

## The Effects of Support on Rollator Frame

Jan Van De Rakt <sup>1\*</sup>, Steve McCarthy-Grunwald <sup>2</sup>, Pascal Roijen <sup>3</sup>

<sup>1</sup> Physical Therapist NDT teacher IBITA, Course Leader and teacher on the Dutch Institute for Allied Health Sciences. Nursing Home “Waelwick” in Ewijk the Netherlands.

<sup>2</sup> MSc BSc RMN Lecturer in Mental Health Nursing with Dementia Specialty. University of Cumbria, Bowerham Road, Lancaster, LA1 3JD England

<sup>3</sup> Team manager, Day care for disabled People. Novi ZORG Netherlands.

**\*Corresponding Author:** Jan Van De Rakt, Physical Therapist NDT teacher IBITA, Course Leader and teacher on the Dutch Institute for Allied Health Sciences. Nursing Home “Waelwick” in Ewijk the Netherlands

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### Abstract

#### Introduction and aim of this investigation.

Walking with an rollator frame is common in our society, we see they everywhere and it is an good thing that people use them to get out their houses and under the people. But in nursing homes is this rollator frame the most use aid for walking and balance control and it is wrong to think that all people must (or better) can use the rollator frame on the same way and that walking with it has no consequences.

#### Materials and methods.

An investigation done in the years 2005 till 2013 on the use of this walking aid by people with starting dementia on changes of their attitude, support on it, body perception, muscle pattern power and selectivity, must give us an answer what using of this walking aid do with people with the neurological disease - dementia- with their body performance, support level and what is the best construction. But what for this users count, can also go count for all rollator frame users.

#### Results

An change of the body perception with muscle pattern decline was clearly present and the level of support together with the construction make driving and especially turning more difficult as we taught it would be. Also was the idea how people must walk behind this walking aid not always realistic.

#### Discussion and conclusion

The rollator frame is a very good aid to hold people on their feet's but it has also consequences when people must increase the support level. And that is an mission for all therapist to create an program with the right intensity to slow down the changes that we don't want.

And the construction of the rollator has also consequences for the user and that is also an task for the professionals to get the right aid for every individual.

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Jan van de Rakt 1, Steve McCarthy-Grunwald 2 Pascal Roijen 3

1 Physical Therapist NDT teacher IBITA, Course Leader and teacher on the Dutch Institute for Allied Health Sciences. Nursing Home “Waelwick” in Ewijk The Netherlands

2 MSc BSc RMN Lecturer in Mental Health Nursing with Dementia Specialty. University of Cumbria, Bowerham Road, Lancaster, LA1 3JD England

3 Team manager, Day care for disabled People. Novi ZORG Netherlands.

**Key Words:** rollator; walking aid; risks of an walking aid; support and balance control

**Introduction**

Walking with an rollator frame is for many elderly a way to get in contact with the world. A world that is decreasing for them and this aid make it possible that she get in contact with the great world around them.

Therefore it is strange that so few good investigations are spend on this subject. Many therapist are learned that people must walk as upright as she could and the amount of support must have be as low as possible.

Second is: walking between the handles and the back wheels, also an indication that an erect attitude is essential to use the rollator frame optimal.

But be honest, erect walking behind an rollator frame means that support isn't necessary and that means that this indication can only be an lack of balance or the feeling that balance isn't optimal anymore.

The category of people that use this aid without support is relative small because often is there an reason more to use this walking aid, from pain all away to problems with the lower trunk and legs and then will the rollator be used with support and will an erect attitude not be possible anymore.

That means also that walking between the back wheels by the most types isn't possible anymore and that people cannot support and at the same time have an erect attitude.

Remarkable detail is that by an research by an group of 66 people that walk with an rollator frame when she have get an rollator frame and from who was the result [1a,1b]:

<b>Rollator Total questionnaire 66 persons</b>	<b>Reason balance</b>	<b>Reason complaints</b>	<b>Given through an professional</b>	<b>Given through an member of the family or relation.</b>
Man 28 persons	8	20	10	18
Woman 38 persons	30	18	10	28

**Table 1**

Clear is that the most people receive an rollator frame from family or an relation and not from an professional and this aid was mostly use till the "end". By this 66 people was nobody that has change from his type of rollator frame.

