

Barriers and facilitators in the implementation of recommendations for hand eczema prevention among healthcare workers

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Summary

Background. Evidence-based recommendations are available for the prevention of hand eczema among healthcare workers. However, the implementation of these recommendations is not always successful.

Objectives. To identify barriers and facilitators in the implementation of recommendations for the prevention of hand eczema among healthcare workers alongside a randomized controlled trial.

Methods. A qualitative study was performed in which 19 healthcare workers were interviewed. The interview transcripts were open coded and also coded by means of a template by two researchers to identify relevant barriers and facilitators.

Results. Most barriers and facilitators reported for the recommendations were found at the level of the innovation (e.g. the recommendations), whereas for the guideline as a whole, multiple levels (socio-political, organization, user, and facilities) were identified.

Conclusions. To enhance the implementation of recommendations for the prevention of hand eczema in a healthcare setting, having knowledge about these recommendations seems to be an important first step. In addition, maintaining the attention of the subject, testing the products beforehand and close collaboration with the infection control department might enhance implementation. Furthermore, it is important that the recommendations fit in with the work of the healthcare workers. When the implementation of the recommendations is prepared, these points should be taken into account.

Key words: barriers; facilitators; guideline; hand eczema; healthcare workers; implementation.

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Hand eczema is one of the most prevalent occupational diseases (1), affecting both the quality of life of a patient (2, 3) and the patient's productivity at work (4). Healthcare workers have an increased risk of developing this condition, as they are exposed to irritants – such as water, soap, and gloves – during their work (5, 6).

For many years now, there have been evidence-based recommendations available for the prevention of hand eczema in an occupational setting (7). Several studies aimed to implement these recommendations by boosting compliance with these measures among healthcare

workers (8–11). However, these studies did not always succeed in implementing all of the recommendations (8–11), which led Dulon et al. to the conclusion that more research is needed to investigate why the implementation of skin care programmes at the workplace is not always successful (8).

Two studies explored the implementation of a skin care programme for hand eczema in an occupational setting (12, 13). They found – among other things – that workers comply with the recommendations for the prevention of hand eczema when they have hand eczema themselves, and that it is vital to have a participatory implementation strategy (12, 13). However, although these studies investigated the implementation of skin care programmes in an occupational setting, they did not look into barriers and facilitators regarding each specific recommendation for the prevention of hand eczema. It is important to investigate specific implementation problems per recommendation, as these might differ per recommendation (14).

Recently, a multifaceted implementation strategy was developed to prevent hand eczema among healthcare workers in The Netherlands (15). The goal of the strategy was to implement evidence-based recommendations for the prevention of hand eczema among healthcare workers. These recommendations were derived from the guideline ‘Contact Dermatitis’ from the Netherlands Society for Occupational Medicine (NVAB) (16). The strategy was evaluated in a randomized controlled trial, called the ‘Hands4U’ study (15).

The aim of this study was to identify barriers and facilitators in the implementation of evidence-based recommendations for the prevention of hand eczema among healthcare workers. The study was conducted alongside the Hands4U study.

Materials and Methods

Study setting and intervention

This was a qualitative study. The study was approved by the Medical Ethics Committee of the VU Medical Centre. The participants in this study participated in the intervention group of the Hands4U study and received the multifaceted implementation strategy. The study was performed within several departments in hospitals throughout The Netherlands (Amsterdam, Groningen, Nijmegen, Stadskanaal, Delft, and Naarden).

The multifaceted implementation strategy consisted of five components: (i) education about (the prevention of) hand eczema; (ii) a leaflet with recommendations (listed in Table 1) for the prevention of hand eczema; (iii)

Table 1. Main recommendations for the prevention of hand eczema

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| 1. Use disinfectant instead of water and soap to disinfect the hands |
| 2. Wear gloves when performing wet work |
| 3. Wear cotton undergloves when you wear gloves for longer than 10 min |
| 4. Use a moisturizer on daily basis to nurse the skin |
| 5. Do not wear jewellery at work |
| 6. Perform as little wet work as possible |

reminders (posters) containing the recommendations for the prevention of hand eczema; (iv) role models; and (v) participatory working groups.

The central part of the strategy consisted of the participatory working groups. Within each intervention department, a working group was formed. The members of the working group were selected by the department manager, on the basis of representativeness, their influence on colleagues, and their motivation to take part in the working group. The goal of the working groups was to identify problems with adherence to the recommendations within their respective departments, to find solutions for these problems, and to implement solutions. Working groups followed the aforementioned steps in three meetings; in an additional meeting, working group members were also trained to become role models for their colleagues. They were taught how to give a good example in relation to adherence to the recommendations for the prevention of hand eczema, and to help and encourage colleagues to adhere to these recommendations.

