Long-Term Care in Motion (LTCMo)
A Guidebook

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The main goal of this guidebook is to provide information on the intervention program and the implementation procedure of the Long-Term Care in Motion (LTCMo) Project, with the intention to make the replication of this program as easy as possible. In the beginning, we provide a short background on the importance of physical activity (PA) promotion in the nursing home (NH) ecology. This is followed by a comprehensive outline of the main goals of the program and a description of useful principles that can be employed when planning and preparing a project in institutional long-term care settings. This part especially deals with implementation issues and gives useful suggestions in this regard.

As a central part of this guidebook, the intervention components that were deployed in LTCMo are explained and described in detail, with a clear focus on practical issues of the program.

In the Annex, we provide an exercise catalogue with an exemplary compilation of useful exercises and fundamental didactical principles, supplemented by a description and explanation of safety measures and safeguarding positions. Moreover, we provide tools that can be used to evaluate already existing activity programs in the nursing home setting and to assign participants to the appropriate exercise training.

In general, this guidebook is addressed at nursing home personnel, i.e. directors or care managers, social care personnel, activity coordinators, nurses and therapists or any other professions who are involved in activities with nursing home residents (NHR) and who are interested in implementing this program. It may also be of interest to organizations (e.g., senior organizations) engaged in improving the lives of older people. That said, those being involved in policy issues related to aging may also find helpful information.

Finally, we hope that the guidebook may also stimulate new PA related intervention research in the context of NH settings and we are highly interested in interactions with professionals or research groups who plan to replicate this program.
Although home care is the predominant care setting in Europe (Rodrigues et al., 2012), the number of dependent older persons living in long-term care institutions such as NHs is expected to remain high in Europe (European Commission [Directorate-General for Economic and Financial Affairs and Economic Policy Committee (Ageing Working Group)] 2009). Due to the often discussed demographic change, the number of older people in need of help has been rising in the past decade. As is well-known, the majority of the current NH population is beyond the age of 80 years and characterized by high rates of multi-morbidity, frailty, mobility impairment, severe cognitive deficits, behavioral disturbances and depression. In terms of day-to-day behavior, an essential feature of NHR is their very low PA, compared to community-dwelling older adults in advanced old age. Such lack of PA is to be seen as an important marker of physical impairment. At the same time, an increase in PA represents an essential pathway to improve quality of life and to enhance cognitive and social functioning of old and very old individuals. That said empirical evidence supports rather large positive effects of PA on a range of important endpoints such as cardio-vascular fitness, gait and balance, fall reduction, cognitive function, and well-being in the general older population (Potter et al., 2011). PA training has also revealed sizable positive effects in terms of physical and functional ability related endpoints in those with dementia-related disorders (Hauer et al., 2006), if efficiently tailored in its application format to the remaining competencies of this specific group. There is also evidence that PA training can unfold positive effects in NHR, such as improved physical function and increased social involvement (Horn et al., 2012). Aside from positive outcomes for NHR, fostering a physically active lifestyle in the institution may go along with benefits for the institution (e.g., a more active social life and an enhanced portfolio of activities for residents that can be seen as an incentive that might also serve to increase the NH’s reputation). By now, numerous exercise programs have been developed for NHR and similar populations. A comprehensive overview is provided by Horn et al. (2012), in which authors distinguish between recommendable and not recommendable programs. In the existing research, PA has mainly been addressed as a means to improve physical function rather than as primary outcome by itself (see our systematic review by Jansen et al., 2015). In addition to making interventional use of the PA pathway as
means for prevention and enhancement of quality of life of NHR, we are aiming to go one step further by enhancing PA itself. In this way, NHR may in the long run benefit even more from an intervention that not only enhances PA due to its mere implementation, but also from a change in PA behavior due to newly established competencies. However, there are not only individual factors that determine PA behavior. It is also determined by the environment and institutional realities, which in case of NHR include NH staff, predetermined daily schedules and restrictive architectural aspects, among others. With this in mind, solely concentrating on the individual level seems short-sighted, as activity behavior is not only based on individual barriers or motivators. Until now the number of more specific and at the same time comprehensive intervention approaches taking into account these characteristics of this specific population is very little. Herein we present a multi-component intervention approach that is based on individually tailored physical exercise training for NHR combined with motivational competence training for staff. It was implemented within the course of the project “Long-Term Care in Motion” (LTCMo) in two NHs in Heidelberg, Germany. LTCMo is a subproject of the interdisciplinary research project “INNOVAGE – Social Innovations Promoting Active and Healthy Ageing” (Health-F3-2012-306058\(^1\)) funded by the European Commission’s Seventh Framework Program.

The primary aim of LTCMo is to present a social innovation with the potential to promote PA among NHR in order to prevent a further decline or even elicit an improvement in motor and cognitive function, and thereby improve the living conditions and quality of life in NHR in line with the main concept of INNOVAGE (active and healthy ageing). However, the mission of INNOVAGE is not only to create a social innovation, but also to spread the newly created and proven concepts. This guidebook was developed with the intention to address relevant stakeholders and users. It highlights the potential of PA as well as its barriers, which can hinder a successful implementation of the intervention program, but also strategies to overcome them. Furthermore, we provide a detailed description of the multidimensional training program to make an implementation as easy as possible.

The guidebook is based on previous research findings and experiences made during the implementation of the intervention program. For further information on the

\(^1\)http://www.innovage.group.shef.ac.uk/
scientific background and empirical outcomes of the project, please see our already published works:

- **Systematic Review** summarizing previous findings regarding interventions and their effect on PA in NH settings: Jansen, Claßen, Wahl, & Hauer, 2015
- **Study Protocol** describing the research design and methodological aspects of the LTCMo project: Jansen, Claßen, Hauer, Diegelmann, & Wahl, 2014. Additional scientific papers are planned and will be published during the final phase and in the aftermath.
- A number of manuscripts describing the project and outcomes are currently in preparation and will be published soon.

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**Main Goals of LTCMo**

The aim of LTCMo was to develop, empirically evaluate and disseminate a socially innovative and sustainable intervention in the NH ecology by means of a multidimensional intervention program (resident and staff oriented) with the potential to promote PA behavior in NHR. It is very important to note that unlike in most other intervention driven studies and programs in long-term care LTCMo addresses physical activity decidedly in terms of behavior.

Looking at the institution ‘nursing home’ as a ‘natural lab’, the approach was sought to address this ‘natural lab’ from several different angles that would add up to achieving this overall goal of enhancing nursing home residents’ physically active behavior. In particular, a controlled intervention was to be exerted at two levels of long-term care institutions: on the side of the main end-users, the nursing home residents, and on the side of nursing home staff. In order to modify physically active behavior, multiple factors such as health and psycho-social status, motor and cognitive function as well as motivational resources that have to be considered due to their large effects on physically active behavior. The decision to exert an exercise-based intervention approach in combination with competence training for staff members was based on several leading considerations.

First, the program can be implemented in a controlled group environment, which not only fosters motor function and skills but also contains social aspects, helping to establish close social contacts in-between participants and between participants and group supervisors. Through close contact to all participants, supervisors are able to
not only improve motor function by means of exercise, but to also activate motivational and psycho-social resources of participants that are important determinants of activity behavior. For example through the improvement or even recovery of the most important key motor functions (sit-to-stand transfer, standing, walking), self-efficacy and a feeling of self-determination may be enhanced, resulting in more active behavior. In addition, constant groups in ‘safe’ surroundings help achieving high adherence rates, especially if tailored to end-user needs.

Secondly, the group approach allows including a broad range of participants when it comes to motor and cognitive abilities. These can be assorted into homogenous groups, which helps to prevent under- or overexertion of residents and to keep motivation on a high level.

Thirdly, by motivating residents to be more physically active, staff is able to enable residents to use their potential and their competencies optimally. Based on own observations, the main potential of this approach lies in the recurrent close bonds between nursing staff and nursing home residents. Nursing staff is expected to have strong influence on residents’ behavior. Therefore, changing staff members’ interactional behavior with residents is hoped to increase the awareness of residents’ health and motion behavior, self-efficacy, control beliefs, self-regulation, and autonomy, as empirical evidence name these as crucial factors for being physically active.

Fourthly, through offering a virtual, game-based exercise training (‘serious game’) targeted at motor-cognitive tasks, residents who are not appealed by “standard” exercise forms are addressed.

