REHABILITATION MANUAL 31

MANUAL TO PREPARE A BROCHURE FOR BEGINNERS OF LOWER LIMB PROSTHESIS TRAINING

Editor
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FOR PERSONS WITH DISABILITIES
JAPAN

(WHO COLLABORATING CENTRE)

November 30, 2015

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The terms of reference are.

1 To collaborate with WHO in the development of knowledge and resources for increasing access to quality health, rehabilitation services and sports for persons with disabilities in the Western Pacific Region.
2 To support and cooperate with WHO to conduct capacity development activities and share good practice and experiences regarding disability and rehabilitation across the region.
3 To work with WHO to increase the awareness and understanding of the needs and rights of persons with disabilities.

National Rehabilitation Center for Persons with Disabilities
WHO Collaborating Centre for Disability Prevention and Rehabilitation

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Manual to Prepare a Brochure for Beginners of Lower Limb Prosthesis Training
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PREFACE

The use of lower limb prostheses after amputation is an extremely effective means of regaining one's walking ability and a fine example of how both health conditions and environmental factors are important considerations in the management of disabilities.

Since lower limb prostheses are designed to imitate the leg, persons with lower limb amputation tend to think that simply donning the lower limb prosthesis will enable them to walk. However, before this is possible, many steps including residual limb maturation, casting, initial fitting, prosthetic gait training, and the creation of the lower limb prosthesis must be completed. In addition, persons with lower limb amputation must learn to manage the residual limb and undergo prosthetic gait training. For patients with complications due to pre-existing internal diseases, health care and lifestyle improvements are also required to achieve their goals.

All persons with lower limb amputation are new to these processes and may feel much fear and anxiety unless given sufficient information. Understanding the entire process involved with acquiring the prosthetic gait may relieve their anxiety and enable them to more actively participate in the prosthetic gait training process. Therefore, our Center prepares a brochure for new patients entitled "First Lower Limb Prosthesis" in an effort to help patients with lower limb amputation and their families learn about the prosthetic gait process prior to experiencing it themselves.

We believe that such a brochure for new patients will be useful in many regions and countries. Despite differences in manufacturing systems of lower limb prostheses among countries and regions, we hope that this manual will be useful for rehabilitation teams as they educate their patients about general lower limb prosthesis concepts and processes.

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Introduction

The main aim of rehabilitation after lower limb amputation is to acquire prosthetic gait and then resume normal daily activities. To promote post-amputation, a patient's physical performance and the psychological aspects such as the sense of loss due to amputation are important considerations. Prior to undergoing the amputation, most patients have no experience seeing or touching a lower limb prosthesis and know very little about the contents of rehabilitation, so they tend to feel much anxiety about what to expect after the amputation. Consequently, to relieve their anxiety and promote gait training smoothly while gaining a better understanding of the lower limb prosthesis, providing information regarding rehabilitation and the lower limb prosthesis is extremely important. In particular, the number of elderly persons who undergo lower limb amputation has recently increased in Japan, so it is important to educate not only patients but also the families and care staffs about the rehabilitation process. Conventionally, such information was commonly provided verbally by the relevant medical staffs. However, considering the breadth and depth of the information involved, it is difficult to believe that patients would be able to sufficiently understand the process given verbal instructions only.

To solve these issues, the use of documents and illustrations is also required. However, most readily available materials have been designed for professionals or students rather than patients and caregivers. Thus, the advent of a manual or set of resources for the latter group is expected to be of great benefit for promoting rehabilitation. If information is provided via a booklet that includes written instructions and illustrations rather than via verbal communication, patients, family members, and professional staff members can read it at any time during the rehabilitation process. Accordingly, this manual includes basic instructions for preparing a rehabilitation manual for persons with lower limb amputation and their caregivers.

Chapter 1.
Constitution and Precautions

1. Constitution

The issues and questions that a person with lower limb amputation faces in the training course vary by rehabilitation stage. Consequently, it is preferable that the content of the brochure is compiled in each rehabilitation stage.

For example, it is preferable to divide the rehabilitation process into several stages to explain important items in each stage as follows:

(1) From amputation to prosthetic rehabilitation onset
(2) From casting to initial fitting
(3) Prosthetic gait training
(4) Daily life after gait acquisition

2. Text Size

For patients with vision impairments such as those due to diabetes or advanced age, it is better to provide larger, easy-to-read text.

3. Terms

Technical terms allow medical staffs to explain something easily to one another but are commonly too difficult for lay persons to readily understand. It is important to minimize the use of technical terms and to use words used in daily life whenever possible. When the use of a technical term is unavoidable, be sure to define it simply and clearly.

4. Illustrations and Layout

In patient brochures, sentences should be as simple as possible and many illustrations should be included. The use of illustrations to explain concepts is ideal.

Chapter 2.
Brochure Contents

1. From Amputation to Prosthetic Rehabilitation Onset

(1) Rehabilitation staffs

Introduce the names and each role of the staff members involved in the rehabilitation process.

For rehabilitation, the team approach by medical staffs is important. Consequently, it is essential to provide the names and roles of relevant staff members so that the patient knows whom to contact with questions.

(2) Amputation causes

Provide information that allows the patients to understand the events that led to the amputation.

Causes of amputation are roughly classified into injury and disease. The rehabilitation process varies greatly by cause. In addition, the presence or absence of complications greatly influences fitting of the lower limb prosthesis and the patient's rehabilitation process. Since self-discipline will be required for the patient to use the lower limb prosthesis, each patient must be aware of the possible related complications.

For example, in patients undergoing amputation due to peripheral vascular disease related to diabetes, considering vision impairments, sensory neuropathy, and renal impairments become important factors for decision of the rehabilitation goals. In many patients undergoing amputation due to injury, acquiring an acceptable prosthetic gait becomes important, whereas in patients undergoing amputation due to other disease-related complications, health care and lifestyle improvements are needed for the patient to acquire a prosthetic gait. Needless to say, the rehabilitation of patients undergoing amputation due to injury, who have fractures or damage at other sites, should be planed considering healing those damaged parts. Patients injured by a land mine may also have vision impairments or other injuries that require prioritizing within a rehabilitation program.

Person with limb deficiency which should be distinguished from acquired amputation as mentioned above, require the other therapeutic programs that include both of the developmental evaluation and the use of prostheses.

