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The "Pusher " syndrome, assessment and treatment Part 2.

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Abstract

Part 1 gives us insight in the Pat. Davies Approach and the surprising reaction of so many person with an severe pusher syndrome after an stroke. That there must be an deficit in the brain is clear and that deficit has also an strong effect on the perception of the body scheme. There are investigators that point this as the ultimate personnel neglect on “spine” level !!

The reaction describe in part 1, when we try to set this person in the right “symmetry” is very clear that there must be an strong reaction of the damaged brain, that this isn’t his truth. On the other hand is the brain capable to interpreted stimuli from the affected side, but not on his end of his capacity.

Working with an back splint is the answer and that must done much more! Walking without is possible but asked so much from the person that we can place the question : Is he/she learning ? !!

In this part, we exercise and learn of buildup, more confidence though increasing the power in the affected side by task specific resistance therapy. So many times therapist try to step as soon as possible over on walking without an back splint and then often the tone of hamstrings increased through the static reaction and makes, that the therapist must set an step back to start again with back splint.

Make the back splint an fast part of the treatment and there are option to use the wall or even new approach with weight decrease on the sealing in combination with the splint and the wall.

We start this part with the transfers, that will be an problem for an long time because this asked so much from the person with an pusher syndrome. But never make the mistake an use an apparatus that has an negative influence on the body perception, because you are learning the wrong attitude.

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Transfer are so difficult

The transfers in bed, out of bed, in and out the chair, from the toilet are now possible to train but always remain, that the brain need information to give an better reaction on this very different movements in very different places [1,2,3,4]. But we can also use the positive effects, par example standing without an back splint is possible , now we can use that possibility on the ward when he must clean after the toilet visit. Even with an back splint is possible but that is than more an therapeutic session. In the beginning (with or without an back splint) this is an exercise, thus the therapist will often perform the standing procedure and that he will do in front of an bed that is placed on the right high and the nurse will help with the cleaning and dressing, but when the patient improve this activity can develop into an ADL procedure that inform the brain through the day on many more moments.
The transfers are so difficult because movement means that the information that the damaged brain receive is every moment different. Standing with an back- splint give an flow of information from the affected leg that has little possibility to go in an diversity because the freedom possibilities are poor [5,6]. Still be aware that there are many movements necessary to create an "new" brain network that will handle all different situations and that cost an lot of training and time. And when it is not finished, patient will always can have troubles to do the same movement that he could yesterday. Therefore the transfers will be an part of the treatment that will stay very long on the treatment agenda and that is important because that part makes him independent. Every different situation asked from the person with an pusher –syndrome adaptation and when than isn't occur he will often go back to his first strategy and push and make than movement impossible. Beautiful to see in an design photo 2 [2] with the person that stand with an back splint, hitting an balloon above him and stand symmetry and without the pushing action and when he go to sit in the wheelchair he get in panic an fixated in the situation.

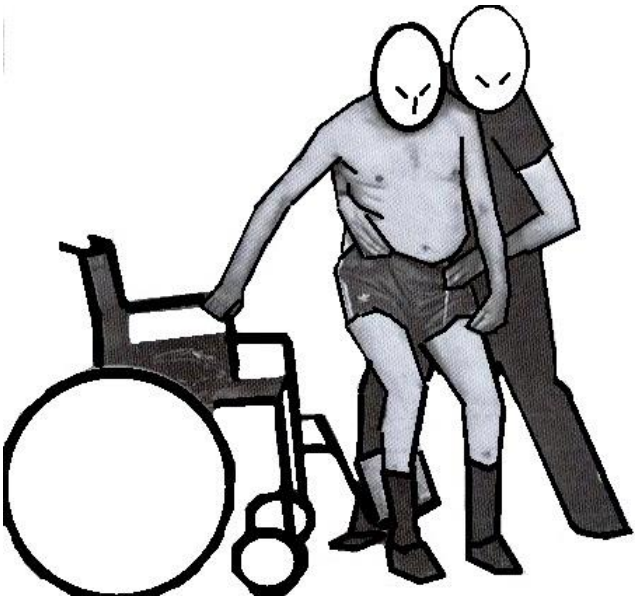
Design photo 1.

Design photo 1 [2].

Every time when you see the remarkable effects of the back splint, it is an miracle how the fixation of the affected knee, create an symmetry and an Balance in the brain and body. The attitude isn't an struggle to get the best standing position according their own perception but the perception is there and give the brain and therefore the person to concentrate on an total other object.

The amount of assistance or control by the therapist is almost nothing , the most important task is to give an dynamic on the standing position. Through the dynamic the stimuli will change and keep the brain active to hold this attitude with the weight on two legs and the body in the center above it. The same person will perform complete otherwise when he must move and go to sit in the wheelchair. (design photo 2) and also the amount of tone in the arm is complete changed. Using the back splint by this group of patient must done over an long period.

Design photo 1 published with the responsibility and permission of the author by j.v.d.Rakt.



Design photo 2.

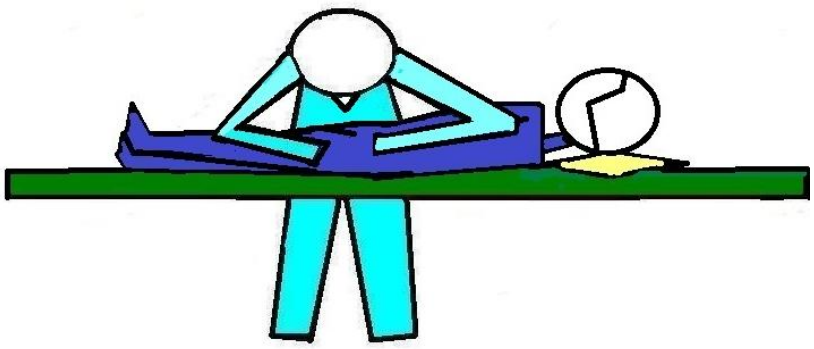
Saying the word: Going to sit in the wheelchair, he start with an sitting movement.
The brain recognized chair and stimulated sitting. He has grasp the side rest but makes the movement of sitting without making the turn complete to the wheelchair.
This will be therefore an problem for the therapist to handle this situation.
Design photo 2 published with the responsibility and permission of the author by j.v.d.Rakt.

Design photo 2.

This reaction and other neuro-psychologic deficits[3,4] are also present by people with the pusher syndrome and that makes transfers so difficult.
By many person was walking even without an back splint possible but turning in bed was without facilitation impossible. This strategy of turning with an increase and changing information is so difficult for this people and with that also the neuro-psychologic elements that makes this more difficult. Therefore be aware of this difficulties and make it not too difficult because the person will react with pushing !!

Transfers over which side ?

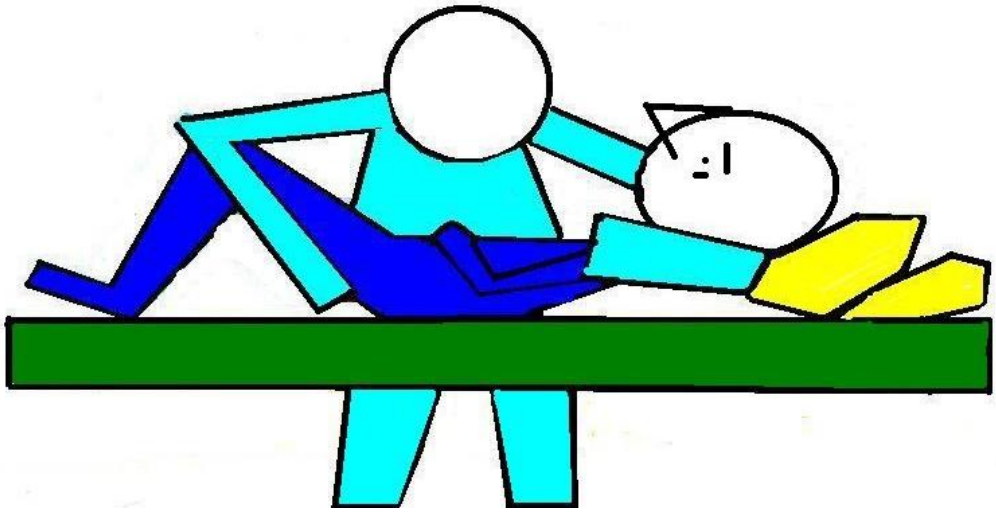
We do the transfer over the affected side, that is the direction she push and when we try to get over the not-affected side there will be always an resistance. That means not that the transfers over the not-affected side are no good but often too difficult. Further one we can use the movement over the affected side as Limb Activation Training (L.A.T.)[7] especially in bed or as an exercise to get in an sideway bed attitude. Turning in bed over the affected side use the technique that give an lot of dynamic stimuli [9,10,11]. This transfer looks very heavy but the most important issue is that we apply dynamic pressure and the turning will be come on the second place. That means don't pull on the person, but have patience because the pressure will give an reaction and that is often that this person recognize what the pressure means.



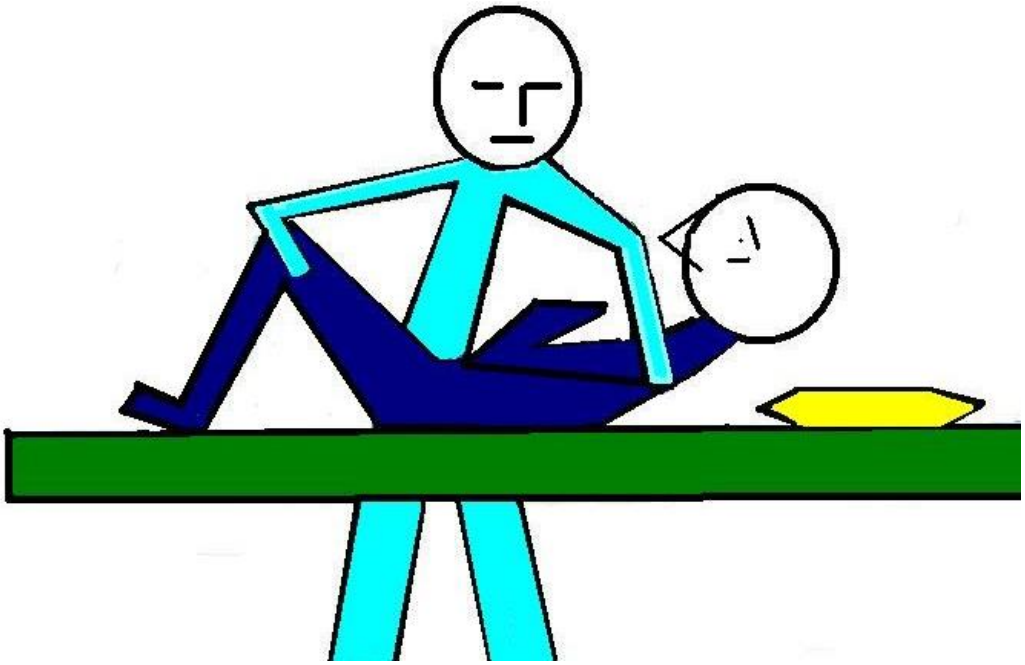
Picture 1.

