Supplemental Digital Content

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Appendix 1. Interview-guide for discussions with clinicians and managers

Interview-guide for discussions with clinicians

- What strategies do you use to improve walking in your patients with stroke? By strategy, I am referring to an intervention such as walking training without / on a treadmill, weight support, exercises, Bobath treatment, aquatics... etc. Is there a specific way the intervention is performed (for example, 3 times per week for 15 minutes)?
- Do you measure heart rate and rating of perceived physical exertion? If so, what parameters do you use to guide your decision-making? For example, do you aim to achieve a specific heart rate range or exertion range on Borg's RPE scale?
- What are the barriers to using high-intensity gait training (HIT) in practice?
- What are the facilitators to using high-intensity gait training (HIT) in practice?
- Have you used HIT in practice? If so, what are your thoughts about this treatment? If not, why haven't you used it?
- From your perspective as a clinician, what questions do we need to answer with this project to determine if HIT is beneficial for clinical practice?
- Overall, what are your thoughts on using HIT in routine clinical practice? Please describe any questions or concerns you have about HIT.

Additional questions for clinicians after HIT training is conducted.

When implementing intensive walking training, we recommend using the guidelines below:
- Frequency: 4-7x week
- Intensity: 70-85% age-predicted HR max and / or ≥14 RPE
- Time: as much walking as possible in 60-minute sessions
- Type (Specificity): walking training on a treadmill, overground and stairs

- To achieve the recommended dose, we recommend prioritizing walking over other interventions.
  - What are your thoughts and feelings about this?
  - What are the barriers that make it difficult to implement this?
  - What can help you achieve this?
- We also recommend that patients perform the activities at a high aerobic level (70-85% age-predicted HR max and / or ≥14 RPE);
  - What are your thoughts and feelings about this?
  - What are the barriers that make it difficult to implement this?
  - What can help you achieve this?
- We also recommend performing tasks with variations (performed in different environments to stimulate step tasks similar to those patients will encounter at home and in society in general);
  - What are your thoughts and feelings about this?
  - What are the barriers that make it difficult to implement this?
  - What can help you achieve this?
- We also recommend that gait training be performed in a way that allows the patient to make errors and even increase specific errors from time to time. As a result, patients will not practice "normal" movement patterns or kinematic correct movement patterns;
  - What are your thoughts and feelings about this?
  - What are the barriers that make it difficult to implement this?
  - What can help you achieve this?
- Do you think HIT is a good intervention for your clinical practice? Why or why not?
Interview-guide for discussions with managers

- What thoughts do you have about implementing high-intensity gait training (HIT) in clinical practice?
- Do you think that HIT fits in your clinic?
- Do you have any concerns regarding the project?
- From your perspective, what questions do we need to get answered with this project in order to determine if HIT is positive for clinical practice?
### Appendix 2.
**Commonly used CFIR Domains and Definitions\(^1\) in the FIRST-Oslo Project**

#### A: CFIR concept

| Topic/Description | Short description |
|-------------------|-------------------|
| **INTERVENTION CHARACTERISTICS** – *Aspects of an intervention that may impact implementation success* |
| Adaptability       | The potential for adaptation, tailoring, refining, or reinventing an intervention to meet local needs |
| Cost               | Costs related to an intervention including implementation costs, investment, supply, and opportunity costs |
| **INNER SETTING** – *Characteristics of the implementing organization* |
| Culture            | Organizational norms, values, and basic assumptions |
| Compatibility      | The fit between intervention meaning and values of involved individuals, alignment of meaning and value with an individuals’ own norms, values, and perceived risks and needs, and the fit of the intervention fit with existing workflows and systems |
| Available Resources| Resources provided for implementation and operations, such as money, training, education, physical space, and time |
| **CHARACTERISTICS OF INDIVIDUALS** – *Individuals’ beliefs, knowledge, self-efficacy, and personal attributes that may affect implementation* |
| Knowledge & Beliefs about the Intervention | Attitudes toward and value placed on the intervention, familiarity with facts, truths, and principles of the intervention |
| Individual Stage of Change | Phase of change related to an individual’s progression toward skilled, enthusiastic, and sustained use of the intervention |