That mean that many people also professionals think that every rollator is the same.

Further see the difference between woman and man and it is clear that woman use an rollator frame faster when they feel that balance is lesser.

In the man- group was by the reason complaints an group of 8-10 persons that use the rollator frame during the rehabilitation of an hip/knee surgery and where not able to get on without.

The balance item is often there when people have difficulty to hold the balance in the walking performance but also are there indications that control of the standing attitude asked for extra point.

Walking along the handrail [2] is often an sign that the control over the walking but also over the attitude is decreasing. An indication that this control is slowing down is the difference between walking inside and outside [2] and the possibilities to walk and take part on an conversation[3]. But also the way people walk and stand, is important because the amount of tension or when there is an neurological disease, the presence and height of the pathological tone can give an indication that walking inside looks perfect but asked so much that this should be an indication to give this people an walking aid.

This pathological tone will decrease when people create an greater support area and have more control over their balance but this asked from all therapist that there is an good assessment why this extra aid is important and thus also knowledge which walking aid, but also the control, how this developed, is important so that people can hold their independency as long as possible.



**Photo 1: Wikipedia [11]: A walker (North American English) or walking frame (British English) is a device that gives support to maintain balance or stability while walking, most commonly due to age-related mobility disability, including frailty. Another common equivalent term for a walker is a Zimmer (frame), a genericized trademark from Zimmer Biomet, a major manufacturer of such devices and joint replacement parts. Walking frames have two front wheels, and there are also wheeled walkers available having three or four wheels, also known as rollators.**

Walkers started appearing in the early 1950s. The first US patent was awarded in 1953 to William Cribbes Robb, of Stretford, UK, for a device called "walking aid", which had been filed with the British patent office in August 1949. Two variants with wheels were both awarded US patents in May 1957, and the first non-wheeled design that was called a "walker" was patented in 1965 by Elmer F. Ries of Cincinnati, Ohio. The first walker to resemble modern walkers was patented in 1970 by Alfred A. Smith of Van Nuys, California.



Photo 2



Photo 3

**Photo 2 and 3:** Walking with the rollator frame on photo 2 asked for an light lift of the back part to drive with the front wheels and that means that support isn't possible. The rollator frame on photo 3 is less stable certainly when people walk in an slow curve, but when turning is necessary around the axis than is this type better through the minimal turning circle. But this turning aspect must be done by both types (photo 1 and 3) with an support on the handles. By walking aid on photo 2 is turning and support almost impossible.

Back to photo 1 and search for the basic elements of this type and their consequences.

The base is back-wheels that cannot turn, because here can therefore the load be carried.

The front wheel can turn – complete around the axis- and often stand this wheels closer to each other. That create an possibility that the wheel can turn complete but never without touching the wall or furniture that can brace the movement because this type will give this troubles through the fact that the wheels come out the whole base system. The type on photo 3 will give never that problem. That means that people walking with an rollator frame photo 1 and 2 must lift, when possible, the walker by an sharp turn.

The amount of support must thus carries “on “the back wheels because when the front wheels must give an contribution, the turning possibilities will be decrease and turning is being more difficult and the curve must be larger.

To search for the best load carrying we use an vector technique.[12,13,14]

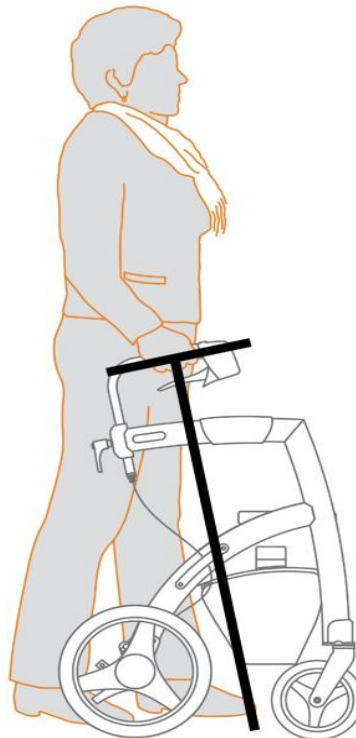
The red line in photo 1 is an indication what will happen with an support on the handles in the mid of it and where the most load will transfer in the

remaining part of the base of the rollator and that is in or in front of the back wheels but far from the front wheels, thus no restriction in the turning possibilities.

