



Painful Movements and Mobility after Urological Surgery: Studying the Feasibility of Pre-operative Exercise, A New Mobility Test and a Randomised Controlled Trial Protocol with Cystectomy Patients in Intensive Care [ISRCTN32898285]

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Competing Interests:

HBM developed the Viv-Arte conception and offers professional trainings to nurses. The other authors declare that they have no competing interests.

Additional Files:

[Appendix](#)

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Abstract

Background: Cystectomy and ileal neobladder are standard procedures in bladder cancer treatment. Regaining mobility quickly after surgery, however, is aggravated by the facts that median laparotomy is used to access the abdomen, and that there are severe tissue violations during surgery. These result in post-operative movement-related pain and in restrictions of functional mobility. Movement patterns, which were self-evident before surgery, cause severe pain or even cannot be performed. Motor exercise with urological patients, before they undergo surgery, seems to be helpful to overcome such restrictions faster. Thus, regeneration could be supported.

Methods: We planned a randomised controlled trial to study the effects of patient education based on the Viv-Arte conception, a kinesthetic mobilisation framework. In addition, we designed a new mobility test (MOTPA – Mobility Test for Patients in Acute Care) for subtle discrimination of the regeneration progress. The target group included patients scheduled for cystectomy in an intensive care setting. The primary outcomes were functional mobility (MOTPA), pain (visual analog scale) and post-surgical hospital residence time (intensive and general care units).

Conclusions: Preliminary results show that the study design and the test are feasible. In-depth data analysis is to be published. Expanding the field of application of both training and test is to be discussed.

Trial registration: Current Controlled Trials ISRCTN32898285

Background

Following cystectomy, the ileal neobladder is a standard reconstruction procedure for urinary diversion. There is a broad literature base on surgical and medical developments [1, 2] and also a

WHO-based consensus on reported evidence [3]. After every surgical intervention, the patient should quickly regain mobility. Sitting, standing, walking, and corresponding transitions form a base for daily activities and thus support general medical regeneration. Cystectomy, however, implies serious mobility problems, because (a) laparotomy has to be used to access the abdomen and (b) severe intra-abdominal manipulations take place.

Both affect the straight, the transverse, and the exterior and interior oblique abdominal muscles. The abdominals are decisive for changing postures or moving the trunk [4]. Therefore, cystectomy results in post-operative movement-related pain and in restrictions of functional mobility. Due to tissue violation, movement patterns, which were self-evident before surgery, cause severe pain or even cannot be performed. In addition to general restrictions after medical surgery, patients are confronted with these severe problems in early post-operative phases and in intensive care. Even though nurses would give specific instruction and guidance post-operatively, working for new motor control and movement habits is left to the patient in his most acute and painful phase.

A pre-operative educational intervention could help to disjoin this disadvantageous coincidence and induce motor learning to improve post-operative mobility and to reduce pain. Clinical experience from a case study [5] shows, that pre-operative education based on kinesthetic nursing [6-8] contributed to avoid post-operative movement pain and to regain mobility early. Both effects may even result in a shorter hospital stay. Therefore, a randomised controlled trial protocol, aiming to examine the observation, is described in the present paper. Its research question reads as follows:

- Which effects does pre-operative motor training have on mobility, movement-related pain and post-operative hospital stay in patients with medial laparotomy?

A literature search (see following subsection) revealed firstly, that no study on the effects of kinesthetic

nursing was known, and secondly, that no proper mobility measure was available. Therefore, a new mobility test for patients in acute care (acronym MOTPA) was developed, and additional aims of the study were defined as

- examining the feasibility of the study design
- proving the usefulness of the mobility test
- determining effect measures in order to compute a power analysis for designing a main study.

The following sections (a) review literature on movement-related pre-operative patient education, (b) give an overview on the Viv-Arte conception of kinesthetic-based nursing, and (c) describe the new mobility test for patients in acute care.

Movement-related pre-operative patient education

There are numerous studies on the effects of pre-operative patient education and movement training. However, the results are not consistent.