In total, 23 departments participated in the formation of intervention groups, and 24 working groups were formed. Each working group consisted of approximately 5 working group members (range: 3–13). The departments that received the intervention were located at two university hospitals (Groningen and Nijmegen), one academic centre for dentistry (Amsterdam), and one general hospital (Stadskanaal). The hospital in Groningen was the largest hospital, with ~12 000 employees, followed by Nijmegen with ~10 000 employees, Stadskanaal with ~800 employees, and Amsterdam with ~500 employees. Groningen also represented the largest group of intervention participants ($n = 573$), followed by Nijmegen ($n = 235$), Amsterdam ($n = 48$), and Stadskanaal ($n = 20$).

Recruitment and sampling

Working group members were invited to participate in the interviews. We used convenience sampling for the recruitment of the participants. We recruited them in three different ways: (i) by asking them to participate at the end

of the last meeting of the working group; (ii) by sending them an e-mail with the request to participate; and (iii) by means of a question in a questionnaire that the working group members had to fill out online. Although we used convenience sampling, we strived to obtain a variety of participants based on the following characteristics: sex; the department and the hospital where the participants were working; having an executive function or not; and having patient contact or not. In total, we interviewed 19 of the 111 registered working group members.

Study population

The participants in the interviews were spread over four different locations: Amsterdam ($n = 1$), Stadskanaal ($n = 1$), Nijmegen ($n = 4$), and Groningen ($n = 13$). They worked at 14 different departments. Of the participants, 12 worked at a department with patient contact (i.e. intensive care unit, surgical units, and dentistry), 3 worked in a kitchen, 2 worked in a laboratory, and 2 worked in the hospital's pharmacy. We considered all workers who work in a hospital as 'healthcare workers'. We interviewed 6 working group members with an executive function. Of the participants, 4 were men and 15 were women.

In Table 2, the total population of working group members was compared with the population of interviewees. Table 2 shows that all characteristics of the total population are represented by one or more interviewees.

Interviews

The interviews were conducted by E.W.C.M., the principal researcher of the study. Before the start of the interview, participants received information about the content and duration (± 45 min) of the interview. The interview covered several topics. In this article, we focus on: barriers and facilitators in the implementation of the recommendations for hand eczema; and the implementation strategy as a whole.

Except for four interviews, all of the interviews took place in a quiet room at or near the department where the participant worked. One interview was conducted at the participant's home, for practical reasons. Three interviews were conducted at the department where the participant worked, but took place in a room where there were other people present – mostly colleagues of the participant. However, the participants were not reluctant to speak freely. Also, one interview was conducted with 2 participants from the same department at the same time, for reasons of convenience.

We used a structured interview guide (Appendix 1) to ensure that all topics were covered during the interview.

Table 2. Characteristics of the working group population and the interviewees

	Total (n)	Working group population (n = 111)	Interviewees (n = 19)
Age (years), mean (SD)	95	41.0 (10.9)	38.0 (11.0)
Female, n (%)	109	91 (83.5)	15 (78.9)
Education*, n (%)	96	–	–
Low	–	0 (0.0)	0 (0.0)
Middle	–	34 (35.4)	5 (33.3)
High	–	62 (64.6)	10 (66.7)
Department, n (%)	111	–	–
Patient	–	89 (80.2)	12 (63.2)
Laboratory	–	11 (9.9)	2 (10.5)
Kitchen	–	6 (5.4)	3 (15.8)
Pharmacy	–	5 (4.5)	2 (10.5)
Hospital	111	–	–
Groningen	–	73 (65.8)	13 (68.4)
Nijmegen	–	22 (19.8)	4 (21.1)
Amsterdam	–	11 (9.9)	1 (5.3)
Stadskanaal	–	5 (4.5)	1 (5.3)
Years in present job, mean (SD)	95	12.8 (10.4)	11.5 (11.6)

SD, standard deviation.

*Low education = primary school. Middle education = basic vocational education, secondary vocational education, or high-school degree. High education = higher vocational education or university degree.

The interview guide was developed before the start of the first interview. During the interviews, participants were asked about the implementation of recommendations for the prevention of hand eczema within their department, and whether they observed any barriers or facilitators related to the implementation of these recommendations. At the end of the interview, the participants were asked whether they thought that we covered all of the important topics, and whether they wanted to add anything. Most participants declared that all topics were covered. The participants' additions were mostly questions on how the research project went, and when the results of the Hands4U project were to be expected.

The interviews took 30–60 min, a timeframe that proved to be sufficient for all of the topics to be covered. Each interview was recorded and fully transcribed. The interviews were planned to occur after working group meetings, within the department in which the meetings took place (i.e. at least 3 months after the start of the intervention period).

Analysis

The interviews were transcribed verbatim. Interview transcripts were both open coded and coded by means of

a template to identify relevant barriers and facilitators. The interview transcripts were coded independently by E.W.C.M. and D.D. Only the first interview was coded by E.W.C.M. and D.D. together, to generate a list of possible barriers and facilitators. This list was the starting point (template) for the coding of the other interviews. When new facilitators or barriers were identified, these were added to the list. As we used convenience sampling, we interviewed all participants who were willing to take part in an interview.

