



## ORIGINAL ARTICLE

## Bibliometric analysis of the literature relating to silicone hydrogel and daily disposable contact lenses

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### KEYWORDS

Bibliometric analysis;  
Contact lens;  
Daily disposable;  
h-index;  
Silicone hydrogel

### Abstract

**Purpose:** Publication metrics are derived for the fields of silicone hydrogel (SH) and daily disposable (DD) contact lenses.

**Methods:** A search of the Scopus database for papers in the fields of SH and DD contact lenses found 979 SH and 291 DD papers. Subject-specific h-indices for SH lenses ( $h_{SH}$ -index) and DD lenses ( $h_{DD}$ -index) were derived, in relation to five categories – authors, institutions, countries and journals – to serve as measures of impact. A short list of the most impactful entities was generated for each of the above five categories in the SH and DD fields.

**Results:** A paper entitled “Soft contact lens polymers: An evolution” by Nicholson and Vogt was the most highly cited article (495 citations) in both SH and DD fields. The most impactful entities for the SH and DD fields were: authors – Lyndon Jones ( $h_{SH} = 33$ ) and Philip Morgan ( $h_{DD} = 15$ ); institutions – the University of Waterloo ( $h_{SH} = 37$ ) and the University of New South Wales ( $h_{DD} = 15$ ); countries – the United States ( $h_{SH} = 45$ ) and the United Kingdom ( $h_{DD} = 24$ ); and journals – Optometry and Vision Science ( $h_{SH} = 33$ ) and Contact Lens and Anterior Eye ( $h_{DD} = 17$ ). Overall, the SH field ( $h_{SH} = 64$ ) is far more impactful than the DD field ( $h_{DD} = 34$ ).

**Conclusions:** Impactful papers, authors, institutions, countries and journals in the SH and DD fields are identified. Optometry is revealed as the leading profession in relation to SH and DD publications.

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### Introduction

The development of silicone hydrogel materials and daily disposability represents two of the most significant advancements in the field of contact lenses over the past 30 years. Silicone hydrogel materials have enabled soft lenses, across a wide range of powers, to be capable of delivering near-

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natural levels of oxygenation to the cornea during both open- and closed-eye wear,<sup>1-3</sup> thus minimising hypoxic effects of lens wear on the anterior eye.<sup>4</sup> This material type has been extremely successful, to the extent that it now accounts for about 72% of soft contact lenses prescribed world-wide.<sup>5</sup>

Daily disposable lenses are a product of significant advances in contact lens manufacturing, resulting in far lower costs per unit lens, making daily disposability economically viable. Daily replacement of contact lenses offers greater convenience for lens wearers,<sup>6</sup> enhanced compliance,<sup>7</sup> cost efficiency,<sup>8</sup> minimal environmental impact<sup>9</sup> and ocular health benefits.<sup>10</sup> Approximately 46% of soft contact lenses prescribed globally are daily disposable lenses.<sup>5</sup>

To characterise the literature underpinning these important contemporary developments, a bibliometric analysis was undertaken to determine the most widely cited papers and most prolific authors, institutions, countries and journals relating to the fields of silicone hydrogel and daily disposable contact lenses. The metrics characterising these two topics are also compared and contrasted.

## Materials and methods

Two independent bibliometric analyses were conducted to evaluate the literature concerning silicone hydrogel and daily disposable contact lenses. The search protocol used here was undertaken using the Scopus database (Elsevier). The following search terms were derived to ensure (a) high sensitivity, including a wide capture of articles with either silicone hydrogel or daily disposable contact lenses as the primary themes, and (b) high specificity, so as to rule out irrelevant or peripherally related articles.