#### B: ERIC (Expert Recommendations for Implementing Change) strategies

| Strategy                                      | Definitions                                                      |
|-----------------------------------------------|------------------------------------------------------------------|
| Access new funding                            | Access new or existing money for implementation                   |
| Build a coalition                             | Recruit and cultivate relationships with partners for implementation |
| Change physical structure and equipment       | Evaluate and adapt, as needed, the physical structure and/or equipment to accommodate the innovation |
| Conduct educational meetings                  | Meetings targeted toward different stakeholder groups to teach about the clinical innovation |
| Change record system | Modify records systems to improve assessment of implementation or clinical outcomes |
|----------------------|-------------------------------------------------------------------------------------|
| Develop educational materials | Develop and format manuals, toolkits, and other supporting materials for stakeholders and clinicians to learn about the clinical innovation |
| Develop resource sharing agreements | Develop partnerships with organizations that have resources needed to implement the innovation |
| Distribute educational materials | Distribute educational materials such as guidelines, manuals, and toolkits |
| Organize clinical implementation team meetings | Develop and support clinician teams who are implementing the innovation, provide protected time to reflect on implementation, share lessons learned, and support learning |
| Promote adaptability | Identify appropriate ways to tailor the intervention to meet local needs and clarify components that must be maintained to preserve fidelity |
| Provide clinical supervision | Provide ongoing supervision of clinicians and train clinical supervisors who supervise those clinicians |
| Provide local technical assistance | Develop and use a system for technical assistance focused related to implementation issues using local personnel |
| Remind clinicians | Develop reminder systems to help clinicians to recall information and/or prompt use of the clinical innovation |
| Revise professional roles | Revise roles among professionals who provide care to patients, and redesign job characteristics |
| Use an implementation adviser | Seek expert guidance in implementation |
| Visit other sites | Visit sites where a similar implementation effort was successful |

1. Powell BJ, Waltz TJ, Chinman MJ, et al. A refined compilation of implementation strategies: results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation science : IS.* 2015;10:21.
### Appendix 3: Implementation Strategies Described using WIDER Criteria

| Implementation strategy | Detailed description of intervention content | Characteristics of those delivering intervention | Setting | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|-------------------------|-----------------------------------------------|-------------------------------------------------|---------|-----------------|------------------------|--------------------------|
| **Interventions targeting INTERVENTION CHARACTERISTICS** | | | | | | |
| **Barrier: Adaptability** - Clinicians' concerns about feasibility, specifically related to safety, patient capacity to participate, and potential for pain, aphasia and/or poor understanding of Norwegian language | | | | | | |
| Promote adaptability | Meetings with clinicians and leaders to identify adaptations | Project coordinator and project leader, clinicians, administrative leaders | Aker campus and in USA | In-person meetings | 1 hour | 4 times |
| Conduct educational meetings* | Literature reviews and discussions about HIT - content related to adaptability | Scientist and expert in HIT, expert in KT, project-manager (PT and researcher), project coordinator (senior PT) | Aker campus | Workshops, video conference problem-solving sessions, case discussions | * | 2016: 10; 2017: 20; 2018: 5 |
| Visit other sites | Patient-demonstrations, meetings to discuss relevant topics of delivering HIT, workshop on developing the FIRST-Oslo specific protocol | Scientist and expert in HIT, expert in KT in cooperation with researchers and clinicians at 3 rehabilitation hospitals in USA | 3 rehabilitation hospitals in USA that use HIT | Site-visits, workshops, presentations, case discussions | 5 days | 1 |
| **Barrier: Cost** – Equipment cost | | | | | | |
| Access new funding | Apply for grants on appropriate announcements. The larger investments (treadmill and overhead tracks and harness) were funded by grants. Smaller and less | Project coordinator and project leader | Aker campus | N/A | N/A | N/A |
| Implementation strategy | Detailed description of intervention content | Characteristics of those delivering intervention | Setting | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|--------------------------|-----------------------------------------------|-------------------------------------------------|---------|-----------------|-------------------------|--------------------------|
| Access new funding       | Apply for grants on appropriate announcements. OMS could engage substitute PTs in periods with shortness of staff. This attempt was not successful, and no additional funding was provided. | Project coordinator and project leader. Administrative leader at OMS | Aker campus | N/A | N/A | N/A |
| Local Consensus Discussions | Clinicians came to consensus that patients would not be prioritized over others because they were receiving high-intensity gait training; general prioritization criteria that previously existed would be followed | Project-coordinator, project-leader and clinicians | Aker campus | In-person meeting | 1 hour | 1 |

