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Global Guidelines in Dermatology Mapping Project (GUIDEMAP): a scoping review of dermatology clinical practice guidelines*

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Summary

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Data availability statement

The data that support the findings of this study are available in the Supporting Information of this article.

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Background Clinical practice guidelines (CPGs) play a critical role in standardizing and improving treatment outcomes based on the available evidence. It is unclear how many CPGs are available globally to assist clinicians in the management of patients with skin disease.

Objectives To search for and identify CPGs for dermatological conditions with the highest burden globally.

Methods We adapted a list of 12 dermatological conditions with the highest burden from the Global Burden of Disease (GBD) study 2019. A systematic literature search was done to identify CPGs published between October 2014 to October 2019. The scoping review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework.

Results A total of 226 CPGs were included. Melanoma had the greatest representation in the CPGs, followed by dermatitis and psoriasis. Skin cancers had a relatively high CPG representation but with lower GBD disease burden ranking. There was an uneven distribution by geographical region, with resource-poor settings being under-represented. The skin disease categories of the CPGs correlated weakly with the GBD disability-adjusted life-years metrics. Eighty-nine CPGs did not have funding disclosures and 34 CPGs were behind a paywall.

Conclusions The global production of dermatology CPGs showed wide variation in geographical representation, article accessibility and reporting of funding. The number of skin disease CPGs were not commensurate with its disease burden. Future work will critically appraise the methodology and quality of dermatology CPGs and lead to the production of an accessible online resource summarizing these findings.

What is already known about this topic?

- Skin-related diseases are leading causes of disability and disease burden globally.

- Clinical practice guidelines (CPGs) are important to ensure appropriate standards of care for skin conditions.
- The number, distribution, accessibility and quality of dermatological CPGs available globally is unknown.

What does this study add?

- This is the first scoping review to describe the distribution of CPGs for common dermatological conditions of highest burden available internationally.
- Inflammatory skin conditions and skin cancers represent a higher proportion of the number of CPGs produced, largely driven by high-income countries.
- Further studies to evaluate the quality of CPGs in dermatology, and the development of CPGs in skin diseases predominantly affecting resource-poor countries, are needed.

Clinical practice guidelines (CPGs) are defined as statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options.¹ CPGs have the potential to improve healthcare quality by synthesizing and translating evidence into recommendations; identifying appropriate evidence-to-practice gaps; decreasing costly and preventable adverse events; optimizing patient outcomes; and facilitating shared decision-making processes.^{2,3} The production of CPGs is a resource-intensive process. Research waste is a problem in the biomedical setting,⁴ with poor design, conduct and reporting of medical research being a common problem for the production of CPGs in dermatology.^{4,5}

There are few resources available that comprehensively document the number and quality of CPGs worldwide, and none dedicated to dermatological diseases. We previously conducted a survey of the *BJD* readership about CPGs and found that a key concern was how CPGs were accessed, with many readers suggesting that an online comprehensive dermatology guideline repository would be helpful for quick access and reference in the clinic.⁶

Therefore, there is a need to collate CPGs in common dermatological diseases available internationally.⁷ Firstly, this may help reduce research waste and identify high-quality CPGs and systematic reviews for future guideline development groups (GDGs) to reference from, avoiding duplication of work. Secondly, it will provide patients and clinicians with a summary of critically appraised dermatology CPGs, also highlighting areas for improvement in CPG reporting and development standards. Thirdly, a resource that clinicians, including those from resource-poor countries, can freely access from anywhere in the world would serve as an important contribution for education and reference purposes in dermatology.

With this mind, we performed a global scoping review as a first step to collate and describe the state of current CPGs within the field of dermatology. The review questions were: (i) How many CPGs are produced for the dermatological conditions of

the highest burden globally in a period of 5 years? and (ii) Is the number of internationally available clinical guidelines on skin diseases commensurate with their disease burden?

Materials and methods

We performed a systematic search for CPGs of common skin conditions following a prespecified protocol in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement,⁸ focusing on the skin conditions with the highest burden adapted from the Global Burden of Disease (GBD) Study 2019:^{9,10} acne, alopecia areata, atopic and contact dermatitis, cellulitis, keratinocyte carcinoma, cutaneous malignant melanoma, psoriasis, scabies, urticaria, tinea capitis, venous ulcers, viral warts and molluscum contagiosum. All records were screened by at least two independent appraisers. Disagreements at any stage were reconciled by discussion with a third appraiser.