The search term for silicone hydrogel contact lenses was as follows:

TITLE-ABS-Key(“silicone hydrogel\*” or “siloxane hydrogel\*”) AND TITLE-ABS-KEY(“contact lens\*”) AND (LIMIT-TO(LANGUAGE, “English”)) AND (LIMIT-TO(SRCTYPE, “j”)) AND (EXCLUDE(PUBYEAR, 2021))

The search term for daily disposable contact lenses was as follows:

TITLE-ABS(“daily disposable\*” OR “single use lens” OR “daily replacement” OR “one use” OR “1 day disposable” OR “single use disposable”) AND TITLE-ABS-KEY(“contact lens\*”) AND NOT TITLE-ABS(“Sclera\*”) AND NOT TITLE(“glucose”) AND NOT PUBYEAR BEF 1992 AND (LIMIT-TO(SRCTYPE, “j”)) AND (LIMIT-TO(LANGUAGE, “English”))

The searches for silicone hydrogel and daily disposable lenses were conducted on December 17 and 23, 2020, revealing 979 and 291 articles, respectively. The top 15 most cited papers for each lens type could be determined by listing the papers in rank order of number of citations.

Each of these two lists of papers also served as a database from which targeted analyses were conducted to determine impact in respect of the following four additional categories – authors, institutions, countries and journals – using a methodology developed by the present authors.<sup>10</sup> The first step was to generate a list of the top 25 in each of these categories by paper count, e.g. for the category ‘authors’, the author who had published the most papers in each of the

two pools of 979 and 291 papers was listed first, and so on, down to 25 authors in each list.

Quality was assessed using the concept of h-index<sup>11</sup> – a single metric that combines productivity (number of papers) and impact (number of citations). This metric can be applied to any category; for example, the h-index of an author is defined as the maximum value of h, such that the author has published h papers that have each been cited at least h times. To continue with the example of ‘authors’ – a subject-specific silicone hydrogel contact lens h-index (the “h<sub>SH</sub>-index”) and daily disposable contact lens h-index (the “h<sub>DD</sub>-index”) were derived for each author, to serve as a measure of the impact that each author has had in the field.

The h<sub>SH</sub>-index and h<sub>DD</sub>-index of a given author were determined by sorting the subset of publications for that author by rank order of citations (from highest to lowest) and working down the list, starting with the paper that had the highest number of citations, to determine the first paper with a paper rank number that was greater than its number of citations. The h<sub>SH</sub>-index and h<sub>DD</sub>-index for that author was identified as the number of the entry above the identified paper. This was repeated for each of the 25 most prolific authors; the top 10 were then identified and ranked in order of h<sub>SH</sub>-index and h<sub>DD</sub>-index, with tied ranks broken in favour of a higher number of published papers. The same approach was applied for the analysis of institutions, countries and journals, with some differences in the number of top entities listed in each category.

## Results and discussion

### Timeline and overall citation metrics of publications

Fig. 1 shows the number of papers published each year in the fields of silicone hydrogel contact lenses and daily disposable contact lenses between 1990 and 2020. It is clear that, overall, there has been greater academic interest in the field of silicone hydrogel contact lenses.

#### Silicone hydrogel lenses

As can be seen from Fig. 1, six papers were published on silicone hydrogel contact lenses during the developmental phase in the late 1990s; there was then a sharp increase in the volume of papers, peaking at 76 papers in 2013, and a declining number thereafter. These works have been cited 20,022 times; however, 10.4% of these papers remain uncited. The combined body of work has a h<sub>SH</sub>-index of 64.