During consensus meetings, E.W.C.M. and D.D. ensured uniformity of the identified barriers and facilitators. After all the interviews had been coded, E.W.C.M. and D.D. checked independently whether all the quotes were given the right codes, and whether the codes could be grouped together or could be split up. These checks were discussed during a consensus meeting. A third researcher, J.W.J.G., resolved disagreements between the two researchers on the coding, and gave advice. Quotes were used to illustrate the meaning of the barriers and facilitators in the participants' own words. These quotes were translated from Dutch into English. After each quotation, the available information about the participant's sex, age (years), education (low, middle, and high) and the number of years that the participant had worked in the present job (years of experience) were presented.

In addition to identification of the barriers and facilitators in implementation, the transcripts were also coded into the recommendations for the prevention of hand eczema (Table 1). Quotes that did not relate to specific recommendations or that were mentioned for (almost) all of the recommendations were coded as 'Implementing the guideline as a whole'. In this way, barriers and facilitators were identified for each separate recommendation. The reason for making this division was that Lugtenberg et al. (14) stated that each recommendation in a guideline might have different barriers and facilitators.

In the Results section, barriers are indicated by 'B' and facilitators by 'F'.

Results

Recommendation 1: Use a disinfectant instead of water and soap

A facilitating factor for this recommendation was that the recommendation could be combined with the hand hygiene rules of the department (F); the infection control department also supports the use of disinfectant over water and soap (F). On the other hand, water and soap felt more hygienic according to some participants (B). Others found a disinfectant too painful to use, as 1 participant explained (B). Interviewee: 'Unconsciously you clean

your hands less carefully, because it stings a bit. Then you do it a bit fast like [rubs her hands] and ...' Interviewer: 'Because it is just too painful.' Interviewee: 'Yes' (participant 9, woman, aged 27 years, education high, 8 years of experience). However, a positive experience with disinfectant facilitated the use of the product (F).

Knowledge was perceived as a facilitator. One participant mentioned: 'For me, it really was an eye-opener as well, the use of soap and disinfectant, I have mixed these two up ... It's just lack of knowledge, and the information that was given about the subject worked really well. I will never forget it again' (participant 14, woman, aged 43 years, education high, 0 years of experience). A lack of knowledge or wrong assumptions about disinfectant could make it difficult to use a disinfectant instead of water and soap (B). Some participants thought that disinfectant made their eczema worse (B), and others had doubts about whether it truly is as good as water and soap for disinfection (B). In addition, participants indicated that it was difficult to switch from water and soap to disinfectant, as it is a habit to use the former (B). Many participants were taught to use water and soap, and are therefore used to it.

Some participants mentioned that the transition from using water and soap to using disinfectant was a small step, and therefore easy to make (F): 'We do have this protocol saying that when you come in: wash your hands, use disinfectant. These are things you always have to do anyway. And now, instead of washing your hands, you use disinfectant more often' (participant 3, man).

The dispenser containing the disinfectant was sometimes difficult to use, because it did not work well (B), or was not recognizable as containing disinfectant (B). Placing the dispenser in an accessible place (F) and increasing availability (F) were mentioned as facilitating factors. However, the placement of disinfectant was sometimes delayed, because it was difficult to place dispensers in the building, owing to housing rules (B). Cumbersome procedures and slow decision-making could delay the process of implementing this recommendation (B). One participant mentioned: 'The dispenser for the disinfectant. I'm sorry to disappoint you that it still has not been placed. That is merely due to the hospital bureaucracy. So many people have to decide about a little dispenser that it still isn't there' (participant 1, man, aged 29 years, education high, 13 years of experience).

Recommendation 2: Use gloves when performing wet work

The participants considered it to be facilitating when the gloves fitted in with their work (F) or the preferences of

workers (F). However, gloves were not always perceived as pleasant (B) or practical (B): 'The gloves we have right now come up to here [wrist] and we are often cleaning large pan and things like that, so when you put your hands in those things, then your gloves fill up with dirty water, warm water with soap enters, so there is pretty much nothing worse than that' (participant 1, man, aged 29 years, education high, 13 years of experience). Participant 1's department (kitchen) searched for longer gloves, as they were more suitable for the type of work performed (F). Other facilitators were an increased awareness among the workers about when they should wear gloves (F), and the fact that wearing gloves is often related to other goals within the department, such as wearing gloves when in the presence of patients in isolation (F).

In some cases, products that were needed for the implementation were lacking (B), inhibiting the implementation of glove use, as a participant explained: 'Because the showers sometimes become really humid, the gloves have to be stored adequately. Well, what kind of holder or cupboard or things like that, she is still working on those things, I know' (participant 13, woman, aged 28 years, education high, 5 years of experience). Another barrier was that wearing gloves during wet work was not a habit (B), and that not wearing gloves did not always lead to complaints related to hand eczema, so the need to wear gloves during wet work was not always acknowledged (B).