(3) Residual limb management

Explain the significance of residual limb management and its associated methods.

Residual limb management involves compressing the residual limb to promote its maturation and checking for the presence or absence of wounds. This is the first step of the rehabilitation process, and when performed immediately after amputation, it can lead to a shortened rehabilitation period.

It is essential to teach each patient how to properly wrap the residual limb with an appropriate elastic bandage to promote its maturation. A shrinker sock or

other product such as a silicone liner can be used by patients who have difficulty wrapping the residual limb with bandaging.

Patient must check the condition of the residual limb such as changes in skin color and the absence or presence of wounds prior to use of prosthesis. This monitoring may prevent troubles caused by getting the socket fitting worth. Patients should be cautioned that the skin over the residual limb is weak and vulnerable and may require extended healing time depending on the available blood circulation in the residual limb. For patients with amputation due to peripheral vascular disease special attention must be paid to residual limbs with decreased sensation. These patients should be advised to use a mirror to check the back of the residual limb regularly. All patients should be educated on the importance of infection control and hygiene.

(4) Phantom limb and phantom limb pain

Provide information about phantom limb sensation.

After amputation, many patients experience phantom limb and phantom limb pain that can interrupt the gait training process. There is an opinion to deny phantom limb itself because phantom limb pain is very troublesome. The presence of phantom limb is not necessarily a bad thing. Phantom limb is specific to patients after amputation and difficult for others to understand. It is advisable to provide each patient and their support team with information about phantom limb sensation to aid their understanding of it. However, it is difficult to manage phantom limb pain which is one of phantom limb sensation. Phantom limb pain is disabling if the pain is severe. Medical staffs carefully discuss treatments for the pain.

It is important that patients understand that residual limb pain differs from phantom limb pain. If they can understand this difference, they can appropriately inform medical staff of the type of pain (residual limb or phantom limb) they experience during gait training.

(5) Psychological care

Acknowledge the psychological component of the patient's amputation experience.

Amputation is associated with both the loss of a body part and the psychological effects of that loss. This is a problem specific to amputation that is not seen with other disabilities. It is necessary for each patient to overcome the loss of the limb and gradually come to accept the loss during the rehabilitation process. It is said that patients must experience five psychological states prior to accepting their disability as described below.

I. Shock and denial
↓
II. Hope of recovery
↓
III. Confusion and distress
↓
IV. Effort to adaptation
↓
V. Adaptation

It is important that medical staffs plan and implement a rehabilitation program that considers the patient's current acceptance stage. Patients should be encouraged to look at their situation objectively to help them accept their disability. Family and other supportive individuals can also help patients move toward acceptance of the disability.

2. From Casting to Initial Fitting

(1) Overall rehabilitation schedule

Briefly describe the contents and order of the rehabilitation program to help ease the patient's anxiety and improve their motivation to adhere to treatment.

Patients can recognize their current aim by showing the progress of gait training according to stage, which may encourage them and provide a feeling of accomplishment of the training.

(2) Structure of the lower limb prosthesis

Show the simple structure of the lower limb prosthesis and describe its parts.

The term "socket" used by prosthetists is unfamiliar for most patients. It is necessary to use illustrations to explain the frequently used terms for patients undergoing lower limb prosthesis training or adjustments (e.g., "socket," "tube," "foot"). A patient's general knowledge of the basic names of the lower limb prosthesis parts promotes their communication with staff members and enables them to convey any troubles they encounter with it.

(3) Lower limb prosthesis types

Describe the lower limb prosthesis types and components corresponding to the level of amputation.

It is apparent to specialists which lower limb prosthesis is indicated for a patient's level of amputation. However, patients consider both hip and transtibial prostheses as lower limb prosthesis and do not distinguish between them. Thus, it is necessary for patients to understand which type applies to the gait training.

It can be helpful for amputees to see the prosthesis types because the choice of prosthesis types and components depend on the level of amputation. In brochures, it is desirable to explain the different lower limb prosthesis types using pictures or photographs.

(4) Casting

Explain the concept and features of "casting."

The casting step is extremely important in the manufacture of an adequate lower limb prosthetic socket. Inform patients of the casting process ahead of time so that they are in good condition during casting. Patients who underwent higher-level amputations may be recommended to wear a swimsuit to ease the casting process. Be sure to warn each patient of the risk of their clothes becoming dirty with plaster during the casting process.

(5) Initial fitting

Explain the initial fitting process.

In the initial fitting step, the patient is shown how to wear the lower limb prosthesis, the socket fitting is adjusted, and the alignment is set.

Improper wearing of the lower limb prosthesis often influences the socket fitting. It is important to carefully explain how the prosthesis should be worn and then have the patient practice applying it. The term "initial fitting" refers to the moment that a patient stands for the first time after amputation and is a major turning point from post-amputation disappointment toward prosthetic gait acquisition. During that first fitting, the patient likely cannot judge whether there is a problem. However, it becomes important for the patient to be able to report an issue (e.g., residual limb pain, balance malfunction) to the staff. This is the starting point of communication with a prosthetist as the patient moves toward prosthetic gait acquisition.

3. Prosthetic Gait Training

(1) Contents of training

Show the patient a prosthetic training menu for the entire rehabilitation process from basic to advanced training.

Prosthetic training takes several months. Learning what to expect ahead of time allows patients to determine their current training level and maintain their motivation. The menu is roughly classified into three sections:

(A) Preparation for prosthetic gait training

- Maintain and improve range of motion and enhance muscle strength
- Acquire balance without the lower limb prosthesis and develop one legged gait using parallel bars or a walker

During the period from amputation to fitting of the lower limb prosthesis, to improve basic strength, ensure range of motion, and prevent contractures highly influences goal setting for the prosthetic gait acquisition. Caution patients to avoid causing ability impairments during disuse. It is preferable to ensure their mobility without the lower limb prosthesis as much as possible.

However, the training during such a period varies according to the cause of the amputation: in patients undergoing amputation due to disease, the treatment of primary disease is given priority, and care must be taken to check the presence or absence of complications because they can have great influence.

