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Commentary

Misinformation is prevalent in psoriasis-related YouTube videos

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Abstract

Background
Psoriasis patients seek information online, but little is known about their interaction with YouTube. We examined the quality of content in psoriasis-related YouTube videos and investigated their interactions with viewers.

Methods
YouTube was searched using the term "psoriasis." Relevant videos in English were independently categorized by two reviewers as useful, misleading, or patient view (regarding experience with psoriasis). Disagreements were settled by a third reviewer. Videos were rated on a Global Quality Scale (GQS) (1=poor, 5=excellent).

Results
According to our reviewers, 17% of the 47 videos were useful, 21% were misleading, and 62% represented patient views. Mean GQS scores were 4.2 ± 1.3 for useful videos, 1.7 ± 0.7 for misleading videos, and 2.2 ± 1.1 for patient view videos ($p<0.001$). Video views per day did not differ among the categories ($p=0.65$), whereas useful videos had fewest "Likes" (useful: 31 ± 55, misleading: 151 ± 218, patient views: 165 ± 325, $p=0.06$) and comments (useful: 9.8 ± 18.3, misleading: 64.1 ± 89.7, 124.9 ± 199.4, $p=0.009$).

Conclusions
Useful videos were highest in quality but had similar viewership as misleading and patient view videos, with lower popularity and engagement of users compared to other categories. Physicians and psoriasis patients should be aware of this pattern when approaching YouTube as a resource.

Keywords: internet, psoriasis, health information, YouTube

Introduction

Prior research has shown that the internet is one tool used by psoriasis patients to seek more information and support regarding their condition [1]. Videos relating to dermatological conditions are also widely available on YouTube. Non-health professional users make up the majority of sources for videos, which are widely viewed and shared. However, it is an ongoing challenge for viewers to distinguish evidence-based content from the rest [2].

Prior studies have examined available YouTube videos on topics including tanning, melanoma, and the relationship between nutrition and acne. It is important for dermatologists to be aware of the type of information patients are exposed to concurrently with clinical care. Therefore, we methodically evaluated the quality and content of uploaded videos which patients may view on YouTube, focusing specifically on psoriasis.

Methods

On December 12, 2014, YouTube (www.youtube.com) was searched using the term "psoriasis." The default ranking option of "relevance" was selected. A prior study on search engine user behavior demonstrated that 90% of users do not click on a result past the first three pages of search results [3]. Therefore the videos included in this study were limited to search results from the first three pages to reflect typical user behavior. Each YouTube search result page contains links to 20 videos, such that there are 60 videos accessible from the first three search result pages. Only videos in English with adequate sound quality were included in this study. Two independent reviewers (SJ, TT) viewed and analyzed all videos. To reduce potential bias, reviewers were blinded to each other's evaluations. Disagreements were arbitrated by a third reviewer (JD). All reviewers were well-versed on current psoriasis pathogenesis, clinical presentation, and management.

Attributes of each video such as video length, duration since upload on YouTube, views per day (total video views divided by number of days since upload onto YouTube), number of "likes," and comments were recorded. Each video was sorted into one of five groups based on source: TV media, nonprofit organization/health professional, independent user (non-health professional), health information website, and medical advertisement.

All videos were classified as overall useful, misleading, or personal views [4–9]. Videos rated as useful contained scientifically accurate information about any aspect of psoriasis. Misleading videos contained inaccurate or unproven information about psoriasis, based on current evidence. To prevent overlap, if a video contained any inaccurate information, it was classified as "misleading." Patient views videos depicted a patient's experience with psoriasis. The "useful" and "misleading" categories excluded videos with patient input. Instead, the contents of patient views videos were rated as either positive or negative, described further below. In addition to these categories, all videos were rated on a 5-point Likert scale, the Global Quality Score (GQS) scale, in order to evaluate the quality and usefulness of each video (Box 1) [6,10].

Box 1. Global quality scale (GQS).

