LIITE S61. Tehostettu käden käyttö -katsauksen alkuperäistutkimusten interventioiden kuvaukset (AVH).

<table>
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<tr>
<th>First author, year</th>
<th>Type of intervention (E = experimental, C = control)</th>
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<tr>
<td>Alberts 2004</td>
<td>The immediate group underwent 2 weeks of CIT in which the less affected hand was placed in a mitt. Patients wore this mitt for approximately 90% of their waking hours during the intervention. These patients attended CIT training sessions 5 days per week for up to 6 h per day for 2 consecutive weeks. Shaping, or adaptive task practice and repetitive task practice techniques were used during the training sessions. Typical activities included stacking checkers, flipping cards, picking up marbles, insertion of bolts in holes, stacking canned goods, and other activities similar to those performed on a daily basis. All training was one on one with a rehabilitation specialist.</td>
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<td>Atteya 2004</td>
<td>Intervention consisted of one half hour of physical therapy (PT) and one half hour of occupational therapy (OT) on an outpatient basis 3 times per week for 10 weeks. Eighty percent of each PT and OT session (24 minutes) focused on neuromuscular facilitation (PNF) techniques with emphasis on ADL tasks whenever possible, and 20 percent (6 minutes) focused on compensatory techniques using the unaffected side (example, reaching and performing functional tasks with the unaffected arm, assisting the weak arm during reaching tasks). “Shaping” is a commonly used operant conditioning method in which a behavioural (in this case movement) objective is approached in small steps of progressively increasing difficulty. The participant is rewarded with enthusiastic approval for improvement, but never blamed (punished) for failure. In CIT, a basic principle is to keep extending motor capacity a small increment beyond the performance level already achieved. In addition, to other tasks practiced during therapy sessions, each CIT patient identified 2 functional tasks listed on the WMFT that were valued by them, and these tasks were recorded on the subject data sheet. During therapy sessions, each previously identified skill was practiced for at least 5 minutes as part of the upper-limb program. During the same 10 week period, the lower arms and hands of the 2 patients randomly assigned to the CIT condition were restrained every weekday for the 5 hours initially identified as a time of frequent arm use. The arm was restrained using cotton Bobath sling. The sling had a single strap worn around the neck and under the arm supporting the elbow and the forearm. The hand was placed in a mesh, polystyrene-filled mitt with a Velcro strap around the wrist (Sammons-Preston).</td>
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<td>Boake 2007</td>
<td>Therapy sessions consisted of performing tasks only with the affected UE. Task movements included reaching, grasping, lifting, and placing. Tasks were individually selected according to motor ability, to ensure successful experience and prevent frustration leading to learned nonuse. Task difficulty was progressively increased using behavioural techniques of shaping and successive approximation. In addition to individual therapy sessions, patients were asked</td>
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to wear a mitten restraint (Sammons Preston #6727 “Padded Safety Mitt,” Sammons Preston, Inc., Bolingbrook, IL) on the unaffected hand during 90% of waking hours, excluding activities when risk of injury might increase. The mitten allowed the unaffected UE to assist in transfers and ambulation, but it prevented use of the unaffected fingers to manipulate objects and necessitated use of the affected hand to perform daily activities.

**Brogårdh 2006**

Participants were requested to use a mitt on the less affected hand 90% of waking hours over 12 consecutive days. The mitts were manufactured in the occupational therapy section of our department (no commercial enterprise involved). The patients performed their therapy at the Department of Rehabilitation training area with 2–3 participants in each group 6 h per weekday and were supervised by staff practically all the time (physical therapists, occupational therapists and for sports and games, staff nurses). The exercises consisted of

1) shaping (movements are approached in small steps of progressively increasing difficulties);
2) task practice such as moving objects from one shelf to another, throwing little balls in a bucket or darts, pouring water into mugs from a jar, picking matches from a surface, putting objects through a slot and so on;
3) fine motor practice such as fastening nuts on bolts, putting pegs in a board, buttoning and unbuttoning, laying a jigsaw puzzle, flipping cards and so on;
4) muscle strength training through lifting weights;
5) activity training such as laying the table, cleaning a window, folding towels, making coffee or lunch, washing the dishes, grooming, office work, making handicraft, playing games and indoor sports.