Searches were performed in MEDLINE, Embase, National Institute for Health and Care Excellence (NICE) Evidence Search, Guidelines International Network, ECRI Guidelines Trust®, Australian Clinical Practice Guidelines, Trip Medical Database and DynaMed. Appropriate disease search terms were combined with a guidelines search filter from the Canadian Agency for Drugs and Technologies in Health. Our full search strategy is provided in Appendix S1 (see Supporting Information). The search was conducted in October 2019 and we included CPGs published between October 2014 and October 2019.

We supplemented the online search with manual searches for guidelines produced by dermatological societies listed under the International League for Dermatological Societies. We also contacted CPG-producing dermatological societies directly to solicit copies of their current guidelines. Where we did not receive a response, we searched for CPGs produced by the dermatology societies through Google and the society websites.

To capture the full range of guidelines, we used a broad definition of CPGs, inclusive of consensus agreement

guidelines informed by reviews of the evidence that were systematic or structured, developed by local, regional, national or international groups or affiliated governmental organizations. All CPGs involving the diagnosis, screening, management, treatment and prevention of the included skin conditions were eligible. Records that lacked systematic search protocols or explicit criteria for appraising evidence, secondary publications derived from CPGs, conferences or consensus statements based on the opinion of expert panels, editorials, clinical trials and single-author documents were excluded. Following discussion with the study group, we excluded CPGs that were directed predominantly for policymakers, such as health technology assessments, and those that focused on treatment-related side-effects. If multiple or updated versions of the same guideline and organization were found, we selected the latest full or long version, and subsequently the English version, which was often used in peer-reviewed publications. We included guidelines from any country and in any language; Google Translate was used to translate the abstracts and full-text records of non-English CPGs, with the exception of Thai CPGs, where a translator was used. The inclusion and exclusion criteria can be found in Appendix S2 (see Supporting Information).

The titles and abstracts were screened using the website and the application 'Rayyan'.¹¹ If no abstract was available, full-text articles were obtained and screened in order to be considered for inclusion. In addition, CPG repositories from members of the International League of Dermatological Societies, Guidelines International Network, Dynamed, NICE and Trip were hand-searched to identify additional relevant CPGs. We extracted the following items from the full-text records for analysis: skin disease subtypes; organization producing the CPG; year of publication; geographical region; language; keyword in title; topics covered; publication source; funding source; and whether the CPG was behind a paywall. We also evaluated the distribution of CPGs by sociodemographic index (SDI), an indicator of a location's sociodemographic development, based on the country and geographical region where the CPGs were produced.¹⁰ The SDI, which combines information on income per capita, education and fertility, was used to categorize all GBD geographies into five SDI quintiles (high, high-medium, medium, low-medium and low). We further calculated the correlation between the number of CPGs published for each skin disease to the GBD 2019 disability-adjusted life-years (DALYs) estimates.

We registered our study protocol with OSF registries (<https://osf.io/fuj3h>) on 30 October 2019. Data were collected, summarized and tabulated in a standardized Excel spreadsheet (Microsoft, Redmond, WA, USA) for descriptive analysis.

Results

Identification and selection of clinical practice guidelines

The PRISMA flowchart of the guideline selection is summarized in Figure 1. Our search yielded 17 211 potential citations. After duplicates were removed, 14 914 were screened

by title and abstract. Of the 576 full-text articles screened, 137 CPGs met the inclusion criteria. In addition, a further 89 articles were identified through manual searching and local dermatological society websites. In total, 226 CPGs were included in the final analysis. A list of the included articles and detailed summary at full-text screening stage are provided in Table S1 (see Supporting Information).

Trends in dermatological clinical practice guidelines

The included CPGs were published between October 2014 and October 2019. Across the 12 skin diseases, the top-five number of CPGs produced were melanoma ($n = 41$), atopic dermatitis ($n = 30$) and contact dermatitis ($n = 12$), psoriasis ($n = 29$), venous ulcer ($n = 25$) and urticaria ($n = 24$) (Figure 2). Melanoma comprised 15% ($n = 7/46$) of dermatological CPGs in 2015, with a steady rise over 5 years to 22% ($n = 12/54$) in 2019. Venous ulcer was one of the most prevalent (15%; $n = 7/46$) dermatological CPGs in 2015 but dropped to 6% ($n = 3/54$) in 2019. The frequency of atopic and contact dermatitis, psoriasis and urticaria CPGs trended upwards from 2014 to 2019. The apparent increase in CPGs could, in part, be explained by the fact that only the latest version of any CPG was included in the database. Overall, there was a low representation for cellulitis ($n = 7$), scabies ($n = 5$), viral warts and molluscum contagiosum ($n = 4$), alopecia areata ($n = 3$) and tinea capitis ($n = 1$).