Walking erect is the most heard instruction that people receive when they walk with this walking aid. Further is it often asked to walk within the two handles that is often only possible when people walk as erect as possible.

Picture 1 is such an example how people are instruct to walk with this rollator frame.

But this attitude will be asked for walking without load on the handles and room for the person to place the legs/feet far to the front, if possible, but here the room is restricted. When this person need an decrease of load on the legs than must she be able to let the erect posture gone and get more flexion in the upper trunk [15] and the handles will than go somewhat lower or the position will change with the feet more backward. Still this is an new type and then is it also important that we calculated how the vectors give the load carrying.



**Picture 1:** Analyse of this type rollator frame when he is used for control of the balance and support when she walk. Balance – erect attitude – is good but the room to make great strides is very limited. But when we create an vector to see how the load is divided than is this too far to the front wheels and that is also through the different position of the handles. They are positioned to the front but also to the front up and that give an sloping situation and that give an vector that is placed close by the front wheels. Now is the question how someone must stand to create an position in which he can load place on the handles, because the position of the handles makes this difficult. To create an attitude must the handles be placed lower to give an position with flexion in the upper trunk but still is than the position of the handles an problem because the person must be go to the back to create that attitude. When the handles stand horizontal than is lowering of the height often enough to create an flexion in the upper trunk and create an support that don't asked for an attitude to the back. This position of the handles create an problem for support distribution and will give an problem with the turning possibilities of the front wheels. Furthermore the room to make normal steps is limited.



**Photo 2:** Seeing this gentlemen walk with this walker give everyone the impression that this isn't easy. Is this through the position of the handles what makes support difficult or/and stand the handles to high. Further are the back wheel far to the back what give the problem to walk with an broad walking pattern. The vector give an load before the back wheels but support on it isn't easy. An example that the walking aid makes things difficult and now he has some capacity in reserve and can walk with it outside but will "learn" an wrong attitude and walking pattern and the possibilities are limited faster for him to participate with the daily live outside his home and that is an pity. An clear example that when support is necessary that the handles must makes this easy !



**Photo 3:** The attitude to get an good support is present and that means that the height of the handles is good. This upper trunk stand in flexion and give him the possibility to support on the right way on the handles. But the vector place the load between the wheels and that means that there is also load on the front wheels and that means that when he must turn, this isn't possible on his axis but he need an greater curve and that asked often for adaptation of the environment. When he want to sit on an chair, toilet, bed etc. better is than an possibility that he place his support on an fixed support point so that the combination support and steering isn't there. An fixed support-( par exemple an handle on the wall or stable table) -point makes often turning much more easier and therefore it is so important that this points are present and often isn't an "learning" training not necessary because people has done this often long before at their home and make sitting down and standing up easier.[16,17,18]



**Photo 4:** The Lea [23] , an robot rollator frame that has multiple possibilities, especially the independent driving and the braking systems make driving and support different. That with the possibility that the tuning with support never has the result as the normal rollator will have. When turning must done with an large corner when the support is heavy and too far to the front wheels, will this devices be capable to hold the turn in the certain degree. There are an lot of other possibilities as instructions etc. but also the lower support can help with standing up because the brace works on for wheels and with the elbow on this support, we have an perfect Vorlage [24].

#### The effects of using and/or support of an rollator frame.

##### 1.Effects on the musculature, lateral but also in lower trunk, around the hip in anterior posterior direction [1,4,5,6]

Investigation through E.M.G. studies confirm that there is an decrease of muscle power especially in the hip region by using the walker as an support-aid. An investigation in the speed of this occurrence and how this process go.