**Dahl 2006**

The CIMT was conducted at an inpatient rehabilitation clinic at Trondheim University Hospital and all the participants were inpatients during the intervention. The patients were intended to train 6 hours daily for 10 consecutive week days. The participants exercised in groups of four led by a physical and an occupational therapist, assisted by specially trained nurses. A mitten immobilized the non-paretic hand 90% of waking hours. It was removed for hygienic and safety reasons and its removal was registered in a log. In the afternoon the nursing staff supervised and motivated the participants to wear their mitten. Each participant formulated five realistic aims related to ADL or leisure times activities before starting the intervention. Daily activities were basis for an individual activity form which was updated with daily progress. Exercises were chosen from a collection of approximately 150 activities to be carried out with one hand, divided into 10 fields. The activities ranged from complex to simple tasks and were individually adjusted with regard to number of repetitions, tempo, resistance, range of motion, texture, weight, size, and shape. The participants had mini-breaks when they shifted from one field of activity to another after half an hour.
Dromerick 2000

There was two groups which have different intensity of training hours in this study. Intervention was the standard CIMT for 2 hours shaping therapy per day and wore a padded constraint mitten for 6 hours per day. Other group received the high-intensity CIMT for 3 hours per day of shaping and wore the mitten for 90% of waking hours. Both of these consisted of performance of basic ADL together with supervised massed practice of skilled functional activities. These activities were graded per the study protocol by treating occupational therapist to match the subject’s motor performance. Increasing levels of demand were based on increase in strength and coordination of the involved joints. As participants archived successful accomplishment of self-care activities and 80% of the trials for each specific motor activity, the complexity or difficulty of these activities were increased to the next level. Subject received extensive verbal and written feedback about their performance, including review of the prior day’s achievements, the day’s proposed goals, and reinforcement of new gains and maintenance of prior gains in graphic and verbal form appropriate to the activities selected for the treatment session.

Gauthier 2008

Intervention were in laboratory training of the more impaired arm on functional tasks for 3 hours daily for 10 consecutive weekdays, restraint of the less-impaired arm for a target 90% of waking hours, and a number of behavioural techniques termed the “transfer package” lasting an additional 0,5 hours in the laboratory. The transfer package, designed to facilitate transfer for therapeutic gains to real-world activities, included daily monitoring of life situation use of the more affected arm in several ways and problem-solving with a therapist to overcome perceived barriers to using the extremity.

Lin 2007

The intervention was modified CIMT where intensive training of the affected arm for 2 hours per weekday supervised by occupational therapists and a mitt use of unaffected hand for 6 hours per day for three weeks. Typical practice activities were picking up marbles, flipping cards, stacking blocks, combing hair, writing and other activities similar to those performed in daily life. The level of challenge was adapted based on patient ability and improvement during the training. The level of challenge was adapted based on patient ability and improvement during the training.

Myint 2004

The constraint-induced movement therapy group underwent a programme of 10 days of hemiplegic upper extremity training by a designated occupational therapist with the unaffected limb being restrained in a shoulder sling and the control group received conventional therapy in the same period. Both groups received 4 hours of therapy each day for five days per week for two consecutive weeks. There was a slight modification from the original protocol by reducing the therapy period from 6 to 4 hours per day to allow for local service structure. Both groups were trained in the geriatric day hospital setting although some patients remained in hospital overnight due to transport problem or lack of social support at home. The constraint-induced movement therapy subjects signed a contract to wear a padded shoulder sling for 90% of waking hours.
during the 10-day treatment period. The subjects were treated with 4 hours of supervised activities which included shaping which is a behavioural method to improve motor performance in small steps and encouraged with positive feedback and increasing level of difficulty. Error information was provided after each shaping trial and the therapist increased the level of difficulty of each set of tasks after the subject could complete the preceding ones. Training did not follow a strict algorithm of tasks with increasing level of difficulty. Rather, the therapist trained the patient with sets of tasks, and items relevant to the patient’s activities of daily living which were appropriate to the functional level of upper extremity. The subject was instructed to wear the sling outside therapy during waking hours except when toileting, bathing and engaging in activities with potential risk of fall. A log book was given for the patient or carer to record the use of the sling hourly over 10 days and the percentage of compliance to the sling during waking hours was calculated.