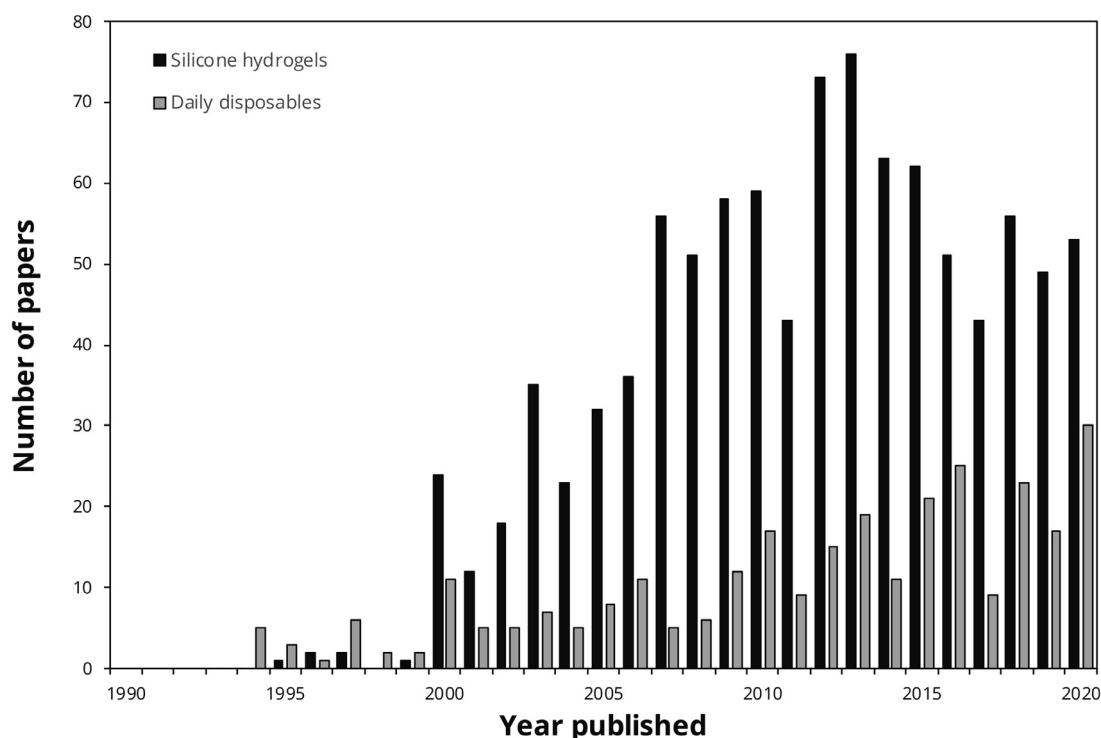
#### Daily disposable lenses

Fig. 1 reveals that the literature on daily disposable contact lenses commenced with five papers published in 1994; this increased to 30 papers in 2020. These papers have been cited 5832 times, with 15.3% of articles uncited. The combined body of work has a h<sub>DD</sub>-index of 34.

### Highly cited papers

#### Silicone hydrogel lenses

Table 1 lists the top 15 silicone hydrogel contact lens-related papers, ranked by their numbers of citations. Of these, six discuss contact lens-associated keratitis and microbial



**Figure 1** Number of papers in the fields of silicone hydrogel and daily disposable contact lenses published each year between 1990 and 2020.

adherence to epithelial cells (#2, 3, 4, 9, 10 and 14); four report on contact lens deposition and drug release (#5, 6, 7 and 11); three discuss lens polymer structure (#1, 13 and 15); one describes solution-induced corneal staining (#8); and one considers discontinuation from lens wear (#12).

#### Daily disposable lenses

The top 15 daily disposable contact lens-related papers ranked by their numbers of citations are shown in Table 2. Of these, six discuss contact lens-associated infiltrates and keratitis (#2, #3, #4, #6, #8 and #15); two consider lapsed wearers (#5 and #7); two report on contact lens drug release (#9 and #10); two describe non-ulcerative clinical findings relating to lens wear (#11 and #14); and single papers cover advances in contact lens polymers (#1), trends in prescribing contact lenses (#12) and dynamic ocular surface temperature during lens wear.

#### Paper overlap

Six of the top 15 papers in Table 1 (#1, #2, #3, #4, #12 and #14) also appear in Table 2, at ranks (#1, #2, #3, #4, #7 and #8) respectively. The paper ranked #1 in both Tables 1 and 2 is entitled “Soft contact lens polymers: An evolution” by Nicholson and Vogt, that has been cited 495 times. This review paper details the polymeric properties of silicone hydrogel contact lens materials and materials from which daily disposable contact lenses can be fabricated.