Characteristics of dermatological clinical practice guidelines

The top-three journals publishing the highest frequencies of dermatology CPGs were the *Journal of the European Academy of Dermatology and Venereology* ($n = 11$), the *Journal of the American Academy of Dermatology* ($n = 9$) and the *British Journal of Dermatology* ($n = 8$). Skin disease CPGs were published in dermatology journals ($n = 89$; 39.4%) and in nondermatology journals (32.3%; $n = 73$), and some were available online only (28.3%; $n = 64$). The majority (53.1%; $n = 120$) of skin disease CPGs were multidisciplinary collaborative efforts between different specialties, with a significant minority (37.2%; $n = 84$) solely written by GDGs from the dermatology community. For example, there was involvement of paediatricians and allergists in atopic dermatitis CPGs, whereas for melanoma and keratinocytes carcinomas CPGs often consisted of a multidisciplinary team of dermatologists, surgeons, oncologists and pathologists. We also found that 88.1% ($n = 199$) of CPGs were developed by national or regional GDG members, while 11.9% ($n = 27$) were part of a collaborative effort consisting of internationally recognized experts.

The majority (72.1%; $n = 163$) of dermatological CPGs were developed by countries with a high SDI vs. high-middle (8.0%; $n = 18$), middle- (5.3%; $n = 12$) and low-SDI countries (1.8%; $n = 4$). The geographical distribution included Europe (51.8%; $n = 117$), North America (21.2%; $n = 48$), Asia (15.5%; $n = 35$), Latin America (4.9%; $n = 11$) and