(B) Basic training for prosthetic gait

- Balance on prosthetic limb and gait using parallel bars
- Gait using assistive devices (e.g., walker or clutch)
- Management of a lower limb prosthesis

The gait training with the lower limb prosthesis is initiated with increasing of the patient's weight to the lower limb prosthesis within parallel bars. Basic training in this period is very important. Relieve the patient's anxiety about developing the prosthetic gait by using parallel bars and assistive devices and gradually improve their ability. Many patients tend to think that they can instantly walk once they wear the lower limb prosthesis; however, before undergoing training, they must understand that the prosthetic gait differs from the normal gait.

Management of the lower limb prosthesis also starts in this period. Through the training, patients must master many concepts, including care of the lower limb prosthesis and adjusting the fitting with residual limb socks. The patient must develop the habit of checking whether there are abnormalities in the lower limb prosthesis or socket fitting. Hygienic management of the lower limb prosthesis is also important. In particular, patients who use a liner must wash it every day.

(C) Advanced training for prosthetic gait
- Stairs
- Outdoor gait (on rough road, slope)
- Sports and recreation

There are few flat walkways such as a hospital corridor in daily life. Patients must achieve a stable gait for navigating non-level surfaces and steps when moving outdoors. Therefore, it is important for them to perform gait training on stairs and non-level surfaces. Depending on their physical condition, the introduction of sports and recreation is needed to maintain and improve their basic strength and improve their quality of life.

(2) Residual limb changes

Explain that the socket fit may change as the residual limb matures.

As prosthetic gait training progresses, the post-amputation edema of the residual limb is reduced, the residual limb begins to mature, and the circumference, volume of residual limb, and hardness of the soft tissue change greatly. In addition, residual limb circumference may fluctuate daily between the morning and evening. Change of the residual limb greatly influences socket fitting and sometimes causes wounds, which may disrupt the gait training. Therefore, it is necessary to advise patients to pay attention to any changes in the fitting condition between the residual limb and the socket. This period is the time that prosthetists and physical therapists are the most careful. Once patients know that the residual limb may change and it may influence the socket fitting, they can inform their care staffs of any discomfort in the socket fitting and avoid any trouble before it can occur. Teach patients how to self-manage their situation after discharge (e.g., improve socket fitting by adjusting the number of socks).

(3) Adjustment of the lower limb prosthesis

Explain the changes in alignment associated with gait ability and the select of parts.

Since the alignment greatly changes depending on the way the lower limb prosthesis is loaded, patients must be informed about the need to adjust the alignment of the lower limb prosthesis and socket as the prosthetic gait training progresses.

Many patients may experience pain caused by change of the socket fitting during gait training and do not have to endure the pain caused by the poor socket fitting. In addition, as their gait ability improves, the specifications of the parts which have been used may become insufficient. It is important to choose appropriate parts according to a patient's gait ability. If the rehabilitation environment allows for several parts to be examined, it is important to provide an opportunity to do so.

4. Daily Life after the Gait Acquisition

Provide patients that completed a rehabilitation program and acquired a prosthetic gait with information towards social participation after discharge.

(1) Precautions in daily life

Explain the actions to be taken for problems that may occur in the use of the lower limb prosthesis in daily life.

In hospital medical staffs can solve some problems in use of lower limb prosthesis, whereas in real life such problems can be difficult to solve by patients. Therefore, to ensure stable and continuous use of the lower limb prosthesis, the patient's management capability is important (e.g., control body weight, manage small residual limb-related problems before they get worth).

Many of the problems caused by use of the lower limb prosthesis occur in the training stage, during which time the patients can learn the solutions. Although these management capabilities should be acquired during gait training, it is preferable to organize and describe them again. It is important to share such information with the patient's family and support system.

(2) Insurance, social welfare system and costs

This item varies greatly depending on the circumstances of country and region where the person with amputation resides. In areas with an established insurance or social welfare system, clearly inform persons with amputation of the applicable system and procedures for obtaining the lower limb prosthesis because it can be difficult for patients to navigate such systems, especially if they are complex, on their own. In addition, since the cost can present a burden, inform them of estimated cost of manufacturing the lower limb prosthesis.

(3) Contact information for repairs and manufacturing of lower limb prosthesis

The more a lower limb prosthesis is used, the more likely it is to break. It is

almost impossible to use only one lower limb prosthesis throughout one's lifetime. For persons with lower limb amputation who always use the prosthesis, the loss of the prosthetic gait limits their sphere of activities and causes psychological damage. Thus, it is necessary to provide patients with information about who to contact for repairs or manufacturing.

Chapter 3.
Concrete Example

Here we present a concrete example of a brochure ("First Lower Limb Prosthesis") for patients transitioning into the use of a lower limb prosthesis provided by the National Rehabilitation Center for Persons with Disabilities.

In the National Rehabilitation Center for Persons with Disabilities, all persons with lower limb amputation who are hospitalized and undergo prosthetic gait training, receive this brochure. This information also helps medical staffs who are unfamiliar with lower limb prostheses improve their knowledge, promotes communication between medical staffs and patients with lower limb amputation, and helps improve patient rehabilitation.

This brochure does not include all of the items mentioned above, and includes specific contents about the Japanese social welfare system.

First Lower Limb Prosthesis

National Rehabilitation Center
for Persons with Disabilities

Hospital : Prosthetic and Orthotic Therapy
Research Institute : Department of Prosthetics & Orthotics

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Part 4 : Daily Life after Discharge

Appendix : Costs of the lower limb prosthesis and insurance coverage

Part1 : Orientation for Admission

Rehabilitation staff

This page introduces our staff in charge of lower limb prosthesis manufacturing and training.

Physician

The physician considers your adaptation ability to prosthetic gait training and decides which type of lower limb prosthesis is good for you.

Prosthetists and Orthotists (PO)

The PO consider and discuss lower limb prosthesis manufacturing with the physicians .
Please consult the PO with issues related to the lower limb prosthesis.

Nurse

The nurse supports your health and manages the residual limb and considering your daily life factors.

Family

You

Physical Therapist (PT)

The PT helps you improve your physical strength to control the lower limb prosthesis. The PT coaches ambulatory exercises.

Medical Social Worker (MSW)

The MSW provides information about medical welfare systems and procedures regarding coverage for lower limb prostheses and wheelchairs.

Rehabilitation Sports Therapist (RST)

The RST helps you improve your physical strength and promotes your health for enjoying an active social life by sports exercise .