McDonald, Hetrick und Green [9] performed a meta-analysis on nine studies with experimental or quasi-experimental designs, which included 782 patients receiving knee or hip replacement. Tendencies were found towards effects of preoperative patient education on hospital stay, mobility, postoperative pain and patient satisfaction, but they were not significant. Specific interventions targeting on patients with fears or with pre-operative restrictions seem to show effects more clearly.

Based on 191 studies, Devine [10] performed a meta-analysis on the effectiveness of pre-operative education and support on pain and other outcomes. Mobility, however, was not mentioned explicitly.

Using an experimental design with 100 female patients, Oetker-Black, Jones, Estock, Ryan, Gale and Parker [11] studied effects of pre-operative education in hysterectomy on walking ability on the first day after surgery and on total hospital stay. The educational intervention was based on Bandura's self-efficacy conception [12-14] and contained movement, breathing and pain-reducing relaxation exercise. Significant differences were found in walking on the first day after surgery.

Heye, Foster, Bartlett and Adkins [15] educated 70 female patients to undergo abdominal or vaginal endoscope-based hysterectomy (section details were not given). Using a video tape, breathing and movement techniques relevant for the time after surgery were explained and demonstrated. Again, Bandura's self-efficacy conception served as theoretical framework. The quasi-experimental design yielded significant differences with regard to need for movement assistance, movement pain and self efficacy.

In conclusion, standard movement-related training seems promising, but difficult to be proved effective. There was no evaluation found with regard to kinesthetics-based patient education. The kinesthetics approach is used by the Viv-Arte conception, which will be introduced in the following section.

Viv-Arte conception

The so-called kinesthetic movement analysis [16] is a well-known conception in acute and residential care. The authors incorporated behaviour cybernetics, Feldenkrais methods and modern dance [17-19].

Based on kinesthetic movement analysis, Bauder-Mißbach developed procedures for mobilisation exercise in different patient groups [6-8]. She included theories from physical exercise and motor learning [20-22] and also conceptualised corresponding job trainings for nurses.

In kinesthetic mobilisation, the patient's own movements are stimulated and guided, they are complemented where necessary. Nurse and patient have an equal relationship, they are moving and also learning together as partners – even in intensive care units.

Transfers and activities are analysed using a framework of six principles: Functional anatomy, human movement, human function, effort, environment, and interaction. A mobilisation procedure consists of three phases:

1. During warm-up, a relationship is built, resources and problems are acquired, muscles and joints are prepared for activities.
2. In the transfer phase, movements are integrated into everyday functions, position changes are coordinated, and the patient learns necessary partial movements in order to develop self-control.
3. The cool-down phase begins with the arrival at a new place. A comfortable position is arranged, so that the patient can relax.

In kinesthetic mobilisation, nursing actions support prevention and rehabilitation of the patient, and at the same time prevent back pain in nurses. There are clinical experiences showing that pre-operative education using this conception could possibly help to avoid postoperative movement pain and to regain mobility early.

A mobility test for patients in acute care

Generally, the term mobility can be defined as locomotion in and changes between lying, sitting, and standing positions. Mobility plays an important role in gaining independence in daily living. There are several tests to assess this construct.

For the purpose of the present study, there are certain demands on a mobility test. After surgery, patients

would have to relearn movements in a lying position, sitting, standing up and walking in the presence of surgical wounds. The planned patient education is expected to be effective mainly in these early phases of recovery after surgery. Therefore, a functional perspective is preferred: It is important to know in detail, whether the patient is able to perform locomotion and change positions or not.

Typical mobility screenings like timed-up-and-go [23] or chair stands [24] would not yield this kind of information, because their focus lies on overall mobility and its prognosis. Instruments like FIM (functional independence measurement) or Barthel-Index [25, for an overview] are functionally orientated, but not detailed enough referring to mobility. In addition, none of the tests could be performed by a patient on the first day after surgery. In conclusion, a new mobility test has been developed. It is described below. The appendix to this paper contains the complete manual.