A unique feature of the approach was that the explicitly end-user oriented approach came at the same time, at the research and methodology level, with an extensive and innovative technical assessment of physical activity, life-space and motor performance as well as subjective interview- and proxy-based questionnaires on psycho-social outcomes were completed (study protocol by Jansen et al., 2014). To our knowledge, this represented the first combination of a cutting-edge research methodology and a resident- as well as staff-oriented intervention approach in a long-term care setting.
The implementation of social innovations and programs such as LTCMo is challenged by a series of barriers, particularly in the NH context. NHs represent highly structured institutions with a large number of well-established routines and practical constraints, which are often not obvious for an external person. Such constraints and routines may follow a rationale which may deviate or even contradict research interests or implementation of programs. Actors in such an institution, e.g., residents, staff or management, also may have diverging interests. As the success of a project such as LTCMo heavily depends on acceptance by institutional members, setting specific routines and interests will have to be taken into account. Acceptance and support are not granted and will have to be merited. As a general recommendation, respect for the setting and actors should be mandatory. In case of scientific studies, team members may therefore rather behave as guests—and not as intruders—in any given situation. Time and resources invested for those issues may pay off when the project is implemented. The following implementation principles might facilitate the acceptance of the main actors and the intended intervention program in a NH setting. Some of the principles are of general importance; some are specific recommendations for scientific staff or other external personnel.

**Principle I: Inform the whole system in consideration of the hierarchical structures (top-down-regulated approach)**

Detailed information on the planned activities and a continuous update is an important prerequisite of any project. The information process may not only be used for delivering news but also to get in contact with the persons in the institution. As within the formal hierarchy of an institution, information processes, targets and types of deliverance should be tailored to the addressees. Leading management, staff, relatives, legal representatives and residents represent different target groups requesting different ways of communication. Regarding all target groups, essential factors for motivation are the valuation of individual opinions, the clarification of the project aims and the positive impact on resident and staff level as well as a skilled way to establish the first contact.
Step 1: Leading management

As a first step, the leading management should be informed about the project to achieve a supportive relationship and a formal “go”. Major target of this step is to clarify concerns and convince the management of the importance of being physically active in a NH and the positive effects which can be achieved even in such a vulnerable population. As with other target groups, it is always helpful to take the perspective of professionals in institutions as a starting point. Major pros may be represented by quality management or advertising/publicity/sales promotion issues. Cons may touch concerns about use of additional (labor-) resources and the acceptance of residents and staff. Information should be delivered step by step using different approaches. Formal and less formal talks accompanied by a clear study description will help to get support. Hierarchies with the management will have to be respected with the leading persons to be informed first. The support of the leading persons and their willingness to cooperate is crucial for any further steps.

Step 2: Staff team

Once the management promotes the project, staff should be informed and involved as their support of the program is essential for its successful implementation. However, convincing the staff team that the intervention program is worth implementing can be challenging due to specific workplace characteristics (e.g., lack of time, inconvenient shift times, heavy workload and the need for emotional labor) and a series of doubts regarding the effort and the impact of the program. Firstly, a lack of specific knowledge and insecurity on how to support PA related behavior represent crucial limitations for the implementation of such innovative models. Due to functional, physical or cognitive losses in NHR, staff may doubt that a considerable increase in residents’ PA is possible and feasible in principal terms without taking too many risks. As a typical consequence, a dependency-supportive interaction style with residents that again strengthens residents’ sedentary behavior has been reported in previous NH related literature (Baltes & Wahl, 1992). Due to the key role of NH staff to trigger or hinder activity-related behavior, LTCMo aims to convince and enable staff members to use specific ways of communication and PA-supportive behavior.

Secondly, some staff members may have concerns about additional workload and may fear critical evaluation of their individual work. Most colleagues working in the
institution will not have any training or insight in scientific or implementation work, which may mystify or devaluate project proceedings. Furthermore, there might be skepticism against external persons who do not work in the same institution and take a more theoretical perspective. Comprehensive information about project plans, limitations, and goals may help to set straight critical considerations. Referencing the complete restriction to forward any information concerning residents and staff to management or the public as requested by ethical boards for project proceedings will help to clear out concerns related to employment law or ethical issues. It may also be helpful to address the potential positive consequences of the project on staff level, including everyday issues such as less care support for residents in case of a successful improvement in motor key functions as targeted in the project. Because of the overwhelming impact of persons working in the institution and their close contact to the target group, staff training is a major intervention approach in this training concept. Daily shift changes or other personnel gatherings may be an adequate organizational opportunity to inform staff. At a given and suitable time, a formal general information meeting including staff and management should also be held. To establish a more personal, informal access it may prove sensible to be present at the site for a longer period of time and to be available for less formal requests. It may be even possible to establish a familiar relationship with staff as well as residents. A promising way to reach a solid relationship is to play an active part in the daily care work, e.g., by doing a short-term internship. An added value is to get to know the daily routine of staff and residents as well.

Step 3: Residents and their relatives

It proved sensible to address residents as potential participants personally in a motivating and emphatic manner to take care of their specific questions, needs, and preferences. It is also advisable to inform relatives or legal representatives about the program and its purposes.

→ Principle II: Learn about and evaluate existing activities within the institution

Before implementing the intervention components described in this guidebook, the setting should be prepared and analyzed carefully and thoroughly. In each facility, some forms of activity groups, therapy classes or any other programs, circles, etc. are already installed. Some of them may be very useful or even very close in scope and execution to what is presented herein. So before modifying the weekly schedule,
all activities, be it single or group activities, should be analyzed and checked for usefulness and their potential to be modified according to the LTCMo components. A systematic evaluation should include quantitative (e.g., frequency, duration, weekday, time of day, number of instructors and participants, sequence) and qualitative (e.g., concept, content, aim, adaption to target group, instructors’ qualification) criteria. Activities that are similar to the intervention that is planned to be installed may either be cancelled during study course or used as expansion of the intervention if the personnel situation allows parallel activities.

A major problem for scientific or any other external projects in real life institutions is that the institutions have established roles and routines, which may be interrupted or altered by the project. The sustainability of successful project standards might be endangered when a project ends and study resources as well as well-trained study personnel are no longer available. To develop a sustainable intervention strategy tailored to the institutional setting and its residents, it is therefore mandatory to start with a description and evaluation of the existing activities in such a highly structured environment (see Annex). Four major considerations will lead the process:

Respect established and successful structures and work of staff

It has to be kept in mind that external projects have their own conditions and aims, which may not be identical with institutional requests. It is a simple fact that studies are limited in time in which project activities interfere with the daily routine of the institution. A first important step is to explore specific NH routines like everyday care, meal and activity schedules. A short-term internship for external project collaborators (as mentioned above) may offer comprehensive insight and help to get involved. Many of the established structures have their history and have been developed for good reason. A useful routine, interrupted by a study project, may only be restored with substantial effort. Modifications of established processes and activities may lead to a negative personal feeling (e.g., to be insufficient) or the anticipation of additional workload and stress by institutional activity coordinators. Resistance is expectable when the need for any change is not clear or information about the frame conditions is insufficiently communicated. The critical assessment of proceedings in non-scientific settings requires evaluation of the organizational (objective workplace characteristics, daily routines and existing programs) as well as the individual
(perceived job demands and resident-staff-interaction, work-related attitudes) situation within the institution.

**Learn about the background of existing activities**

Established activities within institutional settings have their own history and conditions, which may not be obvious at first from an external or scientific point of view. Partly those activities are triggered by strictly content-related criteria (e.g. improvement of quality of life or activity promotion). Partly also formal criteria (such as quality assessment; QA), a lack or abundance of space/equipment/media, as well as education and training or individual preferences of staff and residents who participate determine the activities. For a successful implementation of project standards it is useful to consider all those different perspectives and address those which may support study targets or sustainability of project standards when the project runs out. The residents’ perspective might be extremely helpful in getting an impression of preferences, needs and routines of the main target population of the project.

**Evaluate activities with respect to the project aims**

Due to the highly structured character of the NH environment, there is only limited space for additional activities as planned in study projects or activation programs. In order to prevent overload or distress of residents and staff, it is necessary to identify optimal periods for project sessions and avoid overlap of programs. Therefore, existing activities should be systematically evaluated using quantitative (e.g., frequency, duration, weekday, time of day, number of instructors and participants, sequence) and qualitative (e.g., concept, content, aim, adaption to target group, instructors’ qualification) criteria. Activities that are similar to the intervention that is planned to be installed may either be cancelled during the implementation or used as expansion of the intervention if the personnel situation allows parallel activities.

**Try to integrate project standards in established activities and identify active protagonists**

The systematic summary of existing activities will help to integrate project standards into the established system. In case of external projects, it can be used to identify eligible persons who may be interested and willing to implement and sustain the
project activities. In this case, responsible institution members might be integrated at an early stage and successively incorporated under regular supervision of the program leaders (expertise of psychologists, sports scientists or other specialists) to ensure sustainability of training components. The supervision should be kept up until the end of the project to reach an appropriate continuation and ensure sustainability of the program. At this stage, a guidebook including training components and a detailed description of exercises is very helpful in facilitating training implementation through nursing home staff. The management of the institution should be integrated into this process in order to encourage committed staff to become active protagonists of ongoing activities. It might be helpful to use the management perspective to balance requested additional resources for such implementation with added value for institutions (e.g. marketing/QA).