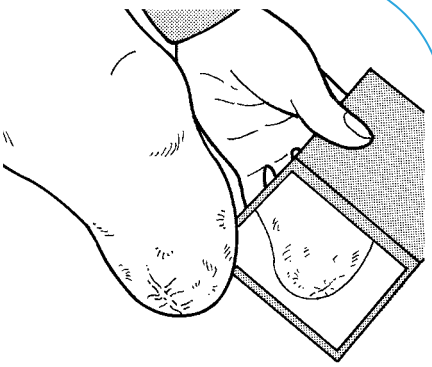
Occupational Therapist (OT)

The OT advises on activities for daily life, introduces useful tools and equipment, and house modifications.

Residual limb management

Skin care - Watch your wound

Once you start to wear a lower limb prosthesis, the residual limb bears your body weight.
Be sure to closely check for wounds. The skin of the residual limb is very weak and vulnerable to injury.



If the wound is not cared for, bacteria may enter it and cause inflammation. Even if no large wound is found, the residual limb may become swollen and a fever can develop. You have to be careful because the same may happen when your body is with a compromised immune system.

If something looks unusual on your residual limb, please contact your physician, nurse, PO, or PT right away.

[Note]
Using a mirror, closely check for wounds at the back of the residual limb end and the back of the knee.

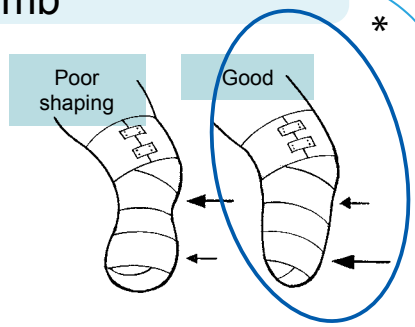
How to compress the residual limb with an elastic bandage - Fix the shape of the residual limb

Why is an compression wrapping with bandage needed?

When you wear a lower limb prosthesis, the residual limb is always pressed, meaning that it will become smaller and thin and not fit in the socket.

<u>Early compression dressing would decrease edema.
If the residual limb is compressed with an elastic bandage before the prosthesis is fitted, it may be less likely to change shape and size. This would prevent discomfort.</u>

If the residual limb is properly wrapped with an elastic bandage as shown in the figure, it will take a shape that makes it easy to wear the lower limb prosthesis.



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[Note]
With the elastic bandage, wrap the upper area of the residual limb loosely and wrap the lower area of that tightly.

If you cannot properly wrap the residual limb with the elastic bandage, please contact your PO. Other compression wrapping items such as socks are also available.

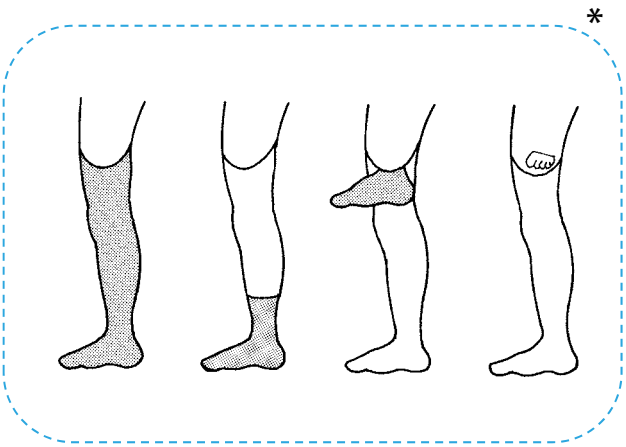
*Source : Sawamura, S. " Amputation and Prosthesis", Ishiyaku Publishers, Inc.,2011, p.401 (in Japanese only)

Phantom limb and phantom limb pain

Many amputees have a phantom limb sensation that the lost leg is still present. This is called ***"phantom limb."***

Phantom limb can feel variety of forms in different people. You may feel that the limb is attached and moving in space.

The presence of phantom limb itself do not negatively affect the individuals. Phantom limb sensation may be functionally useful feed back from the lower limb prosthesis during gait training.



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Phantom limb in lower limb amputees

In many amputees, phantom limb disappears several years after amputation. However, phantom limb is poorly understood. It is important that your family and care givers know about phantom limb to better understand what you are going through.

Phantom limb sensation may be associated with pain. This is called ***"phantom limb pain."*** Know that the pain occurred in the portion of the residual limb, it is called "***residual limb pain***" and is not the same as phantom limb pain.

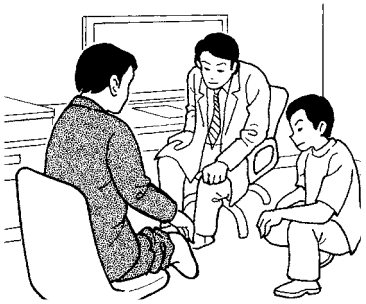
Phantom limb pain cannot be treated because it does not actually exist, and sometimes can make it difficult for you to wear your prosthesis. On the other hand, some patients experience that the consistent use of prosthesis moderates intensity of the pain.

*Source : Hosoda, T. "Physical Therapy of Lower Extremity Amputation with Question and Answer, and Flowchart", 3rd ed., Ishiyaku Publishers Inc., 2007, p.80 (in Japanese only)

Overall rehabilitation schedule

Design of the lower limb prosthesis is tailored to your needs, physical condition, and lifestyle. The prosthetic rehabilitation takes 2–4 months.

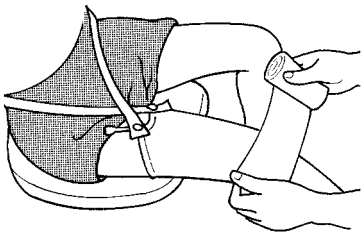
Hospital admission

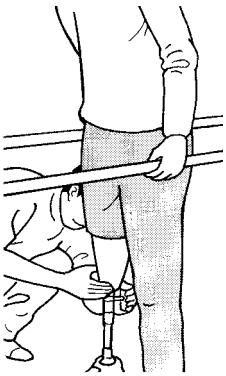


Check of the physical condition, discussion of the specifications of the lower limb prosthesis and orientation of rehabilitation by physicians and rehabilitation staffs.