GQS score and description
1. Poor quality, poor flow of the video, most information missing, not at all useful for patients—I would highly discourage a psoriasis patient from watching this video.
2. Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients—I would discourage a psoriasis patient from watching this video.
3. Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients—I would neither encourage nor discourage a psoriasis patient from watching this video.
4. Good quality and generally good flow. Most of the relevant information is listed, but some topics not covered, useful for patients—I would encourage a psoriasis patient to watch this video.
5. Excellent quality and flow, very useful for patients—I would highly encourage a psoriasis patient to watch this video.

Useful videos were further rated on reliability and content scales. Box 2 displays the 5-point reliability scale, which was adapted from the DISCERN tool for assessment of health information quality [11]. The content score was determined based on how many different aspects of psoriasis-related information were covered, including epidemiology/risk factors, pathogenesis, clinical features, additional diagnostic tests, and treatment. Coverage of an aspect earned 1 point each for a maximum of 5 points.

Box 2. Reliability scale.

Reliability of information (0 points for No, 1 point for every Yes)
1.   Are the aims clear and achieved?
2.   Are reliable sources of information used? (i.e., speaker is a dermatologist, publications were cited)
3.   Is the information presented balanced and unbiased?
4.   Are additional sources of information listed for patient reference?
5.   Are areas of uncertainty mentioned?

For misleading videos, the major elements of the video, which contributed to the misleading classification were recorded. The patient views-based videos were additionally categorized as positive or negative. Positive patient views videos provided useful information on psoriasis or emotional support to psoriasis patients. Negative patient views videos advocated treatment options and theories on pathogenesis without scientific basis, included negative portrayals of evidence-based therapy, or promoted disease-aggravating behavior.

Data entry and analysis were performed using Excel (Microsoft, Redmond, WA) and R statistical software (R Foundation for Statistical Computing, Vienna, Austria). Cohen's κ-coefficient was used to calculate the degree of agreement between the two independent reviewers. Descriptive statistics were generated for recorded video characteristics. The one-way ANOVA test was applied to compare variables among groups of videos. A p value of less than 0.05 was considered statistically significant.

Results

"Psoriasis" as the search term yielded 147,000 results. Of the 60 videos accessible from the first three search result pages, 13 videos not in English or with poor sound quality were excluded (Table S1), leaving a total of 47 videos, which were included in the study. The sum of views for all 47 videos in the study was 2,009,743, with a total duration of 362.1 minutes. The mean video length was 7.7 (± 6.8) minutes, whereas the average number of days since upload onto YouTube was 614 (± 500) days. The mean number of views per day was 80.4 (± 107.4). The videos acquired on average 139.3 (± 276.3) "likes" from users.

Of the 47 videos, 8 (17%) were categorized as useful, 10 (21%) as misleading, and 29 (62%) as patient views. Cohen's unweighted κ for agreement between the two reviewers on video categorization was 0.77, indicating substantial agreement [12,13]. Mean GQS scores for useful, misleading, and patient views videos were 4.2 ± 1.3, 1.7 ± 0.7, and 2.2 ± 1.1, respectively, with statistically significant differences ($p < 0.001$). Cohen's κ with squared weights for agreement between the two reviewers on GQS scores was 0.76, also demonstrating substantial agreement. Mean views per day did not vary significantly among the three categories at 85.7 ± 150.6, 56.8 ± 79.8, and 87.1 ± 104.8 for useful, misleading, and patient views videos respectively (p=0.646). However, differences in mean "likes" from viewers were more striking: 31 ± 54.6, 150.6 ± 217.6, and 165.3 ± 324.5, respectively, for useful, misleading, and patient views videos (p=0.058). Patient view videos attracted the most user comments on average (124.9 ± 199.4), followed by misleading videos (64.1 ± 89.7), then useful videos (9.8 ± 18.3), with statistically significant differences (p=0.009). Table 1 displays the video categories and additional relevant attributes.

Table 1. Attributes of useful, misleading and patient views videos.