Using a milestone framework

The rationale was taken from MOTA, the Mobility Test for Aged Persons [26, 27, see Table 1], which itself shares its basic idea with the Top Down Motor Milestone Test from the M.O.V.E. conception (Mobility Opportunities Via Education [28, 29]). This basic – and very simple – idea can be described as milestone framework:

1. Instead of specially designed motor tasks, mobility is broken down into a functional framework of items. Each item is characterised by one distinct everyday movement, e.g. sitting for a while, standing up, walking 6 meters, or the like.

2. Instead of taking measurements in centimeters or seconds, the subject to be tested is assisted to succeed with every task. The degree of assistance needed serves as outcome for each item. There is device assistance (e.g. rollator vs. walking stick in walking) or personal assistance (e.g. taking over body weight vs. movement guidance in standing up).

Each predefined degree of assistance is called a milestone, because on the way of learning or regaining a certain mobility task, the client or patient would reach a milestone as an intermediate outcome. At the same time, the next milestone would be a goal of coming exercise or therapy. Each milestone relates to a certain level of assistance:

Level I: Without any assistance. The patient needs neither personal nor device assistance to succeed in the functional task.

Level II: Device assistance. The patient does not need any personal assistance but he or she uses a device (e.g. rollator) or an object (e.g. bed frame) to succeed

in the task. According to the degree of support given by a device, different milestones can be ascribed in level 2, e.g. “walking with a rollator” or “walking with a walking stick”.

Level III: Personal assistance. The patient needs personal assistance, e.g. oral feedback or instruction, tactile guidance or an assistant (nurse) fully or partly takes over partial steps. According to the degree of personal assistance needed or if extra device assistance is needed, different milestones can be ascribed in level III. A special form of personal assistance is described as stand-by assistance for safety. It does not only imply the general presence and accompaniment by the assistant (nurse) but also the direct proximity to the patient. Thus the assistant (nurse) can immediately intervene if needed. Therefore the assistant (nurse) keeps a distance of only very few centimeters.

Level IV: Complete takeover. Sometimes the patient may not be able to play an active role in performing a certain task. The assistant would take over main functional phases. In this case, the patient's performance would consist of tolerating the assistant's actions.

With this scheme, outcomes of different items can be related, even if there are different numbers of milestones. In addition, using levels of assistance, mobility test results can clearly correspond to independence: A person is independent, if all items result in milestones of level I or level II. For example, a similar approach was successfully used to evaluate cost-effectiveness of mobility training [30]. Advantages of tests using a milestone framework are

- No apparatus is needed
- Even with weak mobility, the test person experiences success
- Internal validity can be claimed to be logical
- The test results in a mobility profile, directly showing next-step therapy needs

Therefore, milestone mobility tests can easily be implemented within complex or restricted settings, like testing children with multiple and severe handicaps [28], frail or disoriented elderly [27, 31], or – in the study at hand – patients in post-operative intensive care. For the 17 items of MOTA (Illustration 1), sufficient inter-rater reliability (Spearman's r : 0.76-1.00; 2 observers, 10 subjects) and retest reliability (Spearman's r : 0.69-0.98, 23 subjects) was reported for highly aged people (mean age 85 and 86 years, respectively) [27, 32]. The results should be validated for the different target groups.

Modification and further development

In order to evaluate early mobility after surgery, a team including clinical, nursing and human movement

experts developed the new test. At first, the mobility framework of MOTA was revised. A new section structuring preparations to sit up in bed was added. Items like reaching overhead, overcoming stairs or uneven grounds were dropped. Much attention was paid to test economy of the people involved. Additional efforts for patient and observer should be as little as possible.

