall. The programme consisted of a medical and occupational-therapy assessment, followed by recommendations and further referral if indicated. The medical part of the programme consisted of a detailed medical risk assessment followed by recommendations and referrals [23]. The occupational-therapy part consisted of a functional and environmental risk assessment resulting in recommendations in terms of services and assistive devices, and advice on behaviour change [23]. The programme turned out not to be effective in preventing falls and functional decline [1]. The results of a process evaluation which was performed alongside the trial [24] showed that the programme was considered feasible and acceptable by both participants and practitioners. The medical part of the programme resulted in relatively few recommendations (on average less than one per participant). In addition, a substantial number of these recommendations never reached the patient because 45% of the participants did not comply with the recommendation to contact their general practitioner (GP) to discuss the results of the examinations. Hence, it is not surprising that this part of the programme failed to have a favourable effect on falls and daily functioning.

In contrast to the medical part of the programme, however, the occupational-therapy part resulted in a substantial number of referrals and recommendations (on average more than three per participant), which were directly communicated to the participants by the occupational therapists. Considering the number of recommendations and the fact that these reached the participants directly, it remains unclear why the programme, overall, did not lead to a reduction in falls and functional decline. Therefore, the role of the occupational-therapy part of the programme in preventing new falls and functional decline should be further examined.

In order to gain insight into the contribution of the occupational-therapy programme towards the reduction in falls and functional decline, this paper aims to examine (a) the number and nature of the recommendations ensuing from the occupational-therapy part of the programme, (b) the extent to which the recommendations with regard to services and assistive devices were actually implemented, and (c) what was done by the occupational therapists to stimulate the implementation of the recommended behaviour changes.

Material and methods

Design

The current paper reports on a descriptive and exploratory study in which both quantitative and qualitative data were gathered. The Medical Ethics Committee of Maastricht University/University Hospital Maastricht approved the study. All participants signed an informed consent form.

Occupational-therapy programme

The occupational-therapy programme was provided by an occupational therapist at the participants’ homes and comprised a functional and environmental evaluation to identify risk factors for new falls [23]. Daily functioning was assessed by the 15-item Frenchay Activity Index (FAI) [25] and an occupational-therapy checklist [26,27]. In addition, the Falls Handicap Inventory (FHI) [28] was used to assess handicaps associated with repeated falls. Environmental hazards in and around the participants’ homes were identified and recorded by means of a home-safety checklist [29].

The functional and environmental assessments resulted in recommendations for services and assistive devices, and instructions for behaviour change. These recommendations were given to the participants by the occupational therapists during the home visits. Afterwards, the participants received a letter with the recommendations by way of reminder. A copy of this letter was sent to the participant’s GP to inform him/her of the results of the occupational-therapy programme.

At the time of the study, some of the recommended services and assistive devices were provided under the Services for the Disabled Act (WVG), which was implemented by the municipal authorities [30]. The occupational therapists administering the occupational-therapy programme were authorized to advise the five municipalities entrusted with the implementation of the Act in the study region about the care
needed. Subsequently, the municipal authorities decided whether or not to fund the recommended services and assistive devices. After a favourable decision from the municipal authorities had been received, the service and/or device could be provided.

Certain other recommended assistive devices, such as rollators and canes, had to be purchased by the participants themselves, but could often be partly or wholly refunded by their health insurance company.

**Study population**

The study population was derived from that of an RCT assessing the effectiveness and cost-effectiveness of our multidisciplinary fall prevention programme [1] and comprised 166 older people, aged 65 years or over, who had attended the A&E department and/or the out-of-hours GP service offered at the hospital as a result of a fall. The study population also included the two occupational therapists who administered the programme as part of their normal working routine and one official from each of the five participating municipalities who was entrusted with the implementation of the WVG Act.

**Measurements**

**Number and nature of recommendations.** We recorded the number and nature of recommendations ensuing from the occupational-therapy programme by collecting data from specially designed forms completed by the occupational therapists during the home visits.

**Implementation of recommendations for services and assistive devices provided under the WVG Act.** In order to examine the actual implementation of the recommendations with regard to services and assistive devices provided under the Services for the Disabled Act (WVG), we analysed the municipal authorities’ existing implementation records. In addition, we recorded the time interval between the occupational-therapy assessment and the implementation of the ensuing recommendations. We used structured recording forms to collect data on the actual implementation and the time interval.

