CHAPTER 1

INTRODUCTION AND OUTLINE OF THE THESIS
Introduction

Lower limb amputations have been done since time immemorial. The first surgical description of a leg amputation was by Hippocrates (460–377 BC). Many different surgical techniques have been described through history, for example the guillotine amputation, the double circular incision or two cut technique, and the skin-muscle-flap method. Although prostheses are not mentioned in medical literature from Ancient Times, they were certainly made and used as we learn from non-medical books and pictures. We do not, however, know much about the functional abilities after a leg amputation in those times.

Transplantation of extremities has never yet been successfully carried out and will not be successfully done in the near future, even though it was already depicted as the Miracle of the Black Leg of Cosmas and Damianus at the beginning of the fifteenth century. Till now, prostheseology gives better functional results than transplantation of the limb. Thus, patients still need to function with their amputated leg with or without a prosthesis. Many aspects in amputation surgery, prostheseology, and the functional possibilities of patients with leg amputations have improved since Hippocrates. However, for the rehabilitation of amputee patients, treatment is still mainly based on clinical experience and only limited on evidence-based medicine.

Knowledge of important aspects for the rehabilitation of patients with a leg amputation is limited. For example, prediction of functional outcome of amputee patients remains a very difficult problem, the relevance of vocational rehabilitation is just becoming evident, the effect of several therapies is uncertain, and the functional benefits of different types of prostheses are not yet proven. Different aspects of the functional outcome of amputee patients are the subject of this thesis. The model in figure 1.1 forms the basic assumption for the research. This model illustrates the influences of the social environment, physical capacity, and mental capacity on the functional capacity of an individual. The functional capacity consists of ADL (Activities of Daily Living) and HDL (Household activities of Daily Living) abilities as well as work ability. In the rehabilitation of amputee patients, goals are set to upgrade the functional capacity of the subject with the amputation, i.e. independence in self care, and optimal participation in recreational and vocational activities. An amputation causes sustained restrictions in physical capacity but attempts should be made to minimalize the influence on the functional capacity of the person. Thus far, most studies have concentrated on the physical influences on functioning after an amputation. Social and mental influences have not very often been included in these studies.

Most amputee patients in developed countries are older than 60 years of age, and 80–90% of lower limb amputations are performed as a result of vascular problems. The most important functional demands of elderly patients are in the fields of personal care, household activities, and recreational activities. Most lower limb amputations in patients between 18 and 60 years of age, are the result of trauma or cancer. In younger patients, not only are physical mobility and independence in activities of daily living important after the amputation, but return to work or school also plays an important role.
The main aim of this thesis is to gain a better understanding of the influence of physical, mental, and social characteristics on the functional outcome of patients after a lower limb amputation. The main research questions answered in this thesis are:

1. Which physical, mental, and social characteristics after amputation predict the functional outcome for elderly lower limb amputee patients?
2. What is the relationship between impairments, activities, and participation for elderly amputee patients?
3. What is the employment status of amputee patients in the Netherlands?
4. Which factors are related to successful job reintegration and job satisfaction for working people with a lower limb amputation?

Outline of the thesis

In the first part of the thesis (chapters 2–4) we focus on elderly amputee patients. The most important aim of this part is to assess physical, mental, and social predictors for the functional outcome of amputee patients over 60 years of age. An early prediction of functional outcome is important for providing the patient with adequate information, for making well-founded choices in the rehabilitation path after the initial hospital stay, for assessing the relevance of different therapy aims, and for selecting the right group of patients for future studies. Up till now, the positive predictors for successful rehabilitation described in literature include: good living conditions with lots of support, and a good social and health status before the amputation. Negative predictors mentioned for successful rehabilitation include: comorbidity, advanced age, amputation level, phantom pain, and skin problems.

In chapter 2 we determine the interrater and intrarater reliability and the validity of the Timed "up & go" test for measuring physical mobility in elderly patients.
with an amputation of the lower extremity. The "Get-up and go" test was initially
developed by Mathias et al9 to study the disturbance of balance in elderly people.
Podsiadlo and Richardson9 modified the test to the Timed "up & go" test to get a
more reliable outcome measure and they evaluated whether the test was also feasible
for quantifying the physical mobility of the elderly. The reliability and validity of the
Timed “up & go” test have not been previously tested for patients with amputations.
This test was used for the study described in chapters 3 and 4.

In chapter 3 we present the results of a study of the physical, mental, and social
characteristics two and six weeks after amputation, the functional outcome one year
after amputation, and the predictors for functional outcome of elderly patients with
a unilateral lower limb amputation. The functional outcome was assessed with the
Sickness Impact Profile, 68 item version, the Groningen Activity Restriction Scale,
the Timed “up & go” test, and a scale for prosthetic use.

In chapter 4 the relationship between physical, mental, and social impairments,
and the level of activities and participation of amputee patients one year after their
amputation was assessed. The International Classification of Functioning and
Disability (ICIDH-2) describes the relationship between structural or functional
impairments, activities, and participation, influenced by environmental and personal
factors.10 Understanding how these items are related to chronic diseases increases the
understanding of the courses of illness and the differences between patients with the
same or with different diseases. Rehabilitation specialists base their treatment of
people with chronic diseases on the correlation between impairments, activities, and
participation. The main goals are set at regaining independence in daily activities and
full participation in daily life. Knowledge of these factors for the different patient
groups is important.

In chapters 5 to 8 we concentrate on people between 18 and 60 years of age
with a leg amputation. Epidemiologic data for this group of amputee patients in the
Netherlands and their quality of life are described in chapter 5. Vocational
integration of people with chronic diseases is important and many job rehabilitation
programs are being developed. Before starting a job rehabilitation program for a
population with a specific disease or handicap, it is important to know the current
employment status of these patients and the problems they experience in work or in
finding work. The program should be adjusted to the specific problems of the
patients. Thus far, the employment status of patients with a lower limb amputation
has been very unclear. Only a few articles mention the return to work or school of
amputee patients. The most detailed study is that of Millstein et al,11 in which they
describe the employment status of employees with an amputation of the upper or
lower extremity due to accidents at work, revealing a high return to work but many
changes in occupational groups after amputation. Some other studies only mention
the number of patients that returned to work without describing any other details.12-17
The percentage of return to work varies from 30 to 90% and these studies only
included patients with an amputation due to trauma.

In chapter 6 we describe the occupational situation at the time of the
amputation and the current employment status of people with a lower limb
amputation in the Netherlands. Current employment status is described with respect to job participation, type of job, adjustments at the workplace, and the person’s position in the company. In addition, we compare the health experience of amputee patients to a nonimpaired reference population as well as the health experience of working and nonworking patients with amputations. We study demographically related, amputation-related, and employment-related factors that show a relationship to successful job reintegration of patients after a lower limb amputation in chapter 7. It is important to know which patients are at risk of failure to return to work. Extra attention to return to work during the rehabilitation process is necessary for these people. In general, job participation is important but job satisfaction plays a role as well. Determinants of the vocational satisfaction of working amputee patients and a comparison with the job satisfaction of able-bodied colleagues are described in chapter 8.

In chapter 9 we discuss the clinical implications of our research while giving advice for the management of the rehabilitation of amputee patients. In addition, advice for further research about the different topics is included.
References