Recommendation 3: Wear cotton undergloves after 10 min of glove use

The participants indicated that they noticed that it was important for their colleagues to test using cotton under their gloves (F). A positive experience with cotton undergloves (F), for instance the feeling of the product (F) and its effects (F), made people more willing to wear them: 'Well, what plays a part is, with the humidity of the hands, people experienced the effect of the dryness which stimulated them to do it [wearing cotton undergloves]' (participant 4, woman).

A barrier was the decrease in sensation in the fingertips when cotton undergloves were worn, making delicate work more difficult (B). Interviewer: 'What is the reason why they did not find it [wearing cotton undergloves] pleasant?' Interviewee: 'Because our work is very delicate. And you just feel less. And you already feel less, because you wear gloves. I think that is the main reason' (participant 11, woman, aged 42 years, education high, 3 years of experience). There were also other problems related to this subject, such as the size of the cotton undergloves (too small/too big) (B), the temperature (too hot) (B), the material (B), and the fact that too many

steps were required to put them on (B). These barriers were not always based on experience, but sometimes on prejudices. To overcome these barriers, alternative gloves were sought that lacked finger(tip)s, so that the sense in finger(tip)s would not be decreased (F). Their colleagues sought out specific tasks (F) or moments to wear cotton under their gloves (F); for instance, when wearing gloves for a long time or when their tasks were not too delicate: 'It depends a bit on what kind of glove you put on and what kind of work you do. There are, of course, activities that do not rely on your fingertips that much. Or very large gloves, like the safety gloves. Then they [the cotton undergloves] are worn by the people who consider it as important' (participant 16, woman, aged 57 years, education middle, 34 years of experience). At some departments, the working group or manager asked their colleagues whether they liked the cotton undergloves and how many times they used them (F).

Another barrier was that the participants did not know how to deal with the product in terms of prolonged use (B): throw them away after use or wash them? One participant explained: 'And how do you want to arrange it. Do you want to throw them away or do you want to wash them? It is, of course, not possible to wash them together with the normal laundry. That is, of course, rather difficult' (participant 10, woman, aged 28 years, education high, 1 year of experience).

Cost was both a facilitator and a barrier. Departments found the cotton undergloves too expensive to use (B). On the other hand, 1 participant mentioned that she expected the costs to be low, as she expected that very few people would use the cotton undergloves (F). It was not clear whether she expected this because she thought that few people would comply with this recommendation, or because she thought that few people needed cotton undergloves.

Some hospital departments did not always agree with the recommendation for cotton undergloves, because there were doubts about whether the infection control department would agree with it (B), they considered the cotton undergloves to be unhygienic (B), or they found it unnecessary to use them for primary preventive purposes (B).

Recommendation 4: Use a moisturizer on a daily basis

Regarding the use of a moisturizer at work, participants considered a moisturizer that everyone found pleasant to use (F) as facilitating, and an unpleasant product (B) as hampering. Aspects that were related to a pleasant or an unpleasant product were – among other things – the smell (B and F), touch (B and F) and greasiness of the

moisturizer (B and F). A product that was too greasy was not only found to be unpleasant (B), but could also impose limitations on work (B), as 1 participant illustrated: 'Because when you are preparing injections with those greasy hands, I don't like it. And I am not the only one' (participant 14, woman, aged 43 years, education high, 0 years of experience). Having multiple brands at the department could solve part of the problem, as individuals could then choose the products they liked (F). Working groups tried to achieve this by testing several brands (F). One participant explained: 'Well, so we now have two moisturizers, so everyone has a moisturizer of his or her preference, so that cannot be the reason any more' (participant 5, woman, aged 41 years, education high, 1 year of experience).

In addition, the placement of the moisturizer could increase or decrease the use of the product, such as when the product was in a visible or an invisible (B and F) place, or in an accessible or inaccessible place (B and F), or when the product was a fixed place within the department (F). A participant explained: 'So I have placed those tubes in the coffee room and people grab them regularly. You see one of those tubes and then after lunch, during midday. Then it is just ... It has to be visible, hasn't it, then it works' (participant 6, woman, aged 61 years, education middle, 37 years of experience). Increasing the availability of moisturizers within departments functioned as a facilitating element (F).

Seeing other people using a moisturizer encouraged others to do so (F): 'Well, the salving with the moisturizer. I notice that more staff members do that ... If one person does it, the other one thinks: "Oh, right, I have to do that as well"' (participant 12, woman, aged 48 years, education middle, 21 years of experience). However, colleagues using a moisturizer during work were not always visible to others (B).

Not having hand eczema reduced the use of a moisturizer (B), whereas having hand eczema facilitated it (F). Especially in the winter, the participants noticed that more people used it, because they developed hand eczema symptoms (F). When they saw that the moisturizer worked to reduce their symptoms, they tended to use it more often (F). One participant mentioned that it is important to use a moisturizer to protect the hands against hand eczema, as the hands are vital for their work (F). Another participant mentioned that when the recommendation to use a moisturizer is evidence-based more people are willing to comply with it (F).