Papers #2, #3 and #4 in Tables 1 and 2 (the same papers), as well as the paper ranked #14 in Table 1 and #8 in Table 2, relate to the risk of microbial keratitis of both silicone hydrogel and daily disposable contact lenses, which is a critical consideration when evaluating the safety of these lens types. The paper ranked #12 and #7 in Tables 1 and 2,

respectively, considers the impact of silicone hydrogel and daily disposable contact lenses on discontinuation from lens wear, another key consideration in evaluating the success of various contact lens types.

The reason why the papers ranked #2 and #7 in Table 2 each have one more citation than the same paper listed in Table 1 (at ranks #2 and #12, respectively) is because, as stated in the Methods, the analysis of daily disposable papers was conducted six days *after* the analysis of silicone hydrogel papers, thus allowing more time for additional daily disposable lens citations to accrue.

#### Most impactful authors

##### Silicone hydrogel lenses

Table 3 shows the 10 most impactful authors in the field of silicone hydrogel contact lenses, ranked by  $h_{SH}$ -index. In this table, the  $h_{SH}$ -indices of the authors range from 16 to 33. Lyndon Jones is the most impactful and prolific author by a wide margin, with a  $h_{SH}$ -index of 33 and having published 118 papers.

Of the 10 most impactful authors, 9 are optometrists; Mark Willcox (rank #7) is a microbiologist. Two of the top 10 are female – Robin Chalmers and Kathy Dumbleton.

##### Daily disposable lenses

The 10 most impactful authors in the field of daily disposable lenses, ranked by  $h_{DD}$ -index are presented in Table 4. In this table, the  $h_{DD}$ -indices of the authors range from 7 to 15. Philip Morgan and Nathan Efron are the most impactful authors, each having a  $h_{DD}$ -index of 15. Philip Morgan is also the most prolific author, with 35 papers.

**Table 1** Top 15 most highly cited silicone hydrogel-related articles ranked by number of citations.

Rank	Title	First Author	Journal	Year, Volume & Pages	Citations
1	Soft contact lens polymers: An evolution	Paul Nicolson	Biomaterials	2001 22:3273–83	495
2	The incidence of contact lens-related microbial keratitis in Australia	Fiona Stapleton	Ophthalmology	2008 112;1655–62	359
3	Risk factors for microbial keratitis with contemporary contact lenses: A case-control study	John Dart	Ophthalmology	2008 115;1647–54	233
4	Incidence of keratitis of varying severity amongst contact lens wearers	Philip Morgan	British Journal of Ophthalmology	2005 89;430–6	192
5	Lysozyme and lipid deposition on silicone hydrogel contact lens materials	Lyndon Jones	Eye and Contact Lens	2003 29 (Supp);75–9	182
6	Extended delivery of ophthalmic drugs by silicone hydrogel contact lenses	Jinah Kim	Biomaterials	2008 28;2259–69	160
7	Extended delivery of hydrophilic drugs from silicone-hydrogel contact lenses containing Vitamin E diffusion barriers	Cheng-chun Peng	Biomaterials	2010 31;4032–47	153
8	Asymptomatic corneal staining associated with the use of balafilcon silicone-hydrogel contact lenses disinfected with a polyaminopropyl biguanide-preserved care regimen	Lyndon Jones	Optometry and Vision Science	2002 79;753–61	142
9	The incidence of microbial keratitis amongst wearers of a 30-day silicone hydrogel extended-wear contact lens	Oliver Schein	Ophthalmology	2005 112;2172–9	126
10	Effects of rigid and soft contact lens daily wear on corneal epithelium, tear lactate dehydrogenase, and bacterial binding to exfoliated epithelial cells	Patrick Ladage	Ophthalmology	2001 108;1279–88	124
11	Glaucoma therapy by extended release of timolol from nanoparticle loaded silicone-hydrogel contact lenses	Hyun-jung Jung	Journal of Controlled Release	2013 165;82–9	122
12	The impact of contemporary contact lenses on contact lens discontinuation	Kathy Dumbleton	Eye and Contact Lens	2013 39;93–9	120
13	A novel phosphorylcholine-coated contact lens for extended wear use	Sean Willis	Biomaterials	2001 22;3261–72	120
14	Diagnosis and management of Acanthamoeba keratitis	Kristin Hammersmith	Current Opinion in Ophthalmology	2006 17;327–31	112
15	Porous structure of Purevision versus Focus Night & Day and conventional hydrogel contact lenses	Antonio López-Alemay	Journal of Biomedical Materials Research	2002 63;319–25	111