Picture 1.
Technique in which dynamic pressure is far more important than the turning part. The turning must be an reaction on that pressure (dynamic) and of course than we give facilitation to turn. But on the end of the turn it is so important to give another amount of pressure to give information that the turn stop and give him the feeling that there stability. Place one elbow under the shoulder and the underarm /hand along the trunk and for that this placement is right, must the shoulder become free from the bench. This must be done by dynamic pressure and this cost time because before this reaction occur. The pressure must be enter the damage brain and that means that the pressure by every person can be different. The other elbow under the hip [9](under the trochanter major) and again start with dynamic pressure and as an reaction the hip must be leave the bench an little bit. Place your legs against the bed to hold the weigth on the front and not on the back.
Picture 1 published with the responsibility and permission of the author by j.v.d.Rakt.

Still is the reaction on the pressure on hip height and shoulder height not enough because the most important action is an reaction of the head. Person with the pusher syndrome have often an head attitude that stand fixated. Extreme head position than is an rotation to the not-affected side and when that is the case than will this transfer not work. Than we must act as described in part 1[1].
But when the movement occur in bed with the orthosis than will this transfer work but realized that the dynamic pressure has time needed to enter the brain. This transfer can also be used to make the ADL easier and is an perfect possibility to multidisciplinary care. And the person has also an target why he must turn and that peace of recognition will stimulated his active possibilities.
When there are more possibilities than is an turning with bending legs possible with an active movement of the head. Than we can use this movement also to get in an sitting position on the edge and make an transfer in an wheelchair. But be aware that people after an stroke with an pusher syndrome has an great problem with the body perception and that can by movement every time change and evoke an fear reaction.



Picture 2.



Picture 3.

Picture 2 and 3.
The difference between this two pictures is the arm around the head (picture 2) till the shoulder and give therefore also dynamic pressure on the head to stimulated the lift of the head and the turning movement to the therapist. And in picture 2 the underarm can give more pressure on the shoulder. The other arm can also give pressure on the upper-leg but important that there is dynamic pressure on both knee in the direction of the feet and the pressure must also take care that the end of the turn will never give an feeling of falling[9].
Picture 2 and 3 published with the responsibility and permission of the author by j.v.d.Rakt.

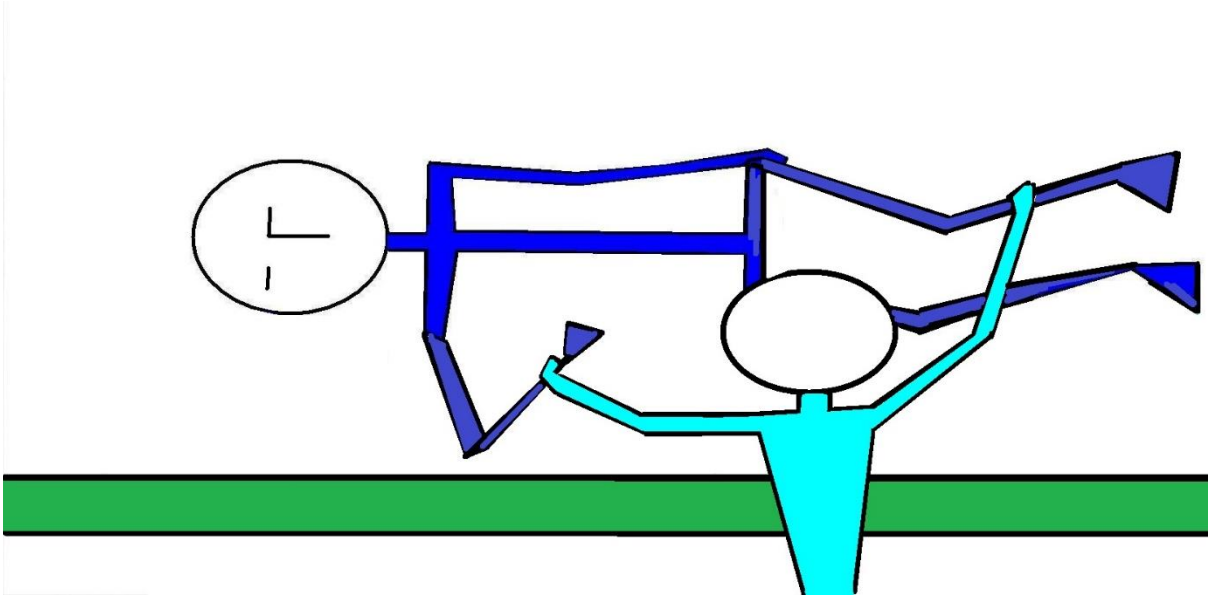
Transfers are difficult and every time will there an moment that the person is losing his faith and react with pushing. Realized that only input that provide information about stability will change that reaction and will build up an network in the brain that can handle this problem. That means that this isn't the work only of the nurses on the ward or elsewhere. This is and will be for an long time the greatest part of the treatment of all therapist.

Preparation.

Preparation of the brain for the movement is possible [13,14] by giving pressure on the side the person must turn. This pressure must be dynamic and go from head to the foot without losing contact. Also an possibility is to give first pressure on the not-affected side and then try to cross with pressure to the affected side. Always try to give information for his damaged perception as base of the treatment and possibility to create an new an right perception.

Exercise

Doing this transfer there always an good moment to start with exercising to increase the power of the affected side. Lying on the affected side is an perfect activity but when this activity can be exercised with load than we create an increase of muscle power and therefore also more information through the muscle spindles.



Picture 4.

Picture 4.
Give an example how side lying can be changed to an heavy exercise. For the whole paretic side with an continuous flow of dynamic information.
Picture 4 published with the responsibility and permission of the author by j.v.d.Rakt.

Lying on the side is the stability very little, therefore the legs are bend on the picture and that degree of bending give more or less stability. The therapist hold the underarm because often an movement of the not-paretic leg will decrease the stability and will asked an activity of the paretic side. This asked of an shoulder and hip fixation on the paretic side [14,15] – the keypoints of the diagonals - and the diagonals must now start in this shoulder and hip on the paretic side [16,17]. Basis reaction will occur as more abduction activity in the affected hip and more extension in the shoulder and elbow on the affected side . And when the not-affected leg move to the front or back, than there will be rotation necessary in trunk, shoulder, hip, head even activity in the paretic foot. This action can be transformed in an task specific resistance treatment and that will increase the power and the coordination in this part. In which the coordination is mostly the first part and coordination is an great form of information.

Coming to sit on the edge of the bed.

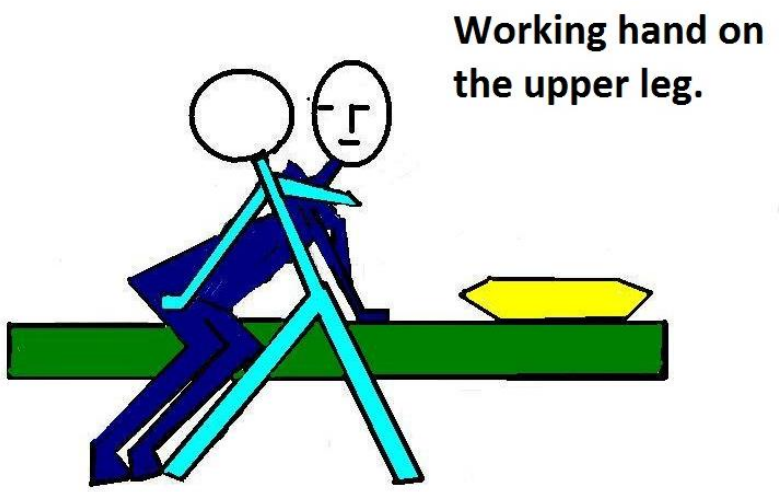
An remark previous, the transfer out bed are also possible back in bed, but by people after an stroke with an pusher syndrome isn't that always the case. The movement back is often more difficult than out of the bed.

The reason can be ;

1. The situation is so different that the neuropsychological problems, such as an neglect, make this an total new situation and the reaction will be more pushing behaviour.
2. But also the fatigue after an day exercising and sitting can change the possibilities of the damaged brain.

Be aware of this phenomena, what for all older people especially with an neurological disease, count but by this group of severe stroke persons is that extra obvious. Coming to sit on the edge of the bed over the affected side asked for an anchor of the lower trunk. And individuals with an stroke have always one side that isn't cooperated by this movement. Lying on the not-affected and move to an sitting posture must be done with the under lying side but cannot count of an good cooperation of the affected side and that makes the anchor of the lower trunk difficult. Lying on the affected side create by an severe stroke on that side no anchor but this can be done through the not-affected side trough facilitation of by hooking with the not-affected leg on the edge of the bed[18].

Start with the transfer over the affected side, because we need the dynamic information for an recovery of the body perception by the individual with pushing syndrome. This is so important because than will there an recovery occur on the affected side (L.A.T.) [7].



Picture 5.

Picture 5.
Facilitation on the affected side to come to sit on the edge of the bed. The left hand on the not-affected will create the anchor on which the diagonals can act to get the job done. The other arm must control the body but gives little assistance.
Picture 5 published with the responsibility and permission of the author by j.v.d.Rakt.

The diagonal have an anchor through the hand with pressure on the not-affected leg. This create an base for the front and back diagonals that give an stretch on the other parts on the affected side and asked for an reaction. The person has weight on the affected hip and move over this other anchor and that can evoke also an diagonal action (front and back) which can give an reaction in the upper trunk on the not-affected side. Further one can an anchor on the not-affected side give an shortening of the spine muscles on the not-affected side and can assist the movement. But the facilitation must be so good that the diagonal walk from the not-affected side to the affected side and vice versa.
That we can feel and observe: The movement of the head is sign of the upper trunk is active, but this must be an shortening of the affected side. The hand on the not-affected shoulder can help but also feel or the shoulder turned to extension rotation, that is an sign that the back diagonal (starting out the not-affected lower trunk to the upper trunk affected side) is used. An sign that diagonal is crossing but too much in the back diagonal. Again give the possibilities to make here an exercise that makes it difficult and therefore an task specific resistance treatment according the R.M. principle[19].
The power of the muscles that take care of the anchor normally, are mostly the muscles on the side we move over. We use the other leg as weight often with speed to make the movement easier, but the hip on the under lying side must take care for the anchor. There we asked for an concentric endorotation force in the hip and therefore see the two photos of two people, coming to sit on the edge of the bed and see the difference.