Participants stated that it is difficult to change behaviour, because it is not a habit to use a moisturizer (B), and in the rush of the day people forget to use it (B). Posters helped people remember to use a moisturizer,

and thereby facilitated its use (F). Some participants stated that their colleagues forgot to moisturize their hands at work (B): 'And often in the coffee room. In that room is a lot of chatter and things like that, and then people won't do it [using moisturizer]' (participant 6, woman, aged 61 years, education middle, 37 years of experience).

Other barriers were the cost of the product (B) and having a lack of knowledge. The lack of knowledge related to how a moisturizer can prevent hand eczema and the belief that a body lotion is a good product for preventing hand eczema proved to be barriers (B).

Recommendation 5: Never wear jewellery at work

Participants indicated that it is difficult not to wear jewellery, because it is a habit to wear it (B): 'But it strikes me that after the summer you always see someone wearing a ring or that you ... It is not the type of behaviour that you can change after saying it one or two times, it keeps repeating itself' (participant 12, woman, aged 48 years, education middle, 21 years of experience). According to this participant, people did not consider wearing their jewellery to be a disadvantage, and therefore continued to wear it (B).

Facilitators for this recommendation were the similarity with the pre-existing hand hygiene rules of the department (F), and having lockers at the department to safely store the jewellery (F).

Recommendation 6: Perform as little wet work as possible

Facilitators for this recommendation were removing all products that were not needed any more, such as the washtubs (F), and ensuring that the removed products were not replaced (F). One department replaced their washtubs with microfibre cloths that could be heated in a microwave. One participant shared the following: 'And then the washtubs were gone, no, there were no washtubs any more. Not a single one. Well, if you want to make a switch you have to do it rigorously, because if you would have kept the washtubs, like leave it to everyone themselves, then it will not work' (participant 6, woman, aged 61 years, education middle, 37 years of experience).

Another department tried the same by letting patients wash themselves more often, and by using a microfibre cloth instead of water and soap for cleaning. It was difficult for the staff to comply with this measure. The staff were used to nursing their patients (B), and some patients were too ill to wash themselves (B): 'It stems from our past anyway. Let's call it the caring. But the people who come here are, of course, very ill and very short of breath. So you

already tend to take it over from them. And yes, patients will allow it more frequently, because you are, of course, very sick' (participant 5, woman, aged 41 years, education high, 1 year of experience).

Within departments that made the switch from wash-tubs to microfibre cloths, some participants preferred to use the washtubs instead of the cloths (B), and some patients preferred to be washed in washtubs (B). In contrast, participants also stated that washtubs were found to be more pleasant (F), less time-consuming (F) and more hygienic (F) than microfibre cloths. In addition, the microwave oven used for heating the microfibre cloths was programmed in such a way that it was very easy to use (F).

Other facilitators were as follows: the new way of working fitted in with the work that had to be performed (F); the change to cleaning with a microfibre cloth was very small, and therefore not difficult to make (F); and a protocol was created on how to use the microfibre cloths and cleansers (F). This protocol was placed near the cleansers for everyone to see (F).

Implementing the guideline as a whole

Both knowledge (F) and awareness (F) were found to be facilitators for the implementation of the guideline for the prevention of hand eczema. Participants indicated that people became more aware of their risk of developing hand eczema (F), and the importance of having healthy hands for their work and daily functioning (F). Having this knowledge, including knowledge about risk factors, was an important first step for the implementation (F). Not having knowledge about hand eczema was a barrier to the implementation (B). A participant explained: 'Because of the awareness people think like: I have an increased risk. On the one hand, that makes things easier. You always have people who have resistance, but for many people it was just a wake-up call' (participant 8, woman, aged 31 years, education high, 9 years of experience). Also, the education session given by the Hands4U team was mentioned as being a facilitator (F). The education session worked as a facilitating element, because the workers, within their respective departments, took the subject more seriously afterwards (F). In addition, it was found to be important that the information provided at the educational sessions was well disseminated and reached all workers (F).

The implementation of the guideline could be hampered or facilitated depending on whether there was continuing attention to hand eczema (prevention) (B and F). The attention to this could diminish when it was not a topic of interest any more (B), or because working group

members were replaced (B), thereby decreasing the continuity of the project. Changes in staff also constituted a barrier related to this topic (B): the question then being, how to keep everyone informed about the prevention of hand eczema when the population is continuously changing? At one particular department, little attention was given to hand eczema, as the department was in the middle of a restructuring (B). Participants indicated that attention could be maintained by repeating information regularly (F), by informing new employees about hand eczema prevention (F), and by having multiple persons within the department who focus on hand eczema (F): 'Sure you need someone who stays permanently, and who enjoys it, and who continues to make other people enthusiastic. That's something you really need' (participant 5, woman, aged 41 years, education high, 1 year of experience).

The role models played a role in the implementation of the guideline by stimulating the use of the recommendations in a positive (F), relaxed way (F), according to participants. Having enthusiastic role models was also important for the implementation of the guideline (F). In addition, the role models answered questions from colleagues (F), had discussions with their colleagues (F), and addressed their colleagues regarding their use of the recommendations (F).

