

Patent about the development of a bath tub for bath-taking training

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ABSTRACT

This paper shows the new patent of the content applied for a patent of the training bath tub development for hemiplegia patients and it reports a result of the use of the bath tub in one case. The following is the structural and functional characteristics of the bath tub for bath-taking motion training. 1) One of the structural characters is that the side wall of the bath tub at its foot side is removed and a foot-pushing board of 30cm high is equipped there with its place optionally set. 2) A plate for washing space, seating part, and handrails are placed. 3) The height of the plate for washing space and the depth of the bottom of the bath tub are optionally changeable. 4) The muscle necessary for bath taking can be strengthened because there is no hot water in the bath tub and no buoyancy is effective. 5) The optimum motion can be trained with one's clothes on in an optional place like a training room.

KEY WORDS

bath-taking, independent training, patent

Introduction

Bath taking is said to be one of the most difficult activities to do by oneself among various activities of daily living (ADL)¹⁾. In most cases of hemiplegia patients, if there is only inadequate recovery of their affected side, it would be difficult for them to take a bath by themselves²⁾. Therefore, reports say that it would be good if a therapist such as an occupational therapist gets in a bathroom with a patient and instructs him/her the way to take a bath. However, it can be conjectured that not so many therapists get in a bathroom with a patient and conduct the bath-taking instruction. There are diverse reasons for that, but anyway, early training after an attack of disease is effective. It seems that the majority of hemiplegia patients are in need of bath-taking instruction and training from their early stage and that it is necessary

to develop some equipment for bath-taking motion training. However, those bath tubs which were developed are only useful for those patients whose motions became relatively independent^{4), 5)}. Some bath tubs were only useful as a support bath tub for those who cannot take a bath by oneself at all⁶⁾. It can be said that training means to make independent those who have potentiality of independence between these two categories of those who have relatively got independent and those who cannot be independent. However, training bath tub meant for training was not developed. Most of the current training situation seems to be limited to the use of an ordinary bath tub or reformed bath tub for easy bath taking.

Then a training bath tub has been developed for those hemiplegia patients whodon't have much chance of motor function recovery of their affected side to

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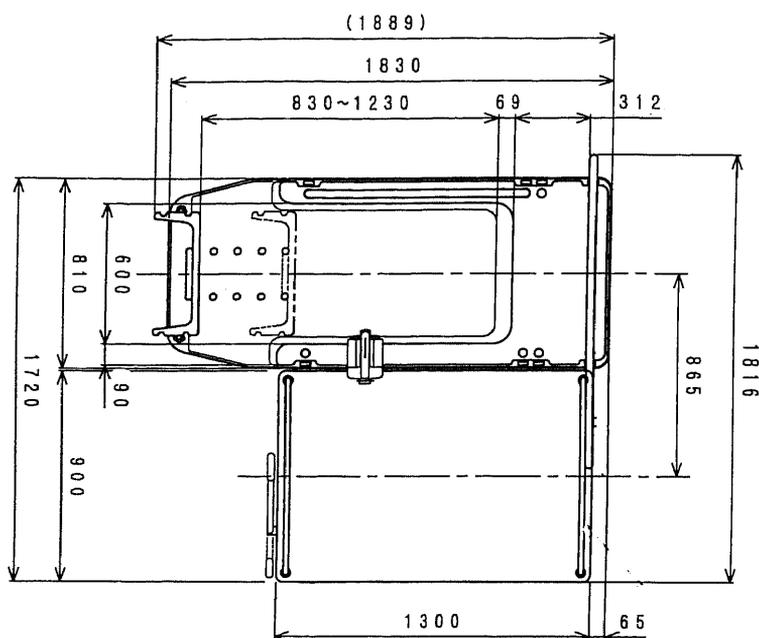


Fig.1 Upper view of the new patent, training bath tub (unit :mm)

practice getting into and out of a bath tub by themselves.

The meaning of independent bath taking of those hemiplegia patients who have no perspective of motor function recovery has been limited to enabling them to get into and out of a bath tub by keeping balance of the whole body in sitting posture, standing posture, and when moving with strengthened motor function of un-affected side. The following is the explanation of the structure of this training bath tub based on the content applied for a patent through Japan Science and Technology Corporation (patent application 2000-108190), and it explains how to use the bath tub as a function. Then a drawing of the bath tub experimentally made in accordance with the content applied for a patent is shown and an example of using it is reported.

Characteristic structure and function of the training bath tub's patent

Pictures of the training bath tub made on the basis of the content applied for a patent and with which an actual testing use was done, and a drawing of it are shown (Fig. 1, 2).

1. General formative characters of the training bath tub

The upper side of the bath tub is a rectangle, and one of the short sides is missing, then the side wall of this part of the bath tub is removed and open. Instead of the removed side wall, a foot-pushing board is equipped and fixed at an optional position at the bottom of the bath tub. The depth of the inside bottom of the bath tub can be changed optionally.