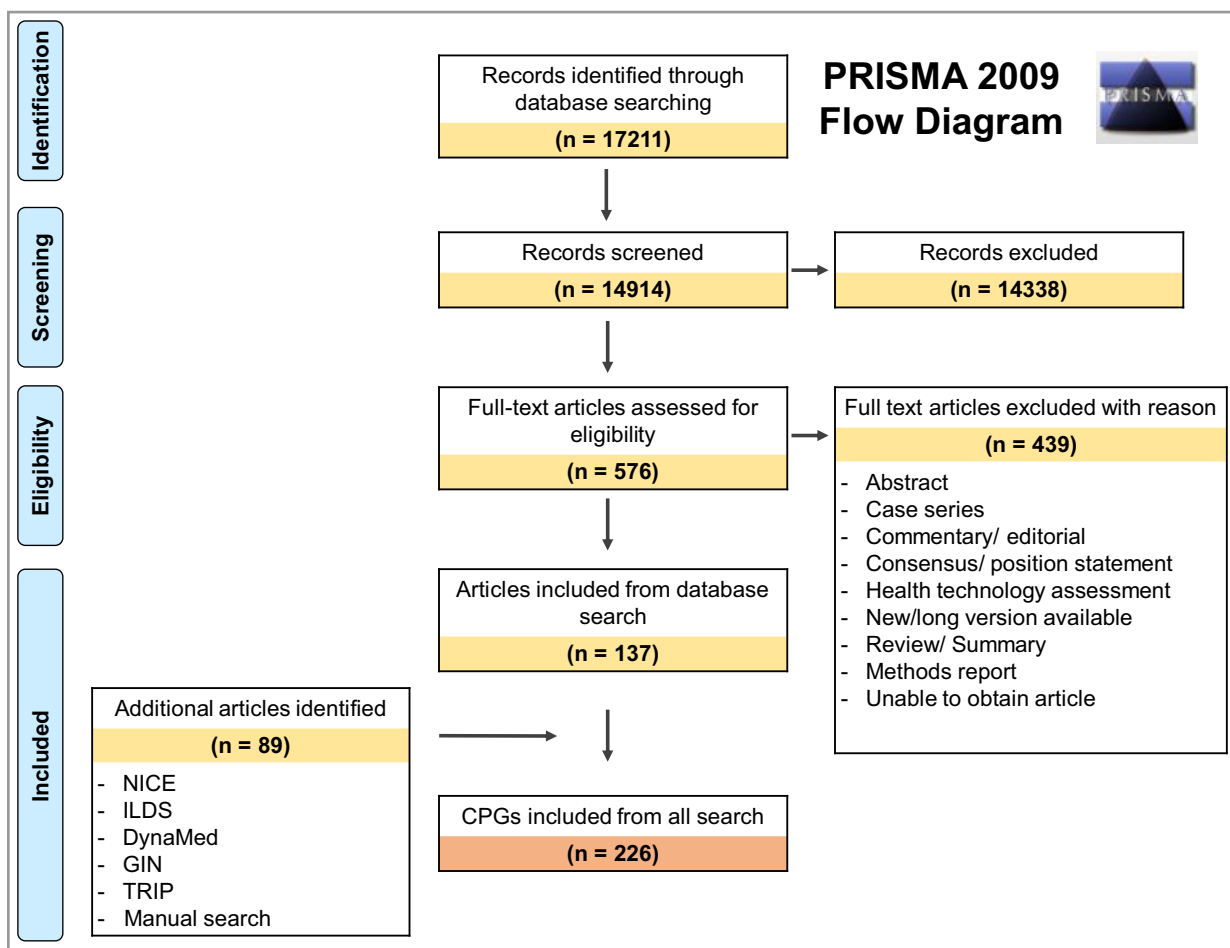


Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flowchart illustrating the process for the selection of the included guidelines for the scoping review. CPG, clinical practice guidelines; GIN, Guidelines International Network; ILDS, International League of Dermatological Societies; NICE, National Institute for Health and Care Excellence.

Australasia (4.4%; n = 10), as well as international collaboration across these regions (2.2%; n = 5) (Figure 3). The countries with the highest number of dermatological CPGs are the USA (15.0%; n = 34) and the UK (10.6%; n = 24), together representing about 25% of all CPGs. The majority of dermatological CPGs were written or available in English (76.5%; n = 173), whereas some were published only in their native languages [i.e. Dutch (5.3%; n = 12), and Spanish and Danish (both 2.2%; n = 5)]. There were also some inconsistencies in the keyword nomenclature: only 11.5% (n = 26) were titled as 'clinical practice guidelines'. Furthermore, 88.5% (n = 200) of included articles had at least one keyword in the title, most frequently 'guideline' (64.2%; n = 145), 'consensus' (14.6%; n = 33) and 'recommendation' (9.7%; n = 22).

Most CPGs focused on treatment/management recommendations (42.9%; n = 97), while other CPGs were broader in scope and covered diagnostic/treatment (30.5%; n = 69) and diagnostic/treatment/prevention (20.4%; n = 46) (Figure 4). Specifically, a significant proportion of CPGs on psoriasis (10.6%; n = 24), melanoma (10.2%; n = 23), atopic and contact dermatitis (7.5%; n = 17) and acne (2.2%; n = 5) focused

on drug and treatment recommendations, while CPGs on venous ulcers (8.4%; n = 19) and keratinocyte carcinoma (4.4%; n = 10) included additional aspects on prevention and long-term management. There were also drug-/treatment-specific CPGs (3.5%; n = 8), for example photodynamic therapy and systemic treatments, which provided recommendations spanning a range of skin diseases.

Funding source and open access

All 226 guidelines were assessed for inclusion of a funding statement and accessibility (Table S1; see Supporting Information). Approximately 39.4% (n = 89) of CPGs failed to provide a funding statement. In CPGs with a funding statement, dermatology/medical societies were the most common source (15.9%; n = 36), followed by government/public funding (11.1%; n = 25). Eight per cent (n = 18) of CPGs, including topics such as acne, atopic and contact dermatitis, keratinocytes carcinomas and psoriasis, declared funding from pharmaceutical companies. Furthermore, 85.0% (n = 192) of CPGs were open access, while many of the CPGs that were