'Department culture' was another facilitator. People being open to changes and innovations (F), and being used to speaking up when non-adherence to guidelines was observed (F), were both seen as facilitators of implementation.

The level of support from management hampered or enhanced the implementation (B and F). Having a supportive supervisor ensured that the subject was taken seriously (F). In addition, colleagues could be facilitators when they were supportive (F), but barriers when they had negative responses to the role models (B). This could lead to role models becoming inhibited when giving hand eczema prevention any attention, especially when they noticed that their colleagues were not enthusiastic about the subject (B).

Having colleagues with hand eczema increased awareness of risk among the workers, and stimulated the use of preventive measures (F), as 1 participant illustrated: 'Plus the fact that we could use that one colleague as an example, because it was very visible and then you notice that in people: "Yes, that's not something I want, so I will do, of course, my uttermost not to get it"' (participant 10, woman, aged 28 years, education high, 1 year of experience). However, hand eczema was not always considered to be a (big) problem within departments (B), according to the participants: 'What was and still is, is the reason why

actually, because that was difficult to explain. Because no one, we work in a pretty large group, no one recognized him or herself in the word “eczema”, so to speak. No one was confronted with it. At most one or two, but the whole reason for improvement was actually lacking for a lot of people’ (participant 4, woman).

Whether or not a participant had hand eczema was a barrier or a facilitator, respectively, in the motivation of people to use the recommendations (B and F). In addition, not everyone believed in the effects of the recommendations, especially those without hand eczema symptoms (B).

Several facilitators were related to actions and tasks within the working groups, such as making an implementation plan before starting the implementation process (F), and having a working group that consists of a representative group of workers from the department (F). In addition, the fact that multiple strategies were used (e.g. both the working group and role models) for the implementation was also considered to be a facilitator (F).

Hand eczema could be linked to the hand hygiene rules of a department, which was a facilitator (F). Other rules were found to be impeding, as 1 participant illustrated (B): ‘But because we are strictly organized and have really clear boundaries of protocols, very few solutions were possible’ (participant 11, woman, aged 42 years, education high, 3 years of experience).

Other factors that influenced the implementation of the guideline were as follows: the changes being small and therefore not costly (F); posters making the recommendations visible (F); knowledge being exchanged between departments (F); people who were needed for implementation – including colleagues – being easy to reach (F); having the right preconditions for implementation within a department (F); the availability or unavailability of products within departments (B and F); people searching for causes of hand eczema outside work (B); difficulty with ordering products, as preferred brands were not always available in the ordering system of the hospital (B); and difficulties in planning educational activities that everyone could attend, owing to conflicting schedules (B).

Discussion

This study identified several factors that could inhibit or facilitate the implementation of the recommendations for the prevention of hand eczema among healthcare workers by using a multifaceted implementation strategy. Barriers and facilitators could be identified at different levels, for example for a specific measure or for the guideline as a whole. It thus seems important to investigate not only barriers and facilitators regarding specific

recommendations, but also factors related to the implementation of the guideline as a whole.

Implementing the guideline as a whole

Knowledge was an important factor for the implementation of the recommendations for the prevention of hand eczema. A review of the implementation of clinical guidelines showed that, in many cases, implementers are not aware of the content of a guideline, and increasing this awareness is therefore vital for its implementation (17). In addition, the participants in the present study noticed that having knowledge about the recommendations listed in the guideline was an important first step for implementation. Moreover, a study by Flyvholm and Frydendall Jepsen (12) found that having knowledge on the recommendations for the prevention of hand eczema empowered the workers, and increased their ability to pass on their knowledge. Giving an educational session about the guideline therefore seems to be a good step to begin with.

An important barrier in our study, which was also found by Mygind et al. (13), was that attention to the prevention of hand eczema diminished over time. However, the participants themselves came up with some interesting ideas to maintain this attention, such as having a person who keeps the topic on the agenda of the department. Introducing role models in the departments was a part of the multifaceted implementation strategy. However, our process evaluation showed that these role models were not always noticed by their colleagues (18). More effort might therefore be needed to strengthen the position of the role models within their department. However, it is not only the position of the role models that offers room for improvement. An open culture in the department and having a supportive supervisor might facilitate implementation as well. The latter was also pointed out by Fleuren et al. (19).

Having (symptoms related to) hand eczema facilitated the use of the recommendations from the guideline. Flyvholm and Frydendall Jepsen (12) found that people only act when they have complaints related to hand eczema. Moreover, our participants indicated that having colleagues with hand eczema could work as a facilitator as well. Perhaps being confronted with colleagues who have this disease increased the perceived susceptibility to hand eczema of the healthcare workers. Therefore, they might be more likely to comply with the recommendations. The perceived susceptibility is a determinant in the Health Belief Model. This determinant influences whether people will take action to prevent disease (20).