Evaluation and Sustainability of LTCMo

In case of external projects, a long-term implementation of the program should be envisaged, so that participants can profit from the intervention during the project and also beyond. In LTCMo, an important issue was the sustainable implementation of the program into daily NH routine. Several steps were taken to achieve this goal. During the intervention phase of the study, social care assistants who worked in the NHs took part in the exercise groups and the individual trainings on a regular basis. In this way they were able to learn about the main principles of the program, to learn basics on group leadership and instruction, to gain basic knowledge of exercise science, and to develop an adequate repertoire of exercises. In both facilities, management and staff were convinced of the positive effects and the additional value of the program. After the end of the intervention phase, the program was seamlessly continued by these staff members, under regular assistance and supervision of LTCMo staff until they were able to conduct the program in an appropriate and effective way without needing support. In both NH facilities, this required a rearrangement of the weekly activity schedule which was only taken into consideration due to the likewise extraordinary resonance of NHR, nursing staff and NH management. As a consequence, both NHs that participated in the study implemented the exercise program into their care and activity routine. Several groups are taking place twice weekly with up to eight residents in each group. In one of the
NHs, the staff training became an inherent part of the internal training schedule. Unfortunately, the competence training was not completed in the second NH. Reasons for that may be that in this NH, LTCMo staff was not able to establish a more personal relationship to nursing staff, e.g. by doing a short-term internship on care level (as described above). In both facilities, research staff of LTCMo is still providing regular support in the execution of the program when necessary.

As part of sustainability measures, it is an important aim for LTCMo to make our approach accessible and also reproducible for institutions and nursing home personnel. Therefore, the physical exercise training and the CT training courses for NH staff will be offered as a two-day training course via AGAPLESION Academy, a well-established care and health educational institution in Heidelberg with nationwide outreach, to allow the implementation of LTCMo into the care routine of interested nursing homes.

Although our study has faced several methodological challenges (e.g., rather small sample size; non-randomized controlled trial), we believe that our approach has the potential to contribute to the enhancement of NHR’s quality of life and at the same time stimulate further PA-related research with vulnerable populations at large.

The data analysis is currently underway - preliminary evidence already shows that positive effects on motor performance and physically active behavior were achieved.
The program LTCMo has been conceptualized for use within long-term care institutions. The physical exercise training is targeted at residents of such institutions; the competence training has been developed for nursing and social assistance staff. In general, all residents and staff members can participate in the program, irrespective of cognitive and motor impairment. Specific requirements and exclusion criteria are delineated below. The key components of the program are illustrated in Figure 1. Residents receive either physical training in homogeneous exercise groups or in an individual one-to-one training form if group assignment is not possible due to severe motor impairment or distinct behavioral problems. For residents who are interested in new forms of exercise, or residents who are not appealed by "standard" exercise forms, a serious games training can be implemented in the NH. Each of the training approaches is described in detail below.

On staff side, a competence training aiming to support physically active behavior of residents is implemented. It consists of theoretical input as well as practical exercises. It also provides a platform to discuss particular cases.

**Figure 1.** Illustration of the intervention components.
The physical training relies on the existing evidence of successful PA intervention in multi-morbid, frail, older persons with and without cognitive impairment (Hauer et al., 2001; Hauer et al., 2012; Schwenk, Zieschang, Oster, & Hauer, 2010) and is at the same time specifically tailored to the needs of the target population of physically and cognitively impaired NHRs. Thus, its bottom line is a rigorous focus on functional and strength exercises and the improvement of key motor qualifications balance, walking and sit-to-stand transfers that are necessary for mobility, autonomy and motion security. Additionally, the intervention pursues the goal to improve psycho-social outcomes such as social participation, self-efficacy, depression, and quality of life. In addition to influencing external factors and barriers as mentioned in previous chapters of this report, training improvements in motor, psychological, and cognitive status are hypothesized to increase activity behavior as these factors have been identified to be high impact predictors of physical activity.

A major goal of the project was to include as many participants as possible, requesting a tailored approach for sub-groups with specific demands for each group. Therefore, the physical training is specifically designed for each target group of NHR, characterized by old age, advanced frailty, multi-morbidity, and motor as well as cognitive impairment and behavioral aberrations. Despite these serious restrictions and deficits, such characteristics do not preclude participation in general and individual potentials differ a lot. Therefore, the physical intervention includes multiple exercise approaches with the aim to offer a comprehensive exercise repertoire, which can be adapted to the special individual needs and limitations of residents (see Table 1). When grouping residents, motor function as well as problematic behavioral symptoms should be taken into consideration. In the Annex a classification tool that was developed for this purpose is attached. We defined three different approaches regarding the group exercise training; each with different group allocation criteria.

The first group training approach was intended for ambulatory participants with advanced motor function, in which exercises show higher intensity and complexity due to advanced physical and cognitive function of the participants. A second approach was implemented for residents who at least were able to stand and showed only mild to moderate cognitive impairment without serious behavioral symptoms.
For residents with severe cognitive impairment in combination with behavioral symptoms of dementia a third exercise group training was installed, as successfully shown in code-secured living units in LTCMo. This sub-division of training approaches allows for the inclusion of as many residents as possible.

However, severe cognitive and motor impairment represents an exclusion criterion for the serious games approach, as successful participation requires the motor ability to complete stepping tasks without support as well as cognitive functioning in terms of task-performance based on visual stimuli and thus may lead to frustration in case of overexertion.

Residents with advanced postural deficits / motor impairment or severe behavioral problems due to cognitive impairment are not included in exercise group sessions but eligible for specific, individually tailored training, which is based on exercises used in the group training and adapted to the individual abilities of the participants in an individualized, one-to-one training situation. Residents with aggression-related behavior problems were excluded from participation.

Table 1 gives an overview of the different exercise approach components.

*Table 1. Physical Exercise Training Approaches*

<table>
<thead>
<tr>
<th>Training approach</th>
<th>Group Description</th>
<th>Frequency</th>
<th>Group size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervised group training I</td>
<td>Residents need to be able to communicate verbally, to walk with or without support, and to have no behavioral symptoms that impede group participation</td>
<td>45 minutes; twice a week</td>
<td>4-8 residents</td>
</tr>
<tr>
<td>Supervised group training II</td>
<td>Residents need to be able to communicate verbally, to stand up, and to have no behavioral symptoms that impede group participation.</td>
<td>45 minutes; twice a week</td>
<td>4-8 residents</td>
</tr>
<tr>
<td>Supervised group training III</td>
<td>This training is specifically for residents of code-secured living units with severe cognitive impairment, showing pronounced behavioral and psychological symptoms of dementia.</td>
<td>45 minutes; twice a week</td>
<td>4-8 residents</td>
</tr>
<tr>
<td>Specific individual training</td>
<td>This training is for residents with severe motor impairment or cognitive impairment in</td>
<td>30 minutes; twice a week</td>
<td>1 resident</td>
</tr>
</tbody>
</table>
combination with severe behavioral problems. Participants should at least be able to stand with close supervision and support and show no highly aggressive behavior.

| Serious game | Residents without or mild cognitive impairment; able to stand and step without aid. | 15 minutes playing time per participant | 3-4 residents; 1 person plays at a time |

In the following, participant characteristics, aims, and training components of the three different group training approaches are described. In addition, special requirements for group trainings in code-secured living units are highlighted.

It is important to note that in LTCMo improving motor function is a means to an end - the aim is not just to improve motor function but to enable residents to be more physically active. Improving or even recovering the most important key motor functions (sit-to-stand transfer, standing, walking), self-efficacy and a feeling of self-determination may be enhanced, resulting in more active behavior. In addition, through close contact to all participants, supervisors are able to not only improve motor function by means of exercise, but to also activate motivational and psychosocial resources of participants that are important determinants of activity behavior. With this in mind, the table below refers to practical goals of the exercise groups regarding improvements in motor function.

<table>
<thead>
<tr>
<th>Supervised Group Training I</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participant Characteristics</strong></td>
</tr>
<tr>
<td><strong>Aims</strong></td>
</tr>
</tbody>
</table>
| **Training Components** | Functional strength training: Sit-to-stand transfer training without using the arms. Dynamic balance and gait training: Different standing positions; improvement of stability and duration of standing posture; different walking exercises (e.g., narrow vs. wide distance between feet; slow
vs. fast walking; uneven floor surfaces).

