









BMJ Open 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 ³ Jacob P Thyssen ³ Christoph Skudlik ^{1,2}
 Swen Malte John ^{1,2} Richard Brans ^{1,2} Tove Agner ³

To cite: Symanzik C, Yüksel YT, Christensen MO, *et al*. Prevalence and incidence of hand eczema in healthcare workers: protocol for a systematic review and meta-analysis. *BMJ Open* 2022;**12**:e062194. doi:10.1136/bmjopen-2022-062194

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-062194>).

CS and YTY are joint first authors.
 RB and TA are joint last authors.

Received 21 February 2022
 Accepted 21 September 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to
 Dr Cara Symanzik;
cara.symanzik@uni-osnabrueck.de

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

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.

of wet work in the healthcare sector,⁴⁻⁶ 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

preventive measures may help to improve existing HE¹⁵; 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.^{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 health-care 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)¹⁹ as well as pooled incidence (proportion of HCWs who newly develop HE during a given time period)²⁰ will be conducted. The purpose of this protocol paper is to describe the approach and methodology exploited to perform this systematic review.

METHODS AND ANALYSIS

Patient and public involvement

Development of this research project did not involve patients and/or the general public.

Design

Based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Protocols (PRISMA-P) checklist,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.

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,²² is used to identify eligibility criteria for publications to be included in the systematic review (table 1). Publications on the prevalence,

Table 1 Eligibility criteria following the PECOS scheme

Criterion	Inclusion	Exclusion
Participants	Certified HCWs Apprentice HCWs	All other than certified or apprentice HCWs, including cleaning personnel
Exposure	Working as active HCW	n/a
Comparator	n/a	n/a
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. 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. 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, ²⁵ OHSI, 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
	Prevalence of clinically assessed (eg, clinical diagnosis, UK Working Party's diagnostic criteria, ²⁷ Hanifin and Rajka diagnostic criteria for AD ²⁸ as well as self-reported AD (eg, 'Have you ever had childhood eczema?', 'Have you ever had an itchy rash that has been coming and going for at least 6 months, and at some time has affected skin creases?') ²⁹	Other instruments
Study design	Experimental studies	Qualitative studies
	Observational studies	Reviews
	Survey-based studies	Case reports
	Clinical studies	Case series

HCW(s), healthcare worker(s) who provide healthcare services such as care and treatment including nurses, nursing auxiliaries, midwives, physicians, physician assistants and other clinicians (eg, physiotherapists, occupational therapists etc), excluding, for example, cleaning personnel.
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 also 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 healthcare professional OR health care professional OR healthcare 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 Plug-in, 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 summed up at the realisation 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 Bibtext 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.²³

Data synthesis and analysis

The data of each included study will be presented in a table with 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, Stats-Direct, 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; YTY: conceptualisation, methodology, writing-original draft, project administration; MOC: conceptualisation, methodology, writing-review; JT: conceptualisation, methodology, writing-review; CS: conceptualisation, methodology, writing-review; SMJ: 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.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

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 Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Cara Symanzik <http://orcid.org/0000-0002-4090-6726>