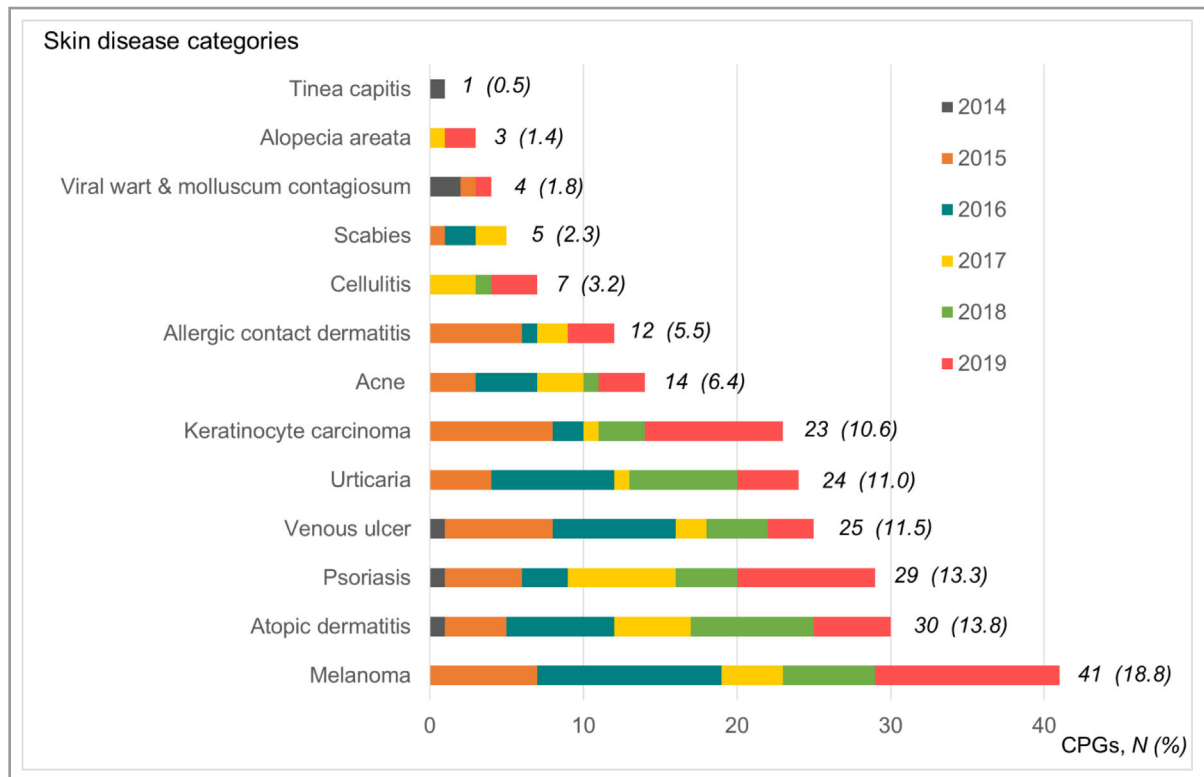


Figure 2 Stacked bar chart showing the trend of clinical practice guidelines (CPGs) produced from October 2014 to October 2019 according to different skin disease categories.

behind a paywall originated from high–middle (1.3%; $n = 3$) and high SDI (13.3%; $n = 30$) countries.

Comparison of disability-adjusted life-year outcomes for specific skin disease clinical practice guidelines

Comparing the total number of CPGs representing skin diseases mapped to the GBD's DALY estimates, we found that the coefficient of determination (R^2) was 0.1676, indicating overall poor correlation between these variables (Figure 5). Melanoma and keratinocyte cancers had disproportionately greater CPGs representation, compared with its disease burden, as measured by DALYs, particularly predominance by high-income countries (e.g. Australasia, Europe and North America). CPG representation of urticaria, atopic and contact dermatitis appeared to be proportionately aligned with their DALY metrics. Acne, alopecia areata, cellulitis and scabies were under-represented in the number of CPGs, compared with their corresponding DALY metrics.

Discussion

To our knowledge, this is the first scoping review to provide a comprehensive global overview of the number and characteristics of CPGs for common dermatological conditions. We define dermatology as the study of diseases affecting the skin,

hair and nails, including venereology and tropical skin diseases, to represent global skin health needs. Our systematic search, screened by two independent reviewers, found 226 CPGs on skin conditions from October 2014 to October 2019, with a lack of correlation to the GBD 2019 disease burden.^{9,10} As a consequence, a number of research gaps that require future investigation have been found.

Inflammatory skin conditions (e.g. atopic and contact dermatitis, psoriasis and urticaria) and skin cancers (keratinocyte carcinomas and melanoma) cause the greatest disease burden in high-income countries,^{12,13} and the greatest increase in the number of CPGs published for these conditions has been observed in the last 5 years. The sharp rise in treatment-related CPGs may be partly explained by the availability of new, effective treatments for these conditions, for example targeted immunotherapy for psoriasis and melanoma. However, the treatment landscape for scabies, tinea capitis and viral skin diseases, which are more prevalent in low-income countries, remained almost unchanged.^{12,13} Newer insights into chronic skin conditions, such as the prevention of venous leg ulcer recurrence and skin cancer screening, have led to the incorporation of preventative recommendations into CPGs for the management of these long-term conditions.