Implementation at the level of the recommendations

The use of a moisturizer was facilitating when people saw their colleagues using a moisturizer. This was also reported in the study by Fleuren et al. (19), who found that modelling (the extent to which colleagues implement the innovation) was an important factor for the introduction of innovations in healthcare organizations. Also, in this particular study, the role models could play a role by being good examples for their colleagues. However, as mentioned above, the effect of the role models needs to be established more firmly within departments.

An important factor for use of a moisturizer, the gloves and the cotton undergloves was that these products did not inhibit the healthcare workers' work and that they had to be compatible with the work performed. For the gloves and cotton undergloves, the participants themselves came up with some solutions to enhance how these strategies fit with their work, but they did not do this for the use of the moisturizer, which they found, among other things, too greasy to use. Instructing the healthcare workers on when to use a moisturizer, for instance during a break, might facilitate implementation.

For the cotton undergloves, there was a lot of resistance to use the product, mainly because it would reduce sensitivity in the fingertips. Two other qualitative studies also found this barrier to the use of cotton undergloves (21, 22). However, this barrier was also based on prejudices of the participants. In fact, many barriers to the use of cotton undergloves were identified before, rather than during, the implementation of this recommendation. Testing the product at an early stage might be an important first step to overcome the prejudices, as mentioned by the participants in this study, and as was suggested by Fleuren et al. (19).

Working together with the infection control department is of great importance for the implementation of the guideline. Agreement between the recommendations for hand hygiene and those for the prevention of hand eczema facilitates the implementation of disinfectant use and jewellery avoidance during work. However, the rules for hand hygiene inhibited the use of cotton undergloves, because participants were not sure whether wearing these gloves was in line with the hand hygiene rules. At the beginning of the study, we tried to overcome barriers related to the infection control department by informing this department about the study and by inviting them to join the working group meetings (15). However, only during very few working group meetings was a person from the infection control department present. It would therefore be advisable to ensure that this person is present

during at least one meeting of every working group, to overcome problems with the implementation of the cotton undergloves.

Hand eczema can also diminish compliance with the rules of infection prevention, as our participants mentioned that having hand eczema is a reason not to use disinfectant. A qualitative study by Erasmus et al. made the same finding (23). Also, the study of Visser et al. (24) among apprentice nurses found that participants decreased their use of alcohol gel rubs, because it hurt when they applied the gel to their hands. This makes it even more important to closely collaborate with the infection control department. Enhancing hand hygiene compliance (hand washing, disinfection, etc.) and preventing hand eczema should go together, as more hand hygiene might lead to more hand eczema, and more hand eczema might have negative consequences for infection prevention within a department (25).

The placement of the product was of importance for the moisturizer and the disinfectant. The product had to be in a visible, accessible place to be used by healthcare workers. The visibility of an innovation was also stressed in a study by Moore and Benbasat (26), but our study showed that an accessible place also stimulates the use of the product.

Barriers and facilitators in relation to a framework for innovations

From a theoretical perspective, barriers and facilitators can be classified into five categories: (i) socio-political (patients and rules/regulation); (ii) organization (department); (iii) user (healthcare workers); (iv) innovation (NVAB guideline); and (v) facilities (19). When we look at the separate recommendations, most of the barriers and facilitators regarding implementation are at the innovation level, for instance whether a recommendation is compatible with the work that has to be performed, whether it is appealing to use (i.e. smell of the moisturizer), and whether people see the advantage of using the recommendations (i.e. that it is more hygienic to use microfibre cloths than to use washtubs). Few barriers and facilitators are at the socio-political level, the organizational level, the level of the user, or the level of facilities. The last of these quite remarkable, as, for instance, time (a facility) is considered to be a major barrier to implementation (27). This was not supported by our findings.

The level of the user was mentioned mainly in relation to habits. According to Nilsen et al. (28), habits are considered to constitute one of the main reasons for

non-adherence to guidelines among healthcare professionals. In addition, the study by Mollerup et al. found that habits inhibited the use of preventive measures in patients with chronic hand eczema, despite their intentions to perform these behaviours (22).

Barriers and facilitators regarding the guideline as a whole are present at every level of the framework of Fleuren et al. (19). For the socio-political level, barriers and facilitators mainly relate to hand hygiene rules – as discussed in the previous paragraph – and, to a lesser degree, to the patients who healthcare workers work with. In the framework of Fleuren et al. (19), the patient is one of the major components of the socio-political level. In our study, however, the patient seems to play only a small role in the implementation of the guideline. This might be because the prevention of hand eczema in healthcare workers is not very visible for patients or does not alter the care of patients, as the guideline is targeted at the healthcare workers themselves and not at the patient. Only for the reduction in wet work was there clearly a patient factor, as patients did not always like to be washed with microfibre cloths. The patients had an interest here, but probably not with the other recommendations.

Barriers and facilitators at the organizational level were, among other things, related to the restructuring of the department or changes in staff. Barriers and facilitators at the level of facilities were, among other things, related to components of the Hands4U study, and had the right preconditions for implementation.