### Supervised Group Training II

<table>
<thead>
<tr>
<th>Participant Characteristics</th>
<th>Unstable walking with aid; standing up and sitting down without personal assistance is possible.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aims</strong></td>
<td>Physical activity promotion in terms of higher frequencies of standing and enabling participants to walk short distances. Improvement of static and dynamic balance (i.e., stable standing); improvement of sit-to-stand transfer. In the further course of the training: support of stable walking, walking security, and a homogeneous walking pattern (then: transition into Group I).</td>
</tr>
</tbody>
</table>

| Training Components         | Support of stable standing without aid by exercising in different standing positions and at different levels of difficulty. 
|                            | Sit-to-stand training: trying to stand up and stand still; in the long run, transition to sit-to-walk training |
|                            | Gait training: In the beginning, improvement of gait performance with support; gait episodes without aid if this seems possible; prolongation of the duration of walking episodes under supervision and improvement of a homogeneous walking pattern. |

### Supervised Group Training III

<table>
<thead>
<tr>
<th>Participant Characteristics</th>
<th>Participants show pronounced cognitive impairment accompanied by severe behavioral problems. Participants should be ambulatory and able to stand up with little or no support. In LTCMO, this group was implemented in a code-secured living unit.</th>
</tr>
</thead>
</table>
| **Aims**                    | Improvement of static and dynamic balance (i.e., stable standing); improvement of sit-to-stand transfer. Support of stable walking, walking security, and a homogeneous walking pattern.  
|                            | In this special group, aberrant motor behavior or wandering behavior was frequently observed. Therefore, it is another aim to divert this kind of ‘unwanted’ active behavior to meaningful activities and exercising activities. |

| Training Components         | Functional strength training: Sit-to-stand transfer training without using the arms. 
|                            | Dynamic balance and gait training: Different standing positions; improvement of stability and duration of standing posture; different walking exercises (e.g., narrow vs. wide distance between feet; slow vs. fast walking; uneven floor surfaces) 
|                            | Focus on social aspect of group training: exercising together by execution of clearly constructed and meaningful tasks. |
Depending on the severity of cognitive impairment, group organization may require adaptations. In LTCMo, instead of a double chair circle, residents were seated side by side in direction of a hallway which was used for exercises. Then, residents were attended to one after another from left to right. When the last participant in the line was done (right) with his round, the first in line (left) started with the next exercise. Residents were seated close to each other so that social contact and conversations were facilitated. In addition, this organization form was found to be easier to understand for the participants than the double chair circle.

Code-secured living units are typically built barrier-free. This allows an “open” group setting in which participants are able to leave and come back anytime in case keeping them in the group is not possible. However, this also means that non-participating residents may enter the exercise area every now and then. Therefore, it is helpful to have additional personnel who can address these external visitors without disturbance of other participants.

**Personnel Requirements: Communication and Appearance**

The group exercise sessions should be led by a qualified person who is familiar with the special requirement of the population (e.g., physical therapist, sports scientist, nursing staff, social assistants or other qualified personnel) and, depending on group size, at least one assistant to provide highest possible safety for participants. During the implementation phase, staff members should also become familiar with communication strategies to ensure suitable training conditions and encourage PA-related behavior (see Table 2). This includes factors related to verbal instructions (clear instructions, loud voice, positive wording, etc.) but just as much non-verbal instructions (demonstration, tactile support, facial expression, etc.) that help the participants to understand what they are supposed to do. Especially in groups of residents with behavioral and psychological symptoms of dementia (BPSD; Finkel et al., 1996), further dementia-specific strategies are necessary to allow organization and implementation of exercise groups, e.g., measures of person-centered care (Brooker, 2004) and validation techniques (Feil, 1993), which are based on emphatic attitude, respect and appreciation of each individual without judgement. In this regard, it is very important to give particular attention to the individual as well as the group as a whole, and to create a positive social environment to enable the person with dementia to experience relative well-being while exercising.
Establishing a stable personal relationship with participants is a key element for adherence and motivation. Therefore, it is advisable not to exchange personnel during the program if possible. Personal conversations are of high importance in this context. An instructor should be able to show interest in the needs and feelings of the participants and find time for personal conversation, e.g., while bringing participants to the training room. In this way, the instructor can gather information regarding physical and mental condition, which may also be important to consider when conducting the training. Especially aspects which can be strong barriers to physically active behavior, such as apathy, depressive symptoms or a lack of self-efficacy, are easier to recognize and to address when a personal relationship is established.

Regarding his appearance, the instructor has to be able to attract attention and to act as a strong motivator with self-assurance, as participants need clear and definite instructions and motivation. Possible insecurities of instructors inevitably lead to insecurities on the side of participants. Therefore, it is most important to prepare each exercise session in advance and maintain a clear and constant structure.
Table 2. Overview of Communication Strategies and Approaches (Brooker, 2004; Feil, 1993; Oddy, 2011; Schwenk, Oster, & Hauer, 2008)

<table>
<thead>
<tr>
<th>Verbal instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Attract participants’ attention (e.g., by calling the name) and give attention</td>
</tr>
<tr>
<td>• Speak slowly, calmly, loud and clear</td>
</tr>
<tr>
<td>• Practice active listening</td>
</tr>
<tr>
<td>• Give short and clear instructions</td>
</tr>
<tr>
<td>• Repeat your request if necessary and be patient</td>
</tr>
<tr>
<td>• Use positive wording (e.g., “Please stay seated” instead of “Don’t stand up”)</td>
</tr>
<tr>
<td>• Link movements with associations (e.g., ‘Stand like frozen’)</td>
</tr>
<tr>
<td>• If there are two or more assistants, decide who should speak</td>
</tr>
<tr>
<td>• Chose a proper position (ideally face to face)</td>
</tr>
<tr>
<td>• Signalize the simplicity of the task (e.g., “Just move to the marked line”)</td>
</tr>
<tr>
<td>• Try goal-based instructions if you assume the person could possibly manage the task</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-verbal instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Demonstrate exercises (“mirroring”)</td>
</tr>
<tr>
<td>• Give tactile support (e.g., for correction of movements)</td>
</tr>
<tr>
<td>• Give rhythmic support (e.g., “and back… and forth…”))</td>
</tr>
<tr>
<td>• Be attentive to participants’ non-verbal reactions (e.g., facial expression, body movements)</td>
</tr>
<tr>
<td>• Monitor and control your own non-verbal behavior (e.g., facial expression, tone of voice)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Person-centered approach and validation techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Emphatic attitude</td>
</tr>
<tr>
<td>• Respect and appreciation of each individual</td>
</tr>
<tr>
<td>• No judgement of individual behavior</td>
</tr>
<tr>
<td>• Give particular attention to the individual but also the group as a whole</td>
</tr>
<tr>
<td>• Create a positive social environment</td>
</tr>
<tr>
<td>• Promote well-being while exercising</td>
</tr>
</tbody>
</table>

Organizational Aspects of the Group Training

The exercise groups should be conducted in 45-minute sessions at least twice a week in small groups of four to eight residents, ideally always in the same room to create familiar surroundings. The level of difficulty should be increased with caution. In the beginning, simple exercises should be conducted and frequently repeated in order to enable residents to perform basic motor tasks such as standing up and stepping. To further motivate participants, constant but appropriate positive feedback should be given. When basic motor functions are stable, participants can progress to advanced levels of exercise, i.e., complexity and challenge of tasks can be
increased. The complexity and intensity of exercises has to be individually adapted to the performance level and the training progress of the participants. In any case, exercises are not supposed to cause overexertion or pain. If so, the exercise has to be interrupted or reduced in intensity/duration. For participants which show overt symptoms of exertion or fatigue, the responsible physician must be consulted in advance (and during the program, in case of adverse events). It is important to keep in mind that self-report abilities may be limited in cognitive impaired people. Persons' non-verbal reactions (e.g., facial expressions, vocalization) therefore have to be observed carefully.

As exercise training inevitably increases risk exposure, safety aspects are of particular importance. A ratio of four participants to one supervisor or assistant should be given. In addition to the personnel itself, the compliance to certain organizational aspects (see also guidelines in Table 3) helps to ensure safety, e.g. by using a double chair circle (see Figure 2), which allows participants to hold on to a chair and sit down whenever necessary. In addition to its safety aspects, the double chair circle allows for internal differentiation, which means that each participant is able to train in a group and according to his/her individual performance level (e.g., with/without holding on to a chair) at the same time. Further information on safety measures are described in the exercise catalogue.