As a result, the Mobility Test for Patients in Acute Care (MOTPA) contains 12 functional tasks starting in lying (4), sitting (3), standing (5) positions (Illustration 2):

Lying position (in bed): moving to the top, moving sideward, transfer from back to lateral position, transfer from lateral lying position to sitting on the edge of the bed

Sitting position (on the edge of a bed): moving forward, keep sitting position, stand up

Standing position: turning 180 degrees, going backward 3 steps, short walk (6 m), walk (30 m), sitting down

The test items sum up to a standard mobilisation routine in intensive care: starting in a lying position, the patient would prepare to sit up, if possible to stand up and walk 30 meters at maximum. Of course, the procedure would be stopped immediately at the patient's wish or a care-related decision of the nurse. Whether a separate observer would raise objectivity or not, was subject of extended discussions. The results of the MOTA validation studies [27, 32-34] were taken into account (Illustration 1). In case of guiding movements by touching the patient, the assistant would receive more precise information than an external observer. Therefore, we decided that the assistant (nurse) should be identical with the observer (tester).

A full description of all items and procedures is presented in the appendix of this paper: Manual of the Mobility Test for Patients in Acute Care (MOTPA). An example (Item G: Stand up from the edge of the bed) is given in Illustration 3. The discrimination within personal assistance (level 3) shall be explained here. For example, the reader may consider a patient, who would have started a movement but gets stuck for any reason. If verbal instruction is sufficient, milestone 3 is given. In case tactile hints (in addition to verbal cues or not) are necessary, whenever the flow of movement stops, the patient would receive a score of 4. If neither kind of assistance would be sufficient, the nurse would take over and complete the move, resulting in milestone 5.

Methods

Setting, design and sample of the trial

The study was designed as a prospective, interventional, single-centre, randomised controlled trial. It was conducted in the intensive care and general care units of the department of urology and child urology of the university hospital Ulm, Germany. In the field of urology, medial laparotomy is performed during cystectomy operations. Therefore, patients who were scheduled for cystectomy were enrolled. Inclusion criteria were

- Cystectomy scheduled (ICD5-576)
- Age 18 years or above
- Ability to understand written and spoken German
- Written informed consent

Patients meeting one of the following criteria were excluded from the trial:

- Impaired mobility (functional degree 2 or above, according to [35]: dependent on personal assistance, supervision or guidance)
- Chronic pain (duration above 3 months, with pharmacological treatment)
- Dementia, medically documented
- Anamnesis includes medial incision

The target number of patients was set as 30. This number was thought to be high enough to judge on the feasibility of the design and the new mobility test, and to calculate effect sizes for a power calculation of a later main trial. On the other hand, it is small enough to avoid unnecessary demands on patients and resources in case the design is not feasible or the intervention has no effect.

The study was registered at Current Controlled Trials (www.controlled-trials.com) and received the International Standard Randomised Controlled Trial Number ISRCTN32898285.

Types and procedures of data collection

Primary outcome measures

The primary outcomes were functional mobility, pain and post-operative length of stay. Functional mobility was tested using MOTPA, as described in the corresponding subsection in section Background. The mobility profile was once recorded before surgery, semi-daily after surgery in intensive care unit (once in the morning and once in the afternoon) and daily after the transfer to the standard care unit (around noon).

Pain was assessed through Visual Analog Scale (VAS), before, during, directly after, and 10 minutes after mobilisation and execution of MOTPA. The Visual Analog Scale is a reliable and valid tool which

measures the acute pain of a patient in different settings [36]. In this study a horizontal VAS with a length of 10 centimeters and the extremes 0 cm = no pain and 10 cm = unbearable pain was used. The post-surgical hospital residence time was recorded as the time in hours between the date of medical operation and the date of documented release. Nurses were trained extensively in using MOTPA, VAS and in the other data collection procedures.

Secondary outcome measures and control variables

Socio-demographic data (age, sex, education, profession), mobility related aids and sporting activities (hours per week) were recorded pre-operatively. The type of surgery after cystectomy (ileal conduit) was recorded once post-surgical. The number of drainage and access canals, the VAS pain intensity, and the analgesic medication before (2 hours), during and after (30 minutes) mobilisation, were recorded at each mobilisation session. Possible post-operative complications (artificial ventilation for more than 6 hours after operation finish, reintubation, relaparotomy or other complications resulting in restriction of mobilisation exercise, e.g. thrombosis, lung embolism, disorder of wound cure or suture) were recorded once a day post-surgically. Presence of one of these complications resulted in exclusion of the patient from the trial.