Photo 1.

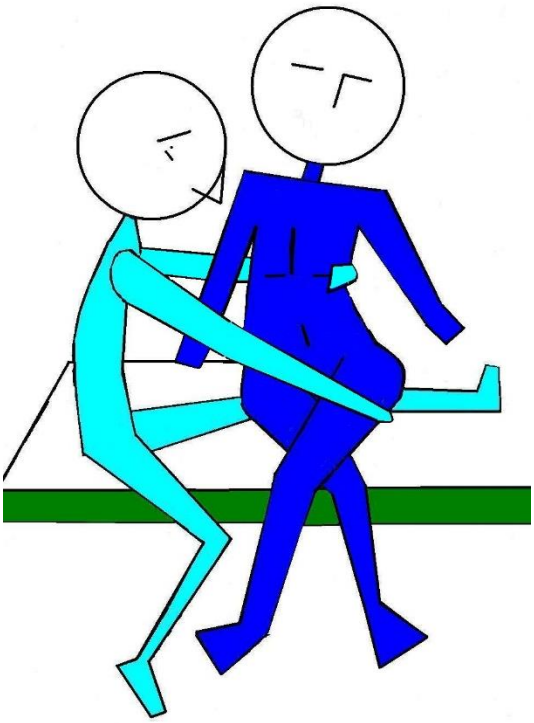
Photo 1.
Look how far the legs are separated and the amount of endorotation in the right leg. Further look at the amount of dorsal flexion in the feet and how much is support on his elbow. And the head shortening activity. Photo1 published with the responsibility and permission of the author by j.v.d.Rakt.

Photo 2.

Photo 2.
The same movement but now see the difference:
More endorotation both legs are together dorsal flexion in both feet almost no support on the elbow, this is one fluent movement. Photo 1 let see an man that must support on the elbow to go further because the lower trunk isn't able to give an good anchor. Further the difference between the shortening of affected side of the neck. This is not only an ADL movement but also an exercise to get this person the independency that he want.
Photo 2 published with the responsibility and permission of the author by j.v.d.Rakt.

This transfer is by all persons after an stroke very difficult, but by an person with an pushing syndrome is this an disaster. And that the lower trunk need exercising against the edge of his possibilities is essential to get an good recovery not alone in standing up and walking but also in moving in an out

bed. Sitting on the edge we can do an exercise what is very difficult but stimulated the lower trunk and balance.



Picture 6.

This exercise can be done on the not-affected hip as also on the affected hip. Two elements are essential:

1.Sitting on one hip asked for an active concentric contraction of the hip muscle especially of the rotator muscle. To get in this position often facilitation of the therapist is necessary and then still be aware of the possibilities there are to compensated.

2.The balance element will be very dramatic and asked for reaction with enough speed and control. The action in agonist and antagonist must be almost normal and will asked of the damaged brain the best he can to stay in balance.

Both rotation movement are present, outside the support area-exorotation-but endorotation to far to the inside.

Picture 6 published with the responsibility and permission of the author by j.v.d.Rakt.

Picture 6.

The endorotation we need for the best stability in the lower trunk when we come to sit but an controlled exorotation we need when the person is lying down. Many persons after an stroke and especially people with low tone can the movement-lying down over the affected side- be dangerous when there is not enough exorotation. That can give an rupture in the ligament of the hip joint [18].

Transfer from the edge of the bed to the wheelchair.

Last transfer that need more than only standing up and stand because here there must be an turn of 90° and that isn't possible in one time. By person after an stroke there isn't the ability to shift with the foot on the affected side and when that foot stand there is an turn of 30° possible than the meniscus structure in the knee is at his end and further can give an rupture [20] This damage in the knee can lead to an almost impossible task to recover the ability to walk[21]. By person with an pushing syndrome created and good support area in front of him, where he can support himself with his not affected arm and always with an upper trunk forward (flexion upper trunk). That means that we need an support-area on the distal part of the bed, therefore we place an table there and start with standing up and supporting on this table and with that support we use weight shifting to place his paretic leg in the right direction and place than the weight on that leg of give him the opportunity to place his other leg. By other individuals with stroke there will often use the low transfer, but by person with the pushing syndrome this is often too difficult and is it better to wait longer and start with this transfer. First standing up with support/facilitation on the affected side. Placed the table in front of the patient, but when we go over to an transfer to the wheelchair than the placing is on the side of the not-affected part of the body. We can turn over the affected side to the wheelchair.

Standing up: That movement can he perform by pulling on the edge of the table when the elbow is supporting on the table. Then he create an upper trunk forward and is enough body from him over the feet. Person with an pusher syndrome has great difficult to go to the front especially when there is to large "empty" space. An chair is often not enough but an table and the opportunity to pull on the table makes this problem often very small. The placing of his not-affected hand through an person with an pusher syndrome is famous !(Picture 7).

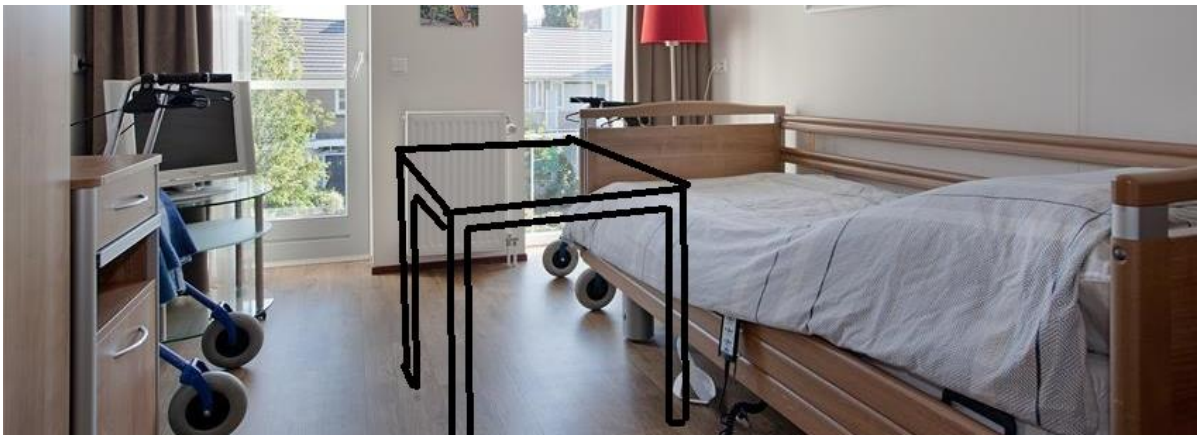
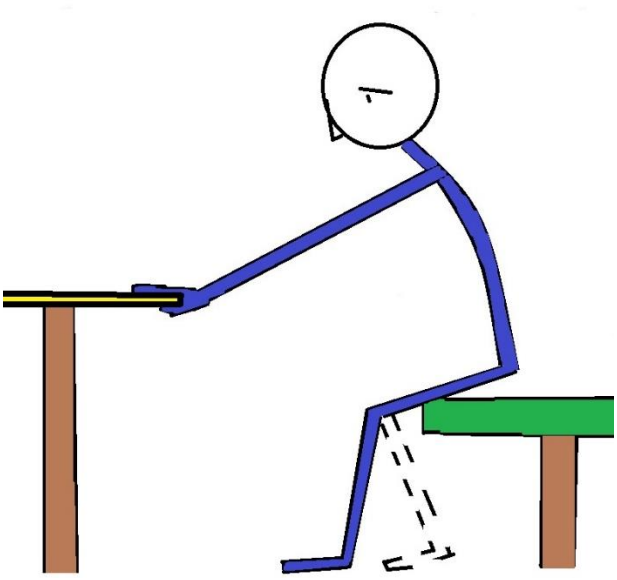


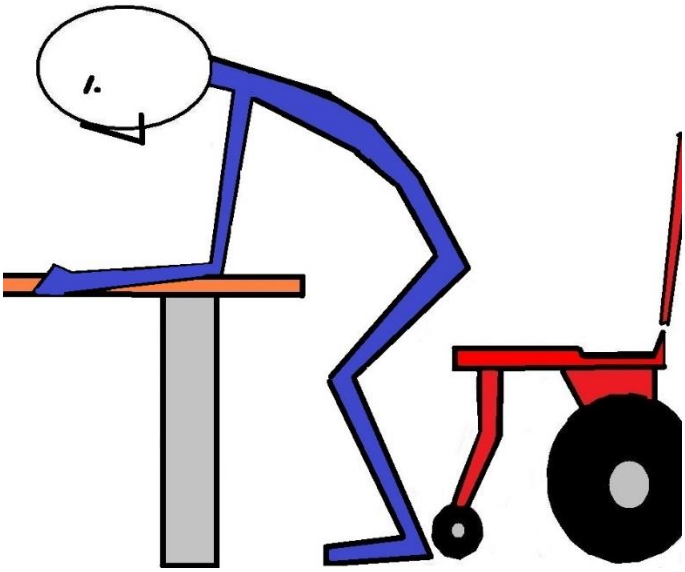
Photo 4.

Photo 4.
The table is standing on this place when the person with an stroke sit on the edge of the bed. In this place to give him am support for his not-affected arm, especially his elbow. Support on his elbow will prevent somewhat that he start to push and through the support on the elbow the not-affected side can be still in an shortening position and create an moment of relaxation and rest to get to the next step. Photo 4 published with the responsibility and permission of the author by j.v.d.Rakt.



Picture 7.

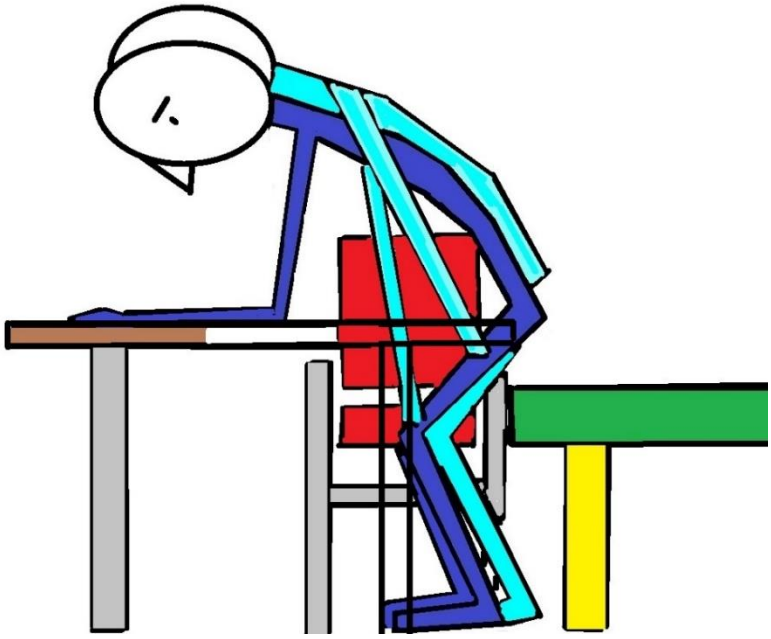
Picture 7.
Sitting in front of an table the hand is place on the edge with thumb under the table edge. That stimulated extension in elbow and often an incorrect placement of the feet. Now the movement of the body to the front (Vorlage) is always inadequate and will lead to no standing up. This has all elements of fear and no –cooperation and that we must avoid.
By placing the table closer we can use the elbow support to get the right amount of "Vorlage ". And gives the support on the arm with the right amount of flexion of the upper trunk. Picture 7 published with the responsibility and permission of the author by j.v.d.Rakt.



