

ORIGINAL ARTICLE

Food Allergy

YouTube and food allergy: An appraisal of the educational quality of information

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Abstract

Background: Food allergy affects an estimated 8% of children and 3% of adults in the United States. Food-allergic individuals increasingly use the web for medical information. We sought to determine the educational quality of food allergy YouTube videos.

Methods: We performed a YouTube search using keywords “food allergy” and “food allergies”. The 300 most viewed videos were included and analyzed for characteristics, source, and content. Source was further classified as healthcare provider, alternative medicine provider, patient, company, media, and professional society. A scoring system (FA-DQS) was created to evaluate quality (−10 to +34 points). Negative points were assigned for misleading information. Eight reviewers scored each video independently.

Results: Three hundred videos were analyzed, with a median of 6351.50 views, 19 likes, and 1 dislike. More video presenters were female (54.3%). The most common type of video source was alternative medicine provider (26.3%). Alternative treatments included the following: water fast, juicing, Ayurveda, apple cider, yoga, visualization, and sea moss. Controversial diagnostics included kinesiology, IgG testing, and pulse test. Almost half of the videos depicted a non-IgE-mediated reaction (49.0%). Videos by professional societies had the highest FA-DQS (7.27). Scores for videos by professional societies were significantly different from other sources ($P < .001$). There was a high degree of agreement among reviewers (ICC = 0.820; $P < .001$).

Conclusion: YouTube videos on food allergy frequently recommend controversial diagnostics and commonly depict non-IgE-mediated reactions. There is a need for high-quality, evidence-based, educational videos on food allergy.

KEYWORDS

food allergy, food hypersensitivity, health education*/methods, health education*/standards, internet, United States

1 | INTRODUCTION

Food allergy affects an estimated 8% of children and 3% of adults in the United States.¹ An estimated 35% of Americans use the Internet as a source of information.² Food-allergic individuals increasingly use the web for medical information.³ YouTube (www.youtube.com, San Bruno, CA), the second most popular social network service after Facebook with >1 billion users, is a media-sharing site that allows the creation and upload of videos. It has gradually evolved into a "how-to" search engine,⁴ where many patients look to express opinions on healthcare topics.⁵ YouTube was previously evaluated regarding healthcare information for asthma, which was determined to be of poor quality.⁶ We sought to determine the educational quality of food allergy YouTube videos.

2 | METHODS

We performed a YouTube search from June 6 to July 16, 2016, using the keywords "food allergy" and "food allergies". Inclusion criteria included videos in English, which lasted for ≤ 20 minutes and with good visual quality (defined as ≥ 240 pixels of progressive scan). Videos in languages other than English, not relevant (eg, canine food allergy), or with poor visual quality were excluded from the study. The 300 most frequently viewed relevant videos were included in the study. Food allergy videos were analyzed for characteristics, source, and content. Video characteristics included sex and race depicted, number of views, number of likes and dislikes, number of comments, and duration. We categorized the video sources a priori into 6 groups: healthcare provider (eg, physician), alternative medicine provider, patient and/or patient's family, company (eg, pharmaceutical company), media (eg, news channel), and professional society (eg, hospital). Regardless of the source, videos were classified based on content: medical professional education, advertisement, personal experience, patient education, alternative treatment, and increase awareness. Video depiction of adverse food reactions was also classified into IgE-mediated reaction or non-IgE-mediated reaction.

A food allergy data quality score (FA-DQS) based on current practice parameters¹ and a previously published method⁷⁻⁹ was created to evaluate the quality of video content, specifically for reviewing food allergy web content. The score was created on discussion with 3 senior allergy/immunology attending physicians and a review of the literature. Videos were rated with a starting score of 0, with a total score that ranged from -10 to 34 points (Table 1). Points were subtracted for misleading information that placed patients at risk (eg, water fast to cure food allergy). Points were awarded for accurate information on food allergy education based on current guidelines.¹ No points were subtracted or awarded for erroneous information that did not place patients at risk (eg, taking a multivitamin is helpful for food allergy). Independent of the scoring system created for food allergy, the overall quality of each video was subjectively rated by all reviewers using the global quality score (GQS), which is a five-point Likert scale that has been previously published and used to score

Web sites containing information on inflammatory bowel disease.⁷⁻⁹ Apart from the overall quality, it takes into account the flow and ease of use for each video. Based on the sample size and power analysis, the video sample size of 25 videos per video category achieved 85% power to detect 1 standard deviation difference among groups with a significance level (alpha) of 0.05. Hence, the 300 most viewed videos were included in our study.