**Advice on behaviour change.** This information was gathered by means of structured recording forms completed by the therapists, as well as by structured face-to-face in-depth interviews with the occupational therapists and a plenary group discussion with all practitioners involved in the multidisciplinary fall prevention programme and the research team.

**Data analysis**

Quantitative data from the questionnaires and recording forms were analysed by means of descriptive statistics. All analyses were performed in SPSS 14.0. From both the in-depth interviews with the occupational therapists and the plenary group discussion minutes were taken. Based on the written reports of the in-depth interviews and the plenary group discussion, answers were thematically categorized and summarized. One researcher (MB) independently reviewed the answers given. In the case of doubt a second researcher was consulted (MH).

**Results**

**Participation**

Of the 166 people included in this study, 28 did not undergo any part of the multidisciplinary fall prevention programme, because they withdrew from the study before the fall prevention programme started or had problems scheduling in the medical and occupational-therapy parts of the programme (n = 1). Reasons for withdrawal were: death (n = 2); refusal to continue participation (n = 8); health problems (n = 12); and other reasons (n = 5). Another 10 participants underwent only the medical part of the programme, for personal reasons (n = 6), or withdrew from the study before the occupational-therapy programme took place (n = 4). The remaining 128 participants (77%) underwent the occupational-therapy programme. Of these 128 participants, 11 withdrew from the study after completing the programme. Reasons for withdrawal were: death (n = 3); refusal to continue participation (n = 4); health problems (n = 4).

**Number and nature of recommendations**

The occupational-therapy programme resulted in a total of 457 recommendations for the 128 participants (Table I), which is on average 3.6 recommendations per participant. These recommendations can be subdivided into three main categories: (1) Services and assistive devices provided under the Services for the Disabled Act (WVG); (2) assistive devices individually purchased; and (3) advice on behaviour change. Since six recommendations did not fit these three main categories, a fourth category was added, namely referrals to other health services. Overall, about two-thirds of all recommendations concerned instructions for behaviour change. In this category, almost half of the recommendations (46%) were related to the correct use of home adaptations and assistive devices.
The category of services and assistive devices provided under the WVG Act accounted for 29% of the recommendations made by the occupational therapists. This category can be subdivided into home adaptations, assistive devices, and moving house (Table I). Some 4% of the recommendations concerned the category of assistive devices individually purchased, and the smallest category (1%) comprised recommendations for referrals to other health services (e.g. homes for the elderly).

### Implementation of recommendations for services and assistive devices provided under the WVG Act

A total of 46 participants received 123 recommendations (2.7 per participant) with regard to services and assistive devices provided under the WVG Act. After the assessment, 36 participants applied for 111 services for daily living and/or assistive devices. The other 10 participants did not apply to the municipal authorities for any services or assistive devices, but five of them implemented the recommendations themselves.

Of the 111 applications for services and assistive devices, 93 were approved by the municipal authorities. The officials of the five municipalities reported that 80 of the 93 approved recommendations for services for daily living and/or assistive devices had actually been implemented (Table II).

We assessed the time interval between the occupational therapy programme and the implementation of the recommendations for home adaptations, using information provided by the municipal authorities. The average time interval between recommendations for home adaptations and their implementation was 6.2 months, whereas the intervals for recommendations for assistive devices and recommendations to move to other accommodation were 5.3 and 9.2 months, respectively. Of the 46 individuals who applied for a service or assistive device under the WVG Act, 28 sustained a fall during one year of follow-up. However, only one of these people fell after the recommended recommendations had been implemented: 10 people had already fallen before they took part in the occupational-therapy programme and 17 people fell after they had received the programme, but before the recommendations had been implemented.

### Advice on behaviour change

The structured recording forms, the structured in-depth interview with the occupational therapists,
and the plenary group discussion revealed that the therapists did not use theory-based strategies to promote behaviour change to reduce the risk of falls. The occupational therapists instructed the participants on how to change their risky behaviour, but the participants were not supported any further in order to achieve the recommended behaviour change. The occupational therapists indicated that they had serious doubts whether the instructions given were sufficient to achieve lasting behaviour change. There were no follow-up visits to check whether the recommendations had actually been implemented, or booster sessions to focus the participant’s attention on the recommended changes again.