Casting

Initial prosthetic fitting
Trial gait and adjustment





Prosthetic gait training

Acquisition of prosthetic gait and completion of lower limb prosthesis

Discharge

Payment for lower limb prosthesis

**After discharge, you must apply for medical insurance coverage of the lower limb prosthesis (reimbursement system).*

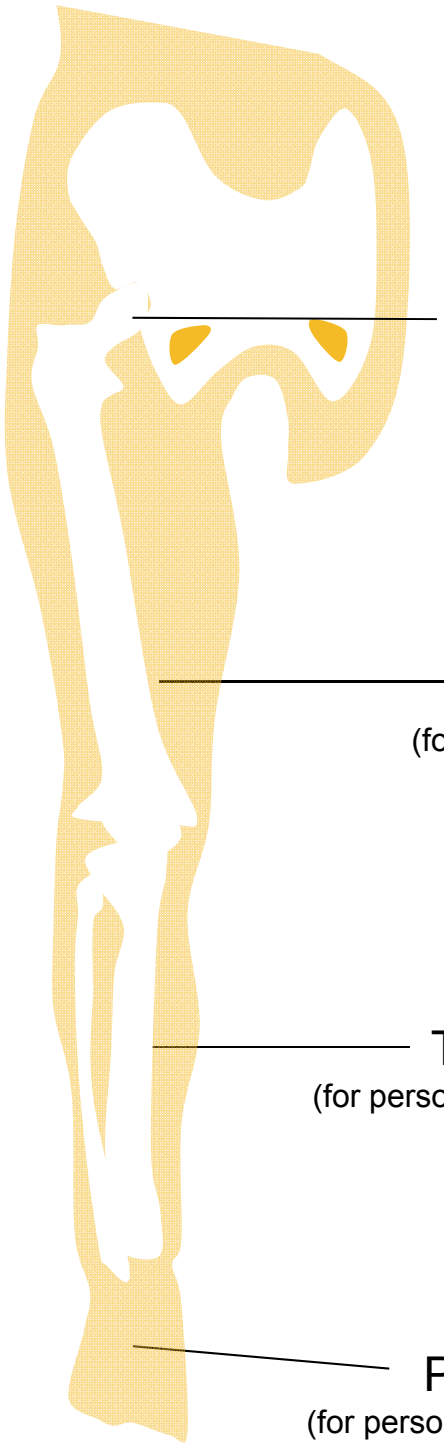
Getting insurances coverage

N.B) This schedule shows a rough flow of lower limb prosthetic training. ***Depending on your physical condition, you may not be able to achieve your targeted gait or may give up the lower limb prosthesis training***. We recommend that you talk about training and components of your lower limb prosthesis with the staff in charge.

Part 2 : Preparatio for Lower Limb Prosthesis Use

Lower limb prosthesis types

The lower limb prosthesis used varies according to the level of amputation.



Hip prosthesis

(for person with amputation around the hip joint)

Transfemoral prosthesis

(for person with amputation above the knee joint)

Transtibial prosthesis

(for person with amputation below the knee joint)

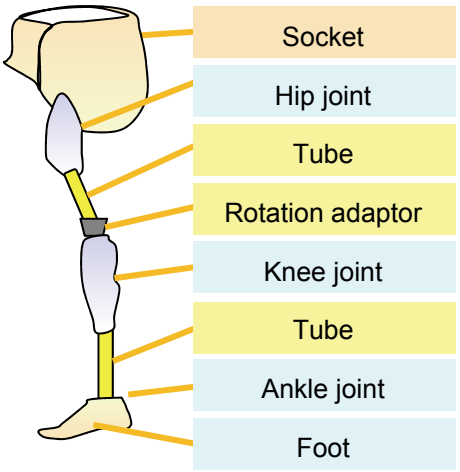
Partial foot prosthesis

(for person with amputation below the ankle joint)

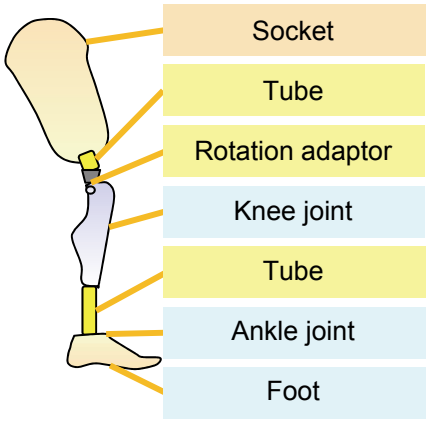
Structure of lower limb prosthesis

Here are the main components of the lower limb prosthesis.

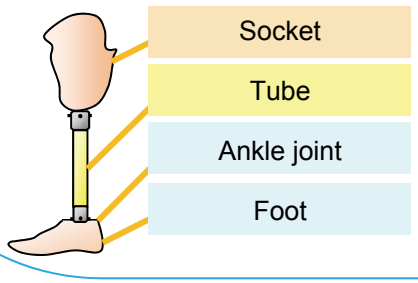
[Hip prosthesis]



[Transfemoral prosthesis]



[Transtibial prosthesis]



Socket

The prosthetic socket connects your residual limb to the prosthesis. It supports the body weight, and transmits power to the prosthesis. The socket is the most important component.

Hip joint

Substitute for the hip joint. Enables flexion and extension of the hip joint.

Knee joint

Substitute for the knee joint. Enables flexion and extension of the knee joint.

Ankle joint

Substitute for the foot joint. Two types: solid (no axis) joint and multi axis joint.

Foot

It looks foot shape. Promotes smooth body weight shifting. Various types available.

Tube

A pipe made of metal or carbon that links between components.
It changes lower limb prosthesis height.

Rotation adaptor

Turns the lower leg site. It is convenient for putting on and taking off shoes. It's available for hip and transfemoral prosthesis.

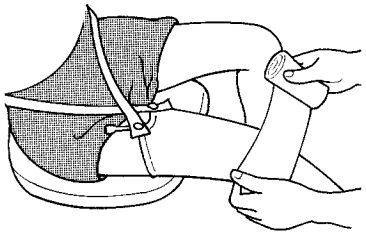
Casting

The socket that joints the residual limb is tailored to each individual.
Wrapping the residual limb with plaster bandage is called ***casting***.

Casting procedure

1. Wet plaster bandages and wrap the entire residual limbs.
2. Once hardened, remove the bandage.
3. Use the mold to make the socket.