2. The function of the foot-pushing board set at an optional position

The height of the foot-pushing board is 30cm and its width is about 10mm shorter than the length of the short sides inside the bath tub. The foot-pushing board is necessary as a side wall of the bath tub when a patient gets out from the bath tub, so at first stretches his/her legs, then pushes the foot-pushing board by his/her un-affected leg with his/her back pushing the inside back wall of the bath tub and with his/her body supported by holding an edge of the bath tub with his/her un-affected hand, then finally places his/her un-affected leg under the hip. The reason why the position of the foot-pushing board is designed to be optionally changeable is to know the best position for each patient and to adjust it to the bath-tub size

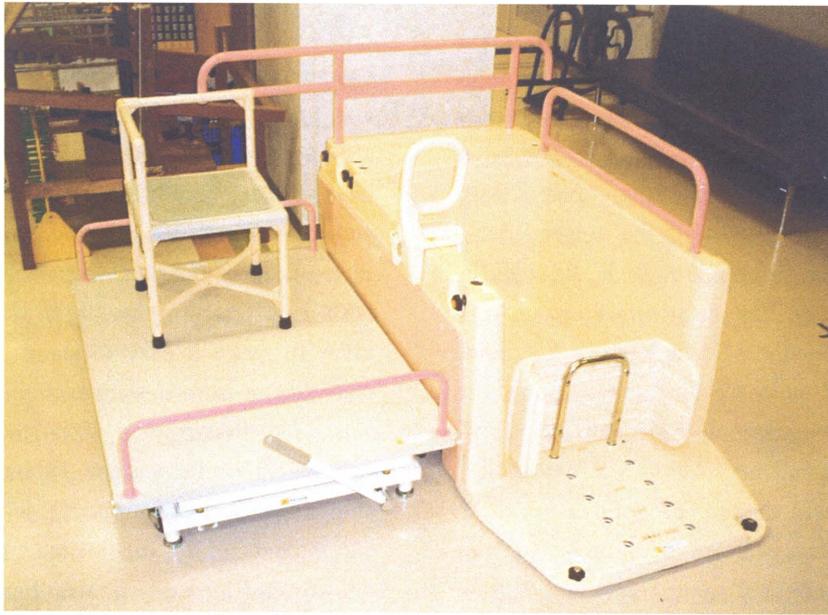


Fig.2 Product of the patent, training bath tub

of the patient's home.

The reason for its 30cm height is that no body has bigger feet size than that. A therapist can easily get into or out of the bath tub, stepping over the foot-pushing board, to support the patient and instruct his/her best position, posture and motion.

3. Seating part and a backrest with a handrail

There is a seating part continued from the back of the bath tub and there is a backrest at the rear of the seating part. A handrail is equipped at the backrest and one side of the handrail projects over the side where one gets in and out of the bath tub. The height of the handrail can be adjustable.

4. Handrail at the upper edge of the bath tub

A handrail is equipped at the edge on the upper surface of the longer side of the bath tub. Among the two long sides, one is the side from which a patient gets in and out, therefore the handrail is put on the opposite side at the surface of the edge of the bath tub. According to an affected side of a patient's body, a side of the handrail and a side of getting in and out will be optionally chosen and set up.

5. Plate for washing space

Outside of the long side where a patient gets into and out of the bath tub, a plate for washing space is set up connected to the bath tub. The extent of the

plate is about one mat (900×1800mm) and its height can be set optionally, making it possible for each user to have his/her best height in relation to the height of the bath tub or even to set the same height as his/her own bath tub and washing space at home.

The side where the washing space will be set up depends on which side the patient's body is affected.

6. Casters with stoppers

Casters with stoppers are equipped at the lowest bottom of the bath tub on the floor and making the bath tub mobile. Casters with stoppers are also equipped at the rear of the seating part, making it easy to carry the bath tub by an elevator putting it up with this caster side on the floor.

Testing use in a case

1. Outline of the case

Sixty-nine-year-old woman, who was attacked by right putamen hemorrhage on May 21, 1999 and went through stereotaxic hematoma suction curettage on May 31. She started rehabilitation training at Rehabilitation Kaga Yahata Onsen Hospital on July 22 and then went back home on October 25. The following is the outline of the progress of occupational therapy and the next to that is the progress of bath-taking training including the usage of the training

bath tub.

2. Progress of occupational therapy

1) Evaluation

Early evaluations and those on leaving the hospital on each item are briefly shown as follows. The latter evaluations are indicated in the parenthesis. Brunnstrom's Recovery Stage of the upper limbs, lower limbs, and hand fingers are II, II, II, (III, IV, III). Superficial sensation and deep sensation are dull (dull). Hasegawa's Dimenntia Scale is point 25 (point 30). Meal taking and wheel chair operation are the only independent activity among ADL (all the activities of ADL are independent).

2) Items of occupational therapy program

①Functional recovery exercise with range of motion exercise for the affected upper limb and muscle strength exercise. ②Standing balance and standing endurance exercise. ③Exercise for independent clothes changing, excretion, and bath taking. ④Investigation of housing environment.