The four patients randomly assigned to the CIT and traditional rehabilitation (TR) conditions each participated in one half hour of physical therapy (PT) and one half hour of occupational therapy (OT) on an outpatient basis three times/week for 10 weeks. Eighty percent of each PT and OT session (24 minutes) focused on neuromuscular facilitation (PNF) techniques with emphasis on ADL tasks whenever possible, and 20 percent (6 minutes) focused on compensatory techniques using the unaffected side (i.e., reaching and performing functional tasks with the unaffected arm, assisting the weak arm during reaching tasks). “Shaping” is a commonly used operant conditioning method in which a behavioural (in this case “movement”) objective is been approached in small steps of progressively increasing difficulty. The participant is rewarded with enthusiastic approval for improvement, but never blamed (punished) for failure. In CIT, a basic principle is to keep extending motor capacity a small increment beyond the performance level already achieved. In addition to other tasks practiced during therapy sessions, each CIT patient identified two functional tasks listed on the WMFT that were valued by them, and these tasks were recorded on the subject data sheet. During therapy sessions, each previously identified skill was practiced for at least 5 minutes as part of the upper-limb program. One occupational therapist and one physical therapist, each with 10 years experience, administered therapy. During the same 10-week period, the lower arms and hands of the two patients randomly assigned to the CIT condition were restrained every weekday for the 5 hours initially identified as a time of frequent arm use. The arm was restrained using cotton Bobath sling. The sling had a single strap worn around the neck and under the arm supporting the elbow and the forearm. The hand was placed in a mesh polystyrene-filled mitt with a Velcro strap around the wrist (Sammons-Preston).

The mCIT was 1 half-hour of physical therapy (PT) and 1 half-hour of occupational therapy (OT) 3 times per week for 10 weeks. All OT concentrated on affected limb use in valued, functional tasks (e.g., writing, opening
containers, folding clothes), with some wrist/arm strengthening; most PT (≈ 24 minutes) concentrated on more affected upper limb stretching, as well as dynamic stand/balance activities and gait training. In CIT, shaping is applied to incrementally extend motor capacity beyond previous performances. In addition to other tasks practiced during OT, patients in the mCIT group identified 2 to 3 valued, functional tasks. These tasks were recorded, and the skills were alternately practiced for approximately 5 minutes using shaping techniques during OT. During the same 10-week period, the less affected upper limbs of mCIT patients were restrained every weekday for a 5-hour period initially identified as a time of frequent arm use. The arms were restrained using cotton hemi-slings (Sammons-Preston) while their hands were placed in mesh, polystyrene-filled mitts with Velcro straps around the wrists (Sammons-Preston). Since mCIT patient were restricted at home, logs were administered to document actual restrictive device use time, as well as activities performed during restraint hours.

mCIMT subjects participated in consecutive, 30 min sessions of physical therapy (PT) and occupational therapy (OT) 3 times a week for 10 weeks. Approximately 20 to 25 minutes of OT concentrated on more affected limb use in functional tasks largely chosen by patients and their treating therapists, with some time (5min) spent on strengthening and/or compensatory techniques using the less affected arm as needed. During OT, shaping techniques were used with 2 to 3 upper limb activities chosen by the patients (e.g. writing, using a fork and spoon, brushing teeth, combing hair). PT sessions largely concentrated on lower-limb activities (e.g. dynamic stand and balance activities, gait training), but some time in each PT session was spent on upper-limb stretching to facilitate ADLs. During the same 10-week period, the less affected upper limbs of subjects in the mCIMT group were restrained every weekday for 5 hours that were identified as a time of frequent arm use. Their arms were restrained with a cotton hemi-sling; hands were placed in mesh, polystyrene-filled mitts with Velcro straps around the wrists. Because patients were restricted at home, logs were kept to document device use time, as well as activities performed during restraint hours.

Each patient assigned to mCIT participated in individualized, 1/2–h therapy sessions, 3 times/week for 10 weeks, all administered by the same therapist. Approximately 25 min of therapy concentrated on more affected limb use in 3 agreed upon ADLs chosen by patients and the treating therapist, including writing, picking up a hairbrush and combing hair, typing on a computer, and picking up a cup and drinking from it. Approximately 5 min of therapy was spent on more affected limb range of motion as needed. Shaping techniques were used with the 3 chosen ADLs. During the same 10-weeks, mCIT patients’ unaffected hands and wrists were restrained every weekday for 5 h identified as a time of frequent arm use. The hands and wrists were restrained using polystyrene-filled mitts with Velcro straps around the wrist (Sammons Preston, Bolingbrook, IL). Because patients’ affected limbs were restricted while they
were at home, logs were administered to document device use time, as well as activities performed during restraint hours.