Request by PO!
Your clothes may become tainted with plaster or get wet.
If you have had hip disarticulation or transfemoral amputation, you may want to bring extra clothes or a swimsuit.



In the initial fitting process, the socket fitting, length of prosthesis, and parts positions are confirmed.

Preparations for initial fitting

Clothes
Please bring shorts to ease the process of donning, doffing, and adjusting the prosthesis during initial fitting and gait training.

Shoes
Please bring shoes that you will wear with the lower limb prosthesis. You can bring your shoes that you normally wear, but walking comfort depends on the shoes. For shoe recommendations, please ask your PO.

Sanitary materials
Please bring soap so you can practice keeping the residual limb and your prosthesis clean.

Initial prosthetic fitting

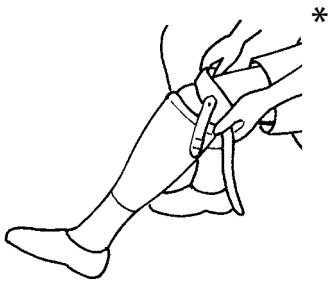
Flow of initial fitting

Before wearing the lower limb prosthesis, cover the residual limb with a prosthetic sock or a elastic liner. In some types of sockets, not wear anything to fit residual limb and socket closely.

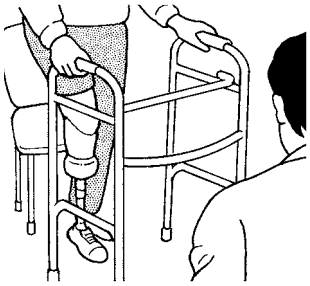
Prosthetic sock

Liner

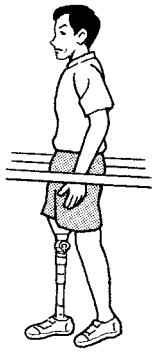
1. Wear the lower limb prosthesis.
   We will teach you how to wear the lower limb prosthesis. Please practice the proper way to don and doff it.


*

2. Stand up while wearing the prosthesis.
   The PO will check the residual limb and socket fitting and then adjust the height of prosthesis and balance as needed.



3. Try walking with the lower limb prosthesis.
   The PO will adjust the setting of the parts to ensure that you can walk smoothly.



Once the initial fitting is complete, it is the time to practice gait training with the lower limb prosthesis!

*Source: Engstrom, B. Vande Ven, C. ed., Suyama, T. et al. trans., "Therapy for Amputees" 3rd ed., Kyodo Isho Shuppan Co.,Lit.,2002, p.189 (in Japanese only)

Part 3 : Physical Therapy

Preparation for prosthetic gait training

Before you can walk with the lower limb prosthesis, your body must be developed enough to control your prosthesis and the residual limb must withstand pressure due to the body weight.

[Residual limb management training]

*1

Adjust the residual limb, tissue getting softness, and increased skin movement by massaging.

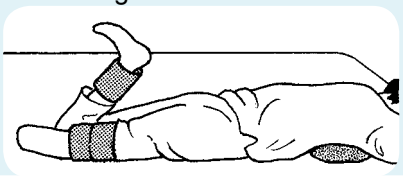
[Maintaining and increasing range of motion]

*2

Maintain and increase lower extremity joint movement.

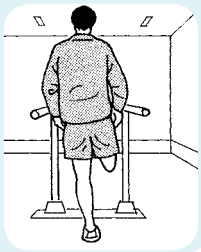
[Enhance muscle strength]

Build your physical strength and improve lower limb muscle strength.



[Improve standing balance]

Balance on one leg.

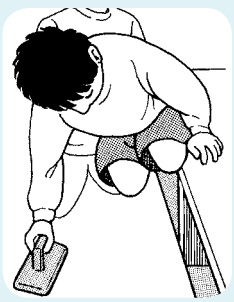


Training for transfer without the lower limb prosthesis.

[Practice activities for daily living]

Practice standing from the floor and activities of daily living (e.g. bathing, toileting, dressing, and undressing) without prosthesis.

Consider the need for house modifications.



[Practice walking with crutches or transferring from a wheelchair]

Practice walking with a crutch.

*3

Practice transferring from a wheelchair to a bed, toilet, and floor.

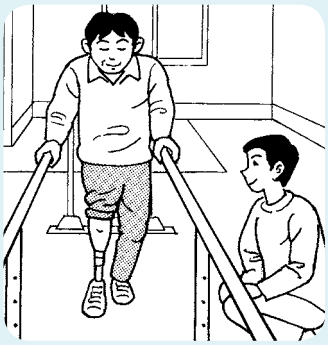
*1*2*3

Source : Engstrom,B. Vande Ven, C. ed., Suyama, T. et al. trans., "Therapy for Amputees" 3rd ed., Kyodo Isho Shuppan Co., Lit.,2002, * 1,2 p.45 * 3 p.50

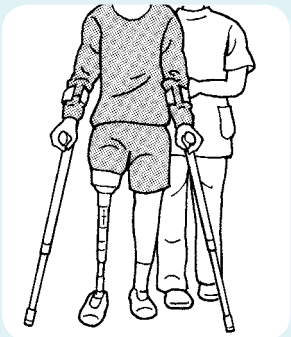
Prosthetic gait training

Examples of basic training with the lower limb prosthesis.

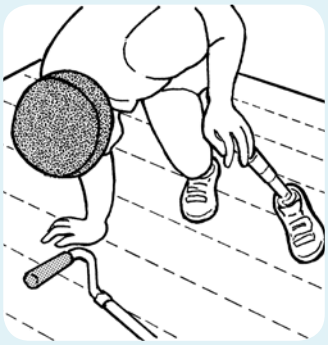
[Walk in parallel bars]



[Walk with crutches]

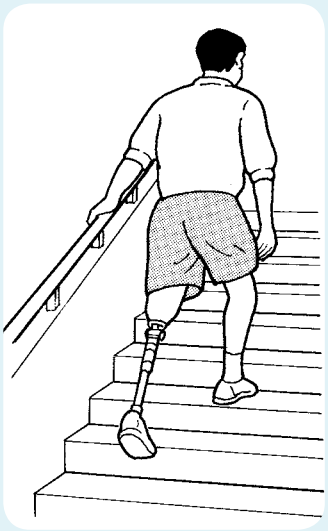


[Stand up from the floor]

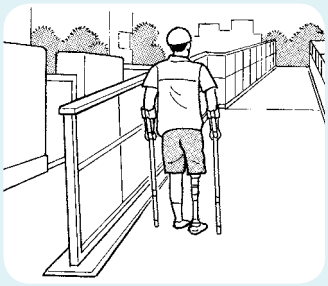


Examples of advanced training with the lower limb prosthesis.