**Interventions targeting INNER SETTING**

Barrier: Available resources - Personnel costs - training, implementation, operations, etc; Potential for negative impact on care delivery of patients who were not receiving HIT if resources are limited (e.g., PTs sick or on vacation); Poor accessibility to equipment (from wheelchair to treadmill); Equipment for safety monitoring (alarm, blood pressure and heart rate monitors) and orthoses; Time management – time for documentation, time for education sessions; Enough equipment and possibilities for mutual exchange between sites/floors.
| Implementation strategy | Detailed description of intervention content | Characteristics of those delivering intervention | Setting | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|-------------------------|---------------------------------------------|-------------------------------------------------|---------|----------------|-------------------------|--------------------------|
| Change physical structure and equipment | Securing equipment: Alarm, wheelchair ramp, AFOs available in different sizes, even distribution of equipment in all rooms, calendars for booking treadmill | Project-coordinator, project-leader and clinicians | Aker campus | N/A | N/A | N/A |
| Purposely reexamine the implementation | Clinicians re-organized activities in the day to make time for time and education sessions; no additional time was provided by the organization. Clinicians used different individual strategies to “fit in” these activities; over time clinician became more efficient and this was less of a barrier. | Clinicians | Aker campus | N/A | N/A | N/A |
| Develop resource sharing agreements | Resource sharing agreements made for Woodway treadmill and LiteGait between two clinical sites | Project-coordinator, project-leader and clinicians | Aker campus | N/A | N/A | N/A |
| **Barrier:** Compatibility - Distribution of patient needs/care among the interdisciplinary team. PT delivery of upper extremity training; Changing long established habits/beliefs/experiences related to workflow, interdisciplinary team, and work-related roles. | | | | | | |
| Revise professional roles | Re-distribution of arm-hand training among | Interdisciplinary team | Aker campus | N/A | N/A | N/A |
| Implementation strategy | Detailed description of intervention content | Characteristics of those delivering intervention | Setting | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|-------------------------|---------------------------------------------|-----------------------------------------------|---------|-----------------|-------------------------|---------------------------|
|                         |                                             |                                               |         |                 |                         |                           |
| Conduct local consensus discussions | Discussions about in delivery and scheduling of care among the team | Project coordinator, project leader, clinicians in interdisciplinary team | Aker campus | In-person meeting | *                        | *                         |
| Use an implementation adviser** | Discussions and meetings about evidence, workflow, work-related and team roles. | Implementation adviser, project coordinator, project leader, clinicians in interdisciplinary team | Aker campus | In-person meetings, video conference | **                       | **                       |
| Change record system | Tailor-made forms for outcome measurements and content of HIT | Project coordinator and project leader. | Aker campus | N/A             | N/A                     | N/A                       |
| Barrier: Culture - Changing long established habits/beliefs/experiences related to practice beliefs and culture among the PTs | | | | | | |
| Create a learning collaborative | Formed a group to review evidence and determine whether HIT should be implemented; Group came to consensus; Collaborative continued to support implementation of HIT. | Project coordinator, project leader, clinicians | Aker campus | In-person meeting | *                        | *                         |
| Conduct educational meetings* | Literature reviews and discussions about HIT – content related to culture | Scientist and expert in HIT, expert in KT, project-manager (PT and | Aker campus | Work-shops, video conference problem-solving | *                        | *                         |
| Implementation strategy          | Detailed description of intervention content | Characteristics of those delivering intervention | Setting           | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|----------------------------------|-----------------------------------------------|----------------------------------------------------|-------------------|-----------------|------------------------|---------------------------|
| Conduct local consensus discussions | Discussions about whether and how HIT should be implemented. | Project coordinator, project leader, clinicians | Aker campus       | In-person meeting | *                      | *                         |