Characteristic	Useful	Misleading	Patient Views	P
No. videos (%)	8 (17)	10 (21)	29 (62)	
Total viewership (% total)	78084 (4)	681944 (34)	1249715 (62)	
Total length, min (% total)	61.0 (17)	72.0 (20)	229.0 (63)	
Mean video length, min ± SD	7.6±7.9	7.2±8.3	7.9±6.1	p=0.971
Mean duration on YouTube, days ± SD	573.6±513.3	945.5 ± 739.2	511.1± 345.2	p=0.253
Mean popularity, views per day ± SD	85.7±150.6	56.8±79.8	87.1±104.8	p=0.646
Mean likes ± SD	31±54.6	150.6±217.6	165.3±324.5	p=0.058
Mean number of comments ± SD	9.8±18.3	64.1±89.7	124.9±199.4	p=0.009
Mean GQS ± SD	4.2±1.3	1.7±0.7	2.2±1.1	p<0.001
Source	TV media: 2 Health information website: 2	Health information website: 1 Independent user: 1	TV media: 1 Medical advertisement: 1	

Nonprofit organization/health professional: 4	Medical advertisement: 6 Nonprofit organization/health professional: 2	Independent user: 27

For useful videos, the mean reliability score was 2.6 ± 0.9, and the mean content score was 2.8 ± 1.3. Cohen's κ with squared weights for agreement between the two reviewers was 0.59 and 0.76, respectively, for reliability and content scores. The following items on the reliability scale were most often fulfilled: "Are the aims clear and achieved;" "Is the information presented balanced and unbiased;" and "Are reliable sources of information used (i.e., speaker is a dermatologist, publications were cited)." As for content score, the most frequently addressed items were clinical features, pathogenesis, and treatment. Health information websites, TV media, and nonprofit organization/health professional categories were represented among the sources for useful videos. Examples of useful videos included those which featured board-certified dermatologists who explained aspects of the disease to the lay audience, including potentially aggravating factors and management options (Table 2).

Table 2. Useful videos and their attributes.

Video URL	Video name	Days since upload	Clip length	View count	Views per day	"Likes"	Source of clip
https://www.youtube.com/watch?v=O3sauC5xGFk	Psoriasis	1334	3:43	38535	28.89	158	Health information website
https://www.youtube.com/watch?v=TUeIuD-dj34	Plaque psoriasis of ear pinna	20	0:39	8759	437.95	57	Nonprofit organization/ health professional
https://www.youtube.com/watch?v=WJj2cy4aGQg	How to treat psoriasis effectively - By Franziska Ringpfeil, Board Certified Dermatologist	321	5:41	7651	23.83	13	Nonprofit organization/ health professional
https://www.youtube.com/watch?v=KQlx6_JU01E	What is psoriasis? Best psoriasis treatment by Dr. Oz	120	5:40	4785	39.88	9	TV media
https://www.youtube.com/watch?v=sNCzuVnvawQ	Embarrassing Bodies psoriasis	96	14:41	14440	150.42	7	TV media
https://www.youtube.com/watch?v=1I6nBUdTJUY	Understanding your psoriasis	622	1:17	881	1.42	3	Health information website
https://www.youtube.com/watch?v=kPuZjkHIdY4	Practical dermatology - psoriasis	919	23:59	1840	2.00	1	Nonprofit organization/ health professional
https://www.youtube.com/watch?v=cspo-drIfIY	Psoriasis triggers and management	1157	5:20	1193	1.03	0	Nonprofit organization/ health professional

With regard to misleading videos, a majority (60%) was attributable to medical advertisement. Additional categories represented in the misleading videos included health information website, independent user, and nonprofit organization/health professional.

Common themes in misleading videos included "natural" remedies and diet changes without evidence basis for effectiveness (Table 3). Several videos prominently displayed links to websites, which further promoted dubious therapies. An example of a misleading video was one that promoted a 6-month herbal program, which would cure psoriasis. Some videos featured individuals introduced as health professionals who promoted alternate homeopathic remedies and diet changes over established treatment options.

Table 3. Misleading videos and their attributes.