Picture 8.

Picture 8.
This is the standing up movement we want to evoke. The table stand very close in front of the person and he support with his elbow on it and grasp the edge of the table. He pull on the table and the elbow stay on the same place, he pull himself forward and create an perfect upper trunk forward (Vorlage) with enough body weight in front of the feet. And often stand now the feet directly on the right spot. *Using this principle as base give the person with the pusher syndrome confidence and will prevent him from "pushing".* Picture 8 published with the responsibility and permission of the author by j.v.d.Rakt.

But be aware that the height of the bed and the chair are right! The hip must be standing higher than the knee and the table must good and able to resist the pulling.
Transfer: In front of the table is the step before the transfer out of the bed because now he must be able to place his feet with assistance but with no fear. In front of him, the table is an obstacle. Therefore we place the table more on the side of the not-affected part and create space to facilitated the turn and placement of the legs. Later on we teach him to walk side way along the table and make the turn but now first learn to stand up pulling on the edge but with table little more to the side.
Step 1

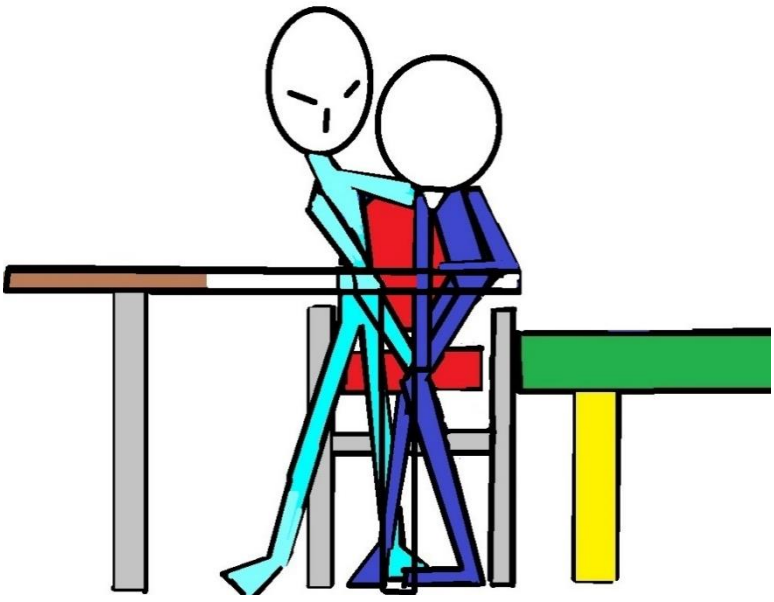


Picture 9.

Picture 9.
Standing up on an table with the possibility to pull and support on the not-affected elbow. The affected hand hang free in front of the body. The facilitation technique [9] is with your shoulder push the upper trunk to the front and give pressure on the upper leg little bit above the knee in the direction of the foot. This hand will control of the extension in the knee is good. Is this all right than place the weight on the not-affected leg by pushing slight the weight to that side but your hand stay on the not-affected side to make this not to great. When the weight is from the affected leg place the foot an little closer to the sitting of the wheelchair. Place now the weight on the affected foot , control the extension of the knee and ask him to place the not-affected foot along the affected. ***Step 1.*** Picture 9 published with the responsibility and permission of the author by j.v.d.Rakt

Where must be the affected arm, because often there is little tone in this arm /shoulder and is there an subluxation in the gleno-humeral joint. On the table is now no room, or we must choose for an technique in which the person walk along the table sideway but that asked for walking ability. The greatest danger that the subluxation can harm the joint is the reaction of the cavity of this joint.
When the shoulder blade stand in an good protraction position that there is an ligament that take care for the best position of head and cavity [2]. The greatest danger is an reaction of the scapula because than the correct position isn't possible and will the head subluxation and is than very vulnerable. This retraction will occur when the person do an upper trunk backward or activated the back diagonal out his not –affected leg very strongly.[23,24] Therefore when this person make more extension in his not-affected leg (pushing) will the back diagonal be activated, more than necessary and see we an extension rotation of the upper trunk on the affected side and that will give an retraction of the scapula. But this pushing act will never occur only in the leg, but also in the not-affected arm and the support of the elbow on the table will be gone. Therefore the support on the table is so important and will often help the person by standing up and also by the turning to the wheelchair.

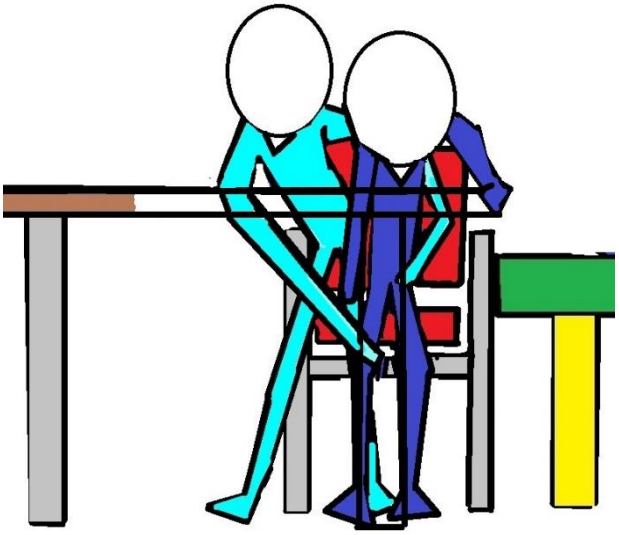
Step 2



Picture 10.

Picture 10.
Support with the elbow on the table and replace the elbow further on the table by gliding and then place the legs further in the direction of the wheelchair sitting. Again by placing the weight on the not-affected leg and place the affected leg and place the weight on the affected leg with control of the knee extension. This can be done several times because great distances gives often more fear.
Picture 10 published with the responsibility and permission of the author by j.v.d.Rakt

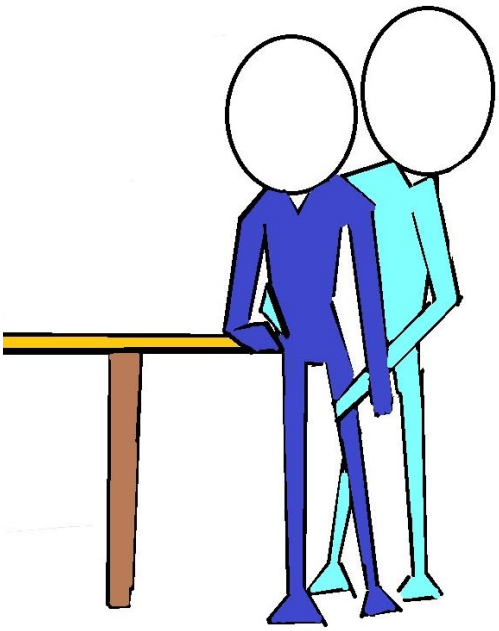
Step 3



Picture 11.

Picture 11.
Now we are by the sit part of the wheelchair and we can go to sit. The attitude of the upper trunk with an support on the elbow is still the same but now the pulling on the edge will decrease and the person can sit in the wheel chair. The whole time there was an support point on his elbow on the not - affected side and he was able to pull. That often gives person so many confidence that this transfer is easy to do. And in this support training is again an very good moment to make this an exercise.
Picture 11 published with the responsibility and permission of the author by j.v.d.Rakt

The person with the pusher syndrome will give with his not-affected arm and leg an push away reaction when he feel that he is in danger. He will push his body to the affected side over the mid- line of his body. Because according his perception in the best save area. The activity on the not- affected side occur between the shoulder and the hip with an active shortening of the spine often also in the cervical spine with an extension in the arm and leg. The support on the elbow makes extension in the arm difficult, but still he can use the shortening in his spine. Therefore start with this transfer over the affected side. The most difficult of this transfer is, he must place his weight on the not-affected leg because than he moves in his perception out of his safe balance. But now he support on his elbow and the edge of the table is an border that he feel and see and will often give the stability to place the weight and replace the affected foot. Often is starting with standing up with support elbow and place the not-affected hip against the bench the best form to teach this weight shifting from one foot to the other foot.



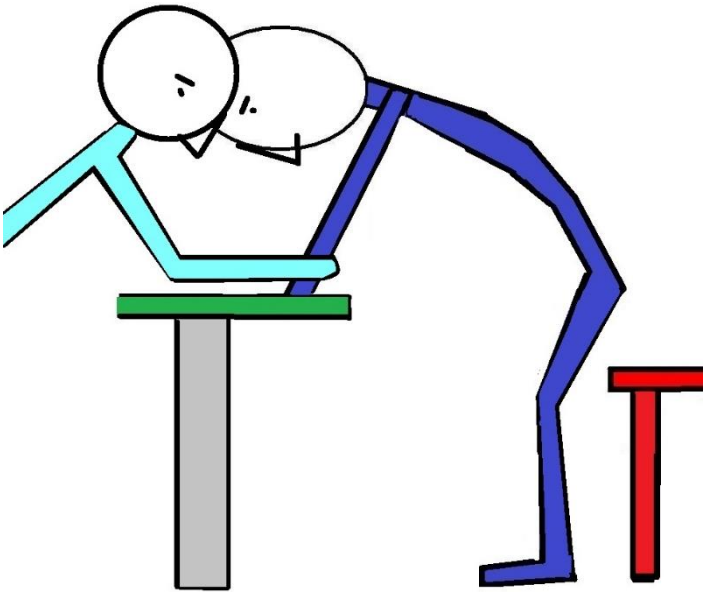
Picture 12.

