Prevalence and incidence of hand eczema in healthcare workers: protocol for a systematic review and meta-analysis

Cara Symanzik 1,2, Yasemin Topal Yüksel 3
Maria Oberlander Christensen 4, Jacob P Thyssen 3, Christoph Skudlik 1,2
Swen Malte John 1,2, Richard Brans 1,2, Tove Agner 3

ABSTRACT

Introduction Healthcare workers (HCWs) constitute a high-risk group for developing occupational hand eczema (HE). The present systematic review and meta-analysis will compile and appraise evidence regarding prevalence and incidence of HE in HCWs.

Methods and analysis Systematic searches will be performed in three electronic literature databases (PubMed/Medline, Web of Science-Core Collection and Embase). Further references will be retrieved by a manual search of included studies’ reference lists using snowballing techniques. We will include experimental studies, observational studies, survey-based studies and clinical studies (publications in English, French and German from 2000 onwards) reporting on certified and apprentice HCWs, who actively work in the job. We will look at the following outcomes: Prevalence and incidence of clinically assessed as well as self-reported HE in the style of the Nordic Occupational Skin Questionnaire-2002; HE severity (measured by eg, Hand Eczema Severity Index, Osnabrück Hand Eczema Severity Index, Physician Global Assessment or other validated instruments as well as self-reported or by using undefined categories such as ‘mild’, ‘moderate’ or ‘severe’); clinically assessed (eg, clinical diagnosis, UK Working Party’s diagnostic criteria, Hanifin and Rajka diagnostic criteria for atopic dermatitis (AD)) and self-reported AD. We will assess the risk of bias within studies using detailed criteria according to the Newcastle-Ottawa Scale. As we expect heterogeneity in methods and outcomes, we will conduct sensitivity analyses. A narrative synthesis of results instead of a meta-analysis will be done in case that quantitative pooling is not feasible.

Ethics and dissemination Ethical approval and patient consent are not required as this work is based on published studies. The results will be published in an international, peer-reviewed journal.

PROSPERO registration number CRD42022303044.

INTRODUCTION

With a 1-year prevalence of nearly 10% within the general population, hand eczema (HE) is one of the most common skin diseases.1,2 Moreover, it is one of the most common occupational diseases.3 Owing to the high amount of wet work in the healthcare sector,1,2 healthcare workers (HCWs) are a high-risk group for developing occupational HE.7,9

The often chronic course of occupational HE does not only pose an individual health burden due to the illness-related suffering for those affected, but also a macrosocial problem concerning the socioeconomic and health-economic level. According to contemporary data, 70% of workers with HE seek medical help, more than 20% of workers with HE are incapable of working for more than 7 days in a row, and up to 50% of workers with HE are compelled to change occupations.1,10 With respect to the HE related expenses, direct costs (eg, medical care costs) account for 30% of the overall expenditures and indirect costs (eg, costs from work absences) for 70% of the total expenses.11,12

Although the prognosis of occupational HE is poor, it may be prevented by a variety of measures. In some studies, primary preventive measures (eg, educational sessions on skin protection) have shown to help avoiding the development of HE.13,14 While secondary

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Extensive search in the most important databases for relevant studies.
⇒ Mapping of the prevalence and incidence of hand eczema in healthcare workers to improve understanding of the impact of the disease and the priority of the preventive measures.
⇒ Thorough meta-analysis with sensitivity analyses will be performed, if possible.
⇒ Included studies might provide high heterogeneity regarding methods and results, entailing potential bias.
⇒ As our search is limited to publications in English, French and German, any relevant studies in other languages will not be identified.
preventive measures may help to improve existing HE\textsuperscript{15}; in severe stages of the illness, tertiary preventive methods are used to ensure a long-term stability of the skin condition and the capacity to work.\textsuperscript{16–18} Despite preventive measures being available in the workplace, the prevalence and incidence of HE is still high in occupations at risk. Therefore, a thorough mapping of the prevalence and incidence of HE in HCWs is needed for an improved understanding of the impact of the disease and the priority of the preventive measures in the healthcare sector.

In light of this, a systematic review with meta-analysis on HE in HCWs in terms of separate assessment of pooled prevalence (proportion of HCWs who have HE at a specific period of time)\textsuperscript{19} as well as pooled incidence (proportion of HCWs who newly develop HE during a given time period)\textsuperscript{20} will be conducted. The purpose of this protocol paper is to describe the approach and methodology exploited to perform this systematic review.

\section*{METHODS AND ANALYSIS}

\subsection*{Patient and public involvement}
Development of this research project did not involve patients and/or the general public.