Yasemin Topal Yüksel <http://orcid.org/0000-0003-1289-1827>

Maria Oberlander Christensen <http://orcid.org/0000-0001-7177-1054>

Jacob P Thyssen <http://orcid.org/0000-0003-3770-1743>

Christoph Skudlik <http://orcid.org/0000-0002-5670-8396>

Swen Malte John <http://orcid.org/0000-0001-5406-9458>

Richard Brans <http://orcid.org/0000-0002-1245-024X>

Tove Agner <http://orcid.org/0000-0002-7543-8299>

REFERENCES

- Thyssen JP, Johansen JD, Linneberg A, *et al*. The epidemiology of hand eczema in the general population—prevalence and main findings. *Contact Dermatitis* 2010;62:75–87.
- Quaade AS, Simonsen AB, Halling A-S, *et al*. Prevalence, incidence, and severity of hand eczema in the general population - A systematic review and meta-analysis. *Contact Dermatitis* 2021;84:361–74.
- Diepgen TL. Occupational skin diseases. *J Dtsch Dermatol Ges* 2012;10:297–315.
- Hamnerius N, Svedman C, Bergendorff O, *et al*. Wet work exposure and hand eczema among healthcare workers: a cross-sectional study. *Br J Dermatol* 2018;178:452–61.
- Yüksel YT, Ebbelhøj NE, Agner T. An update on the prevalence and risk exposures associated with hand eczema in Danish Hospital employees: a cross-sectional questionnaire-based study. *Contact Dermatitis* 2022;86:89–97.
- Lund T, Petersen SB, Flachs EM, *et al*. Risk of work-related hand eczema in relation to wet work exposure. *Scand J Work Environ Health* 2020;46:437–45.
- Yüksel YT, Patel N, Boyse K, *et al*. Prevalence of hand dermatitis in inpatient nurses at a United States Hospital. *Dermatitis* 2007;18:140–2.
- Weisshaar E, Radulescu M, Soder S, *et al*. Secondary individual prevention of occupational skin diseases in health care workers, cleaners and kitchen employees: aims, experiences and descriptive results. *Int Arch Occup Environ Health* 2007;80:477–84.
- Skudlik C, Dulon M, Wendeler D, *et al*. Hand eczema in geriatric nurses in Germany—prevalence and risk factors. *Contact Dermatitis* 2009;60:136–43.
- Carøe TK, Ebbelhøj NE, Bonde JP, *et al*. Occupational hand eczema and/or contact urticaria: factors associated with change of profession or not remaining in the workforce. *Contact Dermatitis* 2018;78:55–63.
- Diepgen TL, Purwins S, Posthumus J, *et al*. Cost-Of-Illness analysis of patients with chronic hand eczema in routine care in Germany: focus on the impact of occupational disease. *Acta Derm Venereol* 2013;93:538–43.
- Diepgen TL, Scheidt R, Weisshaar E, *et al*. Cost of illness from occupational hand eczema in Germany. *Contact Dermatitis* 2013;69:99–106.
- Clemmensen KKB, Randbøll I, Ryborg MF, *et al*. Evidence-Based training as primary prevention of hand eczema in a population of hospital cleaning workers. *Contact Dermatitis* 2015;72:47–54.
- Softanipoor M, Kezic S, Sluiter JK, *et al*. Effectiveness of a skin care programme for the prevention of contact dermatitis in healthcare workers (the healthy hands project): a single-centre, cluster randomized controlled trial. *Contact Dermatitis* 2019;80:365–73.
- Fisker MH, Ebbelhøj NE, Vejstrup SG, *et al*. Prevention of hand eczema: effect of an educational program versus treatment as usual - results of the randomized clinical PREVEX trial. *Scand J Work Environ Health* 2018;44:212–8.
- Breuer K, John SM, Finkeldey F, *et al*. Tertiary individual prevention improves mental health in patients with severe occupational hand eczema. *J Eur Acad Dermatol Venereol* 2015;29:1724–31.
- Antonov D, Schliemann S, Elsner P. Hand dermatitis: a review of clinical features, prevention and treatment. *Am J Clin Dermatol* 2015;16:257–70.
- Agner T, Elsner P. Hand eczema: epidemiology, prognosis and prevention. *J Eur Acad Dermatol Venereol* 2020;34 Suppl 1:4–12.

- 19 Kirch W. Prevalence. In: Kirch W, ed. *Encyclopedia of public health*. Dordrecht: Springer Netherlands, 2008: 1130.
- 20 Kirch W. Incidence. In: Kirch W, ed. *Encyclopedia of public health*. Dordrecht: Springer Netherlands, 2008: 720–1.
- 21 Shamseer L, Moher D, Clarke M, *et al*. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;350:g7647.
- 22 Centre for Reviews Dissemination. *CRD's guidance for undertaking reviews in healthcare*: York Publishing Services, 2009.
- 23 Wells G, Shea B, O'Connell D. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Available: http://www.ohri.ca/programs/clinical_epidemiology/oxford.asp
- 24 Susitaival P, Flyvholm M-A, Meding B, *et al*. Nordic occupational skin questionnaire (NOSQ-2002): a new tool for surveying occupational skin diseases and exposure. *Contact Dermatitis* 2003;49:70–6.
- 25 Held E, Skoet R, Johansen JD, *et al*. The hand eczema severity index (HECSI): a scoring system for clinical assessment of hand eczema. A study of inter- and intraobserver reliability. *Br J Dermatol* 2005;152:302–7.
- 26 Skudlik C, Dulon M, Pohrt U, *et al*. Osnabrueck hand eczema severity index--a study of the interobserver reliability of a scoring system assessing skin diseases of the hands. *Contact Dermatitis* 2006;55:42–7.
- 27 Williams HC, Burney PG, Pembroke AC, *et al*. The U.K. Working Party's diagnostic criteria for atopic dermatitis. III. independent Hospital validation. *Br J Dermatol* 1994;131:406–16.
- 28 Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. *Acta Derm Venereol* 1980;92:44–7.
- 29 Stenberg B, Lindberg M, Meding B, *et al*. Is the question 'Have you had childhood eczema?' useful for assessing childhood atopic eczema in adult population surveys? *Contact Dermatitis* 2006;54:334–7.