Chapter 1
General Introduction
A person’s hands are very important tools in everyday life. People communicate and express themselves using their hands, they work with their hands, and they make contact with others by using their hands. It is therefore not very difficult to imagine that many facets of life can be affected when a person has a very visible condition like hand eczema. Hand eczema has a very profound effect on quality of life, as it may affect people’s mental health, mood, and social life. The hands are one of the most visible parts of the body, and therefore, hand eczema draws the attention of others. The more severe the hand eczema is, the more one’s quality of life will be affected. Moreover, hand eczema is not a condition that is easily cured, as it has a poor long-term prognosis.

Irritant and allergic hand eczema

The two most common forms of hand eczema are irritant contact dermatitis and allergic contact dermatitis, the latter of which is the most prevalent subtype. Of those affected by hand eczema, 80% have irritant contact dermatitis. Symptoms associated with hand eczema are erythema, papules, scaling, fissures, itch, and pain.

Allergic contact dermatitis occurs when a person comes in contact with an allergen that they have a history of being sensitive to. Allergens that can cause this type of hand eczema are, among others, nickel, preservatives, and rubber accelerators. Irritant contact dermatitis is caused by repetitive exposure to irritants that can lead to decreased barrier function of the skin and a decrease in epidermal water content. Furthermore, the type of irritant and the intensity of contact with this irritant determine whether hand eczema will develop. Examples of irritants are water, detergents, cleansers, and chemicals. In addition, wearing occlusive gloves can be an irritant as well, as the hands become moist whilst wearing gloves.

Whether a person develops hand eczema is not solely dependent on the exposure to certain irritants or allergens, but also on an individual’s susceptibility. Risk factors related to susceptibility are having asthma, hay fever, and/or atopic dermatitis.

A focus on work: high risk professions

In certain professions, workers are exposed to irritants and/or allergens very frequently and are therefore at risk for developing hand eczema. While the life-time prevalence in the general population is 15%, the one-year prevalence among for instance nurses has been reported to be as high as 29%. The incidence of contact dermatitis related to work is estimated to be between 11 to 86 patients for every 100,000 workers. The highest incidence rates for hand eczema per profession are found for bakers, hairdressers, and dental surgery assistants, while the highest numbers are found in healthcare professionals.
workers, kitchen workers, and factory workers\textsuperscript{15}. As a result, contact dermatitis is one of the most reported occupational disease in many countries\textsuperscript{6}.

Alongside quality of life being affected\textsuperscript{16}, hand eczema can have a very profound effect on one’s job and job performance. Workers can lose their jobs as a result of hand eczema, or they have to change jobs\textsuperscript{14}. In addition, many workers report sick leave because of their symptoms\textsuperscript{14}, and many report interference with their work, as well as troubles while performing their work\textsuperscript{16}. Aside from the problems this might cause a worker, employer costs associated with sick leave due to hand eczema are annually more than €6,000 per worker\textsuperscript{17}. In addition, annual costs for medication for hand eczema are estimated to be more than €2,500 euro per patient\textsuperscript{17}.

**Why healthcare workers are an important group for prevention**

Considering the arguments mentioned above, the prevention of hand eczema in an occupational setting is necessary. However, there continue to be many workers who are at risk for developing hand eczema. Which occupational group should thus be given priority?

First of all, prevention should be aimed at groups with a high risk for developing hand eczema\textsuperscript{18}. One such occupational group, with high prevalence rates, is that of healthcare workers. The \textit{1-year} prevalence of hand eczema in this group is around 20\%\textsuperscript{13,19}. They are often exposed to irritants that can cause hand eczema, like water, soap, and occlusive gloves\textsuperscript{20}. Therefore, this group can be classified as a high risk group, in regard to hand eczema. In addition, in the Netherlands, healthcare is one of the most populated sectors of work: 1.3 million out of a working force of 7.3 million\textsuperscript{21,22}. Almost all of these healthcare workers are at risk for developing hand eczema. Moreover, nurses are, especially, among those that most frequently change jobs because of their hand eczema\textsuperscript{18}. These arguments support the choice of having healthcare workers as the target group of implementation of preventive measures. However, there is another reason why prevention of hand eczema should focus on this group.

Healthcare workers have to comply with hand hygiene protocols during their work to reduce the chance of spreading healthcare related infections to their patients\textsuperscript{23}. Healthcare workers with hand eczema, however, have more bacteria on their hands compared to workers without hand eczema\textsuperscript{24}. In addition, damage to the skin – one of the symptoms of hand eczema – is one of the main reasons mentioned by healthcare workers as to why they perceive it to be difficult to comply with hand hygiene rules\textsuperscript{25}. As healthcare workers with hand eczema might thus be a risk for the infection prevention in hospitals, it is an important group to target preventive measures for hand eczema on.

**Primary and secondary prevention of hand eczema**

To reduce the prevalence of hand eczema among healthcare workers, both primary and secondary prevention might be suitable. As damaged skin makes it difficult to comply with hand hygiene rules\textsuperscript{25}, healthy and undamaged skin might facilitate compliance with these rules. Therefore, primary prevention seems to be necessary in this context. However, within a hospital, it is likely that many healthcare workers already have (symptoms related to) hand eczema, considering the aforementioned
prevalence rates of the condition among this group. Continuing work while having hand eczema symptoms is not only risky in terms of spreading infections to patients, but might also lead to the hand eczema persisting, as was found by Mälkonen et al. The prevention of hand eczema among healthcare workers must thus be approached dually, via primary and secondary prevention.