\subsection*{Design}
Based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) checklist,\textsuperscript{21} this work will be a systematic review with meta-analysis. In the case that the protocol is changed, the date of the revision will be recorded with an explanation of the change and its justification.

\subsection*{Eligibility criteria}
The Participants, Exposure, Comparator, Outcome, Study design scheme, derived from the CRD’s (Centre for Reviews and Dissemination) guidance for undertaking reviews in health care,\textsuperscript{22} is used to identify eligibility criteria for publications to be included in the systematic review (table 1). Publications on the prevalence,

\begin{table}[h]
\centering
\begin{tabular}{|l|l|l|}
\hline
\textbf{Criterion} & \textbf{Inclusion} & \textbf{Exclusion} \\
\hline
Participants & Certified HCWs & All other than certified or apprentice HCWs, including cleaning personnel \\
& Apprentice HCWs & \\
\hline
Exposure & Working as active HCW & n/a \\
& & n/a \\
\hline
Comparator & n/a & \\
& & \\
\hline
Outcome & Prevalence of HE (ie, proportion of HCWs who have HE at a specific period of time, for example, current HE (point prevalence), HE in the past 12 months (1-year prevalence), and HE ever (lifetime prevalence)), both clinically assessed as well as self-reported HE based on questions in the style of the NOSQ-2002.\textsuperscript{24} & Skin changes/adverse skin event/symptom-based diagnosis \\
& Incidence of HE (ie, occurrence of new HE cases in HCWs during a given time period which will be reported as number of new cases per 1000 person years) both clinically assessed as well as self-reported HE based on questions in the style of the NOSQ-2002.\textsuperscript{24} In cross-sectional study designs, the incidence can be assessed by retrospective questions (ie, ‘Have you newly developed HE?’ in a given time period). & Skin changes/adverse skin event/symptom-based diagnosis \\
& HE severity (measured by, eg, HECSI,\textsuperscript{25} OHSI,\textsuperscript{26} PGA or other validated instruments (eg, photographic guide) as well as self-reported or by using undefined categories such as ‘mild’, ‘moderate’ or ‘severe’ & n/a \\
\hline
Study design & Experimental studies & \\
& Observational studies & Qualitative studies \\
& Survey-based studies & Reviews \\
& Clinical studies & Case reports \\
\hline
\end{tabular}
\caption{Eligibility criteria following the PECOS scheme}
\end{table}

AD, atopic dermatitis; HCWs, healthcare workers; HE, hand eczema; HECSI, Hand Eczema Severity Index; n/a, not applicable; NOSQ-2002, Nordic Occupational Skin Questionnaire; OHSI, Osnabrück Hand Eczema Severity Index; PGA, Physician Global Assessment.
incidence, onset or severity of HE in HCWs will be considered. Only experimental studies, observational studies and survey-based studies will be included. There are no limitations applied regarding the quantity of participants.

Searches
The electronic databases PubMed/Medline, Web of Science-Core Collection (WoS) and Embase will be used to conduct systematic searches. All searches will be performed at the beginning of the project. In addition, we will handsearch the bibliographies of all papers that met the inclusion criteria and were found through an electronic database search. We will do additional forward-snowballing, checking any references that cite any of these articles using the six most important references we found. The WoS database will be used to do this citation analysis. In general, the title, abstract and key words will be searched. Prior to the final analysis, searches will be rerun in order to make sure no relevant publication has been missed.

The search string (studies from 2000 onwards) will be:
(healthcare workers OR health care workers OR health-care professional OR health care professional OR health-care personnel OR health care personnel OR nurses OR hospital employees) AND (hand eczema OR hand dermatitis OR pompholyx OR contact dermatitis) AND (prevalence OR incidence) AND (“2000/01/01”[Date - Publication] : “3000”[Date - Publication]).

Further restraints
Only publications in English, French and German (accepted original research articles) will be considered. Since exposures to skin hazards and standards of prevention measures have changed over time in the healthcare sector as well as criteria for assessing HE were more diverse before the year of 2000 as compared with after 2000, we will include studies from 2000 and later to depict the current situation in the healthcare sector and to increase the consistency of included studies with respect to study designs and applied methods.