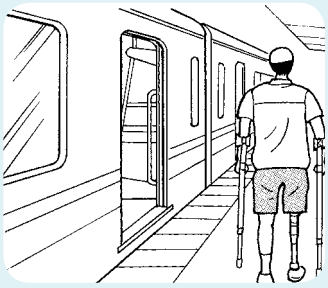
[Climbing stairs]



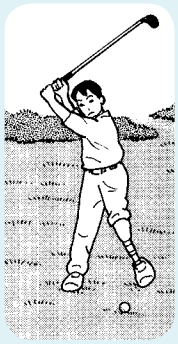
[Slopes, ramps and rough road]

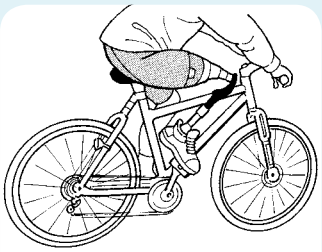


[Using public transportation]



[Rehabilitative sports and recreation]





Residual limb changes

Many amputees experience residual limb change (also called maturation or shrinkage) after the start of lower limb prosthesis training.

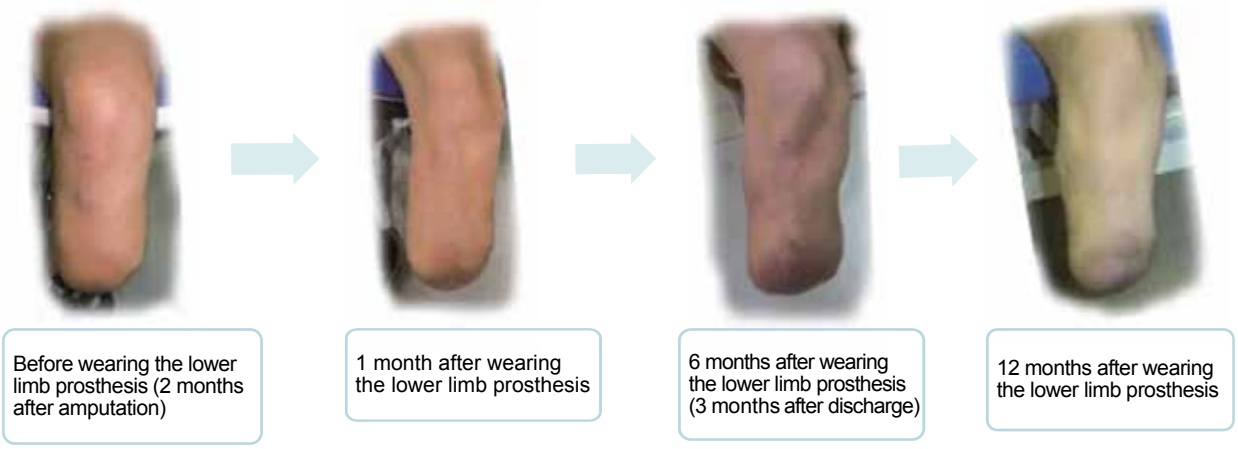
When residual limb change begins, the following may occur:

[Residual limb side]
- **Thinning**
- **Increased muscle mass**
- **Tissue softening**
- **Bones standing out**

[Lower limb prosthesis side]
- **Socket loosening**
- **Balance worsening**
- **Power not transmitted**
- **Residual limb pain**

The residual limb becomes stable over time.

[Example of the residual limb changes - transtibial amputation -]



Before wearing the lower limb prosthesis (2 months after amputation)

1 month after wearing the lower limb prosthesis

6 months after wearing the lower limb prosthesis (3 months after discharge)

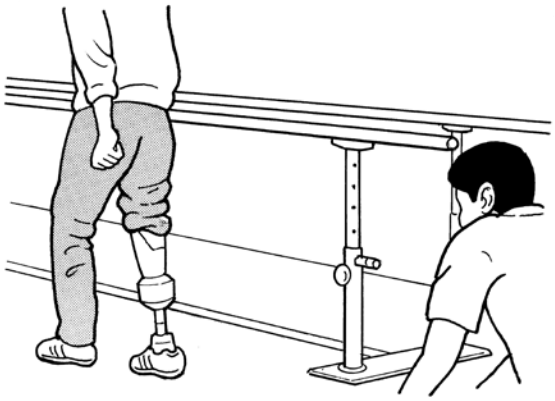
12 months after wearing the lower limb prosthesis

It takes approximately several months for the stump to settle.

If the lower limb prosthesis feels loose, *do not continue wearing it and immediately contact your physician, PT, PO, or nurse.*

Adjustment of the lower limb prosthesis

The lower limb prosthesis is adjusted according to the residual limb change and your walking ability.



When the prosthetic gait becomes stable, more appropriate parts are chosen in consideration of your lifestyle after discharge.

At this point, your lower limb prosthesis will be complete for use in your real life.

Part 4 : Daily Life after Discharge

General management in daily life

To live with the lower limb prosthesis, it is necessary for you ***to care your prosthesis and the residual limb yourself.***

*** Cautions ***

Keep leading a regular life
If you gain weight or your body become swollen, the residual limb may not fit the socket well. Keep your regular life in mind to wear the prosthesis safely.

Keep the stump clean
Wash the stump with soap and water.
Make sure that there are no new wounds and blister.

Care for the lower limb prosthesis
Wash the liner daily according to its manual.
Change the stump sock daily. In hot weather, be sure to change the sock frequently.
Wipe the inside of the socket with a wet towel to remove dirt.

How to choose shoes
For a stable gait, it is preferable to wear shoes that are easy to put on the lower limb prosthesis and in which a string or hook-and-loop fastener are used to keep it still.
When changing to shoes with different heights, the lower limb prosthesis may become unstable.

Problems with the lower limb prosthesis and the residual limb

When the following signs occur in your lower limb prosthesis and the residual limb after discharge, please contact to your PO.