Video URL	Video name	Days since upload	Clip length	View count	Views per day	"Likes"	Misleading element
https://www.youtube.com/watch?v=JtosFcCVepg	Psoriasis natural treatment that works	815	30:00	151,241	185.57	687	Chiropractic manipulation is promoted as a cure for psoriasis.
https://www.youtube.com/watch?v=y5LZ463klJE	Psoriasis cure by neem and other herbs - Dr. Vikram Chauhan - MD-Planet Ayurveda	837	5:15	28139	33.62	314	Herbs are claimed to cure psoriasis in a 6-month program.
https://www.youtube.com/watch?v=-zckble4p-w	Inexpensive remedies for psoriasis and eczema	2129	5:27	68,064	31.97	252	Viewers are advised to avoid steroids at all costs.
https://www.youtube.com/watch?v=JubVwLvu-Zw	Scalp psoriasis	1506	2:53	339707	225.57	114	A website that sells homeopathic therapies is advertised.
https://www.youtube.com/watch?v=KsWLAsJOdFI	Diet & nutrition tips: Foods to eat with psoriasis	2172	1:17	71,973	33.14	64	Gluten-free diet is advocated regardless of whether the patient has a gluten allergy.
https://www.youtube.com/watch?v=A2qU34N8taA	Psoriasis eczema dry skin the nightshade foods #19	419	7:03	9344	22.30	25	Avoiding a wide range of foods is presented as a curative remedy.
https://www.youtube.com/watch?v=LE2hh4M6Iis	Food triggers for psoriasis	93	5:43	1471	15.82	23	Homeopathic merchandise is advertised.
https://www.youtube.com/watch?v=LFa3Fltw9uk	Scalp psoriasis treatment tea tree oil & olive oil - natural psoriasis remedy	688	1:58	9989	14.52	22	A concoction which lacks evidence for effectiveness is presented as remedy for scalp psoriasis.
https://www.youtube.com/watch?v=pVs-n8hjBQM	Help for psoriasis and dermatitis and acne	410	6:55	870	2.12	3	Multi-vitamin mineral complex supplements are advertised as a remedy for numerous illnesses.
https://www.youtube.com/watch?v=YF8T7Jmt5vM	UVB psoriasis lamp	386	5:30	1146	2.97	2	A one-size-fits-all approach is promoted as guaranteed curative therapy, effective in weeks.

Most patient views videos originated from independent users (93%). Among patient views videos, 29 videos (83%) represented negative patient views, and 5 videos (17%) represented positive patient views (Table 4). Cohen's unweighted κ for agreement between the two reviewers on positive and negative classification was 0.93. An example of a positive patient view video featured a celebrity who spoke about her experience with psoriasis, including her symptoms and insecurities. She encouraged others with psoriasis to seek out care through a dermatologist and not to let their skin condition define them. An example of a negative patient view video depicted a psoriasis patient using a knife to scrape his scales and pulling them off, occasionally causing bleeding. Prevalent themes among the patient views videos consisted of the following: promotion of specific diet changes (e.g., special juices, alkaline water, avoiding certain foods), use of natural products (e.g., aloe vera, apple cider vinegar), manipulation of scales on the skin, use of cosmetic modalities (e.g. wigs, makeup to cover up lesions), as well as discussion of emotional tolls of the disease.

Table 4. Patient view videos and their attributes.