Special organizational aspects of group trainings in code-secured areas are delineated under ‘Special Requirements’ of Group III above.
Table 3. Overview of Organizational Aspects and Training Guidelines: Group Training

<table>
<thead>
<tr>
<th>Organizational aspects and training guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Always use the same room for the training (ideally a familiar area)</td>
</tr>
<tr>
<td>• Keep constant and simple organizational forms (e.g., same instructor; same groups)</td>
</tr>
<tr>
<td>• Arrange groups as homogenous as possible with respect to motor and cognitive function</td>
</tr>
<tr>
<td>• A maximum of eight participants should not be exceeded</td>
</tr>
<tr>
<td>• Individual differentiation should be made possible</td>
</tr>
<tr>
<td>• Training should be conducted in small groups under the supervision of at least two trained instructors</td>
</tr>
<tr>
<td>• Be attentive to postural instability and risk of falls</td>
</tr>
<tr>
<td>• Adapt the training to the individual status</td>
</tr>
<tr>
<td>• Training equipment should guarantee highest possible safety</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Training instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use simple structured exercises</td>
</tr>
<tr>
<td>• Increase level of difficulty with caution</td>
</tr>
<tr>
<td>• Frequently repeat exercises</td>
</tr>
<tr>
<td>• Give positive feedback to reinforce motivation</td>
</tr>
<tr>
<td>• Use dementia-specific communication strategies (if necessary)</td>
</tr>
</tbody>
</table>

Spatial and Equipment Requirements

The implementation of the physical exercise training requires an adequate room with enough space for a double-chair circle for eight residents. Usually spatial conditions are poor in NHs. Still, if some options are available, some issues should be considered.

The room should be neither too small nor too big so that participants do not feel confined or lost and it should allow a certain amount of privacy without external disruptions or interfering activity. Too many people leaving or entering the room as well as people passing by might be a distraction for participants. The interior of the room should be bright and inviting to provide a harmonic atmosphere. It is important that the room can be heated and ventilated if necessary. A very important issue is the floor coating. The floor should not be slippery or uneven. Handrails on the walls might be helpful but they are not mandatory. As the training ideally is conducted within the premises of the NH, a quick connection to nursing staff in case of emergency can be expected. To prevent longer interruptions of the training, a near bathroom is very convenient.
Further spatial requirement for groups in code-secured areas are delineated under ‘Special Requirements’ of Group III above.

In addition to the spatial requirements, the following materials should be available to allow for diverse and functionally effective exercise compilation (see Figure 3):

- Two stable chairs (ideally with side armrests) have to be available for each participant in order to build a double chair circle.
- Balls (e.g., exercise balls or foam balls)
- Balance pads (e.g., Airex® or Terra Sensa®)
- Porcupine balls
- Step stools
- Ropes

### Specific Individual Training

The specific individual training was developed for those residents who show distinct motor and functional impairment and/or severe behavioral problems that would result in unacceptable disturbance of group activities. The exercises are similar to those used for group training. One major pro of individual training is that the individual supervision allows perfect fit to the personal needs of an individual. Individual problems and deficits can be addressed in a more detailed manner. However, this form of training is very personnel-intensive and requires an instructor who is able to do the training without help of an assistant in a one-on-one situation.

<table>
<thead>
<tr>
<th>Specific Individual Training</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participant Characteristics</strong></td>
</tr>
<tr>
<td><strong>Aims</strong></td>
</tr>
</tbody>
</table>
In the beginning main focus on seated strength and mobilization exercises: strengthening of leg muscles (leg extension) to enable sit-to-stand transfers. In the course of the training, conduct standing exercises with support if possible. For ambulatory residents who are eligible for individual training due to behavioral problems, the training components have to be adapted to the functional abilities. Based on the description of Group I and II, the training components can be adjusted to each individual.

**Serious Games Approach**

In general, physical training is based on repetitive and standardized training tasks, which guarantee effectiveness, but will possibly fail to attract all participants. An alternative mode to motivate persons to be physically active is a serious games approach, in which motivational aspects are driven by a game setting, and effectiveness is supported by a “serious”, evidence-based exercise task. In this supervised cognitive-motor training, the motor task is based on a progressive functional task (stepping/dynamic postural control), the cognitive task targets different cognitive sub-performances such as divided attention, temporo-spatial orientation, reaction time, and executive performances (Pichierrri et al., 2012; Schoene et al., 2014; Sherrington et al., 2008).

**Serious Games Training**

<table>
<thead>
<tr>
<th><strong>Participant Characteristics</strong></th>
<th>Participants are able to stand and step independently and are not or mildly cognitively impaired.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aims</strong></td>
<td>The game based training addresses both motor and cognitive performances. The stepping task focuses on dynamic postural control (important for motor key features such as standing or walking); the cognitive task relates to cognitive sub-performances (such as temporal-spatial orientation, executive functions).</td>
</tr>
<tr>
<td><strong>Training Components</strong></td>
<td>Supervised cognitive-motor training. Participants have to execute steps (forward, backward, right or left) on a dance plate as indicated on a computer or TV screen.</td>
</tr>
</tbody>
</table>

Due to the execution of major motor-cognitive tasks that are relevant for the target group, such Serious Games are expected to induce more meaningful improvements than simple virtual gaming consoles (e.g., Nintendo Wii or Sony PlayStation). Another important feature of this type of Serious Game is immediate referral to stored
previous performance and respective feedback of progress and goal achievement during ‘play’, meaning a direct motivational support. Difficulty can be individually adapted as the program depends on previous individual performance in each level to prevent overtaxing of users. The standardized program has been adjusted to the performance level of frail older adults with and without cognitive impairment in pilot testing prior to the intervention.

The Serious Game used in LTCMo was the “Dividat Step Plate”. For further information, please visit http://www.dividat.ch.
The main aim of the competence training is to enable staff members to use specific ways of communication in order to motivate residents to be more physically active. We aim to increase the awareness of residents’ health and motion behavior, self-efficacy, control beliefs, self-regulation, and autonomy, as empirical evidence name these as crucial factors for being physically active. The resulting change in staff members’ interactional behavior is hoped to enable residents to use their potential and their competencies optimally.

Theoretical and Empirical Background

The primary aim of the competence training (CT) is to implement and enhance PA-encouraging staff behavior. The CT was developed for the target group of nursing staff and nursing assistants, care supervisors, and activity coordinators and it is based on three theoretical traditions:

(1) Health psychology approaches applied to old age; (2) self-regulation and co-regulation approaches related to aging; and (3) life-span motivational models (see also Table 4).

Regarding health psychology the training builds on motivational theories (e.g. Self-Determination Theory by Deci & Ryan, 1985) which address the question why someone does or does not behave in a certain way. The framework of Motivational Interviewing or work on the Positivity Bias, for example, name ways to practically influence motivational components of behavior. Self-regulation Approaches (e.g., Social Cognitive Theory by Bandura, 1977) assume that persons can achieve their goals despite certain barriers (e.g., age-related functional impairments), as they selectively influence their actions, emotions, cognitions, or intentions, for instance. Co-Regulation Approaches address the question how certain ways of interacting and communicating (e.g., baby talk) may influence vulnerable persons’ autonomy. The knowledge on clinical action is highly relevant in this context. Life-span motivational models (e.g., Socio-Emotional Selectivity Theory by Carstensen, 1991) assume a goal-focused, mainly conscious, and functionally adaptive process of selection and active arrangement of the social context that aims at an age-adequate re-
arrangement of the social context as well as at a (re-) activation of social resources in order to maintain well-being.

Though a large body of research identified factors promoting as well as factors preventing PA, research lacks findings concerning this matter in older persons, especially in the NH context. Regarding motivators and barriers of PA, factors like social support, self-efficacy, individual choice options, perceived security, regular performance feedback, or positive reward have been named. Furthermore, individually adjusted interventions including personal activity goals and the provision of information on local offers have been considered relevant. Regarding the special role of persons with dementia, it is relevant to enable them to get in touch with others, to give them the sense that they contribute something relevant, as well as to provide them the chance of reminiscence. The use of specific communication strategies (patients’ education, self-monitoring, goal setting, verbal encouragement) is very important to motivate this target group.