Page 2008

The mCIT intervention consisted of 2 components. The first component consisted of half-hour, one-on-one sessions of more affected arm therapy occurring 3 days per week during a 10-week period. This component included shaping techniques in which operant conditioning was applied in such a way that subjects received positive verbal encouragement to more fully perform selected motor skills with their more affected arm. Shaping was applied with 2 or 3 upper-limb activities (e.g., writing, using a fork) chosen by the subjects with help from their therapist. In the second component of the mCIT intervention, during the same 10-week period, subjects’ less affected arms were restrained every weekday for 5 hours identified as a time of frequent arm use, as identified by the subjects with assistance from the therapist. Their arms were restrained using a cotton hemi-sling, while their hands were placed in mesh, polystyrene-filled mitts with Velcro straps around the wrist.

Ro 2006

Participants less impaired arm was restrained by placing their hand in a mitten, which required the patients to carry out all activities with the affected upper extremity. These patients wore the mitten for target of 90% of waking hours over 14 consecutive days. Exceptions to this regimen included activities in which safety would have been jeopardized by wearing the mitten. Two therapists, one occupational therapist and one physical therapist from Memorial Hermann Hospital were trained to provide CIMT at Dr. Edward Taub’s laboratory at the University Alabama at Birmingham. The CIMT included shaping of the desired improvements in movement using the technique of success without incurring failure and frustration that could suppress further use of the affected upper extremity and result in learned-non-use. Other techniques involved in the CIMT included repeatedly presenting the performance goal to the patient, continuous verbal feedback and presenting trial-by-trial graphic representation of performance trends. To eliminate any therapist effect, each therapist administered the CIMT to each patient for an equal amount of time. Approximately 3 hours/day, 6 days/week of CIMT treatment was given to each patient over period of 14 days. All CIMT treatment was given to each patient over period of 14 days.

Suputtitada 2004

Patients were treated in groups of 3-4 in the outpatient clinic of the Department of Rehabilitation, Medicine of King Chulalongkorn Memorial Hospital. Every patient in each group received the same treatment for 2 consecutive weeks, 5 days a week, and 6 hours a day. All patients in the experimental groups had their healthy hands covered by glove for avoidance of using them. Patients were encouraged to use the affected arm at home during the 12 days of treatment, too.

Taub 1993

The unaffected limb was secured in a resting hand splint and then placed in a sling closed at both ends. The restraint was to be worn at all times during
waking hours except when specific activities were being carried out. Each subject agreed to spend well over 90% of waking hours in restraint. The restraint devices were worn for 14 days. On each weekday during this period, patients spent seven hours at the rehabilitation center and were given a variety of tasks to be carried out by the paretic upper extremity for six hours.

**Underwood 2006**

Intervention lasted for 6 hours per day for 10 days over a 2-week period. Two procedures were used during training: shaping (adaptive task practice) and standard repetitive task practice. During adaptive task practice, the primary goal of a chosen functional task was approached through emphasis on distinct parts of the task that may be limited by the participant's impairments (e.g., repeating the action of bringing a fork toward the mouth when a participant was limited in elbow flexion as part of the task practice for eating). The task was made progressively difficult through manipulation of temporal or spatial elements to create a demanding and challenging motor learning environment for skill acquisition. Each adaptive task practice activity was carried out in a set of 10 trials, and explicit feedback was provided with regard to the participant's performance in each trial. Standard repetitive task practice was less structured and consisted of functionally based activities performed continuously for 15 to 20 minutes. These activities tended to be more complex and often contained component subtasks that were practiced during adaptive task practice (e.g., eating lunch or writing). More global feedback regarding performance was provided at the end of the 15-20-minute period. For the larger national clinical trial, a large bank of tasks was created for each type of training procedure. Tasks were chosen on the basis of each participant's preferences, goals, and movement limitations. Frequent rest breaks were provided throughout the 6 hour training day. The amounts of time spent on each task in addition to the rest breaks were recorded to ensure accurate data collection regarding time actually spent by participants performing the CI therapy.