Often is this effect within an month but not with an muscle decrease but with changing in the body perception. The support point of the walker are outside the hip level and it isn't now necessary to move the hip over the lateral edge of the foot. This movement is essential to get the weight complete and in balance on one leg, this movement can now replace in an increase of weight on the handles of the rollator walker. This movement change give an changing in the brain about the borders of the body and we see often in an month as first sign that the movement of the hip sideways isn't done because people have the feeling that the fall. An test as the one leg standing test [19] is than fast decreasing and often not possible without an support and people are afraid to do it.

After that, there is often an decrease of power and we see that without the walker people show an compensation often in the form of an Duchenne movement[20] rather than an Trendelenburg [21] or put it another way the trunk moves in the upper trunk sideway. Testing of the power of the abductors [22] makes it often clear that the power is decreasing.

The support on the handles will also have in influence on the extensor muscles, not directly on perception level but the activity of the extensors is now almost never concentric but always eccentric and often will the adductor muscle group do the most labor.

“No “- support and straight walking to prevent this, is an contradiction because only with flexion in the trunk is support possible. Thus people that need an rollator frame for support and balance control, than is thus the only way to prevent this through an exercise program that prevent or better slow down the body-perception loss and the power loss.

**2. The driving aspect will be change and will give difficulties with especially turning. Turning when someone is going for a sit on the edge of the bed or in a chair. [7,8,9]**

Everyone knows an person that go to bed and that end every time in an sit on the feet part of the bed. Walking to the bed the rollator is passing the foot part and the hand goes to the bed and people end in an sit on the edge and now will it be lot of work to get this person correct in bed.

Why is this performance every time the same and what could be the solution?

This part, driving toward the bed asked for an turning that hasn't support than will this be possible through the rollator to lift and place it on the right spot. But when there is support, is this “lift” impossible and also dangerous (photo 6). Thus must that person make an large turn and then will people search for an faster and less heavy solution and that is equal with the bed and place an hand and turn and sit.

What we asked than ?

We advise verbally that people must walk further and then make an turn of 90 degree that is often not possible and often is the advice also walk to back and that is often very dangerous [4]. Thus the solution must be that there is an good support point along the head rest of the bed, an stable table thus not an nightstand on wheels, than can people can support on that table and this support is so much more stable than the rollator frame and people can much better control the attitude and the turn to the bed and will always give an perfect assistance for sitting down and standing up [24].

Thus the rollator construction and the amount of support determinate what the possibilities are of the person behind the rollator and the turning quality and this isn't verbally to correct because this capacity has nobody and still every person get the same criticism.

Of course must the environment be perfect for the rollator user but that means not an lot of room but an clear route that goes direct to the table along the head rest and room for leaving the rollator and take the support further on the table.

Photo 5 gives an picture of so many people that stand still at the end of the bed and search for an solution to get the turn done and sit on the edge of the bed or in the chair.

Photo 6 let us see an person that is turning around his axis with an attempt to lift the rollator but look at the amount of body that is behind his heel (red line) and thus can this be the beginning of an fall backward. Through his position of the head he can hold this in balance, thus by this turning is flexion of his head and upper trunk essential to prevent falling to the back.



Photo 5



Photo 6

Go to an chair with nothing in front and get sit in that chair, that asked often for an complete turn of minimal 90 degree and walking backward. Now go to an table, place the rollator along him and support on the table an sit down

in the chair and many are capable even to pull the chair to back from the table because through the stable support.

The stability of an rollator frame has boundaries.

### 3. The problems when the control/support is high on the capacity to walk back[4].

The amount of tension or even pathological tone in the back muscles will make backward walking very dangerous. The rollator frame will not contribute because people will hold support in the same attitude. Walking backward is than done without an correction with the trunk and after two steps often the weight of body is passed the whole base of the feet and the fall is often starting without the possibilities to brake and shift the weight and

make an step strategy to the back.[25] The last part after the brace of the fall movement, necessary to get “time” to make a shift of weight to one leg and to free the other, asked for an fast movement of the trunk to the front to get the leg to the back for the step strategy.

And here the trunk is “fixated” in extension thus the leg that get “free “, goes also to the front.