Requirements and Aims of the Communication Training

Based on the theoretical and empirical foundations, the change in staff members’ communicational and interactional behavior is meant to promote the following components on the part of the residents (see Table 4).
Table 4. Key Variables, Staff Requirements, and Intervention Contents

<table>
<thead>
<tr>
<th>Key Variables</th>
<th>Staff Requirements</th>
<th>Intervention Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health psychology and motivational approaches</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>provide and grant residents leeway in decision-making, offer opportunities to try behavior</td>
<td>empathy, positive regard, value-free conversation (Rogers); the problem of the corruption effect; Motivational Interviewing</td>
</tr>
<tr>
<td><strong>Health benefit</strong></td>
<td>sufficient knowledge on chances and risks; convey an optimistic view to residents</td>
<td>age-related attitudes and stereotypes</td>
</tr>
<tr>
<td><strong>Self-efficacy beliefs</strong></td>
<td>appreciate residents’ competences, emphasize their confidence, encourage, consider fears</td>
<td>techniques to express positive, self-worth enhancing statements</td>
</tr>
<tr>
<td><strong>Control beliefs</strong></td>
<td>support residents in attributing success to their own competences, failures to external sources; encourage residents to try again</td>
<td>role of control beliefs; techniques to express positive statements</td>
</tr>
<tr>
<td><strong>Self-regulatory competences</strong></td>
<td>support residents to recognize and to use chances of selection, optimization, and compensation</td>
<td>develop chances of selection, optimization, and compensation</td>
</tr>
<tr>
<td><strong>Considering individual preferences</strong></td>
<td>know residents’ individual preferences and needs and respect these</td>
<td>techniques to explore needs</td>
</tr>
<tr>
<td><strong>Life span approaches</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support, social exchange</td>
<td>involve residents in social interactions to promote their activity; give residents the feeling of being important and needed</td>
<td>positive attitude towards PA; develop opportunities to connect PA with social interactions (e.g., involve residents in housework); safety concerns</td>
</tr>
</tbody>
</table>
Organizational Aspects

The competence training is offered to nursing staff and is integrated into their regular in-house training schedule to facilitate participation and to reach higher adherence rates. The training comprises twelve sessions: eight 1-hour-sessions including theoretical as well as practical contents and four 30-minutes-sessions serving as case discussions and feedback-loops. Each session is offered twice a week to facilitate staff attendance. To encourage motivation, compensatory time off or financial compensation for participants may be helpful. The 12-session training can be repeated regularly, e.g. every three or four months. In this way, new staff members are instructed and staff who already attended the training may use it as “refresher”.

In order to establish an internal quality management, the program can be adapted the actual situation or new developments within the institution. Therefore, after each session staff members may fill out a short evaluation form. This instrument provides information on the following: interest in session content, structure and pace of session, comprehensibility and practical relevance of contents, learning effect, evaluation of practical exercises, response to personal matters, atmosphere, experienced fun during session, intention to attend next session, general evaluation, and possibility to provide additional comments. At the end of the 12-week training a more extensive evaluation may be conducted. In addition to the contents listed above it addresses consequences of the training and experiences with the practical use of newly acquired skills.

General Description of CT Contents

The CT consists of 12 weekly in-house-training sessions with two major parts (see also Table 5):

- Eight introducing sessions of 60 minutes containing especially theoretical aspects.
- Four intervision sessions of 30 minutes including case-oriented discussions and feedback-loops.
Because time limitations are a critical factor in the NH workplace, every session should be offered at least twice a week. Furthermore, extrinsic motivators like compensatory time off or financial reward are required to promote attendance.

**Table 5. Contents of the CT for Staff Members**

<table>
<thead>
<tr>
<th>Session</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction and overview over training program</td>
</tr>
<tr>
<td>2</td>
<td>Importance of PA in (old) age: theoretical input and joint discussion</td>
</tr>
<tr>
<td>3</td>
<td>Change of behavior: theoretical input and joint discussion</td>
</tr>
<tr>
<td>4</td>
<td>The role of age stereotypes in caring routines: theoretical input and joint discussion</td>
</tr>
<tr>
<td>5</td>
<td>Communication strategies I: Theoretical input and practical exercises</td>
</tr>
<tr>
<td>6</td>
<td>Communication strategies II: Theoretical input and practical exercises</td>
</tr>
<tr>
<td>7</td>
<td>Communication strategies III: Theoretical input and practical exercises</td>
</tr>
<tr>
<td>8</td>
<td>Feedback on practical application of communication strategies in caring routines and development of respective solutions</td>
</tr>
<tr>
<td>9-12</td>
<td>Case discussion and development of respective solutions</td>
</tr>
</tbody>
</table>
Concerning the theoretical meta-perspective, the first modules (2-4) are based on health psychology as well as motivational approaches. Modules 5-8 mainly contain components from the self-regulation, co-regulation approaches and the agency of the knowledge on clinical action as well as life span approaches. “Applying methods” will majorly convey techniques of person-centered counseling according to Rogers as well as by Motivational Interviewing.

In the following, the sessions of CT will be described in more detail. Each session starts with a brief feedback on the previous session, followed by a discussion of unsolved issues if needed and ends with a short summary and outlook.

### Specific Contents of Sessions

#### Session 1: Introduction

In the first session, staff members get an overview of the frame conditions and the contents of the intervention program. They are informed about the project’s mission, the innovative methods and the research staff involved. Furthermore, the potential positive consequences for residents as well as staff are highlighted.

The contents of the sessions to come are shortly addressed, an outlook is given and upcoming questions and doubts are discussed.

#### Session 2: Importance of PA in (old) age

In this session, staff members learn about the importance of PA in old age and in NHR in particular. The session starts with a joint reflection on personal reasons for being physically active or not before discussing pros and cons for being physically active in old age. Empirical data on demographic statistics as well as age stereotypes are presented with regard to PA and positive consequences of PA for older adults with and without cognitive impairment are addressed. Participants are informed about dementia-related changes in basic motor functions (e.g., gait disorders, limitation in sit-to-walk-transfer, risks of falling) and dementia-specific intervention techniques (e.g., specific communication strategies, individually tailored exercises).

#### Session 3: Change of behavior

This session is about change of PA-related behavior and potential challenges in this regard. After discussing individual experiences considering behavior change, the
difficulty to break behavioral habits (e.g., smoking, alcohol consumption) is illustrated. Information on the phases of behavior change is provided (pre-contemplation, contemplation, preparation, action, maintenance) and each phase is discussed with regard to PA in NHR (e.g., which factors keep NHR in a rather inactive status). Ways to overcome potential barriers are discussed jointly afterwards.

Session 4: The role of age stereotypes in caring routines

In this session, the role of age stereotypes in caring routines is discussed with regard to fostering the independency of NHR. Information about age stereotypes, gains, losses and risks associated with older age as well as the impact of subjective age (how old someone feels) are provided. Socially predominant age stereotypes are described and the resulting consequences are critically examined. For this purpose, video sequences are shown illustrating in an exemplary way, how different types of staff behavior can influence dependent vs. independent lifestyle of NHR. In a subsequent discussion, strategies promoting autonomy of NHR are worked out together.

Session 5-8: Communication strategies I-III

These sessions aim at PA-encouraging staff-resident interactions. Staff members get information about how to structure conversations actively. Techniques such as active listening, clear communication, paraphrasing, expressing contents personally and using meta-communication are presented in this regard. Special attention is drawn to dementia-specific communication techniques as well as to challenging conversation situations (e.g., dealing with anger, sadness, aggression, personal attacks). Offering practical exercises (e.g., role plays) staff members get extensive practice opportunities. Practical experiences with the new techniques made during the daily nursing care are discussed in the following session.

Session 9-12: Case discussion and development of respective solutions

The intervision sessions offer an opportunity to jointly discuss challenging single cases and develop respective solutions together. Furthermore, the practical application of the newly learned communication and interaction strategies are reviewed, and strategies for upcoming challenges are developed
ANNEX

Exercise Catalogue and Guidelines
Safety Measures & Safeguarding Positions
Tool for the Evaluation of Existing Activities
Training Group Assignment of Residents
This catalogue contains an exemplary compilation of exercises that are specifically suitable for use in nursing home residents. It mainly comprises a progressive functional and strength training as well as dual task exercises. By now there is a rather large amount of training programs that are based on similar exercises and principles. An extensive overview of interventions useful in the nursing home setting, including recommendations of particularly useful programs is given by Horn et al., 2012, e.g. HIFE - High Intensity Functional Exercise Program (Littbrand et al.), SimA-P (Oswald et al., 2007), MIA (Sportbund Bielefeld, 2009), or Strength- and Functional Training for Older People with Dementia (Schwenk et al., 2008).

In the following, the exercises will be assigned to the main motor skills that are trained with the exercise, although most exercises address multiple motor skills. Training is performed in static as well as dynamic standing positions and, depending on individual functional abilities, during walking. In the exercise catalogue basic exercises are described that can be adapted and varied in multiple ways. The exercises are implemented following three didactical principles:

- from low to high intensity
- from known to unknown tasks
- from simple to complex exercises.

With each exercise, we also describe alternatives and more complex variations of each exercise that can be used to further aggravate the exercises. In this way, exercises have constant high impacts and thus stronger effects on motor function. In general, exercise can always be developed further. Creativity is completely unrestrained as long as the exercises are functional, effective and safe.
Static Balance Training

B1: Side by Side Stance
Both feet are placed parallel in an upright stance, touching each other. This position should be held with as little movement as possible, as long as possible but no longer than 30s. If the person can hold this position with support, this can be done without support, under close supervision.