Interventions targeting **CHARACTERISTICS OF INDIVIDUALS**

**Barrier: Individual Stage of Change - Little knowledge of the evidence to support HIT (Interdisciplinary Team)**

| Conduct educational meetings* | Information sessions for the interdisciplinary team | Project-leader in cooperation with coordinator | Aker campus | In person meetings with interdisciplinary team | ½ hour | 4 |

**Barrier: Knowledge & Beliefs about the Intervention - Little knowledge of the evidence to support HIT (PTs and Interdisciplinary Team); Little knowledge of how to provide HIT to patients (PTs)**

| Conduct educational meetings (PTs)* | 1-Day course on evidence related to HIT: Introduction of HIT and knowledge translation. Presentations incl. case-videos from US, Q&A and discussions. Distributions of relevant research articles. | Scientist and expert in HIT and expert in KT | Conference-room at Aker campus | US team delivered training in-person to FIRST-Oslo team of PTs | 6 hours | 1 |
|------------------------------------|---------------------------------------------------------------------------------|---------------------------------------------|---------------------------------|-------------------------------------------------------------|--------|---|
| Online course                     | Scientist and expert in HIT                                                     | N/A                                         | Online education course         | *                                                           | *      |   |
| Literature reviews and discussions about HIT | Scientist and expert in HIT, expert in KT, project-manager (PT and | Workshops at Aker campus | Workshops, video conference problem-solving | *                                                           | *      |   |
| Implementation strategy | Detailed description of intervention content | Characteristics of those delivering intervention | Setting | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|-------------------------|---------------------------------------------|-------------------------------------------------|---------|-----------------|--------------------------|---------------------------|
| Visit other sites       | Patient-demonstrations, training on application of HIT with patients in practice. | Scientist and expert in HIT, expert in KT in cooperation with researchers and clinicians at 3 rehab. hospitals in USA | 3 rehabilitation hospitals in USA that use HIT | Site-visits, workshops, presentations, case discussions | 5 days | 1 |
| Build a coalition       | Created partnership and fostered relationship to support implementation of HIT | Researchers, project leaders, clinicians from OUH, OMS, RKR, and Indiana University | N/A | N/A | N/A | N/A |
| Use an implementation adviser** | Finalization of FIRST-Oslo project protocol | Project-leader, project-coordinator, expert in KT | N/A | Video-conference ** (1 hour) | ** | ** |
|                         | Regular meetings to discuss implementation progress | Project-leader, expert in KT | N/A | Video-conference ** | ** | ** |
| Develop educational materials | Manuals for outcome measures and the HIT intervention, “cheat”-sheets, signs and forms for treatment rooms and clinicians | Project-coordinator, project-leader and clinicians | Aker campus | N/A | N/A | N/A |
| Distribute educational materials | Distribution of materials described above to locations and clinicians | Project-coordinator, project-leader and clinicians | Aker campus | N/A | N/A | N/A |
| Implementation strategy | Detailed description of intervention content | Characteristics of those delivering intervention | Setting | Mode of delivery | Intensity (contact time) | Duration (number of times) |
|-------------------------|---------------------------------------------|----------------------------------------------|--------|----------------|------------------------|--------------------------|
| Facilitation            | Regular meetings between project lead and KT expert to discuss project implementation | Project leader and KT expert | N/A    | Video-conference | ~100 hours           | 86                       |
| Remind clinicians       | Monthly newsletter targeting PTs and their leaders with reporting on numbers included, equipment and forms, meetings, courses, presentations and other relevant information | Project-leader in cooperation with coordinator | Aker campus | E-mail | ½ hour collect information write newsletter | 15                       |
| Audit and feedback      | Audit and feedback of stepping activity      | Project coordinator | Aker Campus | Written feedback to patients and clinicians | N/A | Weekly febr-17 – dec-18 |

* The intensity (contact time) and duration (number of times) is the total contact time and duration of the all educational meetings regardless of targeted barrier with the exception of the 1 day course and information sessions for the interdisciplinary team. The educational meetings aimed to cover several aspects and identified barriers. The specific content for each barrier is listed in the column of detailed description of the intervention content.

** The intensity (contact time) and duration (number of times) is the total contact time and duration of the all use of an implementation adviser regardless of targeted barrier.

Adherence/fidelity to delivery protocols was monitored for the intervention, however not for the KT interventions. Thus, the column is removed.