Eight reviewers, 1 medical student, 1 preventive medicine senior attending, 1 senior internal medicine resident, 1 junior pediatric resident, 1 chief pediatric resident, 2 junior allergy/immunology fellows, and 1 junior allergy/immunology attending evaluated all the videos. Before scoring the videos, each reviewer was required to read the current food allergy practice parameters¹ and a review on food allergy¹⁰ prior to participating in the study. Reviewers scored each video independently and were blinded to each other's comments. Video characteristics were recorded over a period of 1 month and 10 days as this information may change over time (ie, number of views) in YouTube videos. The review and scoring of video content were performed over a 3-month period by each individual blinded reviewer.

This study was exempt from the Institutional Review Board. Study data were collected and managed using REDCap electronic data capture tools hosted at East Tennessee State University.¹¹ Video characteristics were described using medians and quartiles for all continuous variables and counts as well as percentages for all categorical variables. All analyses were two-tailed and were performed at a significance level of .05. Analysis of variance was used to compare score by video source. Intraclass correlation (ICC) was used to assess the reliability in scoring by reviewers. SAS 9.3 software (SAS Institute, Cary, NC) was used for all analyses.

3 | RESULTS

The use of the keywords "food allergy" and "food allergies" in YouTube generated ~69 000 and ~83 000 videos, respectively; from June 6 to July 16, 2016. However, there are only 580 and 560 actual videos available for each keyword. Fifty videos were excluded; language other than English (5), lasted for >20 minutes (15), poor visual quality (8), and not relevant (22). Using the filter tool in YouTube, these videos were placed in order by the number of views. The 300 most viewed videos were included in the analysis. Video characteristics are summarized in Table 2.

Least square mean scores (FA-DQS) by video source are summarized in Table 3. Overall, there was a statistically significant difference in the average score among videos by video source ($P < .001$). Multiple comparisons showed that the average score of professional societies was higher than the average scores of all other sources (all $P < .001$). Figure 1 summarizes average scores by video source of FA-DQS vs averages by GQS. There is a positive correlation between both average scores ($P < .0005$).

The ICC of the reviewers scoring is summarized in Table 3. Overall, the reviewers rated the videos similarly (P [correlation

TABLE 1 Score system to evaluate food allergy healthcare information

Click all that apply. Erroneous information but does not place patients at risk (0 points), ie, "Taking a multivitamin is helpful for food allergy"

Definition of food allergy (1 point each), max 4 points

- ☐ Generally describes food allergy
- ☐ Describes the difference between allergy and intolerance
- ☐ Reaction within minutes or hours
- ☐ Happens every time food item is consumed, even with small amounts of the food

Triggers - mentions the 8 most common food (1 point each), max 8 points

- ☐ Milk
- ☐ Egg
- ☐ Peanut
- ☐ Tree nut
- ☐ Fish
- ☐ Shellfish
- ☐ Soy
- ☐ Wheat

Describes symptoms (1 point each), max 5 points

- ☐ Cutaneous
- ☐ Gastrointestinal
- ☐ Respiratory
- ☐ Cardiovascular
- ☐ Anaphylaxis

Diagnosis (1 point each), max 3 points

- ☐ Skin prick testing
- ☐ IgE (in vitro serum specific IgE)
- ☐ Challenge

Management (1 point each), max 7 points

- ☐ Avoidance measures
- ☐ Inform the school/restaurant/friends & family of the food allergy
- ☐ Food label reading
- ☐ Medical bracelet use
- ☐ Epinephrine use
- ☐ Food allergy action plan
- ☐ Future of desensitization to foods

Prognosis (1 point each), max 3 points

- ☐ Most milk and egg allergic children will outgrow their allergy
- ☐ Most peanut and tree nut allergic children will NOT outgrow their allergy
- ☐ Cross-reactivity among foods

Other (1 point)

- ☐ Mentions Oral allergy syndrome
- ☐ Mentions Eosinophilic esophagitis
- ☐ Mentions alpha-gal
- ☐ Mentions Non IgE-mediated reactions (eg, FPIES)

(Continues)

TABLE 1 (Continued)