Data management
The search output will be exported in an appropriate format from the used electronic databases and imported into Zotero (V.5.0.96.2) libraries, with the number of references given by each export/import set recorded. Bibliographical duplicates will be detected in the Zotero library. Each record will be distinguished by a distinct, human-readable identifier created by the BetterBibtex Plugin, with any required manual modification. The resulting consolidated library will be exported in RIS format and loaded into a new Rayyan project (Rayyan QCRI, https://rayyan.qcri.org/welcome, last viewed 28 October 2021) for collaborative screening of eligibility relying on title, keywords and abstract by two independent reviewers. Any eventual controversies will be settled by third reviewers who were not engaged in the screening, while any other inconsistencies will be resolved by debate and consensus among the authors’ group at all phases of study selection. Studies on which an agreement has been reached will be retrieved for full-text analysis based on the agreed eligibility criteria. Non-inclusion reasons will be noted and summarized at the realization of the workflow to be used in the PRISMA-P flow chart.

Study selection
The final set of references deemed eligible for full text screening by above-mentioned two reviewers will be exported from Rayyan in Bibtex format for import into the Zotero cloud-based reference database, after the initial set of references has been archived. All decisions and reasons leading to the exclusion of studies at this stage will be documented, providing information on the individual assessments by both initial reviewers and the final decision. At the end of this process, a set of full-text articles to be included in the systematic review will be identified.

Data extraction
Using standardised, prepiloted publication record forms (PRFs) for each research category, two reviewers will separately extract data from studies that match the inclusion criteria. In circumstances where the extracted data is conflicting, a third senior reviewer will evaluate it and make the ultimate determination. The following basic data will be extracted (as far as applicable): Publication ID, year of research execution/study period, follow-up, country of origin, study design, methodology, definition of HE, presence of HE at a specific period of time (prevalence), development of HE during a given period of time (incidence), HE severity, past and current atopic dermatitis (AD), study setting, population engaged, basic participant characteristics (eg, age, gender, ethnicity), number of participants, number of positive outcome(s) and funding source. The final PRFs will be saved and released as an addendum to the systematic review paper. If required, numbers from the studies will be used to estimate outcome information. If several publications report on the same study, we will aggregate information from the publications if they report on distinct outcomes and use the more complete one(s) if the shorter one(s) do not contribute any further information. If there are any content inconsistencies between the several publications, we will extract the material from the most recent release. If crucial methodological details are missing, we will contact the corresponding author through email.

Risk of bias within included studies and quality of evidence assessment
Reasonable criteria for assessing risk of bias (ROB) and evidence quality will be used. Without being blinded to the publications, two reviewers will independently rate papers that match the inclusion criteria following full text analysis. Detailed criteria for the evaluation of quality and ROB are chosen according to the Newcastle-Ottawa Scale.25
**Data synthesis and analysis**

The data of each included study will be presented in a following information: name of author, year of publication, study design, size of study population, type of HCW (eg. nurses) and further characteristics of the study population. The prevalence and incidence estimates will be calculated by pooled proportions. ORs with a 95% CI will be calculated using random effect or fixed effects models depending on the heterogeneity of analyses. For each endpoint, the heterogeneity will be visualised in forest plots and assessed by the Cochran's Q test and I² statistic. Sensitivity analyses (eg. large vs small studies, different geographies) will be performed in case of substantial heterogeneity to investigate reasons for such heterogeneity. For calculation of pooled effect estimates, StatsDirect, V.3 (StatsDirect, Cheshire, UK) will be used.

**Protocol amendments**

Amendments to the protocol will—if applicable—be filed with PROSPERO and indicated in the publication of the systematic review, which will otherwise reference to this protocol.

**ETHICS AND DISSEMINATION**

No ethical approval or patient consent is necessary as this is a systematic review based on published studies. This systematic review has been registered in the International Prospective Register of Systematic Reviews (PROSPERO) under the registration number CRD42022303044. The systematic review shall be published in an international, peer-reviewed journal. If possible, an open-access publication is aimed at. Members of the working group may also present the results at national and international conferences.

**Author affiliations**

1Institute for Interdisciplinary Dermatological Prevention and Rehabilitation (iDerm), Osnabrück University, Osnabrück, Germany
2Department of Dermatology, Environmental Medicine and Health Theory, Osnabrück University, Osnabrück, Germany
3Department of Dermatology, Bispebjerg and Frederiksberg Hospital, University of Copenhagen, Copenhagen, Denmark

**Contributors**

CS: conceptualisation, methodology, writing-original draft, project administration; YT: conceptualisation, methodology, writing-original draft, project administration; MOC: conceptualisation, methodology, writing-review; JT: conceptualisation, methodology, writing-review; SM: conceptualisation, methodology, writing-review and editing; RB: conceptualisation, methodology, writing-review, guarantor of the review. TA: conceptualisation, methodology, writing-review and editing, funding acquisition, guarantor of the review. All authors have read and approved the final submitted version of the manuscript.

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**Competing interests**

None declared.

**Patient and public involvement**

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication**

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