Intervention, control and common procedures

Admission to the study and randomisation. After proving inclusion and exclusion criteria by the nurses of the urological clinic, the patients giving informed consent were consecutively admitted to the study. Afterwards, the group allocation was randomised by the nurses of the urological clinic according to the randomisation plan (block randomisation, allocation concealment) of the Institute of Biometry, University Ulm. Originally, a blinding of the data collector was intended, but it was not practicable due to the necessary close involvement of the data collection with the care giving procedures.

Surgery preparation. Before surgery, both groups received a general standard preparation by the care staff, on the day before operation (shaving and laxative preparation, information on procedures with regard to operation). A mobility profile was recorded using the MOTPA.

Patients of the experimental group underwent an individual educational intervention. It included cognitive and motor learning aspects on post-operative mobility (Illustration 4) and an introduction to the warm-up exercise to be conducted before the mobilisation sessions. According to the

Viv-Arte conception (see corresponding subsection in section Background), nurse and patient together elaborated individual motor solutions to problems with post-operative mobility restrictions. In addition, a brochure with a summary of exercise instructions was presented. During the 30 min lesson, patients were asked to exercise during the day. On occasion of the same nurse visiting in the evening, further questions of the patients were answered. The control group received written information containing explanation and motivation for active movement to prevent from thrombosis, as is usual.

After surgery. All patients received pain medication according to a twofold local standard protocol:

1. Naropin 0,375%, continuously administrated by perfusor via peridural catheter
2. individual and situational adjustment through individual dosage of the Naropin and additional administration of peripherally acting analgesics and further opiates

In addition, they (a) were instructed to execute active movements according to the information sheet and (b) underwent mobilisation exercise without differences.

Standardised mobilisation. Twice a day during intensive care (between 9 and 11 a.m. and between 3 and 5 p.m.), once a day during standard care (around noon), a mobilisation session was scheduled. The number and nature of drainage and access canals, the VAS pain intensity and the analgesic medication before (2 hours), during and after (30 minutes) mobilisation, were recorded. A VAS score above 30 mm directly before scheduled mobilisation exercise resulted in cancellation of the session.

A warm-up phase (Illustration 5) served as preparation. According to the MOTPA concept, the session contained all positions, transfer and locomotion procedures from "lying in the bed" up to "walking" (see corresponding subsection in section Background). Thus, from the patient's view, the mobilisation session consisted of a well-known sequence of everyday movements, except for standardisation and the assistance given by an educated nurse. At any time, the session could be stopped at the patient's wish or the nurse's professional judgement.

The mobilisation sessions were conducted until (a) the patient regained his or her former mobility profile and (b) this was confirmed in a second measurement. Mobilisation and measurements were conducted by the same person.

Data analyses and evaluation methods

The data were analysed descriptively by means of the frequency, median, minimum and maximum. The difference of the central tendency between the groups

in regard to the outcome measures was tested using the Mann-Whitney U test.

In order to gather more information about the mobility profile in each category of the MOPTA test, a detailed analysis of the data was carried out. It was based on descriptive parameters and diagrams showing group-wise aggregated values for each item and each measurement point in time. In addition, values were averaged above items with the same starting position: item A-D (horizontal position), item E-G (sitting position), item H-L (standing position). Details can be found in Illustration 2 and the MOTPA manual (Appendix).

Several discussions on outcomes, feasibility, usefulness and other aspects of the trial were conducted. The groups of participants were (a) all nurses involved in the trial and (b) managing nurses, scientists and central nursing management.

Ethical considerations

All participants gave informed consent to the study. The trial was fully approved by the University of Ulm (Germany) Ethics Committee (reference number: 43/06 - UBB/se). It is in accordance with the Helsinki declaration.

Preliminary results: sample characteristics

A total of 30 patients, who fulfilled the inclusion and exclusion criteria, were admitted in the study and randomised. Three patients dropped out due to a change of the scheduled operation, respectively due to a necessary relaparotomy. Overall, data from 27 patients were available for the analysis (Illustration 6). Characteristics of the intervention and control sample are shown in Illustration 7.