### Discussion and conclusion

The recommendations resulting from the occupational-therapy assessment can be divided into four main categories: (a) advice on behaviour change (66%); (b) services and assistive devices provided under the Services for the Disabled Act (WVG) (29%); (c) assistive devices individually purchased (4%); and (d) referral to other health services (1%). Advice on behaviour change was predominantly confined to recommendations to reduce risky behaviour, made during the home visit by the occupational therapists, but these were not supported by follow-up sessions. Of the recommendations regarding services and assistive devices covered by the WVG Act, 65% were actually implemented, as reported by the municipal authorities.

In view of the number of recommendations and the fact that these were directly communicated to participants, it remains unclear why this part of the programme did not significantly contribute to an overall reduction in falls and functional decline. Our in-depth analysis of the occupational-therapy programme furnished a number of possible explanations for the fact that the programme did not contribute to a reduction of falls and functional decline during the 12 months of follow-up. First, the ineffectiveness may be explained by the fact that 35% of the recommendations were not implemented during the follow-up period. However, as we reported in a previous paper [24], compliance with the recommendations was reasonable and comparable to the compliance rates reported by other studies in this domain [15,17,31,32].

Second, the implementation of recommendations for services and assistive devices provided under the WVG Act took almost six months. Of those who sustained another fall during the one year of follow-up \((n = 28)\), all but one (96%) fell before their WVG applications had been implemented. This suggests that it is very important to decrease the time that elapses between recommendation and implementation.

Third, Lord and colleagues reported that home hazard reduction is an effective fall prevention strategy if targeted at older people with a history of falls and mobility limitations [19]. Our study population may not have met these criteria. Although we included persons who had recently experienced an injurious fall (and were thus considered to be at increased risk of recurrent falls) the occupational therapists stated that the people visited were relatively healthy and had, on average, few mobility impairments. This is supported by the participants’ mean score on the Groningen Activity Restriction Scale (GARS), which measures activities of daily living (ADL) and instrumental activities of daily living (IADL) disabilities [33]. The mean score \((\pm SD)\) for the 128 persons who took part in the occupational-therapy programme was 17.5 \((\pm 7.06)\) on a scale ranging from 11 to 44, where a low score indicates few or no limitations in terms of ADL and IADL.

Fourth, the occupational therapy programme resulted in 301 recommendations with regard to behaviour change. However, this aspect of the programme was limited to pointing out a person’s fall-related risk behaviour during one home visit and suggesting a change in behaviour to reduce his/her fall risk in the future. It is doubtful whether this single contact is sufficient to result in the recommended behaviour change [34].

### Table II. Implementation of recommendations for services and assistive devices provided under the WVG Act.

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Number of recommendations ensuing from the occupational-therapy programme</th>
<th>Number of recommendations applied for by the participants</th>
<th>Number of recommendations accepted by the municipal authorities</th>
<th>Number of recommendations implemented according to municipal authorities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home adaptations</td>
<td>90</td>
<td>82</td>
<td>71</td>
<td>62</td>
</tr>
<tr>
<td>Assistive devices</td>
<td>23</td>
<td>21</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Moving house</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>123</td>
<td>111</td>
<td>93</td>
<td>80</td>
</tr>
</tbody>
</table>
Lessons learned/recommendations

Based on the results of this study and the results reported in the previously published papers on the effects and feasibility of our multidisciplinary fall-prevention programme [1,24], we conclude that the occupational-therapy part of the programme should not be implemented in its current form in regular care.

Our findings suggest a number of recommendations to improve the programme. First, we should aim to increase the efficiency of the programme by drastically reducing the time between the occupational-therapy programme and the actual implementation of recommendations for services and assistive devices provided under the WVG Act. Second, to increase compliance with the recommendations, participants should be supported over a period of time to achieve the recommended changes. This could include follow-up visits to check whether the services and assistive devices have actually been implemented and are being used correctly. Furthermore, the occupational therapists should use theory-based techniques to stimulate behaviour change and use follow-up visits to encourage behaviour change and promote maintenance of the desired behaviour.

Finally, in order to recruit a population likely to derive most benefit from the programme, there should be a more stringent selection procedure. Participants should have a history of recurrent falls and moderate to severe mobility impairments.

Competing interests

The author(s) declare that they have no competing interests.

Authors’ contributions

All authors contributed to the development of the design of this study, analysis, and interpretation of the data. MB drafted the manuscript with input from the other authors. All authors read and approved the final manuscript.

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