During the search process for this review, we noticed that a significant number of local CPGs (28.3%; $n = 64$) were not indexed in electronic library databases and only found on

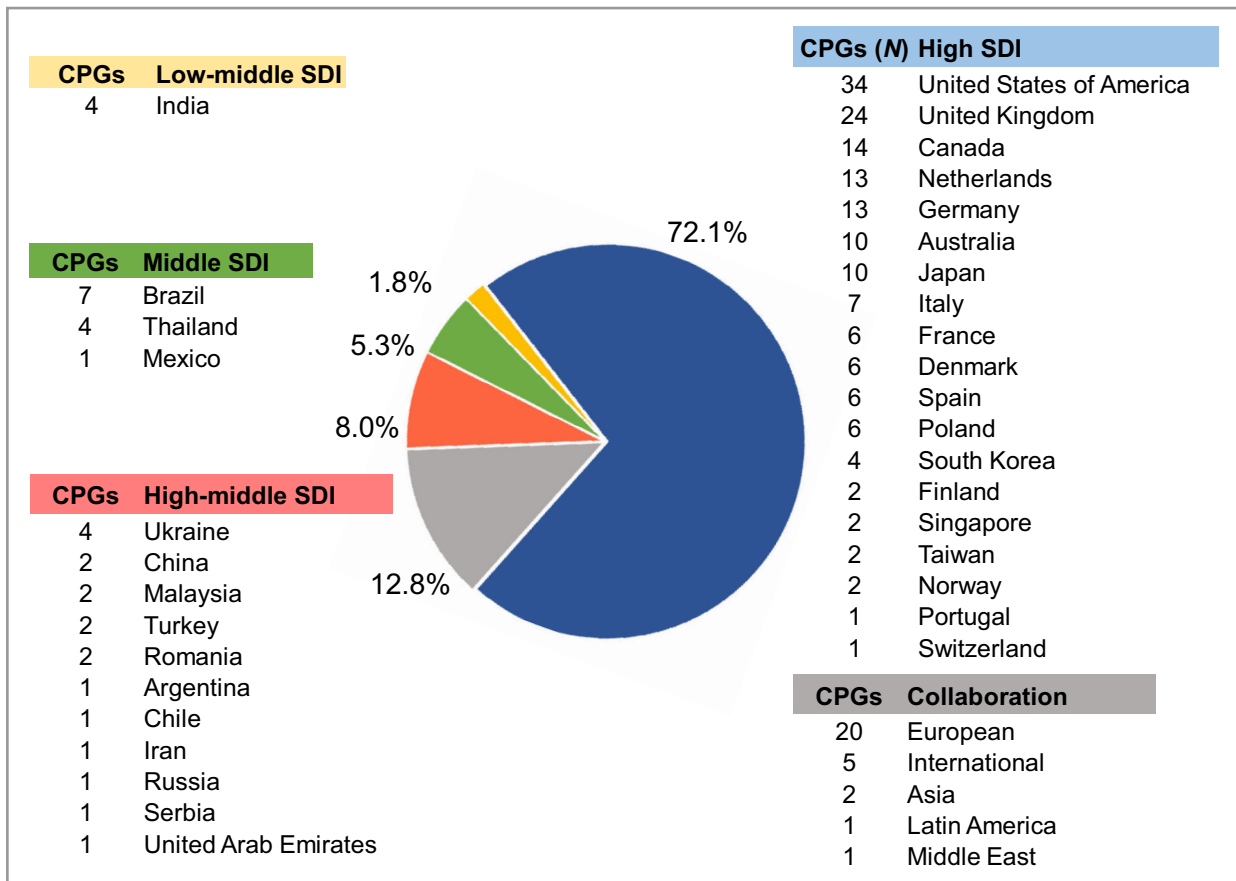


Figure 3 Representation of skin disease clinical practice guidelines (CPGs) according to corresponding countries and their sociodemographic index (SDI).

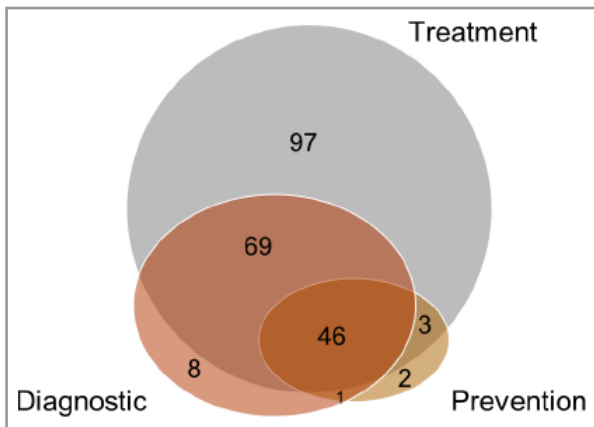


Figure 4 Venn diagram showing distribution of topics covered in skin disease CPGs.

websites, rendering them difficult to find for clinicians and guideline developers.¹⁴ In particular, those on society websites were hard to find (e.g. archived in nonintuitive subsections of the website). As a result, the website searches relied heavily on supplementary hand searches, which might hamper reproducibility efforts in a biomedical database.