Video URL	Video name	Days since upload	Clip length	View count	Views per day	"Likes"	Patient views
https://www.youtube.com/watch?v=9MejlvS3i5Y	How to cure psoriasis naturally	437	19:55	169,762	388.47	1544	Negative
https://www.youtube.com/watch?v=K0UAv3Blung	How to "cure" scalp psoriasis naturally! My story 1 year later after shaving my head!	540	19:14	123196	228.14	997	Negative
https://www.youtube.com/watch?v=rXdALbRRQfA	My scalp psoriasis story and what I wish I knew before it was too late	540	13:22	87,481	162.00	411	Positive
https://www.youtube.com/watch?v=Ub0pN58WKzE	Psoriasis peel n scrape part 1	581	3:03	216,060	371.88	181	Negative
https://www.youtube.com/watch?v=nzoUyvtCVlU	Make psoriasis plaques go away	1024	2:26	74,172	72.43	152	Negative
https://www.youtube.com/watch?v=9aEtBCJMN2w	Check your diet and cure psoriasis	412	16:54	16393	39.79	147	Negative
https://www.youtube.com/watch?v=HrASpXthXp8	Shaving my head for psoriasis	845	3:34	57,106	67.58	144	Positive
https://www.youtube.com/watch?v=F5wq0CS11pI	How to get RID of scalp psoriasis and REGROW hair!	344	7:42	9757	28.36	125	Negative
https://www.youtube.com/watch?v=9D24_UrfrGo	Magic scalp treatment for seborrheic dermatitis and psoriasis with emphasis on intestinal health	541	17:33	26603	49.17	119	Negative
https://www.youtube.com/watch?v=dERg2qXCll0	Stacy London on living with psoriasis--The Doctors	428	4:24	27,684	64.68	110	Positive
https://www.youtube.com/watch?v=RKDWRe-FzUo	Psoriasis scrape - Long and HARD! 2 month build up.	476	5:03	109,470	229.98	105	Negative
https://www.youtube.com/watch?v=TX2MvCE7Wq8	Aloe vera psoriasis treatment	1231	2:45	108,083	87.80	105	Negative
https://www.youtube.com/watch?v=W9ddk2h5CSI	My journey with psoriasis	812	3:56	23,523	28.97	79	Negative
https://www.youtube.com/watch?v=vS017GbLJFo	Reversing psoriasis with green smoothies	1377	5:15	12994	9.44	66	Negative
https://www.youtube.com/watch?v=THRr1lr4fW4	Picking at psoriasis scales	280	2:06	60,426	215.81	55	Negative
https://www.youtube.com/watch?v=A9mEOul9rfs	Psoriasis and psoriatic arthritis	1067	4:09	3102	2.91	55	Positive
https://www.youtube.com/watch?v=SShg6w6EmGU	Psoriasis without the plaque after soak n scrub	279	0:43	18,979	68.03	51	Negative
https://www.youtube.com/watch?v=HkKVBJgf4Xs	Cure psoriasis naturally - How to make & drink alkaline water to heal psoriasis	123	5:51	10295	83.70	48	Negative
https://www.youtube.com/watch?v=EHBCwSF-5No	How to treat scalp psoriasis naturally / Scalp psoriasis natural treatment / Scalp psoriasis diet	260	2:08	1057	4.07	48	Negative
https://www.youtube.com/watch?v=5W6BfIYAJ8o	Knife picking psoriasis part 3	280	3:29	33,792	120.69	43	Negative
https://www.youtube.com/watch?v=M8ZC6iEnz2c	Psoriasis (update) vs Foot file	373	7:10	20667	55.41	39	Negative
https://www.youtube.com/watch?v=pkGA30bxftA	Healed psoriasis naturally - raw, vegan, plant-based power!	864	8:26	3417	3.95	39	Negative
https://www.youtube.com/watch?v=ycZJ26UnbQw	How I cured my psoriasis - psoriasis treatment that works!	449	1:31	20765	46.25	35	Negative
https://www.youtube.com/watch?v=Fb2ruJ9vvSU	How to cure psoriasis naturally	485	6:47	3133	6.46	32	Negative
https://www.youtube.com/watch?v=X3G5akfOCFI	My psoriasis 411: Apple cider vinegar tutorial for scalp treatment	323	4:32	5471	16.94	23	Negative
https://www.youtube.com/watch?v=oQ1ntFyLb8k	Psoriasis cure - how I used a juice diet to change my skin - part 1	287	10:58	4195	14.62	22	Negative
https://www.youtube.com/watch?v=VOri3JtFWEY	Psoriasis diet diary week four	58	10:53	929	16.02	10	Negative
https://www.youtube.com/watch?v=fBEVKyFbNMA	Psoriasis diet diary week eleven	9	14:15	301	33.44	6	Negative
https://www.youtube.com/watch?v=x8fcF4Hxed0	The big cover up! How to cover psoriasis with makeup - Tips and tricks	98	20:58	902	9.20	2	Positive

Table 5 displays various attributes of video grouping based on source. The most common source type was independent user (60%), followed by medical advertisement (15%), nonprofit organization/health professional (13%), TV media (6%), and health information website (6%). Videos credited to independent users, nonprofit organizations/health professionals and TV media were most viewed (p=0.057). Independent user-generated videos (165.8±330.9) and medical advertisement (172.7±251.5) videos garnered more "Likes" than other categories (t-test, p=0.065). The same was true for number of comments (128.1±202.3 and 70.3±104.8, respectively; t-test, p=0.007). However, videos in these two categories earned the lowest GQS scores overall (2.1±1.0 and 1.5±0.6, respectively) whereas nonprofit organization/health professional videos (3.8±1.1) and health information website-generated videos (4±1.7) had the highest mean GQS scores (p=0.038).