The patients were between 35 and 83 years old (median 56 years), 19 were males. Total activity was between 0 and 34 hours (median 7 hours). One patient received an ileal conduit, one patient a trans-uretero-uretero-cutaneo-stoma (TUUC) and all the others received an ileal neobladder. The duration of the surgery was between 180 and 475 minutes (median 312.5 minutes).

There was no significant difference between the study groups concerning baseline characteristics like sex, age, education, occupation, total activity, surgery procedure and duration. Also, no difference was found between the groups concerning the control variables (pain medication, drainages and access canals). Preliminary results were also reported in [37].

Discussion and Conclusion

Motor exercise with urological patients, before they undergo cystectomy, seems to be helpful to overcome post-operative mobility restrictions, and so may contribute to regeneration. We designed a new mobility test (MOTPA) and a randomised controlled trial to study test feasibility and effects of patient education. The target group included patients scheduled for cystectomy, whose mobility regularly would be strongly restricted after surgery due to medial incision wounds.

Conduction of the trial showed that the trial design as well as the mobility test were feasible in an intensive care setting. While preliminary results were described in [37], an in-depth analysis is being prepared. In addition, some of the data are planned to be used to analyse reliability and stability of MOTPA. Nurses involved in trial conduction reported, that standardised procedures of mobility assistance, which are a consequence of the test application, may also raise the nurses' attention for general movement assessment and documentation. Thus the patient's state may be influenced. This will be subject to further investigation.

Our research refers to a "technological" approach to science [38]: Rather than finding new general laws, this approach orients on establishing premises, under which certain laws take effect – this is often called applied research. Laparotomy is a standard to access the abdomen [39]. Therefore, if the training or the mobility test prove to be useful, an expansion of the field of application may be discussed,

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Authors

Hunt's authorship scoring system, published in Nature [40], was used to describe the contributions and to determine sequence of authors.

In the planning, designing, and interpreting category EMP, AME, JH and MB scored highest. EK, JH and EB captured and processed data, and were in charge of all procedures. Specialist input came from MB (human movement science) and HBM (Viv-Arte conception). Together with AD and EK they developed the new mobility test. All authors contributed to and take full responsibility of the manuscript.

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Illustrations

Illustration 1

MOTA test validation summary:

Spearman correlation coefficients between two observers (objectivity or inter-rater reliability), between test and retest (reliability) and between test scores and expert ratings (external validity) were taken from Brach and colleagues [27] and refer to the Mobility Test for Aged Persons. All studies were conducted in a residential geriatric care setting [33-34]

Test Item	Objectivity (<i>n</i> = 10)	Reliability (<i>n</i> = 24)	External validity (<i>n</i> = 25)
Sitting	.81	.91	.13
Moving while sitting	.97	.69	.16
Standing	.86	.98	.57
Sitting up (in bed)	> .99	.86	.48
Standing up	.89	.87	.48
Sitting down	.92	.75	.33
Turning while standing	.92	.91	.39
Reaching up	.97	.68	.46
Picking up	.76	.94	.29
Walking	.99	.95	.66
Starting a walk	.98	.90	.74
Stopping a walk	.97	.93	.68
Reverse steps	.92	.90	.38
Bend walking	.93	.98	.76
Upstairs walk	> .99	.93	- not tested -
Downstairs walk	> .99	.94	- not tested -

Illustration 2

Mobility scheme showing the items of the test: Basic positions like lying on the back or on the side, sitting, standing and walking, are represented by silhouettes. Linking black arrows denote transitions from one position to another. Yellow block arrows stand for additional items within the same basic position.