Example of signs due to poor lower limb prosthesis condition

- The prosthesis suddenly becomes heavy (the loosened socket)
- The belt or cable has been cut
- The prosthesis feels shaky
- The prosthesis makes a sound

Please contact your PO immediately for a repair or adjustment.

Example of signs due to poor residual limb condition

- Wound
- Pain
- Redness
- Rash

Contact your PO or visit a dermatologist for treatment.

? Should a new lower limb prosthesis be made?
Can my temporary prosthesis be repaired?

Firstly, please contact your PO. When visiting our institution, please call to make a reservation.

Appendix : Costs of the lower limb prosthesis and insurance coverage

Payment for the temporary lower limb prosthesis

The first lower limb prosthesis is commonly called a ***"temporary lower limb prosthesis"*** because it is used for training purposes.

Cost of the temporary lower limb prosthesis

The costs of the temporary lower limb prosthesis vary by level of amputation and components to be used.
The table below provides cost estimates.

(data from 2011–2013 Department P & O at NRCD)

	Cost range (mean)
Transtibial prosthesis	150,000-770,000 yen (390,000 yen)
Transfemoral prosthesis	340,000-1,650,000 yen (800,000 yen)
Hip prosthesis	580,000-940,000 yen (810,000 yen)

Accounting desk for prosthesis costs

- The cost of the temporary lower limb prosthesis is not included in the hospital charges.
- Please note you have to pay this fee at the accounting desk located in the ***Office of the Department of Prosthetics & Orthotics.***

Advance payment

- Even if you use some insurance system for payment of the temporary prosthesis, you must pay ***all of the expenses in advance***.
- After payment, please send the relevant insurance documents.
- The amount owed to you will be refunded.

For the available social welfare system, please see page 18.

Insurance coverage -the temporary lower limb prosthesis

Available reimbursement system for temporary lower limb prosthesis

Please confirm the type of health insurance you use and check the necessary documents.

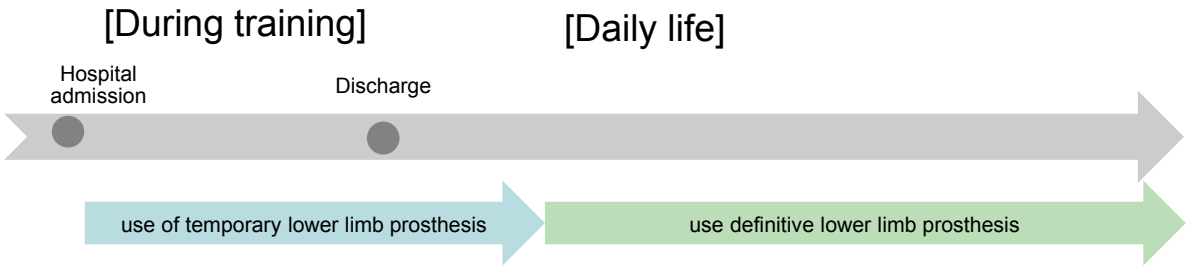
Health insurance type	Necessary documents	Documents available from	Apply to
● Worker's accident compensation insurance	1. The bill defined by the laws in Japan (Claim form No.7 or No.16) 2. Receipts for purchased lower limb prosthesis 3. Statement of items for purchased lower limb prosthesis	For 1., the staff in charge of labor service in your workplace or the website of the Ministry of Health, Labour and Welfare. For 2 and 3., the Department of Prosthetics & Orthotics will issue them.	Your local Labor standard inspection office
● National health insurance	1. Physician's statement 2. Receipts for purchased lower limb prosthesis 3. Statement of items for purchased lower limb prosthesis 4. Application for reimbursement of medical expenses	For 1., you can obtain the enrollment form in the ward. For 2 and 3., the Department of Prosthetics & Orthotics will issue them. For 4., please contact the relevant office.	Your local National Health Insurance section
● Cooperative insurance			Relevant office of the cooperative insurance or your workplace
● Japan Health Insurance Association	1. Physician's statement and prosthesis / orthosis wearing certificate 2. Receipts for purchased lower limb prosthesis 3. Statement of items for purchased lower limb prosthesis 4. Claim form for payment of medical treatment expenses	For 1 and 4, you can obtain the form of Japan Health Insurance Association from the relevant office or website. If you use the statement or certificate issued by our hospital, please submit the enrollment form available in the ward. For 2 and 3, the Department of Prosthetics & Orthotics will issue them.	Japan Health Insurance Association branch of the district listed in your insurance card

If you use insurance other than that listed above, please contact your PO.

From the temporary to the definitive lower limb prosthesis

The lower limb prosthesis that you newly purchase following discharge has another name.

The first lower limb prosthesis is intended to be used during training and is commonly called a ***"temporary lower limb prosthesis."***
In contrast, the lower limb prosthesis used in daily life (purchased after the manufacture of the temporary prosthesis) is called a ***"Definitive lower limb prosthesis."***



When you believe that you are ready for the definitive prosthesis, please contact your physician, PT, or PO. This can be several months to several years after you are first fit with the temporary prosthesis depending on your physical condition and lifestyle.
There is no clear standard of the time course from the use of the temporary prosthesis to the use of the definitivet prosthesis.

You will likely need more than one definitive lower limb prosthesis over the course of your lifetime since the prosthetic components have a limited service life.

[Estimated service life]

Tube	5 years
Joint	3 years
Rotation adaptor	3 years
Foot	1.5 years

You also may have to change its parts depending on physical change or change in living environment.

2 social supports are available for the definitivelower limb prosthesis.
Please see page 20 for more information.

Available social welfare system

Available social welfare system for the definitive lower limb prosthesis

1. ***Amputees who purchased a temporary lower limb prosthesis for training under the worker's accident compensation insurance can use this system.***

Application procedures	Apply at ***your local labor bureau.***
Self-pay	None

2. ***Persons with lower limb amputation except the above persons can use the General Support for Persons with Disabilities Act.***

Application procedures	Apply at ***your local welfare department.***
Self-pay	Depends on your income. In principle, pay 10% of the cost.

If you have any questions about the available system for the definitive lower limb prosthesis, please contact your PO.

[Contact]

National Rehabilitation Center for Persons with Disabilities

Hospital : Prosthetic and Orthotic Therapy

Research Institute : Department of Prosthetics & Orthotics

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Published 2015