Table 5. Attributes of videos based on source.

Quality score	Nonprofit organization/ health professional	TV media	Independent user	Health information website	Medical advertisement	P
Number of videos (%)	6 (13)	3 (6)	28 (60)	3 (6)	7 (15)	
Total viewership (% total)	159,480 (8)	46,909 (2)	1,218,381 (61)	49,405 (2)	535,568 (27)	
Total length, min (% total)	42.4 (12)	24.8 (7)	226.4 (63)	7.0 (2)	61.5 (17)	
Mean video length, min ±SD	7.1±8.6	8.3±5.6	8.1±6.2	2.3±1.3	8.8±9.4	p=0.030
Mean duration on YouTube, days ± SD	1119.7±896.1	214.7±185.1	479.9±308.0	881.3±393.4	774.9±524.7	p=0.107
Mean popularity, views per day ± SD	88.3±171.9	85.0±58.0	88.4±106.4	14.9±13.7	67.9±95.4	p=0.057
Mean likes ± SD	64.5±96.0	42.0±58.9	165.8±330.9	61.0±84.5	172.7±251.5	p=0.510
Mean number of comments ±SD	29±40.6	9.7±13.3	128.1±202.3	20±29.6	70.3±104.8	p=0.112
Mean GQS ± SD	3.8±1.1	3.5±2.2	2.1±1.0	4±1.7	1.5±0.6	p=0.038
Useful videos, n (%)	4 (50)	2 (25)	0 (0)	2 (25)	0 (0)	
Misleading videos, n (%)	2 (20)	0 (0)	1 (10)	1 (10)	6 (60)	
Patient views, n (%)	0 (0)	1 (3)	27 (93)	0 (0)	1 (3)	
Mean reliability score ± SD (useful videos only)	2.9±0.6	1.8±1.1	NA	2.5±0.7	NA	p=0.573
Mean content score (useful videos only)	2.9±1.4	2.3±1.8	NA	2.0±0.7	NA	p=0.714

Discussion

The videos investigated in this study totaled over 6 hours in duration, with more than 2 million cumulative views. Collectively, the 47 videos gathered 6,547 "Likes" and 4,342 comments from viewers, reflecting the support and active input from viewers. The videos encompassed a wide array of issues related to psoriasis, featuring perspectives from patients, health professionals, and organizational entities. The present study supports the notion that YouTube users are seeking and sharing health information online, and a specific dermatological condition like psoriasis can occupy a substantial presence on a video-sharing platform.

The classification methodology used in this study has been applied to investigate various other medical topics in the literature. This supports the validity of the method, and our results can be compared with those of other studies. Among the examined videos, useful videos comprised 17% and were associated with the highest quality scores. Compared with studies on other disease topics, which also carried out content analyses using similar methodology, this value is relatively low. The following demonstrate a representative sample of the percentage of useful videos: 54% of rheumatoid arthritis videos [6], 63% of hypertension-related videos [9], and 58% of dialysis videos [8].

The discrepancy is likely explained by the sheer number of patient view videos relating to psoriasis. Namely, 62% of all videos were categorized as patient views. This is a much larger proportion than that found in corresponding studies: 15% of rheumatoid arthritis videos [6], 4% of hypertension videos [9], and 25.2% of dialysis videos [8]. Meanwhile, the proportion of misleading

videos was 21%, more comparable to the other studies, in which misleading videos accounted for 33% of hypertension videos [9], 30% of rheumatoid arthritis videos [6], and 25% of dialysis videos [8]. Perhaps our large proportion of patient views videos can be explained by the inherent visibility of psoriasis, which lends well to documentation on camera and sharing via videos. Indeed, videos often featured shots of patients' lesions or cleared skin. Studying additional skin conditions on YouTube via content analysis would help shed light on whether this pattern applies more broadly.