Picture 12.
Give more information about the stability of the situation on the not-affected side!! This to prevent an pusher action and with this an full extension of the not-affected leg and arm and the provocation of an static reaction (cross extension-flexion reaction, than the situation is full out hand.
Now the situation is under control and is placing of the affected leg possible and can we give input on this affected leg and give the person the information that the not-affected leg can be move. Often the support of the hand isn't necessary anymore !! Again when this is too difficult, think on the back splint and build again an confidence and get movements free from fear.!
Picture 12 published with the responsibility and permission of the author by j.v.d.Rakt

This transfers are the important one !
And it is an art to keep transfer simple. There are so many transfer especially for person with an pusher –syndrome, that sometimes it look like that the transfer is important than the person. Especially the "low transfers"[9] is very difficult for people with an severe pusher- syndrome and certainly when that transfer must be done over the not-affected side. Again transfers are an part of the treatment plane that comes latter and must be learn and exercise in such an way that the person has control over his situation and that damage brain get no the information that he cannot copy with. That will lead to an struggle and will decrease the motivation and skills of the person and his care givers.

Transfer and exercising almost at the same moment.

Standing on the edge of the table (picture 9 and 12) there are again opportunities to exercise with task-specific resistance therapie to increase the perception and thus the coordination and the power of the diagonals and thus the affected side.



Picture 13.
Standing in front of an table with an good elbow support. Now the therapist can determinate the R.M by pulling the upper-arm to him and feel what the maximal resistance is that this person can resist. That is 1 R.M. [19]. But can also pushing the upper arm back and asked the person to resist that force and again he can calculate what 1 R.M.
Now he can work on an scheme in which this can lead to improving of coordination and power.
Picture 13 published with the responsibility and permission of the author by j.v.d.Rakt

Picture 13.

To calculated what the best stimuli are to increase the coordination and power [25,26,27] we take par example 75% of 1 R.M. and we know that this asked for 10 rehearsal. In which the last one often are less because there is muscle fatigue and that is the sign we need. This will be done three times and that 3 times an week.

<u>The reaction on pulling on the upper-arm is :</u>

An retraction of the arm and therefore an back diagonal action but the support on the table must be stay on the same place that means that the whole back diagonal will be activated together with the front diagonals and that we see more extension in the legs especially in the knee

<u>The reaction on pushing is ;</u>

The opposite, now the front diagonal must be more active and that will increase the "Vorlage", give more support on the table, again with the back diagonals, an action in the buttock , because the whole life must push forward and therefore also more extension in the knee. Together can pulling and pushing give an co-activation of the trunk muscle and create more stability (Core stability [28])

Regrettable often is the patience of the care givers too low and are the transfer with an passive elevator not good enough and will use they an "active "elevator, but it is important to know that we now <u>give the person wrong information</u> on the damage brain and that we create an body perception that he never can use to recovery further !!

<u>No wrong information !!</u>

Be aware that the brain is capable to learn from the information that he receive and can cope with it. The information gives the brain the possibility to react on an way that this will benefit the person in

relearning par example his balance. The information that the person receive must thus so that the reaction this evokes is benefit for the person and help him to restore so much as possible.
But what will the reaction be when the brain receive wrong information, that not evoke an fear reaction over an longer time and no struggle to get out of this situation.

Photo 5. **Photo 6.**

Photo 5 and 6.
An individual after an stroke with an severe pusher- syndrome. In sitting position and in standing position. In sitting position there is control almost independent but in standing position is this impossible. Through the brain damage is this the attitude that the damage brain create. The brain must therefore information what is right and what isn't.
Photo 5 and 6 published with the responsibility and permission of the author by j.v.d.Rakt

In both photo's the reaction is active with the not-affected side pushing to the active side. The therapist give opposite pressure to prevent falling, now the damage brain must re-learn what is the right symmetry. Pushing him back in the right position will be very heavy and the question is : "what he is learning". Observe the affected arm on photo 5 low tone but on photo 6 there is more tone in the arm and that is an sign that there is an associated reaction and that he is working hard. Is that working hard to decrease the pressure of the therapist or working hard to try to win from the therapist. In the last situation his brain learn that pushing can be the answer. Still on photo 6 his affected leg gives an full extension and that is an sign that he is learning that he can trust that leg and then the pushing will decrease and he is working with his brain on an solution – **that is learning.**
The person with an pusher –syndrome will realize that this isn't right but he need, certainly when this is an severe one, assistance to give his damage brain the information what is wrong.
But when this person do transfers on the ward with an active elevator, what is he learning and what is his damage brain do with this information. Of course an active elevator with support in the axilla isn't use for person with an stroke but now there are others that has an sling around the chest.
This elevator is design to get standing up out as an active transfer and through this device the burden of the nurses would be less. **But at what cost !!**
We are trying to get the independency of this group of individuals with stroke so high as possible.
We know that the reason that he react so "strange", has to do with the damage in the brain and that damaged brain search for solution to get so independent as possible and so soon as possible.
That asked for action of all to get the information in the brain and stimulated that brain to create an better body perception in which movement is in balance. That cost time and effort and there are investigators that believe that the intensity is too low and also that the amount of exercising is far below the level that this should be[29]. That are mostly investigations by stroke patient without an severe pushing syndrome, but by that group must in intensity (heaviness) larger and the frequency through the day much higher. This particular group of stroke patients asked for another approach but also for an longer treatment. Achievable through more moments through the day that are shorter because the damaged brain hasn't the capacity to do high performance over longer period of time. Than is the solution to do exercises and ADL through the day on different level but with an restricted time area. Therefore are the transfers so important because every movement that this person makes on the ward and at home with others are one of the most important moments that he can move on

the right level. Using the “active” elevator and giving wrong information and make wrong “image” in the damage brain lead to an decrease of independency. What are we doing.
There is some evidence that the progression will stop and even decrease in the wrong direction with loss of possibilities on sit possibilities and even swallowing could be worse[30].

Photo 7.

Photo 7.
This active elevator is use in many institution in the Netherlands and that is for all patients an new experience. This experience is in the beginning not pleasant but after some time patient will adapt. But on what must this person adapt?
That he cannot stand up normal, because his feet stand not behind the knee but directly under the knee. Because the movement in the ankle to create the best weight on the feet isn’t allow. And he must pull himself up and that gives an upper trunk backward and therefore an back diagonal action that is never use by standing up ! Normally would the feet shoot to the front but that is through the construction not possible, but the intention and muscle pattern reaction is present and is used and learned.
Photo 7 published with the responsibility and permission of the author by j.v.d.Rakt

But what will happen with his “damaged” body perception also through the wrong muscle pattern using! He adapt himself on this situation but what is that adaptation !! There is little investigation on this subject only best practice as we speak about body perception changes. Only [31,32,33,34] have investigated this but not by person after an stroke and absolute not by people with the pusher-syndrome. The first two[31,32] has discovered that elderly fall because their weight placement wasn’t correct. Meaning that the reaction on an balance disruption was too late because the brain has not “feel” that “the point of no return” wasn’t there. The third [33] investigated the body perception changes by people with impaired cognition and his conclusion was that their body perception decrease when this cognition was decreasing. The last [34] investigation was an best practice assessment by elderly that use this device and concluded that this people has an perception that was change and disturbed their performance to make normal transfer and even their sit position was changing on an dramatic way. To illustrated this phenomena we use photo to show what their sitting attitude was after 3 months of use this device. (photo 8). Burnfield [35] and colleagues discover that not only the body perception was changing but also the coordination and power of the muscle that are involved in the standing up performance. All person that where transfer with this active elevator device have fear in the beginning but that is changing after 3 months but what has this adaptation change?
In the brain there is an new body perception that is totally wrong and will give an reaction that we see by the people with an pusher-syndrome but now also more to the back.
Another device (photo 12) in which the knee are not blocked but where the possibility to pull up, is the only alternative. Pulling up asked for an upper trunk backward and will give an activity in the upper trunk backward and therefore extension in the head. That activated the back diagonals and created extension in the legs but on the wrong moment! Because the body weight is to far behind the feet and

it create an standing attitude in which there is not right balance above the feet. And often we see that the affected leg makes an extension and that the affected foot is moving to the front !!

Photo 8.

Photo 9.

Photo 8 and 9.

This can happen when people were transferring with an active elevator .

The disturbances of sitting on an bench (photo 8) is great because this person "feel" that he is sitting far enough to the back but on the same time he has the feeling that he is falling backward and he must hold the edge of the bench. Photo 9 gives an picture that she is always searching! But both to fare to the back !! Photo 8 and 9 published with the responsibility and permission of the author by j.v.d.Rakt

Photo 10.

Photo 11.

Photo 10 and 11.

The same contrasting feeling and the problem in that situation to drink out an cup. He makes an correction with his upper trunk forward but need both hand to get the cup on his mouth. See on photo 8 the stretch on the muscle in the front of the neck and that can changes his ability to eat and swallow. This stretch we see also on photo 10. Be aware that this body perception changes has great consequences for movement, quality of life and possibilities to eat normally]36].

Photo 10 and 11 published with the responsibility and permission of the author by j.v.d.Rakt

Photo 12

Photo 12.
Another standing up system that is use also by people after an stroke. This person stand now free and move not further. He feel that he is in balance but is he in balance? When we draw an line from his buttock to the standing surface than will than line come far behind his heel. That means that he will fall when he get his hand of the rail. But his body also the not-affected side give no sign that he is out of balance. That means that the damage brain think that this is right!! The sign that we expected on the not-affected is an dorsal flexion of the foot. That means that he is out of balance but his brain isn't aware of this. That the sigh (dorsal flexion) we not expected on the affected side but no reaction on the not-affected side!
What learn the damaged brain !!
Photo 12 published with the responsibility and permission of the author by j.v.d.Rakt

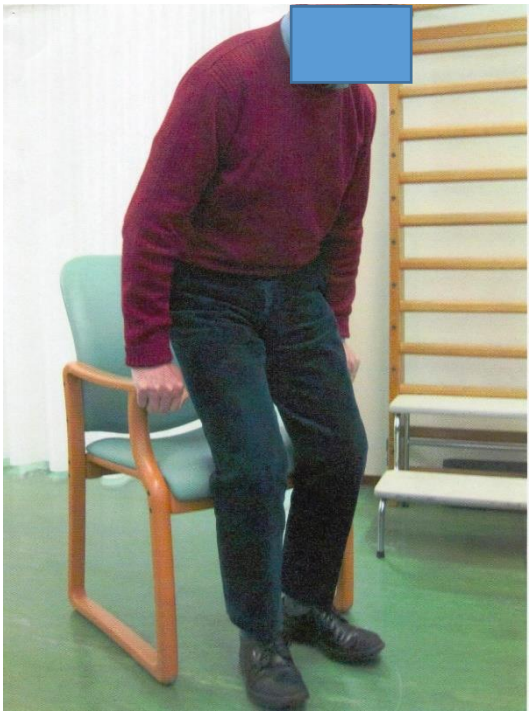


Photo 13.