Strengths and limitations

This is the first study whose primary goal was to identify barriers and facilitators regarding the implementation of recommendations to prevent hand eczema in an occupational setting. Also, this study is the first to investigate barriers and facilitators regarding each separate recommendation. Although we used convenience sampling to recruit participants, the study population showed, coincidentally, a wide variety. Another strength of this study was that we double-coded all of the interviews. Because of this, the results were not coloured by the opinion of only one researcher. Furthermore, the results of this qualitative study are not limited to averages, but reflect the underlying reasons for certain actions. This is an advantage of qualitative studies over quantitative studies.

A limitation of this study is that we used convenience sampling instead of purposeful sampling. Because of this method of sampling, we were not able to strive to obtain a greater variety of participants. We interviewed

all participants who were willing to take part in the interview. This could have led to selection bias, as these participants might have been the most enthusiastic participants. As a consequence, this could have biased the results, as the more enthusiastic participants might have focused more on facilitators than on barriers. Second, the data analyses were performed after all interviews had taken place. As a result, the results from the first interviews did not guide the content of the following interviews. Moreover, the results of the interviews did not guide the number of interviews that were performed, as we stopped interviewing as soon as there were no more participants who were willing to take part in the interviews. Therefore, it is not known whether all of the barriers and facilitators were identified during the interviews. However, not many new codes were found in the last interviews, indicating that data saturation was almost reached. Another limitation was that the participants knew that the interviewer was the principal investigator of the study. This might have led to socially desirable answers during the interview. A final limitation of this study was that barriers and facilitators were identified alongside a randomized controlled trial. Other barriers and facilitators might have been identified when the participants were workers in a healthcare setting without participating in an intervention study, as the implementation of the recommendations in this study cannot be studied separately from the multifaceted implementation strategy. For instance, some facilitators were now related to the Hands4U study (working groups and role models). These facilitators would probably not have emerged when workers who were not involved in the Hands4U study were interviewed.

Conclusions

To enhance the implementation of recommendations for the prevention of hand eczema in a healthcare setting, having knowledge about these recommendations seems to be an important first step. In addition, maintaining the attention of the subject, testing the products beforehand and close collaboration with the infection control department might enhance implementation. Furthermore, it is important for the recommendations to fit in with the work of the healthcare workers, because, for the recommendations, most barriers and facilitators were related to the level of innovation itself. For the guideline as a whole, multiple levels were identified. It is important to take all of these factors into account when preparing the implementation of this guideline.

Appendix

Interview guide

Introduction

You participated in a working group of the Hands4U study. During the working group, you and your colleagues thought about solutions for barriers at your department. These barriers were barriers to the implementation of recommendations for the prevention of hand eczema. In this interview, I want to go into further detail about how this process went. I will ask some general questions about the process, but also I will ask some questions per solution.

Questions about the process in general

1. What was your opinion about the barriers and solutions that were selected by you and your working group?
2. How did the implementation of these solutions go?
 - a. Extra questions:
 - i. What were the agreements?
 - ii. How did you divide tasks?
 - iii. How were the tasks carried out?
 - iv. To what extent did everyone comply with the agreements?
 - v. How were the solutions communicated to your department?

Questions for solutions that were not (entirely) implemented

3. What was the reason why this solution was not (entirely) implemented?
4. Do you expect that the solution will be (entirely) implemented in the future? Why do you expect this?

Questions about barriers per solution

5. What were factors (or persons) that slowed down the implementation of this solution (*fill out a specific solution*) or made the implementation impossible?
6. Did you or other members of the working group find ways to overcome these barriers? And if so, how?

Questions about facilitators per solution

7. What were factors (or persons) that made the implementation of this solution (*fill out a specific solution*) easier?
8. The meaning of this solution (*fill out a specific solution*) was to enhance the use of the following recommendation: (...). To what extent did this work, according to you?

Questions about the solutions in general

9. What is your opinion at this moment about the solutions and barriers prioritized by the working group?
 - a. Extra questions:
 - i. What would you do differently next time?
 - ii. To what extent were the prioritized barriers the most important barriers?
 - iii. To what extent did the solutions fit with the barriers?
 - iv. To what extent were the solutions compatible with the department?
10. What was, in your opinion, the solution that worked best to stimulate the use of the recommendations to prevent hand eczema at your department? What is the reason why this solution worked best?
11. What was, in your opinion, the solution that worked least to stimulate the use of the recommendations to prevent hand eczema at your department? What is the reason why this solution worked least?
12. When you look at the near future, in your opinion, to what extent will 'hand eczema' receive attention at your department when the Hands4U study has ended? To what extent will the solutions help to maintain the attention?

Questions about the working group in general

13. As a working group, what did you want to do differently next time?
14. What was the biggest success of the working group?

General questions

15. In your opinion, what had more effect on changing the behaviour of your colleagues? The Dermacoaches or the solutions of the working group? Can you explain this?
16. What impact has the project had on you?
17. What would you do differently next time?
18. What would you do exactly the same next time?
19. What did you think about the support of the Hands4U team? What could be improved?

Closing

20. Is there something that we did not discuss during the interview, but that you want to address?

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