Misleading information (–1 point each). This includes any misleading information, harmful or placing patients at risk. (ie, "water fast to cure food allergy" "visualization to cure food allergy")

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

☐ (–1 each)

Total score (–10 to +34 points) _____

TABLE 2 Video characteristics

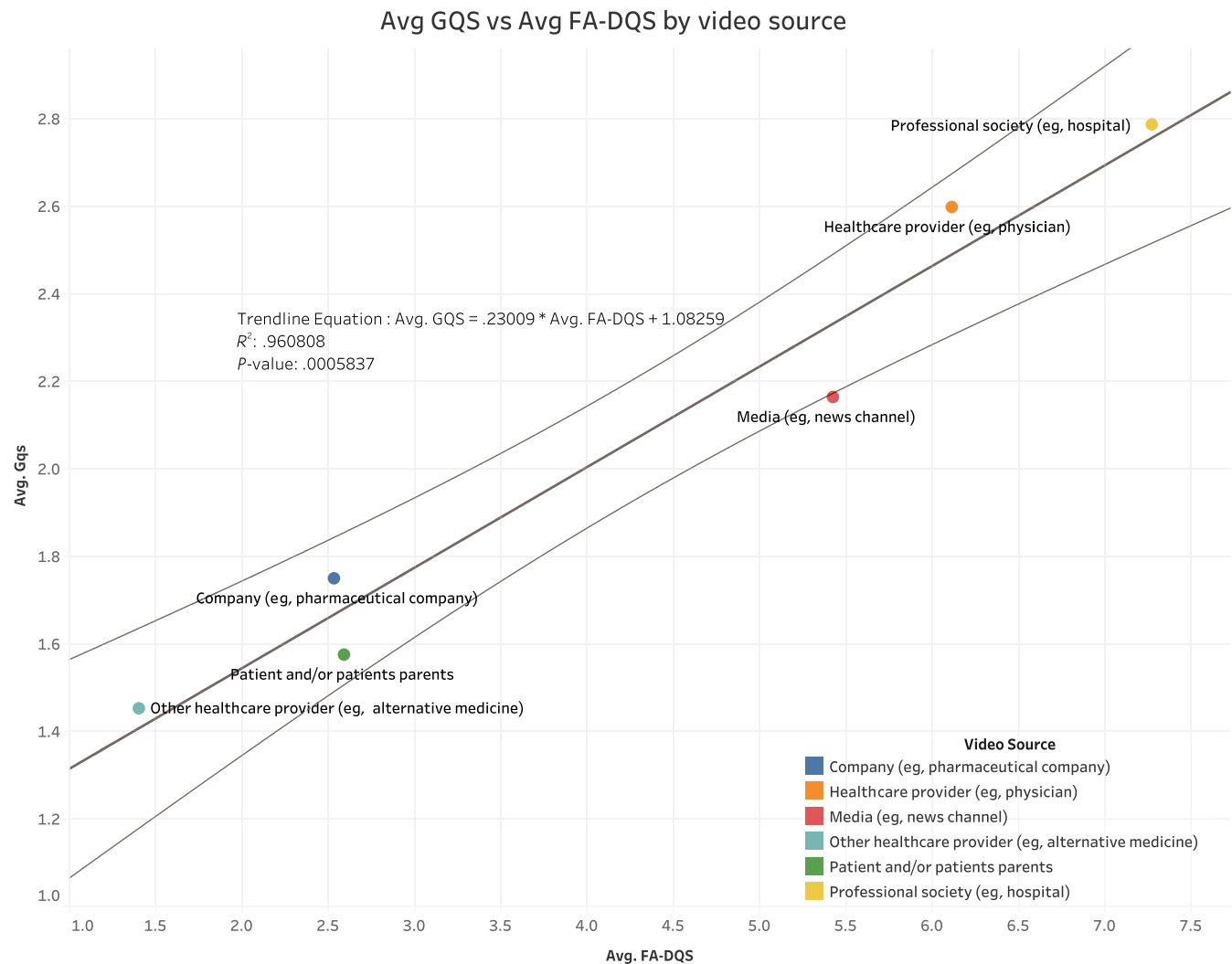
Variable	N = 300 (%)	Ranges
Female gender depicted	165 (54.3%)	
Race depicted		
Caucasian	246 (82.0%)	
Asian	16 (5.3%)	
African American	5 (1.7%)	
Hispanic	0 (0%)	
Native Hawaiian or Pacific Islander	0 (0%)	
None depicted	33 (11.0%)	
Median of views	6351.50	1190-5 812 634
Median of likes	19	0-36 819
Median of dislikes	1	0-1099
Median of comments	4	0-7539
Median of video duration in minutes	3:76	3:0-19:40

coefficient] = .82 CI 0.793-0.845; $P < .001$). The consistency of reviewers was moderate when viewing patient source videos from companies ($r = .65$) and alternative medicine providers ($r = .68$). This implies that there was some lack of reliability in the manner in which the reviewers scored the videos.