*Alternative*: High level performance: both eyes closed during exercise.

B2: Semi-Tandem Stance
This exercise builds up on B1 and poses higher demands on participants’ balance due to the more complex location of the body’s center of gravity. The starting position is similar to B1. Then, one foot is shifted to the front for about ten to 15 cm. The execution of this task is similar to B1.

B3: Tandem Stance
Just as B2, the Tandem Stance further increases the complexity of the standing task. Starting position is as in B1 and B2. Then, one foot is placed straight in front of the other foot. The execution of the exercise is as in B1 and B2.

*Alternative*: All three exercises can be performed on e.g. balance pads (B1a) or porcupine balls (B1b) to further increase complexity.
**B4: Leg pendulum**

The exercise requires the participant to stand straight on one leg, while the other leg is swung to the front and back like a pendulum. Initially, the person may hold on to a chair placed alongside the participant. The better a person can manage the task, the less aid should be used. After 30 seconds, the legs can be switched.

*Alternative:* The standing foot can be placed on an uneven underground (balance pad, porcupine ball, etc.) which increases the complexity of the task.

**B5: Catching a ball**

The person is standing straight and has a hand-sized ball in one or both hands. Depending on the experience with this exercise, the standing position can be varied (see B1 to B3).
The person throws the ball up in front of his/her face and catches it with both hands. As this exercise requires the use of both hands, direct contact with a supervisor is mandatory to ensure highest possible safety. To increase complexity, the task can be done with one handed throws and catches, different stances, and with different balls (exercise ball vs. tennis ball). By adding a complex motor-cognitive task such as throwing and catching a ball, keeping one’s balance is made more difficult.

*Alternative*: This exercise can be performed as a partner exercise. Two or more persons are standing opposite to each other. For safety reasons, chairs can be placed behind and in front of the persons, in case they want to hold on to a chair. Then, the ball is thrown back and forth between the persons with one hand (if holding on to a chair; B5.1) or both hands (if standing freely; B5.2). Different balls or balloons (B5.3) can used to vary the exercise task.
**Dynamic Balance and Step Training**

**D1/D2: Lunges**

In an upright stance, the person holds on to a chair in front with both hands. Then, a lunge to the side (S1) or to the front (S2) is performed. Lunges to the left and right can be performed either alternately or one side after the other; lunges to the front should be performed alternately with each side. The step has to be performed recognizably; the foot has to be lifted up in a distinct manner.

*Alternative:* To increase difficulty, the person can grab the chair with one hand (see Figure D1) or perform the exercise without support.

**D3: Lunges with porcupine balls/balance pads**

To combine the stepping task with an aggravated balance task, porcupine balls and balance pads can be used. The starting point is the same as in S1. Porcupine balls or balance pads are placed in front of the person. The steps then have to be executed on the materials. The person can either hold on to a chair or be held with hands by the instructor. This exercise requires the ability to stand safe and a certain amount of strength, experience, and security of the instructor.
Alternative: To further aggravate the task, the participant can start already standing on two porcupine balls. In this way, a balance training of rather high intensity can be incorporated in the stepping task. Two modes are possible:

- Three balls; standing on two parallel balls and stepping on the ball in front;
- Four balls: from side-by-side on the two back balls (D3.1) through stepping forth (D3.2) to side-by-side on the two frontal balls (D3.3); and back again.
**G1: The stalker**
The person has to walk with distinct and excessive knee lifts. Each step should be performed in a slow and deliberate manner. The supervisor has to walk close by and, if necessary, the person can hold on to the supervisor’s hand until s/he is capable of walking independently. The length of the walking path can be adapted according to individual skills.

*Alternative:* This task can be performed under different conditions which increase difficulty and complexity: with eyes closed; back-wards; with different stepping patterns or paces.

**G2: Walk the line**
A slip-resistant rope is placed straight on the floor. The task is to balance on the rope with each step at least touching the rope. Ideally, the whole foot is placed on the rope with each step. The better this task is performed, the less support should be provided.

*Alternative:* To increase complexity, the rope can be lain in a wavy line; the task can be executed with eyes closed; steps can be performed as in G1; a ball can be included as in B5.
**G3: Multi-task walk**
Walking a distance is linked with certain motor-cognitive tasks, for example throwing and catching a ball (G3.1); solving tasks such as math problems; enumerating names, cities, animals, spelling words, or else. Close supervision is mandatory as cognitive tasks while walking increase the intensity and at the same time raise the risk of adverse events such as falls.

**G4: Obstacle course**
Many different materials can be used for the construction of an obstacle course that can be adapted according to individual preferences or deficits. The course should be adapted regarding obstacles length. Due to the higher complexity and intensity, obstacle courses should be shorter than the normal walking exercises. Such courses present an excellent way to train several motor skills simultaneously. In the following, different forms of obstacle courses are presented. In all of them, very close supervision and aid are mandatory as these are the most challenging exercises in a sample of NHR.

**G4.1: Shaky ground walk**

This course can be used to initiate obstacle courses in general. Terra Sensa® mats are very useful just as Airex® mats or any other balance pad. However, these are required to be slip-resistant. Otherwise, the risk of falls is very high.

**G4.2: Balance mix**
Balance pads can be combined with several other obstacles, such as ropes (G.4.2a) and porcupine balls (G4.2b). It is important to mind the distance between the obstacles, which should be adapted to the step length of each individual.
There are many options to combine materials, and no combination is inappropriate or false. It is possible to adapt the courses according to the training goals and/or participants’ preferences to ensure efficiency, fun and enjoyment while doing the exercises.

**G5: Get up and walk**
Starting from a chair in a seated position, the person has to stand up and walk a certain distance turn around after passing an obstacle. In order to train balance as much as possible, this task should be executed in a very slow fashion.

Alternative: The exercise can be done as fast and quick as possible; while talking to the supervisor; with or without aid.

**G6: Get up, walk and step**
The execution of this exercise is similar to G5, with one exception: the person stops in front of the porcupine ball and performs alternating steps on the ball with the right and left foot, then returns to the chair.

Alternative: The person can stand on the ball with one foot and hold the position for ten seconds; then uses the other foot. The person walks back to the chair backwards.
S1: Push the button
While standing, the person has to stand on a ball with one foot and push down the ball as hard as possible – then hold the pressure for about ten seconds (depending on the exhaustion of the individual). Balls with air outlet are particularly suitable as the fill up with air again once pressure is released. After ten rounds, the foot is switched.

Alternative: Instead of switching after ten rounds, the task can be performed alternately with the left and right foot to lay more focus on the stepping task.

S2: Uplifting
The person is standing behind a chair and holding on to it. Then, ten to 15 calf-raises are performed. Depending on the individual strength of the participant, these can be done single-legged or with both legs and/or hands-free.

It has to be made sure that the person does not push her/himself up with help of the arms. This is also important for safety reasons as the chair may be torn down.

S3: Step up
The person has to step on a tread and down again. As many rounds as possible should be executed, but no more than 15 per leg. It can be done either one leg at a time or alternating with the right and left leg. If available, treads of different heights can be used, starting with the lowest for those with weak motor skills and highest for advanced stair climbing skills. For safety reasons, the supervisor should always stand close to the person.
Chair rise task can be separated into three major parts that have to be performed five to twelve times:

S4.1: Slide to the front edge of the chair with feet positioned in shoulder width, directly below or slightly behind the knees.

S4.2: Lean forward until the shoulders are at the height of the knees.

S4: Chair rises
This exercise is intended to a) strengthen the lower extremity muscular system and b) train a proper chair rise technique in order to enable persons to stand up independently. Therefore, the
S4.3: Stand up, if possible without momentum and use of hands.

*Alternative:* To increase the intensity of the task, balance pads can be put under the feet. If done so, an elevation of the sitting surface may be necessary. The slower the task is performed, the higher the intensity. Another aggravation of the task would be not to put down the rear on the sitting surface but to rise again once it is slightly touched.

### Seated Exercises

Many of the exercises above can be adapted to the needs and requirements of persons who are not able to stand up or walk. There are also some more exercises that are especially for wheel-chair bound residents. They can be used for exercise groups as well as in individual single training as implemented in the project LTCMo.

**W1: Riding a bike**
The person is sitting on a (wheel)chair and leaning backwards. Then, both legs are lifted in the air and moved as in cycling. One round should last ten to 30 seconds, depending on individual muscular endurance.

*Alternative:* The cycling can be done backwards; each cycle can be performed in a very slow manner; cycles can have a small or large diameter.