**Table 2** Top 15 most highly cited daily disposable-related articles ranked by number of citations.

Rank	Title	First Author	Journal	Year, Volume & Pages	Citations
1	Soft contact lens polymers: An evolution	Paul Nicolson	Biomaterials	2001 22:3273–83	495
2	The incidence of contact lens-related microbial keratitis in Australia	Fiona Stapleton	Ophthalmology	2008 112;1655–62	360
3	Risk factors for microbial keratitis with contemporary contact lenses: A case-control study	John Dart	Ophthalmology	2008 115;1647–54	233
4	Incidence of keratitis of varying severity amongst contact lens wearers	Philip Morgan	British Journal of Ophthalmology	2005 89;430–6	192
5	A multi-centre study of lapsed contact lens wearers	Graeme Young	Ophthalmic and Physiological Optics	2002 22;516–27	151
6	Contact lens-related microbial keratitis: How have epidemiology and genetics helped us with pathogenesis and prophylaxis	Fiona Stapleton	Eye	2012 26;185–93	140
7	The impact of contemporary contact lenses on contact lens discontinuation	Kathy Dumbleton	Eye and Contact Lens	2013 39;93–9	121
8	Diagnosis and management of Acanthamoeba keratitis	Kristin Hammersmith	Current Opinion in Ophthalmology	2006 17;327–31	112
9	Controlled release of high molecular weight hyaluronic acid from molecularly imprinted hydrogel contact lenses	Maryam Ali	Pharmaceutical Research	2009 26;714–26	104
10	Clinical performance of daily disposable soft contact lenses using sustained release technology	Rachel Peterson	Contact Lens and Anterior Eye	2006 29;127–34	84
11	A 3-year prospective study of the clinical performance of daily disposable contact lenses compared with frequent replacement and conventional daily wear contact lenses	O. David Solomon	CLAO Journal	1996 22;250–7	82
12	A decade of contact lens prescribing in the United Kingdom (1996–2005)	Philip Morgan	Contact Lens and Anterior Eye	2006 29;59–68	81
13	The effect of contact lens wear on dynamic ocular surface temperature	Christine Purslow	Contact Lens and Anterior Eye	2005 28;29–36	79
14	Risk factors for nonulcerative contact lens complications in an ophthalmic accident and emergency department. A case-control study	Cherry Radford	Ophthalmology	2009 116;385–92	74
15	A multicenter case-control study of the role of lens materials and care products on the development of corneal infiltrates	Robin Chalmers	Optometry and Vision Science	2012 89;316–25	73

**Table 3** Top 10 authors of silicone hydrogel-related articles, ranked by author  $h_{SH}$ -index.

Rank	Author	$h_{SH}$ -index	Paper count
1	Lyndon Jones	33	118
2	Brien Holden	20	40
3	Nathan Efron	20	36
4	Philip Morgan	20	34
5	Desmond Fonn	19	39
6	Robin Chalmers	19	29
7	Mark Willcox	18	37
8	Craig Woods	17	31
9	Lakshman Subbaraman	16	39
10	Kathy Dumbleton	16	26