### 4. The construction of the rollator frame makes walking easier. [25]



Photo 7



Photo 8

**Photo 7 and 8:** Regrettable still today have people the idea that the rollator frame can be useful for standing up, that is an utopia. When the power in the legs are too less to get to stand than will the rollator frame cannot contribute, because the handles are too high and inhibit an good trunk movement to the front. The solution what this gentlemen let us see ( photo 8) is an solution in which the burden on the legs and the technique of the trunk ( Vorlage) improve but the whole situation isn't good for an person that need an rollator to walk in his home.

#### The obstacles in the situation on photo 7/8.

- The bed stand too low and that makes standing up so much heavier for him and he must thus need power of his arms to push his body from this bed.
- The room between the bed and the closet should be filled with an firm table, so that he can use this table to get easier up [25]. And an standup what is immediately in balance and then can be grasped the rollator and walk away, the same could he use when he goes to bed. Walking to the table and place the rollator on the side asked for more room as here is present thus the best solution is remove the closet. This is every time an difficult decision but

that is proponed because; “ I manage it at this moment”. And of course an table for the closet makes the use of the closet very difficult.

- But this two changes makes walking to the bed not an struggle but much longer under own control. The use of the rollator is than restricted for the walking part and not for the turning of sitting down and standing up and the support on table will give more balance control and create not the dangerous situation as on photo 6.

### 5. Shoulder complaints [10]



**Photo 9:** This attitude we see by many rollator users who place some support on the handles and this will have consequences for the shoulder joints. This joint isn't built for that amount of load and often is there an lot of correction necessary to get the rollator frame in the correct position. That part must often be done by the small muscles in the shoulder and the amount of load is often the reason for tendon problems [26]. But also is there damage through the impingement syndrome, through the upper trunk forward [15] is exorotation in the gleno-humeral joint restricted, that can give damage on structures in this area. [27,28] It is certainly important that therapist assess the shoulders of people that use rollator walkers, certainly when the use it to carry their load. Than is the danger great and is treatment often necessary to hold the shoulders in an optimal condition. Don't underestimated what an rollator walker can do to the shoulder joint and also an wrong type or handles that stand not on the right height.

#### 6. Elements on the and around the back wheels.

There now an lot of different type of rollator walkers on the market but this make the task for professionals bigger to advise people to get the right rollator. Special the type with the back wheels far to the end ( photo 2), here is the danger that people hurt itself but often the walk to far from the walker and make control and walking more difficult as necessary.

#### 7. The suit surface, hard or soft and collapsing danger when sitting on it and then reach to the ground.

All rollator walker have an sit part and many people go to sit on it and there are people that are able to do work on it in house or in the garden. Perfect but when this surface is firm and with his load precise on the back wheels ( photo 1,5) that is the risk present that when someone bend to grasped something of the ground that the rollator will flipped and that this person will fall on the ground. No brace system can stop this because the rollator frame get his weight so that the wheels with an brace on will shoot away.

#### Discussion and conclusion

The rollator frame is one of the most successful walking aid that exist and that has it earned. But there must be more investigation about the benefits or... shortcomings of the diverse types of this walker aid. That so the right type can be given on the person that need that type to control his walking. But also the development of rollator frame as the LEA are important because now is the control and the push part not present and what is than the possibilities of an person that need this aid.

The most important part is that people know what the difficulties are or become when this rollator frame is necessary to control the load of the legs,

this mean that the quality of the legs in perception and power is fast decreasing but that also the steering of the rollator frame is much harder, also dependent of the type, but by all types will turning be an hell of an job and that asked for support point where the rollator frame can be stored because this can this walker aid not deliver.

This element is so important because than we understand why people react – in our eyes- so strange but that isn't the case.

The action that we want that they do with the rollator frame is almost impossible, because they must steer and support on an instable support and that is far too much.

Thus create an environment that give the possibility to support on an stable – (Table) point and create an optimal situation to turn and reach the correct place.

And standing up behind an rollator and think that the rollator will make it easier is an fairy tale, standing up with the hands so high make it only more difficult, thus let people use an table and an upper trunk forward strategy [25] to get to an standing position and then have also support in the front to control the balance and then take the walker an go.

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