Photo 13.
When someone is moving too far to the back, there must be an balance reaction be there.
In this photo this gentlemen is standing up with an push-off through his arms. He hasn't not enough "Vorlage" and his body weight is behind is heel and his brain has feel this because the reaction is there. Both feet are on the front of the floor and he makes therefore an lot of dorsal flexion to brace the movement of this body to the back. That sign give us the clearance that the brain knows exactly where the body is and in or out balance. This reaction isn't there in the not-affected foot of the gentlemen of photo 12 and that means that the damaged brain register no balance disturbance with all consequences. This we see faster when this elevator is used, a sign we must be careful.
Photo 13 published with the responsibility and permission of the author by j.v.d.Rakt

What will this persons learn (photo 7 and 12)? Here we have an situation that the brain has learn but with wrong information, has learn something that isn't right. And this he will use when he sit on an bench or in the wheelchair and all movement to the front are very difficult and is in his opinion dangerous. This part is the body perception part, but what is happen with the need for power of the muscle and the coordination. Will we see there also an changing in coordination and power ?! Use this elevator by patients isn't never an good solution because the senso - motoric track will change in the brain and this patient will be afraid to move to the front and sit on the edge of the bed too far backwards. That will have an negative influence on the sitting attitude (pelvis shift to the back)lower tone in the buttock muscles, an higher change of an thoracic spine collapse and to brace that an high cervical extension that can change the possibility to swallow normally. High cervical extension and

swallowing[36] will influence each other negative. But when this elevator is used by the pusher-patient this will be an disinformation that will learn the patient an senso-motoric track that never will lead to an recovery. He will stand on his not-affected leg and hold with his not-affected arm. In the beginning we shall see that the tone in the arm and leg (affected side) will increased because the patient is in panic. Only the not-affected side will learn that the "good- attitude" must be *behind* the feet and no transfer in bed, out of the bed will be possible for him because his body scheme is totally destroyed. The consequences are;

1. The bed attitude will be changing and ask for treatment but often without the effects that there were before.
2. The transfer in bed will be worse and the resistance of the patient will increase – pusher.
3. Transfer out of bed and on the toilet are difficult, but also very often there are moments that the patient is in panic.
4. Sitting in the wheelchair will an attitude always back in the chair.
5. Standing up and walking will not possible even with an back splint will the experience of right information not win from the wrong information by the daily use of this active elevator.

Conclusion : Don't Use this active elevator !!

Multidisciplinary.

Always will an treatment be successful when there is an multidisciplinary cooperation. That means that all members of the team see each other work and can participated in part of that work. This is very important by the treatment of the pusher because the ADL and the Toilet-visit will be longer dependent of an passive elevator because go to standing and stand is so difficult.

On the other hand, the therapist can also do his exercise on the ward when the person must stand to get of the toilet- douche chair to get cleaned and dressed. (Context exercising!)

This is an exercise that stimulated the patient to stand good and long, because now he know why he is doing this.

Maybe it is possible that through the week to schedule and so take an part of the treatment to the ward. The capacity of person with an pusher syndrome isn't great, more effect will be obtained by short treatment on several moments through the day. Therefore it is wise to use minutes on the ward as extra moment of therapy. Now the situation on the ward (context [37,38]) is often very clear for the patient and the other members of the team can learn how to do the exercises and after time take it over. Now there is an generalization starting that stimulated the brain to create an good network and the recovery will be stimulated. Exercise 5- 10 minutes 10 times on the day[39] will give the team the changes to train on the three attitudes and challenged everyone to try and make an adjustment where the patient benefits from;

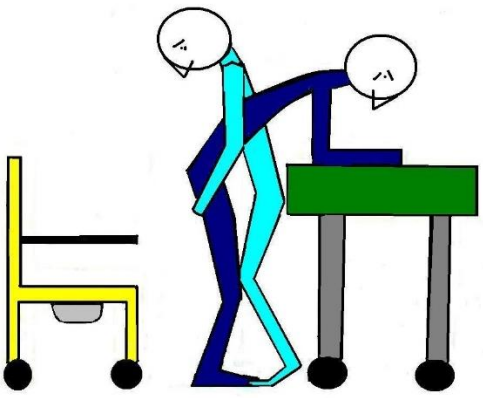
1.Bed attitude, after lying on the back the side lying especially on the affected side[7,8] must be relearned or trained. That isn't easy because lying normally evokes no dynamic stimuli and that is necessary in the beginning. No dynamic, that will extinguish[40] the stimuli and the patient will return to his not-affected side. But lying on his affected side can be dynamic when there is something in front of him to reach or grasp. Together learning lying on the affected side can start by the therapist in daytime and in daytime done by others of team before it is done in night time. The difficulty to maintain this attitude in the night is much more difficult because of the loss of visual control. Always is there the danger, that he will push himself back, because the affected side receive no information, is that no longer an part of his body and that can give attitudes of arm and leg that can traumatized the hip, shoulder and the hand. It is obvious that this must exercise in day time to see what effect it had and of the person is capable to sleep with it and how react when he wakes up and has no information immediately. When that is going well, the information of lying on the affected side will build up the keypoint of the front and back diagonal and makes it possible that the patient can move over this points. When he is lying an part of the night on his affected side and can handle it, the next step will be: training of the movement from side lying to the back and again on the side. Learning how to move from side lying position to the back and back in side-lying or from the back to the other side is an treatment that need especially attention and can be used as an resistance task specific treatment to

increase the coordination and muscle pattern power. Even lying in side lying can be used as an perfect task specific resistance exercise [9, 14,15,18]

Picture 13.

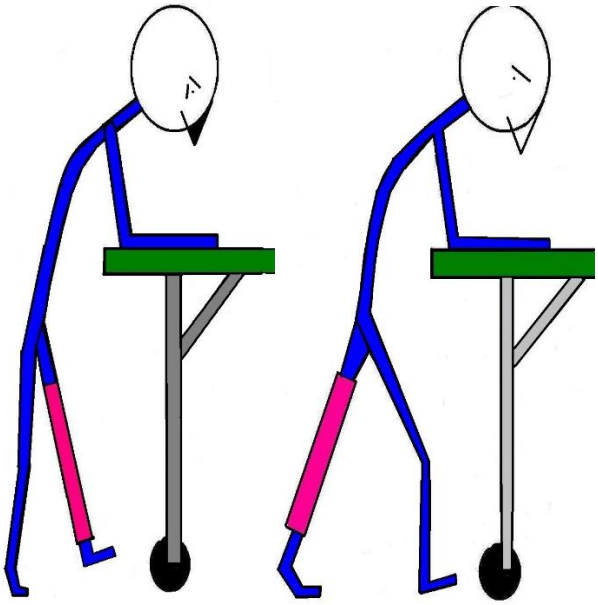
Picture 13.
The attitude that will give the most dynamic information is an attitude in which the leg and arm of the affected side will be informed. That can be done by an hard pillow under the affected foot. In the beginning with an affected leg that is so far in flexion that the knee comes against the other hard pillow (green) and the pillow under the foot must than so large that it push against the foot and evoke an extension of the affected leg. Here is also an pillow(yellow) in the back and front to stabilized but also to give an border with information. Turning will be brace but also through the pillows the brace with alter and that is information. This pillows are important, therefore be careful to let the patient sleep without this pillow because than there are almost no information points. Picture 13 published with the responsibility and permission of the author by j.v.d.Rakt

2.Standing attitude, with the back splint as soon as possible. Even before the lying position in bed has achieved, standing with an back-splint can started. This can be done on the ward, maybe it is wise to do this on the ward because when the person is standing with the back splint also the transfer out of the bed is occur. The back-splint goes on when the patient is lying in bed and on the ward always are more people present and they can help setting him on his feet along the bed. Along the bed with his not-affected side against the bed edge, not to make pushing possible but to learn him to lean against the bed edge. Now he makes his not-affected side long and that brace the push movement but also give the patient information about the right balance. After this performance the patient can be sitting in the wheelchair or when we go for an transfer standing with no back splint in the douche chair. And now after the douche he must standing with no back splint in front of the bed. This exercise will support by the therapist and the nurse has the opportunity to clean and dressed and the person has often more motivation to do this, because than he is ready and need no longer go back to bed for the cleaning and dressing. An exercise moment which has an great impact because the person has feel that it is changing and he can work with the members of the team. Essential is that the therapist has exercised not only standing but also walking with the back splint. This will give an walking pattern that is alter by the splint but walking give so much information and the reaction in the diagonals and homolateral structure is continue present.



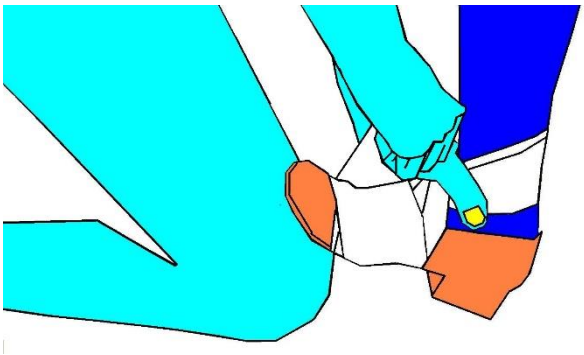
Picture 14.

Picture 14.
Standing in front of the bed with the upper trunk in flexion and the not-affected arm resting on the elbow. The therapist hold the affected knee en gives information[9] . The nurse can do the clean, washing and dressing. This standing is equal as picture 8,9. Essential is the support on the elbow beacsue than is pushing with his not-affected arm more difficult and will he support on this elbow.
Picture 14 published with the responsibility and permission of the author by i.v.d.Rakt



Picture 15. Picture 16.

Picture 15 and 16.
Walking with an back splint. In this case behind an high bench that can ride. The patient has his upper trunk bended and support himself on his not- affected elbow. Pushing is than difficult and the support is large. Walk not only forward but also backward and especially sideward because that is often easy and need no bench that can ride. Of course there will be need for assistance with the bench and the person need assistance with the swing and placement of the affected leg . That placement, make it firm, that gives immediately the greatest input. Picture 15 and 16 published with the responsibility and permission of the author by j.v.d.Rakt



Picture 17.

Picture 17.
Often an ankle stabilisation is necessary because the ankle will often go in an plantair flexion with inversion and that makes this ankle very vulnerable. And through the back splint this affected foot will enter the ground more severe with the consequences that the ankle get in an wrong position.
Picture 17 published with the responsibility and permission of the author by j.v.d.Rakt

Photo 14.