**Table 4** Top 10 authors of daily disposable-related articles, ranked by author  $h_{DD}$ -index.

Rank	Author	$h_{DD}$ -index	Paper count
1	Philip Morgan	15	35
2	Nathan Efron	15	30
3	Lyndon Jones	13	24
4	Craig Woods	12	18
5	Fiona Stapleton	9	11
6	Robin Chalmers	8	12
7	Kathy Dumbleton	7	11
8	Lisa Keay	7	10
9	Thomas Naduvilath	7	10
10	Brien Holden	7	9

Nine of the 10 most impactful authors are optometrists; Thomas Naduvilath at rank #9 is a biostatistician. Four of the top 10 are female – Fiona Stapleton, Robin Chalmers, Kathy Dumbleton and Lisa Keay.

### Author overlap

Given that authors with a specialist interest in contact lenses often publish on a multitude of topics within that broad subject area, it is unsurprising that seven of the top authors featured in Table 3 (those ranked #1, #2, #3, #4, #6, #8 and #9) also feature in Table 4, albeit in a different rank order (the corresponding ranks in Table 2 being #3, #10, #2, #1, #6, #4 and #7).

### Leading institutions

#### Silicone hydrogel lenses

Table 5 lists the 10 most impactful institutions in the field of silicone hydrogel contact lenses ranked by  $h_{SH}$ -index. In this table, the  $h_{SH}$ -indices of the leading institutions range from 14 to 37. These institutions are based in Australia (2), Canada (2), Portugal (1), Spain (1), the United Kingdom (2) and the United States (2).

The leading institution is the University of Waterloo, with a  $h_{SH}$ -index of 37 and a total of 160 papers. Publications have emanated from optometry departments or research centres in 7 of the 10 leading institutions; of the remaining three, one is a research institute (the Brien Holden Vision Institute, rank #3), one is a contact lens company (Alcon Laboratories, #5) and one is an engineering department (at McMaster University, rank #9).

#### Daily disposable lenses

The 10 most impactful institutions in the field of daily disposable contact lenses ranked by  $h_{DD}$ -index are listed in Table 6. In this table, the  $h_{DD}$ -indices of the leading institutions range from 7 to 16. These institutions are based in Australia (4), United States (3), United Kingdom (2) and Canada (1).

The leading institution is the University of New South Wales, with an  $h_{DD}$ -index of 16 (total papers = 28). The University of Manchester has produced the most papers (34). Publications have emanated from optometry departments or optometric research centres in eight of the ten leading institutions; of those listed, the other two institutions are contact lens companies (Johnson & Johnson, ranked #7, and Alcon Laboratories, ranked #9).

**Table 5** Top 10 institutions of silicone hydrogel-related articles, ranked by institution  $h_{SH}$ -index.

Rank	Institution	Country	$h_{SH}$ -index	Paper count
1	University of Waterloo	Canada	37	160
2	University of New South Wales	Australia	30	96
3	Brien Holden Vision Institute <sup>a</sup>	Australia	26	71
4	University of Manchester	United Kingdom	23	43
5	Alcon Laboratories <sup>b</sup>	United States	21	29
6	Ohio State University	United States	18	34
7	University do Minho	Portugal	16	39
8	Universidad de Santiago de Compostela	Spain	16	24
9	McMaster University	Canada	15	28
10	Aston University	United Kingdom	14	32

<sup>a</sup> Includes Vision Cooperative Research Centre.

<sup>b</sup> Includes CIBA Vision Corporation.

**Table 6** Top 10 institutions of daily disposable-related articles, ranked by institution  $h_{DD}$ -index.

Rank	Institution	Country	$h_{DD}$ -index	Paper count
1	University of New South Wales	Australia	16	28
2	University of Manchester	United Kingdom	14	34
3	University of Waterloo	Canada	14	28
4	Queensland University of Technology	Australia	13	26
5	Aston University	United Kingdom	11	25
6	Brien Holden Vision Institute <sup>a</sup>	Australia	11	18
7	Johnson and Johnson	United States	9	15
8	Ohio State University	United States	9	14
9	Alcon Laboratories <sup>b</sup>	United States	9	13
10	Deakin University	Australia	7	9

<sup>a</sup> Includes Vision Cooperative Research Centre.