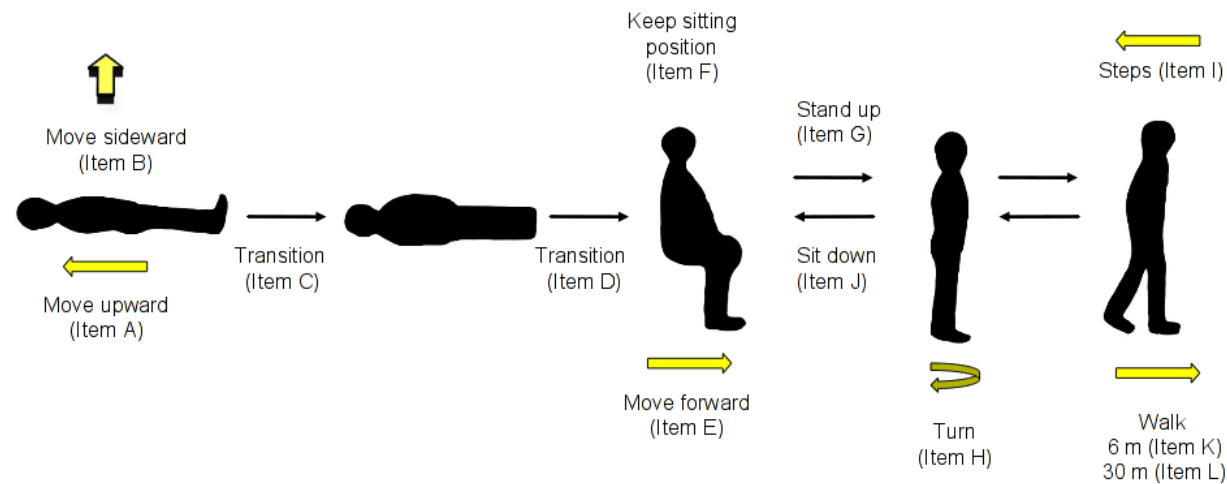


Illustration 3

MOTPA Item G: Stand up from the edge of the bed

Level	Milestone	Denition
Level 1: Without any assistance	G.1	The patient needs neither personal nor device assistance to move from a sitting position on the edge of the bed into a standing position.
Level 2: Device assistance	G.2	The patient does not need any personal assistance but he/she uses existing device assistances (e.g. infusion stands, bedside table) to move from a sitting position on the edge of the bed into a standing position.
Level 3: Personal assistance	G.3	The patient needs oral feedback, instruction or standby assistance for safety provided by an assistant (nurse) to move from a sitting position on the edge of the bed into a standing position.
	G.4	The patient needs oral feedback or instruction and minimal tactile guidance (e.g. slight intensification of thrust, slight correction of direction, slight support) provided by an assistant (nurse) to move from a sitting position on the edge of the bed into a standing position.
	G.5	The patient can move from a sitting position on the edge of the bed into a standing position if an assistant (nurse) fully or partly takes over partial steps.
Level 4: Complete take-over	G.6	The patient tolerates to be moved from a sitting position on the edge of the bed into a standing position by one or two assistants (nurse/s) (complete takeover).

Illustration 4

Pre-operative patient education: This table shows the standardised procedure of a patient education lesson.

Phase	Subject
(1) Introduction	Patient is asked to explain and to show, how he/she usually gets up from the bed.
(2) Restrictions after surgery – a need for learning new movements	Nurse explains the medial incision. Patient once more performs his/her everyday movements. Nurse lets him/her feel tension and use of the abdominals.
(3) Instruction and exercise	Nurse explains and shows possible solutions. Patient and nurse try and train them. They modify the new movements to the patients needs. Patient performs new patterns without assistance.

Illustration 5

Warm-up phase prior to the mobilisation session: Prior to the mobilisation session, patients of the intervention group performed warm-up exercises according to the table in a lying position. The controls were instructed to conduct a standard exercise of thrombosis prevention before mobilisation.

Body part	Exercises
Legs	Multi-directional and circular movements with the leg, from two starting positions: leg racked on the bed, or leg put-up (knees showing to the ceiling). Slight pelvis lift increases efforts. Integrate breathing.
Arms	Movements in all directions, including circular movements. Increase efforts by reaching downwards across the thorax.
Head	Slow bowing, racking and turning movements.