**W2: Leg extensions**
The person is seated on a chair and leaning backwards. A ball is clamped between both feet; the feet are slightly
above ground. Then, both legs are extended ten to 15 times with the ball still being clamped between feet. The ball can be left out if a person is unable to keep it between feet.

**W3: Knee raise**
The person is seated nearer to the front edge of a chair; the back is kept straight; both feet are placed straight on the ground. Then, one leg is lifted straight up and held at the highest possible point for about two seconds. Legs are switched after each repetition.

*Alternative:* Both legs can be lifted at the same time; a ball can be clamped between both feet while the exercise is performed (W3.1).

**W4: Push the button – seated**
Seated position as in W3. A ball is placed under one foot and pushed down as hard as possible. Pressure should be held for about ten seconds (depending on the exhaustion of the individual). Soft balls or balls with air outlet are preferred; after ten rounds, the foot is switched.

*Alternative:* Instead of switching after ten rounds, the task can be performed alternately with the left and right foot.

**W5: Kicking it**
Two or more persons are seated facing each other and kicking one or two balls to and fro; both feet should be used.

*Alternative:* Smaller (tennis ball) or bigger (soccer ball) balls can be used; the ball can be kicked back immediately or stopped in between.
Participants’ safety is one of the most important issues when it comes to exercise training with frail older people. Therefore, we present the most important safety measures and precautions as well as safeguarding positions during exercises.

The double chair circle has already been mentioned. It is the most effective way to provide safety and prevent falls, especially in larger exercise groups. A proper double chair circle provides one chair within reach in front of a person and one in the back, close enough to sit down immediately without having to take a step backwards (SF1/SF2).

The better the motor function of a person gets, the less aid should be provided. However, safety has to be kept at the highest possible level throughout the training course. The balance between two somewhat opposing interests, safety and exercise effectiveness, has to be kept at all times. There are several ways to facilitate or aggravate an exercise for a person. Whether this is necessary or useful is always an individual decision that depends on the ability and experience of the instructor and the motivation and attitude of the exercising person. In the following, safety measures and safeguarding positions are presented from easy to difficult (meaning that the exercise becomes more complex and intense).

The easiest way to provide safety is to use the double chair circle with additional aid of the instructor. In this way, the participant can hold on to a chair and the instructor can provide additional aid and help performing the task. This is especially useful for participants who feel unsafe or have severe motor deficits.

If an instructor is sure that s/he can handle the task, the chair in front of the participant can be left out. Instead, the
instructor can stand in front of and hold the person by both hands (SF3).

To make the exercise more difficult for the participant, the instructor may take away one hand and place it on the shoulder. Still, the participant can hold on to the instructors’ other hand (SF4).

If the instructor is sure that a person is able to do the exercise on his/her own, both hands can be placed near the shoulder or waist of the participant, so that the instructor can intervene immediately if necessary (SF5).

The closer the instructor stands to the person, the easier it is to intervene in a safe and uncomplicated manner.

The positions above can be used in almost all exercises. However, when walking, the instructor should walk alongside the participant and have one arm around shoulder or waist and one hand free to hold on to if necessary (e.g., see exercise G2).
# Tool for the Evaluation of Existing Activities

<table>
<thead>
<tr>
<th>Date &amp; duration:</th>
<th>Rater/Observer:</th>
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<tbody>
<tr>
<td>Unit:</td>
<td>e.g. 1st floor unit</td>
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| Activity:        | ☐ word of the day  ☐ sitting-dance  
                  | ☐ morning round  ☐ evening round  
                  | ☐ calisthenics  ☐ painting / creativity group  
                  | ☐ Wii-training  ☐ fall prevention  
                  | ☐ Other: _____________________ |
| Participants (Residents): | overall:  N=___  
                      | wheelchair users: N=___  
                      | walker-rollator users: N=___ |
| Participants (Staff): | N=  (including trainers, interns, legal guardians, etc.) |
| Profession of trainer: | ☐ social care  ☐ nurse  ☐ honorary post  ☐ other: ____________ |
| Short description of activities: | - main goal of activity:  
                          | - performed activities:  
                          | - amount of physical activity involved:  
                          | - intensity of activities:  
                          |   - cognitive:  
                          |   - physical:  
                          | - motivation of participants:  |
| Potential use for project: | Grade  ☐ A ➔ of strong use; similar aims; only small modifications required (if necessary)  
                              ☐ B ➔ medium to high potential; slightly different aims; may be useful if modified  
                              ☐ C ➔ low potential; different aims; hardly any activity involved  
                              ☐ D ➔ no potential; totally different aims; no activity involved |
| Modifications necessary: | |

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### Training Group Assignment of Residents

#### Ability to stand without personal assistance

- **Ability to sit**
  - No
  - Yes

- **Ambulatory**
  - No
  - Yes

#### Group Assignment:

- **No/Bedridden**
  - Not possible

- **Ability to sit**
  - Yes
  - Individual Tr.

- **Severe behavioral problems/code-secured**
  - Yes
  - No

#### Individual Training

- **Characteristics/Criteria:** Residents show severe motor impairment and/or cognitive impairment in combination with severe behavioral problems. Independent standing is not possible and requires constant help of at least one supervisor. Explore, whether re-learning or improving standing is possible.
- **Aims:** Support of dynamic sitting; relearning of sit-to-stand transfer; advance to Group II or III.
- **Training Components:** In the beginning main focus on seated strength and mobilization exercises: strengthening of leg muscles (leg extension) to enable sit-to-stand transfers. In the course of the training, conduct standing exercises with support if possible.

#### Group I

- **Characteristics:** Ability to walk without aid; to stand up independently and sit down without any support; to walk longer distances without help.
- **Aims:** Physical activity promotion in terms of number and duration of active episodes; improvement of walking performance, dynamic postural control, and sit-to-stand/sit-to-walk transfers.
- **Training Components:**
  - Functional strength training: Sit-to-stand transfer training without using the arms.
  - Dynamic balance and gait training: Different standing positions; improvement of stability and duration of standing posture; different walking exercises (e.g., narrow vs. wide distance between feet; slow vs. fast walking; uneven floor surfaces)

#### Group II

- **Characteristics:** Unstable walking with aid; standing up and sitting down without personal assistance is possible.
- **Aims:** Physical activity promotion in terms of higher frequencies of standing and enabling participants to walk short distances. Improvement of static and dynamic balance (i.e., stable standing); improvement of sit-to-stand transfer. In the further course of the training: support of stable walking, walking security, and a homogeneous walking pattern (then: transition into Group I).
- **Training Components:**
Support of stable standing without aid by exercising in different standing positions and at different levels of difficulty.

Sit-to-stand training: trying to stand up and stand still; in the long run, transition to sit-to-walk training.

Gait training: In the beginning, improvement of gait performance with support; gait episodes without aid if this seems possible; prolongation of the duration of walking episodes under supervision and improvement of a homogeneous walking pattern.

Characteristics: Participants show pronounced cognitive impairment accompanied by severe behavioral problems. Participants should be ambulatory and able to stand up with little or no support. In LTCMO, this group was implemented in a code-secured living unit.

Aims: Improvement of static and dynamic balance (i.e., stable standing); improvement of sit-to-stand transfer. Support of stable walking, walking security, and a homogeneous walking pattern.

Training Components:
- Functional strength training: Sit-to-stand transfer training without using the arms.
- Dynamic balance and gait training: Different standing positions; improvement of stability and duration of standing posture; different walking exercises (e.g., narrow vs. wide distance between feet; slow vs. fast walking; uneven floor surfaces)
- Focus on social aspect of group training: exercising together by execution of clearly constructed and meaningful tasks.

Special Requirements: Depending on the severity of cognitive impairment, group organization may require adaptations. In LTCMO, instead of a double chair circle, residents were seated side by side in direction of the hallway which was used for exercises. Then, residents were attended to one after another. When the last participant in the line was done with his round, the first in line started again. In this way, residents were seated close to each other so that social contact and conversations were facilitated. In addition, this organization form was found to be easier to understand for the participants than the double chair circle.

Characteristics: Participants are able to stand and step independently and what are not or mildly cognitively impaired.

Aims: Improvement of motor-cognitive function and dynamic postural control.

Training Components: A supervised cognitive-motor training. Participants have to execute steps (forward, backward, right or left) on a dance plate as indicated on a computer or TV screen.
References


Project-Related Publications


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Disclaimer:
All contents of this Guidebook have been thoroughly reviewed before publication. Nevertheless, it may be the case that mistakes and wrong information are still part of the book. Given that this book offers guidelines, no less but also no more, we do not take any responsibility for events that may occur as part of a training based on this book. For example, all success depends on highly qualified instructors with large experience in working with older adults, particularly physically and mentally frail older adults.

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