**Wittenberg 2003**

Therapy in the CI group consisted of restraint of the unaffected upper extremity during waking hours and task-oriented therapy of the affected upper extremity on 10 continuous inpatient days for 6 h a day (except 4 h a day on weekends). Therapy involved progressively improving motor task performance by a successive approximation procedure during combined physical, occupational, and recreational therapy. Restraint of the unaffected arm was accomplished in the CI group with a hand-splint and sling ensemble; its purpose was to reduce temptation to use the unaffected side. In contrast, the control therapy was designed to be less intense (3 h/day on weekdays and no treatment on weekends) but also aimed to improve task performance with the non-affected side. Passive therapy (stretching and heat) was provided to the affected upper extremity for 1 h during those weekday sessions. While the treatment group received 8 days of 6 h and 2 weekend days of 4 h of daily therapy, the control group received 8 days of 3 h of therapy, and 2 weekend days of rest.
Participants in the intervention group were taught to apply an instrumented protective safety mitt and encouraged to wear it on their less-impaired upper extremity for a goal of 90% of their waking hours over a 2-week period, including 2 weekends, for a total of 14 days. On each weekday, participants received shaping (adaptive task practice) and standard task training of the paretic limb for up to 6 hours per day. The former is based on the principles of behavioural training that can also be described in terms of motor learning derived from adaptive or part-task practice. Standard task practice is less structured (i.e., repetition of tasks is not conducted as individual trials of discrete movements); it involves functional activities performed continuously for a period of 15 to 20 minutes (e.g., eating, writing). Adherence to mitt use while the participants were in the research laboratory was usually very high. Intervention included use of a behavioural contract, caregiver contract, mitt compliance device, and daily schedule. After completing each treatment, participants were encouraged to practice 2 to 3 tasks daily at home. Adherence to the extra laboratory treatment components was monitored regularly via a physical sensor and timer placed in the mitt and by a home diary. Participants were encouraged to perform about 30 minutes of task practice daily following completion of the intervention period.

Intervention was 2h/d, 5d/wk for 3 consecutive weeks) directly supervised by the occupational therapists. The intervention was provided at 2 centres under the supervision of 2 separate occupational therapists. These 2 therapists were trained in the administration of the CIMT protocol by the investigators and completed a written competency test before subject treatment. During the treatment period, structured daily treatment notes were made and reviewed by the investigators to provided on an individual basis. Typical training activities involved the use of the more affected UE and were similar to those performed daily (e.g., reaching forward to move a jar from 1 place to another, picking up a cup and drinking from it, picking up a hairbrush and combing hair, cleaning the window). The less affected hand was placed in a mitt for 6 hours a day throughout the study period.

Intervention was modified CIMT where each subject participated in individualized, 2-hour therapy sessions, 5 times a week for 3 weeks supervised an occupational therapists. Shaping and adaptive and repetitive task practice techniques were used during the training sessions. Therapy concentrated on the affected limb use in functional tasks chosen by patients and the treating therapist, including turning on and off a light switch, reaching forward to move a jar from one place to another, picking up a cup and drinking from it, picking up a hairbrush and combing hair, and other activities similar to those performed on a daily basis. Approximately 15 minutes of therapy was spent on normalization of muscle tone of the affected limb as needed. During the 3-week period, the patients’ unaffected hands and wrists were placed in mitts with self-adhesive (Velcro) straps every weekday for 6 hours identified as a time of frequent arm use.
The modified CIMT training was administered intensively 2 hours per day, 5 days per week, for 3 weeks. Training took place during regularly scheduled occupational therapy sessions, and all other routine interdisciplinary stroke rehabilitation proceeded as usual. mCIMT therapy concentrated on use of the affected limb during functional tasks chosen by patients and the treating therapist. It consisted primarily of a procedure termed shaping, which involved:

1. selecting functional tasks tailored to address the motor deficits of the affected hand,
2. increasing task difficulty in small steps when performance improved on more than 3 consecutive trials, and
3. providing immediate feedback when the task was successfully completed or movement speed and quality improved.

Approximately 15 minutes of therapy was spent on normalization of muscle tone of the affected limb, as needed. During the 3-week period, the patients’ unaffected hands and wrists were placed in mitts every weekday for 6 hours identified as a time of frequent arm use.

Intervention was modified CIMT. mCIMT reserving the mass training of the affected arm, a procedure termed "shaping", was carried out for 2 weeks (6 hrs/days) without any physical restriction of the intact one. The shaping procedure involved 1) providing explicit verbal feedback for small improvements in task performance, 2) selecting tasks that were tailored to address the motor deficits of the individual patient, and 3) helping the subjects to carry out parts of a movement that they, at first, can’t perform. A battery of approximately 50 tasks was used for shaping, from which a subset of 15 to 20 tasks were selected for individual subjects. The household objects (e.g. jars, eating utensils, spring-loaded clothespins) and standard devices used in physical and occupational therapy were used the task objects in this study.