Patient views and misleading videos garnered more "Likes" and inspired more comments than useful videos, which were higher quality. Independent users and medical advertisements were the most common sources of these videos, respectively. Other studies have echoed this trend of non-useful videos being more popular than the useful videos [8,9]. Engaging with other psoriasis patients online has been demonstrated to lead to improvement in psoriasis severity, quality of life, and support for patients [1]. However, our results show that there is also risk of significant exposure to inaccurate information for patients who seek information on YouTube. According to a study which compared treatment satisfaction between psoriasis patients recruited from an online sample versus from a dermatological center, the patients in the online sample were less satisfied with their care, which may explain the reason they seek resources online [14]. Perhaps these unsatisfied patients are among the users who watch and comment on the popular misleading and patient view videos.

Although informative, our study was characterized by several limitations. We only captured a snapshot of the available psoriasis videos on YouTube at a specific time. We also included fewer videos than comparable studies. However, compared to other studies which investigated YouTube videos, there were far more views total for the videos reviewed in this study (e.g., psoriasis: 47 videos, 2 million views. RA: 102 videos, 581,819 views total [6]). The large number of views and the greater likelihood that viewers will see the videos on the first three search result pages support the relevance of our results.

Future studies may apply our methodology to other prominent dermatological conditions such as acne and eczema to assess the relevant content on YouTube. It would also be interesting to investigate the characteristics of users who watch and comment on the videos. How do their attitudes toward their skin disease and care differ from people who do not frequent YouTube for disease-related content? Furthermore, what proportion of and what type of patients from dermatology clinics count YouTube among their resources for health information? Answering such questions would empower dermatologists and patients alike in understanding this popular resource.

Conclusion

Our study calls for the important curation of educational content for patients by professional organizations and patient advocacy groups. Unfortunately, many of the non-useful videos featured individuals labeled as health professionals and or seemingly credible health information websites. This may be misleading during online patient navigation. Because our study highlights the popularity of videos featuring patient views, perhaps a good video framework would be one that features patients in addition to providing accurate information about the condition. We hope that the study serves as further impetus for providing good quality health information online that is easily accessible by patients.

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Table S1. Videos excluded from study.

Video Title	URL
Psoriasis Treatment in Ayurveda by Prof. Dr. Murali Manohar, M.D. (Ayurveda)	https://www.youtube.com/watch?v=ZL2mAdG3hWA
Dieta para la psoriasis	https://www.youtube.com/watch?v=1LmHCN0u3WU
Natural Methods to cure Psoriasis - Baba Ramdev	https://www.youtube.com/watch?v=6TRMjtUbnO0
Le psoriasis	https://www.youtube.com/watch?v=bxMUNshR3gk
Ecole Française d'Hypnose : Psoriasis et Hypnose	https://www.youtube.com/watch?v=3qYwB6A9qi8
Psoriasis: una enfermedad de la piel	https://www.youtube.com/watch?v=Iq1Rde43BKA
Ayurvedic Remedy for Psoriasis - By Panditha Elchuri	https://www.youtube.com/watch?v=f756tPWyb_Y
The Worst Psoriasis I've Seen	https://www.youtube.com/watch?v=0ljMuGhN9TM
Ellinor berättar om sin psoriasis för killarna | Top Model Sverige	https://www.youtube.com/watch?v=Rhdw_kX60M0
Biologiske Behandlinger mod psoriasis	https://www.youtube.com/watch?v=uCoowPtmjQg
Psoriasis coconut oil treatment	https://www.youtube.com/watch?v=zAJows2yMw4
Psoriasis, dermatitis y acne reversion plantas medicinales	https://www.youtube.com/watch?v=ZIn10tJ-XBo
Le psoriasis… quand le vase est trop plein, il déborde ! - www.regenere.org	https://www.youtube.com/watch?v=K0VL9B5-T-0