**Recommendations to prevent hand eczema**

The prevention of hand eczema is based on two principles: 1) avoiding exposure to the irritant or allergen causing hand eczema; and 2) applying skin protection during work. Based on these principles, the Netherlands Society of Occupational Medicine (NVAB) developed a guideline based on the best available evidence and expert opinion. The goal of the guideline is to prevent contact dermatitis in an occupational setting. The recommendations in this guideline are as follows:

1. Use a disinfectant instead of water and soap when hands are not visibly dirty.
2. Avoid contact with water and soap by using gloves.
3. When wearing gloves longer than 10 minutes, wear cotton under the gloves as well.
4. Use a moisturizer on a daily basis, at least 6 times a day.
5. Do not wear jewellery during work.

**Problems with prevention of hand eczema in a healthcare setting**

To prevent hand eczema among healthcare workers, the workers should comply with the recommendations from the NVAB guideline. However, there are some implementation problems.

First of all, the recommendations might be difficult to comply with. Although using disinfectants is quite common among healthcare workers, complying to this recommendation might be difficult, as many healthcare workers report a burning sensation when applying disinfectant to their skin. They consider disinfectants as more caustic and harsh to their skin compared to using water and soap, which may decrease their compliance. However, the belief that disinfectant is harsher is incorrect. The burning sensation is not caused by the disinfectant itself, but by the fact that the skin is already damaged, and that is the reason why they experience pain when using disinfectants. Furthermore, some workers experience palm/hand sweating while wearing gloves, which they report to be unpleasant, which can also be a barrier for compliance. Wearing cotton under gloves absorbs the bothersome sweat, however, doing so can diminish hand dexterity and dexterity is important when performing delicate tasks. In addition, moisturizers can make hands slippery and greasy, which makes the tasks of a healthcare worker more difficult to perform.

Secondly, another problem is that of primary and secondary prevention of hand eczema. Primary prevention is difficult, as people do not (yet) experience problems and are therefore not always motivated to alter their behaviour. In addition, in regard to secondary prevention of hand eczema, many healthcare workers consider hand eczema symptoms as a standard side effect of their job and might therefore not be alarmed by it. These issues with primary and secondary prevention thus make it
difficult to convince healthcare workers of the need to comply with the recommendations from the NVAB guideline.

Thirdly, guidelines are generally often not implemented into the daily practices of the healthcare setting. Many factors at different levels can both inhibit or enhance the uptake of an innovation in clinical practice, such as the rules and regulations of a hospital, the support healthcare workers receive from supervisors and/or colleagues, and also factors that are related to the guideline itself.

**How to study an implementation problem?**

To sum up, several obstacles can be expected when implementing the NVAB guideline among healthcare workers. Therefore, to prevent hand eczema, more is needed than simply distributing the guideline to healthcare workers.

A way to facilitate the implementation of a guideline is by developing an implementation strategy. According to Curran et al., an implementation strategy is a combination of methods to enhance the adoption of an intervention, or in this case a guideline. Examples of effective implementation strategies are education, feedback, and reminders. However, an implementation strategy is not a ‘one-size-fits-all’ solution. An implementation strategy should focus on specific barriers for implementation related to, for instance, the setting or the target group. Therefore, a specific strategy needs to be developed to implement the recommendations from the NVAB guideline among healthcare workers in the Netherlands. This leads to the following objectives of this thesis:

**Objectives**

1. To develop a multifaceted implementation strategy to prevent hand eczema among healthcare workers in the Netherlands;
2. To investigate the prevalence of hand eczema among healthcare workers in the Netherlands, and the productivity losses associated with hand eczema;
3. To identify barriers and facilitators that arise in the use of the multifaceted implementation strategy and the implementation of the NVAB guideline in a healthcare setting;
4. To evaluate the (cost) effectiveness of a multifaceted implementation strategy to prevent hand eczema among healthcare workers in the Netherlands.

**Outline of the thesis**

Chapter 2 describes the development of the Hands4U study: the design of the multifaceted implementation strategy for the prevention of hand eczema, including the design of the effect evaluation. In chapter 3, the prevalence of hand eczema and associated absenteeism and presenteeism are reported for the study population of Hands4U. Chapter 4 focuses on the process evaluation of the multifaceted implementation strategy. In chapter 5 and 6 barriers and facilitators within the implementation of the NVAB guideline are presented, as well as within the role of role model. Chapter 7 through 9 describe the (cost) effectiveness evaluations of the Hands4U study. In chapter 7 the effects on behaviour and behavioural determinants after a 6 months follow-up are discussed, chapter 8 contains
the effect evaluation after a 12 months follow-up for behaviour and hand eczema, and chapter 9 describes the cost-effectiveness evaluation of the Hands4U study. This thesis closes with a general discussion of the main findings, and recommendations for practice and research, which are presented in chapter 10.
REFERENCES

21. Centraal Bureau voor de Statistiek [Statistics Netherlands]. Heeft werk voor twaalf uur of meer per week (Werkzame beroepsbevolking) [Has work for 12 hours or more per week (Working force)]. Centraal Bureau voor de Statistiek [Statistics Netherlands]. 2013. 16-1-2014.