Photo 14.
An bandage to secure the paretic foot has certain rules. First, be sure that the dorsal flexion is maximal with the foot in an good mid-position between in- and eversion.
Second, use an bandage that isn't elastic and do two around the foot-sole and only one around the ankle. This because the blood-supply to the foot isn't than harmed.
Third, the sole of the shoe must be rigid than the bandage will correct and the shoe must stop under the malleoli because otherwise the bandage will lose his grip.
And be sure that the tone is as good as normal ! Inhibition in an good posture is essential
Photo 15 published with the responsibility and permission of the author by j.v.d.Rakt

When this going well, walking with an back splint that isn't so rigid and with an chair and of course some parts without an splint. But be aware what the reaction is without see photo 15.

Photo 15.

Photo15.
An person with an severe stroke of the right side. Walking with an high chair that he moves by himself and he placed on the not-affected side. The distance that he has walk is about 10 meter and the signs that the exhaustion is there, are obvious. Look at his face, see the flexion synergy in his affected arm and see the difficulty he get to set weight on his affected leg. The standing time on his not-affected leg is increasing and he start to push with that leg. But see the elongation in his affected trunk that is an sign that the shortening on the non-affected side is great and the extension in the affected knee is decreasing. Cross extension-flexion reaction, an static reaction and that means it is very heavy !!! Almost to much !!
Photo 15 published with the responsibility and permission of the author by j.v.d.Rakt

The diagonal all started on the not-affected side and it is time to restore the attitude.

Photo 16.

Photo16. *Restoring the attitude.*
The therapist gives the affected side an amount of extra information and the attitude is now in "balance" and that is visible on the face and on the tone in the affected arm /hand . He use also the back rest of the chair as information to correct his attitude and this is an learning moment. Important is that information he get is dynamic and that he is also taken part of it. Meaning that he also makes input by himself that will learn him how he can stimulated his body to get in the right position.
Photo 17 published with the responsibility and permission of the author by j.v.d.Rakt

Learning moment : Walking (photo 15) asked everything of him and he use also his "pusher"-information from his damaged brain to get further but there is almost no room for control his body in the space and therefore he is so far out balance. He use the therapist as his anchor how far he can go to his affected side. That therapist can make the mistake to push back, because that he feel that the room he had isn't so big and want to make it greater and will push harder. The therapist can only be the endpoint, when he do more than the panic will come. But still is this very heavy and there must be an moment that he can search for the best attitude with all the point he has learned.
That we see on photo 16 :. Less extension in the knee on the not-affected side, more weight on both feet, less elongation on the affected side and more extension in the affected knee.

But both condition are high cognitive performances and will not lead to an automatization of walking! Further look to the affected arm/hand, how high the tone is in this arm/hand and that is done by the not-affected leg that dominated the back diagonal to the affected shoulder, that asked for treatment every time.

Walking with an back splint.

Photo 17.

Photo 18.

Photo 17. and 18.
Walking with an back splint. The difference is great, when we look to his face, his trunk and his affected arm. But also the not-affected leg isn't pushing anymore and is ready to get from the floor to the front. An the therapist do less, the input on the affected leg isn't needing anymore and the push he gives with his body is almost nothing. Walking with the back splint is easier and gives more speed and independent and the distance is increasing. He feels and sees progression!! With the back splint he stand still on his own and will now make the balance with his own two feet without the barrier that is given by the therapist.
Photo 17 and 18 published with the responsibility and permission of the author by j.v.d.Rakt

Indeed walking with an back splint gives an different way of walking but the amount of tone through the "pusher-behavior" is less now and has little influence on the tone of the affected arm/hand and see the possibilities in standing position to release that tone and place the affected hand on the chair. And with back-splint he can exercise in other walking forms as backward and sideways.

Photo 19.

Photo 19,20 and 21.

He is able in an standing position to place his affected hand with some assistance on the edge of the chair back rest. Support on it with two hands and push the chair an little to the front. In standing position his attention is by his arm/hand and isn't needed anymore by the standing position and his balance. Here we see the great advantage of using an back splint and this must be use also on the remaining of the treatment to give the brain "room". With chair he walk back- and sideward without assistance. The variation with this back-splint on is so great, that he use the bench on the end as support point to walk sideway around. That was his own invention. Photo 19,20 and 21 published with the responsibility and permission of the author by j.v.d.Rakt.

Photo 20.

Photo 21.

The standing posture is now achieved with and without an back splint, the next step will be without the back-splint ;

1.Exercises in turning movement in the beginning over the affected side and ended in an sitting position. Than standing up and turn for 90 ° so that he exercises the movement that he need on the ward when he goes to bed , toilet and other chairs. When this is possible than the therapist will practice this on the ward and the team will take over and incorporated it in the ADL. That means that standing for the bed isn't necessary anymore but now it is possible that he goes to an toilet. A very good team will be able to wait till this moment and explain it to person and the problems with the pushing phenome will be less.

2.The power in the affected side is often very low. There is function but the tone is low and often with an low selectivity but there are almost always more possibilities to activated this muscle but that ask for an task specific resistance treatment because the task will give that much on information that will help the diagonals to restore. An again the diagonal have an innervation that is double and it must be possible that activation to get succeed.

Treatment at the border of the patient capacity !

Often therapist go far (maybe too far for both)in the training of person with an severe pusher syndrome and the admiration they deserve is great but always keep in mind that the person is also on the edge of his capacity and often he is “over” that level and will thus be afraid to do it again.
There must be an learning possibility and that cannot when fear is present.

Photo 22.

Photo 23.

Photo 22 and 23.
The courage of therapist and person is big but the amount of effort is so big that the person will learn little. The therapist (photo 22) must keep the person on his not-affected leg to get the affected leg to the front. This means that there is an struggle between this two and that will give the damage brain not the possibility to seek for an solution. Photo 23 again on the edge of the possibilities but we see that the affected side isn’t brace by the therapist . The movement is too far outside. But again both person will walk faster and with little assistance with an back splint on .
Photo 22 and 23 published with the responsibility and permission of the author by j.v.d.Rakt

Photo 24

Photo 25

Photo 24 and 25.
Here an example to create an standing position but the information from the affected side is so little that the person evokes an static reaction and must sit down. He push so hard with his not-affected leg that the affected leg goes in flexion and sitting down is the only option. Walking first with back splint and then sitting down on high chair without and standing up with an table in front, will give the patient the information in his affected leg . Photo 24 and 25 published with the responsibility and permission of the author by j.v.d.Rakt

Swing phase affected leg. Walking without an back splint has an moment that the affected leg must go to the front. Because the not-affected leg is than in the lead means that the back diagonal is active from the not-affected leg and that the front diagonal, started in the not-affected arm can be activated through the support and pushing of an chair (photo 26). That means that the therapist must assisted the affected leg to the front. Than information to create an extension and when the patient that feels, he will lift his not-affected the leg. But an little bit of pushing of the not-affected leg will give in the affected leg an abduction, exorotation and flexion and we have an static reaction and that is an sign that he need everything even the pathological reaction to hold this position and then we are "over" the border! That is the moment to stop but also the moment to get again an back splint on and with good facilitation [2,8,42] the leg can be placed on time and with the right amount of information.

Photo 26

Photo 27

Photo 26 and 27. *Example where the therapist goes too far and were the back splint is needed to give the person some "room" to experience and learn (photo 26) and an example where the person has learn to control here balance with the information of the edge of the table and now is the swing phase with facilitation easy and is this capable to try to assist that swing.*
Photo 26 and 27 published with the responsibility and permission of the author by j.v.d.Rakt

Photo 28.

Photo 29

Photo 28 and 29.
Person with an pusher-syndrome must search for the best stability. This stability is their stability feeling. Therefore it is important that therapist see what the individual do with his not-affected arm /hand. On photo 29 the hand and especially the thumb stand around the edge of the bench and the elbow isn't on the bench, this makes fast pushing possible as an solution and is an sign that there is fear.. On photo 28 the hand stand on the bench and the not-affected hip against the bench, an picture that here is control and now is walking along the bench an learning process. *Photo 28 and 29 published with the responsibility and permission of the author* by j.v.d.Rakt

Therapy "time" and Resistance Therapy Task Specific by stroke patient and by this group of individual with stroke ?

Because many therapist will train with this individuals for years with the same exercises, the brain will not learn or learn only that. The scientific investigation of the last decade [37,38] has an period let us believe that that more (therapy) time is better and this is in the therapy-world explain as working for

more than an half an hour. In 2016 this mantra **"more time is better"** was regarded as negative for the rehabilitation, because the intensity isn't dependent of more time. [48]
Intensity, that is correct for the rehabilitation of individuals with an stroke isn't still today not clear but the exercises must be have an certain amount of load or difficulty [29] to create an stimuli to increase in coordination and power and we need an situation in which the damage brain must search for solution and learn. Always do the same exercises will "kill" the brain for learning processes and motivation. This group of stroke patients had another problem and ask for another approach [2,8,42] and that approach works . Why, that must investigated the science and hopefully for all patients with this syndrome and not only the 9% (2016) that lies in rehabilitation center, the most lies in Nursing homes. Working with the individual with the pusher-syndrome for 5-10 minutes 5-10 times[39] a day , because the neuropsychological and cognitive problems are often so big that this better to handle by this group. Doing this on the place the person "lives' on the ward and in the exercises-hall it is possible to handle this frequency and have an better result.

There are also 3 point to change the treatment and make it an learning concept, an motoric learning system that can stimulated the recovery or build an functional "compensation".
1.High frequency and not to long the treatment time, when the person is tired than is that an sign that rest is necessary. Stop count the treatment time and put on the clock when you start again.
2.Rehearsal is essential but with variation. Always the same isn't an learning procedure, it is the brain demoralizing. Often is much more possible and one of the variation is to bring the possibilities to the living situates of the patient and done by others.
3.Intensity has nothing to do directly with more time, but all with heaviness of the exercises. There will be than always an reaction of the muscles and when the muscles react with concentric/eccentric or isometric contractions there will also something change in the spinal cord and in the brain. Therefore when an person always use his muscle on an eccentric way this will also be registered in the spinal cord and brain and will never change because the brain isn't pressed to this change.
In the next part we introduce walking an stair as done through Pat.Davies. It is very important and easier than much therapist taught inclusive the authors but the skills and knowledge of [2,8,42]using this become one of the finest task specific resistance therapy and aerobe therapy there was. In that part we go deeper on the reason of the pusher behavior and other cognitive deficit that often is present by individuals with severe stroke. And new and old techniques to get the individuals an secure feeling and the possibility to exercise with great variation and learn !!

Conclusion

In the treatment of patients after an stroke with an "pusher" syndrome is essential to admit that the problem is, an problem in the damage brain. That change the perceptual picture of the body in the brain in comparison with the reality and the therapy has only an positive effect as we try to change that picture in the damage brain. Try to "convince" the patient that he makes the error isn't an realistic approach. The only positive possibility is to give the brain the information that he hasn't and with this information he must be able to restore the picture. This learning process isn't possible with an explicit learning system –sec-, the capacity of the damage brain will cope with it as the situation isn't difficult but will go automatic back to his base when this situation is very problematic.
This aspect is so important that we every time again write, that when we see that the system cannot handle it , go back to the "back-splint"- approach and give the brain the information in an situation that the brain has experienced.