Illustration 6

Flow chart of the trial and sample sizes

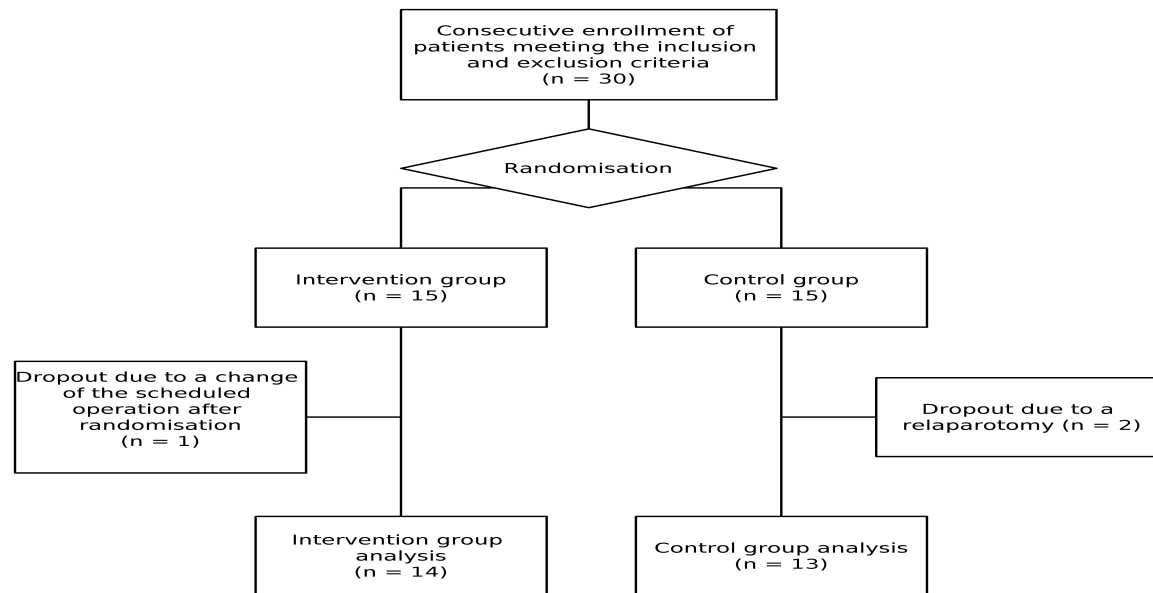


Illustration 7

Characteristics of the intervention and control sample:

For each variable named in column 1, absolute and relative data is presented for the intervention (column 2) and the control (column 3) sample. Units for age, total activity and duration of surgery are given in column 1. The other values refer to frequencies. TUUC is an abbreviation for trans-uretero-uretero-cutaneo-stoma.

Variable	Intervention (<i>n</i> = 14)	Control (<i>n</i> = 13)
<i>Age (years)</i>		
Median	61.5	65.0
Minimum – maximum	35-76	44-76
<i>Sex</i>		
Female	5 (35.7 %)	3 (23.1 %)
Male	9 (64.3 %)	10 (76.9 %)
<i>Total activity (hours)</i>		
Median	7.0	6.5
Minimum – maximum	0-21	0-34
<i>Education</i>		

Elementary education	7 (50.0 %)	6 (46.2 %)
Secondary education	2 (14.3 %)	2 (15.4 %)
High school degree	2 (14.3 %)	3 (23.1 %)
Tertiary education (college)	2 (14.3 %)	1 (7.7 %)
University degree	1 (7.1 %)	1 (7.7 %)
<i>Occupation</i>		
Worker	0	2 (15.4 %)
Employee	5 (35.7 %)	4 (30.8 %)
Self- employed	1 (7.1 %)	1 (7.7 %)
Official	1 (7.1 %)	0

Other	1 (7.1 %)	0
Retiree	6 (42.9 %)	6 (46.2 %)
<i>Type of surgery</i>		
Ileal conduit	0	1 (7.7 %)
Ileal neobladder	14 (100 %)	11 (84.6 %)
TUUC	0	1 (7.7 %)
<i>Duration of surgery (minutes)</i>		
Median	312.5	312.5
Minimum - maximum	180-475	180-475

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