This review also found a range of terms being used to describe skin disease in CPGs. Although over half of the identified guidelines used the term ‘guideline’ in their title, only a relatively small number were titled as a ‘clinical practice guideline’. A number of CPGs were expert recommendations that might not have been intended to be a CPG, even if they could be interpreted and used as a guideline. This highlights the need for a more precise definition of what constitutes a recommendation statement in contrast to a CPG.

There was also an uneven distribution and substantial variation of skin disease CPGs by geographical region. The high number of CPGs developed in North American and European countries may reflect the healthcare environment in which CPGs were used to evaluate treatment cost-effectiveness, allocation of resources and healthcare priorities.¹⁵ Furthermore, the review showed significant under-representation of CPGs from Asia (15.5%; n = 35), South America (4.9%; n = 11) and there was no representation from the African continent. Low-income countries may have fewer resources to develop and implement locally written CPGs, or research capacity to explore local context issues.¹⁶ To address this gap, they often adopt or adapt CPGs from high-income countries, especially where high-quality guidance already exists.¹⁷ However, these CPGs are sometimes written with different health systems in

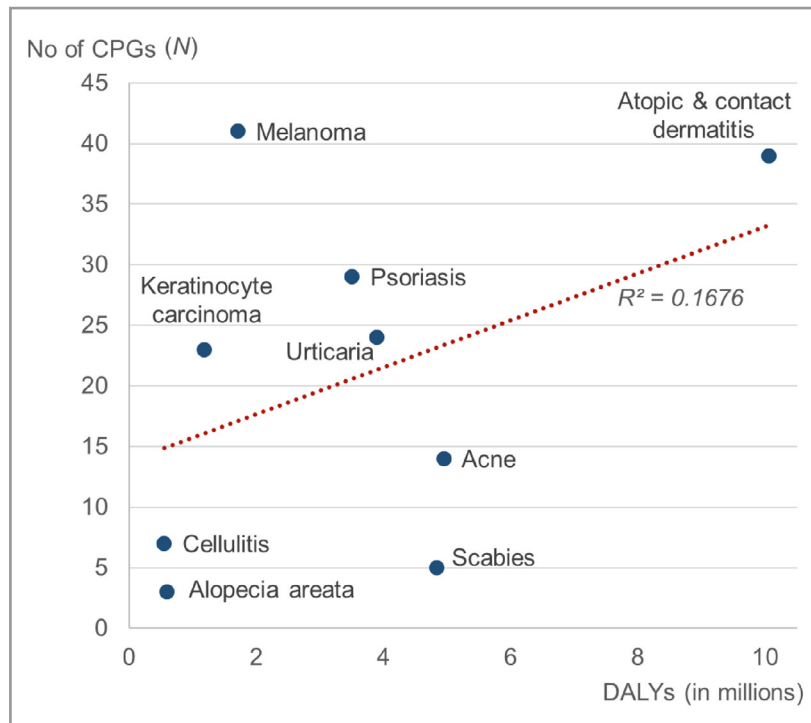


Figure 5 Scatter chart comparing the correlation between nine skin disease clinical practice guidelines (CPGs) and the corresponding disability-adjusted life-years (DALYs) as measured in the 2019 Global Disease Burden (GBD) study. Three of the 12 skin diseases (tinea capitis, viral warts and molluscum contagiosum, and venous ulcers) were used as representative conditions in the review for which there were no DALY data available from the GBD study. These three groups were therefore excluded from the correlation analysis.

mind, potentially leading to under-representation of considerations around skin of colour, resource and workforce availability. As a result, the guidance in CPGs might not be directly appropriate for local implementation.¹⁶ The generalisability of CPGs in some skin diseases could also be improved by increasing international collaborations during guideline development.² CPGs produced in collaboration with other countries were more frequently of higher methodological standards and conform with the internationally accepted quality criteria.⁵

Regular monitoring of existing CPGs and timely dissemination of updated ones are essential ways of ensuring that CPGs remain useful in improving healthcare quality and patient outcome.¹⁸ For example, the Association of the Scientific Medical Societies in Germany and NICE in the UK require CPGs to be checked or updated every 3–5 years. This is particularly important in disease areas where there are significant evidence gaps or where numerous new effective treatments have been introduced. In our hand search, we found a number of skin disease CPGs, in particular from dermatological societies in low-income countries, that were updated less regularly than those from high-income countries and, as they were outside the study timeframe, were excluded during the screening process.