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All authors have read and agreed to the published version of the manuscript.

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References.

1.Van de Rakt J. McCarthy-Grunwald S . The "Pusher " syndrome, assessment and treatment. Part 1. Ita. J. Sports Reh. Po. 2021; 8 (18); 3; 3; 1904- 1934

2. Davies P. Steps to follow. The comprehensive treatment of patients with hemiplegie. Second edition. Completely revised and updated. 1999. Springer-Verlag. 100-150

3. Prosiegel M. Neuropsycholgische storungen und ihre rehabilitation. Pllaum 1998. 54-89 ISBN 3790507717. 20-57.

4. Fasotti L. Van Kessel M. Novel insights in the rehabilitation of neglect Frontiers in Human neuroscience .2013: 7; 1-8

5. Bernstein, N. The coordination and regulation of movements. Oxford: Pergamon Press, 1967.

6. Kaas J.The reorganisation of sensory and motor maps after injury in adult mammals The new cognitieve neurosciences 1999. 200-290.

7. Priftis K, Passarini L, Pilosio C, Meneghello F. and Pitteri M. Visual scanning training, limb activation treatment, and prism adaptation for rehabilitating left neglect: who is the winner? Front. Hum. Neurosci., 08 July 2013:7.360

8.Davies P. Right in the middle.Springer Verlag. 1990.Isbn 354051242X. 20-67.

9. Van de Rakt J. The skills of the resident in an nursing home as the base for therapeutic and movement guiding care " Paperback Eigen uitgave ResearchGate 2018.

10. Frohlich A. . Basale Stimulation. Verlag selbtbestimmtes leben 1999. ISBN 3910095313. 112-221.

11. Willner P, Bergman J, Vanderschuren L., Ellenbroek B. The behavioral pharmacology of the basal ganglia: in memory of Lex Cools. Behav. Pharmacol. 2015.Feb,26(1-2):1-2

12. ArnADOTTIR G. The brain and behavior. Mossby Company 1995. ISBN. 080160334X. 30-56.

13. Frohlich A. Bernstein C. Basale stimulation in der Plege. Kallmeyer. 2004.ISBN 3780040018.

14. Van de Rakt J, McCarthy-Grunwald S. Diagonals Part three – Pathology The Stroke patient: How we can train the diagonals to create a better result. Ita J Sports Reh Po 2016 ;3 ; 1 ; 576 – 615 ISSN 2385-1988 [online] - IBSN 007-111-19-55

15. Van de Rakt J. McCarthy-Grunwald S. Diagonals Part four : Stroke 2 - Transfers in bed and the chain rules. Italian Journal of Sports Rehabilitation and Posturology 2016. ;3 ; 1 ; 616 – 669 ISSN 2385-1988 [online] - IBSN 007-111-19-55

16.Van de Rakt J , McCarthy-Grunwald S. Diagonals : Part One Ita J Sports Reh Po 2015. 2; 3; 146 -169 :2015 ; ISSN 2385-1988 [online] - IBSN 007-111-19-55

17. Van de Rakt J,McCarthy-Grunwald S. Diagonals Part Two : Assessment and Trunk Rules Ita J Sports Reh Po 2015. 2; 3; 146 -169 :2015 ; ISSN 2385-1988 [online] - IBSN 007-111-19-55

18. Van de Rakt J, McCarthy-Grunwald S. Diagonals Part Five – Pathology How can we develop the diagonals so each individual achieves optimal recovery following a stroke? Ita. J. Sports Reh. Po. 2017, 4,1 ; 746 -788 ISSN 2385-1988 [Online)IBSN 007-111-19-55

19. Pollock ML, Gaesser GA, Butcher JD, Després JP, Dishman RK, Franklin BA, Garber CE. American College of Sports Medicine Position Stand. The Recommended Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory and Muscular Fitness, and Flexibility in Healthy Adults. ACSM; 1998. 30(6):975-991.

20. Van de Rakt J, McCarthy-Grunwald S. Diagonals Part six . Standing up and the static reaction Ita. J. Sports Reh. Po. 2018. 5 ; 2 ; 926 - 989 ISSN 2385-1988 [online] IBSN 007-111-19-55 CGIJ OAJI :0,101

21. Van de Rakt J, McCarthy-Grunwald S. Treatment possibilities of "contractures " by neurological diseases. Ita. J. Sports Reh. Po.; 2020. ; 7 ; 1 ; 1450 -1478 ; ISSN 2385-1988 [online] IBSN 007-111-19 - 55 CGI J OAJI :0,101)

22. Van de Rakt J. The Environment in Long-Care Facilities (Nursing Home) Decrease the Possibilities to Move Independent! Global journal of research and review. 2018. Vol.5 No.2:10. DOI: 10.21767/2393-8854.100039. ISSN 2393-8854

23. Van de Rakt J, McCarthy-Grunwald S. Diagonals Part 8 . Stroke 6 Analysis of walking pattern and treatment. Ita. J. Sports Reh. Po.; 2019. 6 ; 2 ; 1191 -1238 ; ISSN 2385-1988 [online] IBSN 007-111-19 - 55 ; CGI J OAJI :0,101).

24. Van de Rakt J, McCarthy-Grunwald S. Diagonals Part 9 Analysis of walking pattern. Learn to assess. Ita. J. Sports Reh. Po.; 2019. ; 6 ; 2 ; 1253 -1294 ; ISSN 2385-1988 [online] IBSN 007-111-19 -55

25. Van de Goolberg T. De Rehaboom, Een methodische aanpak in de sportrevalidatie. Publish & More. 2018 80-110ISBN 9789082535174.

26. Bosch F. Krachttraining en coordinatie. 2010 uitgevers 2011. 34-76 ISBN 9789490951108

27.Hettinger T. Isometrische muskeltraining . THieme verlag. 1983.120-199. ISBN 3133495054.60-74.

28. Freeman F. Gear M. Pauli A. Cowan P. Finnigan C. Hunter H. Mobberley C. Nock A. Sims R. and Thain J. The effect of core stability training on balance and mobility in ambulant individuals with multiple sclerosis: A multi-centre series of single case studies. Multiple Sclerosis. 2013. First published August 10, 2010: https://doi.org/10.1177/1352458510378126

29. Nielsen J. Willerslev-Olsen M. Christiansen L. Lundye-Jensen J. Science-based Neurorehabilitation. Journal of motor Behavior. 2015. ;47(1):7-17. doi: 10.1080/00222895.2014.931273.

30. V.d.Rakt J, McCarthy –Grunwald S. Swallowing and the attitude of the neck/body. ; Ita. J. Sports Reh. Po. 2021; 8 (17); 2; 1; 1745 - 1783 ; DOI: 10.17385/ItaJSRP.21.17.080201 ; ISSN 2385-1988 [online] ; IBSN 007-111-19-55; CGI J OAJI 0,101)].

31. Robinovitch S. Feldman F, Yang Y, Schonnop R, Ming Luen P, Sarraf T, Sims-Gould J, Loughin M. Video Capture of The Circumstances of fallas in enderly people residing in long term care : an observation study . Lancet. 2013 Jan 5; 381(9860): 47–54.

32. Robinovitch S and others . Risk factors for hip impact during real life falls captured on video in long term care. Osteoporos Int. 2016 Feb;27(2):537-47. doi: 10.1007/s00198-015-3268-x. Epub 2015 Aug 8

33. Kraft P . Gadeholt O. Wieser M. Jennings J. Classen J . Lying obliquely—a clinical sign of cognitive impairment: cross sectional observational study BMJ. 2009 Dec 16;339:b5273. doi: 10.1136/bmj.b5273.

34.Van de Rakt J. Het zou verboden moeten worden! Hoe een "actieve lift" een patiënt onnodig passief maakt. Tijdschrift voor verpleegkundigen 2005: 2 (9) 1-6.

35. Burnfield J. Shu Y. Buster T. Taylor A. McBride M. Krause M. Kinematic and electromyographic analyses of normal and device-assisted sit-to-stand transfers. Gait Posture. 2012 Jul;36(3):516-22. doi: 10.1016/j.gaitpost.2012.05.002. Epub 2012 Jun 22

36. Bautmans I, Demarteau J, Cruts B, Lemper J , Mets T. Dysphagia in elderly nursing home residents with severe cognitive impairment can be attenuated by cervical spine mobilisation November 2008 Journal of rehabilitation medicine: official journal of the UEMS European Board of Physical and Rehabilitation Medicine 40(9):755-60 DOI: 10.2340/16501977-0243

37. Richtlijnen Beroerte KNGF 2014. www.kngf.nl › kennisplatform › richtlijnen › beroerte

38. EBRSR [Evidence-Based Review of Stroke Rehabilitation]2013. www.ebrsr.com

39. Sheppard L. Dewey H. Bernhardt J. Collier J. Ellery F. Churilov L. Tay-Teo K. Wu O. and Moodie M. Economic Evaluation Plan (EEP)for A Very Early Rehabilitation Trial(AVERT): An international trial to compare the costs and cost-effectiveness of commencing out of bed standing and walking training (very early mobilization) within 24 h of stroke onset with usual stroke unit care. Int J Stroke. 2016 Jun;11(4):492-4. doi: 10.1177/1747493016632254. Epub 2016 Mar 2

40. Arnadottir SA, Mercer VS. Effects of foot-wear on measurements of balance and gait in women between the ages of 65 and 93 years. Phys Ther 2000. 78-145.

41. Schöllhorn W et al.. Time scales of adaptive behavior and motor learning in the presence of stochastic perturbations. Hum Mov Sci. 2009 Jun;28(3):319-33. doi: 10.1016/j.humov.2008.10.005. Epub 2008 Dec 4.

42. Davies P. Starting again. Springer Verlag. 1997. 266-284. ISBN 3540559345

43. Bernhardt J. Borschmann K. Boyd L. Carmichael S. Corbett D. Cramer S. Hoffmann T. Kwakkel G. Savitz S. Saposnik G. Walker M. and Ward N. Moving rehabilitation research forward: Developing consensus statements for rehabilitation and recovery research. Int J Stroke. 2016 Jun;11(4):454-8. doi: 10.1177/1747493016643851. Epub 2016 Apr 12

44. Choi S. Lim J. Nibaldi E. Phillips E. Frontera W. Fielding R. Widrick J. Eccentric contraction- induced to type 1,2a and 2a/2X muscle fibers of elderly adults. Age (Dordr). 2012 Feb; 34(1): 215–226.


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