<sup>b</sup> Includes CIBA Vision Corporation.

### Institution overlap

For the same reasons as described above in relation to authors, commonality also exists between [Tables 5](#) and [6](#), whereby seven of the top institutions featured in [Table 5](#) (those ranked #1, #2, #3, #4, #5, #6 and #10) also feature in [Table 6](#), but in a different rank order (the corresponding ranks in [Table 2](#) being #3, #1, #6, #2, #9, #8 and #5).

### Academics working in different institutions

Academics are peripatetic, often working in different institutions, and in many cases different countries, through their careers. The citation and paper counts presented in this work, in relation to institutions and countries, are those designated by Scopus, and typically relate to the current institution/country of *corresponding author* of the paper being assessed. This creates two issues: (1) for a paper with a multinational author listing, only the institution/country of the corresponding author is counted; and (2) if an author has previously worked in one or more institutions/countries, these will not be credited, even though the majority of relevant work may have been undertaken there. Accordingly, [Tables 5](#) and [6](#) should be viewed in light of these factors.

### Top countries

#### Silicone hydrogel lenses

[Table 7](#) lists the top 5 countries contributing to the silicone hydrogel contact lens literature, ranked by  $h_{SH}$ -index. The countries range in  $h_{SH}$ -index from 22 to 45. The United States is the most impactful and prolific nation, with a  $h_{SH}$ -index of 45, and an output of 348 papers.

#### Daily disposable lenses

The top 5 countries contributing to the daily disposable contact lens literature, ranked by  $h_{DD}$ -index, are presented in [Table 8](#). Countries range in  $h_{DD}$ -index from 7 to 24. The United Kingdom, United States and Australia are equally the three most impactful nations, each with a  $h_{DD}$ -index of 24. The United Kingdom is the most prolific country, having produced 91 papers – one more than the United States (90 papers).

**Table 7** Top 5 countries of silicone hydrogel-related articles, ranked by country  $h_{SH}$ -index.

Rank	Country	$h_{SH}$ -index	Paper count
1	United States	45	348
2	Canada	36	170
3	Australia	34	160
4	United Kingdom	32	138
5	Spain	22	78

### Country overlap

The five top countries producing silicone hydrogel and daily disposable contact lenses are common to [Tables 7](#) and [8](#). The corresponding rankings in [Table 8](#) (to the top five countries featured in [Table 7](#)) are #2, #4, #3, #1 and #5.

### Prominent journals

#### Silicone hydrogel lenses

[Table 9](#) lists the top 5 journals publishing silicone hydrogel contact lens-related papers, ranked by  $h_{SH}$ -index. For these journals, the  $h_{SH}$ -indices range from 14 to 33. Of the top 5, two are contact lens journals (those ranked #2 and #3), and the other three are optometry (#1), ophthalmology (#4) and vision science (#5) journals. *Optometry and Vision Science* is the most impactful journal, with a  $h_{SH}$ -index of 33, having published 158 papers.

**Table 8** Top 5 countries of daily disposable-related articles, ranked by country  $h_{DD}$ -index.

Rank	Country	$h_{DD}$ -index	Paper count
1	United Kingdom	24	91
2	United States	24	90
3	Australia	24	65
4	Canada	16	35
5	Spain	7	20



**Table 9** Top 5 journals of silicone hydrogel-related articles, ranked by journal  $h_{SH}$ -index.

Rank	Journal	$h_{SH}$ -index	Paper count
1	Optometry and Vision Science	33	158
2	Eye and Contact Lens <sup>a</sup>	32	202
3	Contact Lens and Anterior Eye	27	149
4	Investigative Ophthalmology and Visual Science	23	37
5	Cornea	14	28

<sup>a</sup> Includes CLAO Journal.