Since the patient had shoulder pain and drop shoulder in the upper limbs, her affected shoulder muscles were mainly strengthened to prevent the pain from worsening, and to keep standing balance by the unaffected side in order to make her ADL independent.

3) Bath-taking training

The bath-taking training is divided into the following three periods. The first is the period when training was done by using the training bath tub through strengthening the basic motor function necessary for bath-taking. The second is the period when the bath-taking motion exercise was done by using a homey bath tub built in the hospital ward and also the environmental adjustment of the bathroom in the patient's house was proceeded with. The third is the period when an evaluation was made through actual bath taking in the adjusted bathroom in her place.

3. Progress

1) The first period (from the end of July to the beginning of September)

The program consists of three exercises. ①Moving-balance training by throwing a ball without any support at the upper limbs of the patient standing inside of parallel bars under supervision. ②Sideway-walking exercise with holding parallel bars. ③Exercise to lift up the affected lower limb by the un-

affected upper limb and hand with sitting on a stool.

As an early exercise, such necessary motions as balancing, standing-up and moving for taking bath, and lifting the patient's affected lower limb which is also necessary for getting in and out of the bath tub were done every time. Because voluntary movement and motion of the affected lower limb were rarely seen at that time, the exercise to step over a stock with un-affected upper limb was repeated. Then, in order to make it easy to stand up from an edge of a bath tub or from a shower stool, standing-up exercise was done, first from a 45cm stock and lastly from 35 cm one. After the motion balance during standing up and in standing posture were achieved to some extent, we moved on to the exercise with the training bath tub. By this period, it also became possible for the patient to step over the edge of the bath tub at least the half way.

The patient can get in and out of the training bath tub in a training room with her clothes on. However, since there is no water in it, when she stands up inside of the bath tub after getting into it without any buoyancy, usage of the lower limbs (especially the un-affected lower limb), muscular strength, timing use in motion, and keeping of postural balance are surely required. This means that through this exercise with the training bath tub, the patient can fully exercise the usage of her lower limbs including muscular strength, timing of the motion, and balancing the whole body during the movement. In this way, this method of exercise was instructed and trained with the help of the training bath.

2) The middle period (from the beginning of September to the end of it)

This program consists of three parts. ①Evaluation and training of taking bath at the homey bath tub in the hospital ward. ②Reform of the bathroom at the patient's home. ③Training of balancing, moving, standing up, and lifting the affected lower limb.

When every motion except for standing up inside of the bath tub became independent in the series of the exercises with the use of training bath tub, actual evaluation and training at the homey bath tub in the hospital ward was started twice a week in cooperation with nurses. At first, a little support was needed to lift the affected lower limb, but with the repetition of

the exercise it led to be independent. With body-washing motion and clothes-changing motion added, we considered her fatigue and avoided risks through proper assistance.

During this period, we visited the patient's home to see the bathroom and examine and arrange a concrete reform plan talking with the patient, her family, and a party from a reform company. Then we reached an agreement to set the barrier-free bathroom meant for hemiplegia patients.

In the training room, the exercises done since the first period such as balancing, walking along parallel bars, standing up, and lifting the affected lower limb were continued. As a result, the muscular strength of both un-affected side and the affected side got improved, making it possible for the patient to lift the affected lower limb only by its own strength. Standing up from 30cm stock became also possible. The way of the whole movement became certain with shorter time, then finally all the motions recovered independent.

4. Bath taking after the reform of the bathroom at home

When the reform of the bath tub at the patient's home was done, we carried out over-night visiting instruction and evaluated the bath taking, then confirmed it was possible. Then after that, the patient returned home.

In this patient's case, voluntary movement of the

affected lower limb recovered to the level that she could step over the edge of a bath tub sitting at the edge of the tub or at the seating part extended from the edge. Logically, however, it can be estimated that the whole movement of bath taking can be independent only with an exercise and to keep positioning of posture balance mainly with un-affected side. So we would like to have more experience in training such cases and report on their results in the near future.

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浴槽への出入り動作自立を進めるための特許

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要 旨

本論では新たに開発し特許申請した片麻痺患者の入浴訓練用浴槽の構造を述べ、合わせて一例の使用状況を報告した。以下にこの入浴動作の訓練機としての浴槽の構造特色を述べる。1) 利用する人の足の側となる側板を撤去して、代わりに高さ30cmの足板を任意の位置に立てるものが、この浴槽の基本構造である。2) そのほか、浴槽の背側には腰を下ろして据わるスペースと任意の高さに設置する手すりと洗い場を備えたセットとなっている。3) 利用者の麻痺側に合わせて浴槽の左右に置く洗い場は、高さを調整できるようになっている。4) この浴槽には湯水をいれることができないため浮力が無く、この動作に必要な筋力を十分に強化する事ができる。5) 服を着たまま動作訓練するため、訓練室など適宜に移動し設置して用いる事が出来る。