The process of writing a guideline is time- and resource-consuming. We propose that further collaboration between guideline developers on quality assessment could limit the workload and that sharing of knowledge and expertise might also increase the overall quality of individual local guidelines.

The concept of ‘living guidelines’ could potentially make this more feasible, with the promise to provide timely, up-to-date and high-quality guidance to target users.¹⁹ Therefore, our team has developed a web repository of dermatological CPGs based on the current work. The open online resource, which can be found at <https://sites.manchester.ac.uk/guidemap/>, is a work in progress and will be updated over time as our team update the literature search and start to perform critical appraisal of the collated CPGs.

The source of funding for CPGs may create conflicts of interest, especially for CPGs involving treatment recommendations, and may introduce bias in the development of CPGs. Over one-third of GDGs failed to declare their source of funding. Approximately 7% of GDGs received financial funding from the pharmaceutical industry, although most claimed to have maintained editorial independence. The influence of industry sponsorship or GDG members’ conflicts of interest may be particularly important where evidence is lacking or of poor quality.²⁰ This level of participation can affect readers’ opinions regarding the integrity of these CPGs, and some studies have even documented that disclosure of industry funding may lead clinicians to downgrade the quality of the guideline content.²¹

A number of CPGs (15.0%; $n = 34$) were published behind paywalls, which restricts access to research findings and limits the dissemination and clinical benefit of CPGs to clinicians and patients. They also exacerbate the substantial inequalities in

scholarly resources between developed and developing countries, creating a barrier to access important medical knowledge.²²

The concept of 'disease burden' can be expressed in terms of DALYs, calculated as the sum of years of life lost plus the years of productive life lost due to ill health, disability or premature death. The global burden of skin and subcutaneous diseases has been steadily increasing (total DALYs from 1.2% in 1990 to 1.8% in 2017).^{9,23} Our study showed weak association between DALYs and the representation of CPGs according to their skin disease categories. The findings are consistent with reports of poor association between global burden of disease and the number of published randomized trials,²⁴ and moderate correlation between systematic reviews and DALYs across the entire Cochrane Database of Systematic Reviews.²⁵ Furthermore, a study in 2015 comparing research funding by the US National Institutes of Health demonstrated that skin cancer research was generally overfunded, whereas dermatitis, decubitus ulcer, fungal skin diseases and cellulitis received substantially less financial support.¹⁵ Although skin cancers are represented by lower DALYs according to GBD metrics, their true burden is thought to be significantly underestimated, and thus might still be deemed important because of the associated morbidity and mortality. We recognize that many variables play a part in research prioritization and development of CPGs, including disease prevalence, therapeutic options, geographical and clinical settings, cost constraints and local resource availability, healthcare priority setting, pharmaceutical suppliers and public interest.^{26,27}

Our systematic search strategy aimed to identify all available skin diseases CPGs from October 2014 to October 2019. However, some guidelines have a built-in 'expiry date' and are renewed according to a fixed schedule. We cannot exclude that some relevant CPGs may have fallen beyond the search scope and time limits of this review. We may also have missed CPGs that are inaccessible to the public, and some dermatological societies did not respond to us contacting them about accessing their CPGs. If a CPG did not clearly identify itself as a guideline, or if the meaning was lost during translation of a non-English CPG, it might have been missed in this review, despite measures taken to limit such omissions. In addition, we did not formally assess the quality of individual CPGs with a validated tool, as this will be the focus of future work.

In this first global scoping collation of CPGs for common dermatological conditions, we found numerous internationally available CPGs for the diagnosis, treatment and prevention of these diseases. By highlighting the current state and numbers of CPGs in dermatology, we provide insight into the potential mismatch between the resources used to develop CPGs for certain dermatological diseases and the corresponding disease burden worldwide. For the next stage of this project, we will perform critical appraisal to assess the quality of each of the included CPG, with the overarching objective to establish an accessible online resource indexing current and future CPGs in dermatology ranked by guideline quality.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1 GUIDEMAP search strategy.

Appendix S2 Inclusion and exclusion criteria.

Table S1 Included articles and detailed summary at the full-text screening stage.