**Table 10** Top 5 journals of daily disposable-related articles, ranked by journal  $h_{DD}$ -index.

Rank	Journal	$h_{DD}$ -index	Paper count
1	Contact Lens and Anterior Eye	17	72
2	Optometry and Vision Science	17	46
3	Eye and Contact Lens <sup>a</sup>	13	41
4	Clinical and Experimental Optometry	11	20
5	Ophthalmic and Physiological Optics	7	10

<sup>a</sup> Includes CLAO Journal.

### Daily disposable lenses

The top 5 journals publishing daily disposable contact lens-related papers, ranked by  $h_{DD}$ -index, are shown in Table 10. For these journals, the  $h_{DD}$ -indices range from 7 to 17. Two of these top five are contact lens journals (#1 and #3) and three are optometry journals (#2, #4 and #5). *Contact Lens and Anterior Eye* and *Optometry and Vision Science* are the most impactful journals, each having a  $h_{DD}$ -index of 17. *Contact Lens and Anterior Eye* has published the most papers (72), by a wide margin from #2-ranked *Optometry and Vision Science* (46 papers).

### Journal overlap

Three journals are common to both tables – those ranked #1, #2 and #3 in Table 9, corresponding to ranks #2, #3 and #1 in Table 10. It is unsurprising the two specialist contact lens journals – *Eye and Contact Lens* and *Contact Lens and Anterior Eye* – feature in the top three in both tables.

### Conclusions

This examination of the silicone hydrogel and daily disposable contact lens literature over the past 30 years has revealed the most highly cited papers and the most impactful authors, institutions, countries and journals in each field. As assessed by h-index analysis, the impact of the literature underpinning the field of silicone hydrogel contact lenses

( $h_{SH}$ -index = 64) is considerably greater than that underpinning the daily disposable contact lens literature ( $h_{DD}$ -index = 34).

The considerable overlap of bibliometrics between the silicone hydrogel and daily disposable contact lens fields suggests that the constituent components (papers, authors, institutions, countries and journals) that underpin developments in these fields emanate from a common base, largely centred on academic optometry, supported by ophthalmology, vision science, and material science and engineering. The data presented here essentially establish a baseline bibliometric profile of the academic foundations of the development of silicone hydrogel and daily disposable contact lenses.

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

### Conflict of interest

This work identifies three of the authors (NE, LWJ and PBM) as leading authors in the fields of silicone hydrogel and daily disposable contact lenses, from which they stand to derive reputational benefit. The authors also declare the following:

**Nathan Efron:** Nothing to declare.

**Lyndon Jones:** Over the past 3 years Dr Jones' research group (CORE) or he personally has received research support or lectureship honoraria from: Alcon, Allergan, CooperVision, GL Chemtec, iMed Pharma, J&J Vision, Lubris, Menicon, Nature's Way, Novartis, Ote, PS Therapy, Safilens, Santen, Shire, SightGlass and Visioneering. Dr Jones is also a consultant and/or serves on an advisory board for Alcon, CooperVision, J&J Vision, Novartis and Ophtecs.

**Jason Nichols:** Over the last 3 years, Dr. Jason J. Nichols has received honoraria from Paragon Vision Sciences and CooperVision. He has also received research funding from Alcon, Bruder, Johnson and Johnson Vision, and Malinckrodt. Also, Dr. Kelly Nichols is the spouse of Dr. Jason Nichols, extending her declarations to him. In the past 12 months, Dr. Kelly Nichols has consulted for and received honorarium from: Bruder, Dompe, Kala, Novartis/Shire (Medical Exchange International), Osmotica, Oyster Point, Sight Sciences, Tear Film Innovations/Alcon/Acquiom, Thea, Tarsus, and TopiVert. She has received research funding from: Allergan, Kala, and Tear Science.

**Phillip Morgan:** Nothing to declare.

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