Figure 2 summarizes all videos by source. The most common types of video content discussed were increase awareness (40.3%), alternative treatment (23.3%), and patient education (18.0%). The most commonly depicted adverse reaction to foods was IgE-mediated (51.0%), followed by food intolerance (18.3%). Epinephrine auto-injector use was depicted in 160 (54.8%) of all videos. Controversial diagnostics included the following: kinesiology; IgG testing; and pulse testing. Alternative medicine content on food allergy management included the following: water fast; juicing; Ayurveda; apple cider therapy; yoga; visualization of not having a food allergy; and sea moss.

TABLE 3 Scores by video source

Video source	Least square mean (n)	Intraclass correlation	95% Confidence	P value
Professional society	7.27 (52)	.833	0.770-0.888	<.001
Healthcare provider	6.12 (29)	.808	0.713-0.899	<.001
Media	5.42 (66)	.814	0.754-0.886	<.001
Patient and/or patient's family	2.59 (58)	.801	0.733-0.861	<.001
Company	2.54 (16)	.654	0.474-0.829	<.001
Alternative medicine provider	1.41 (79)	.688	0.612-0.763	<.001
All sources	4.05 (300)	.820	0.793-0.845	<.001

**FIGURE 1** Graph comparing averages of both scoring systems; global quality score (GQS) and food allergy data quality score (FA-DQS) [Colour figure can be viewed at wileyonlinelibrary.com]

4 | DISCUSSION

We critically appraised the 300 most frequently viewed food allergy videos on YouTube. Analysis of our data indicated that food allergy videos on YouTube were a poor source of food allergy health information. Most videos on food allergy depicted an IgE-mediated reaction (51.0%); however, videos were frequently uploaded by an alternative

medicine provider (26.3%) and contained misleading information for patients with food allergy (controversial diagnostics and unproven alternative treatments). Least mean scores (FA-DQS) for videos from professional societies were statistically significantly different from all other sources (all $P < .001$) and had the highest average score (7.27).

Our findings indicate that there is a lack of high-quality food allergy education on YouTube. This is comparable with other

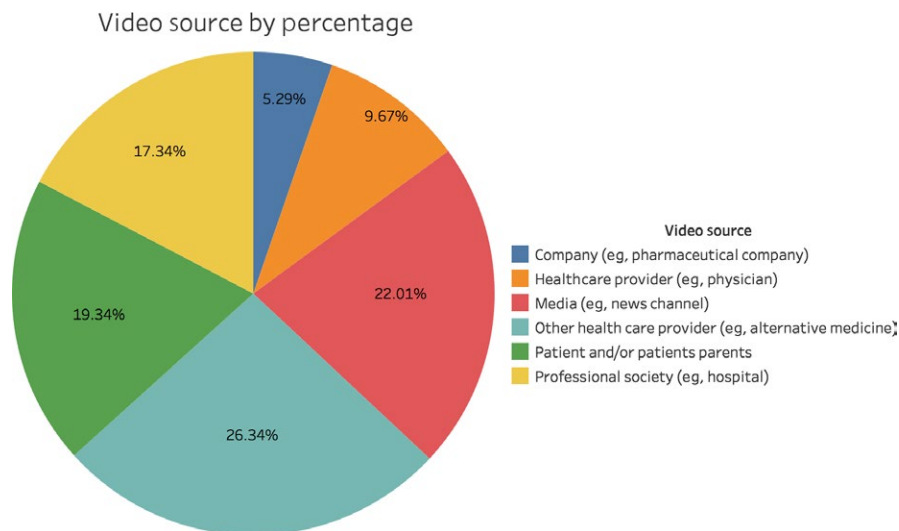


FIGURE 2 Food allergy videos by source [Colour figure can be viewed at wileyonlinelibrary.com]

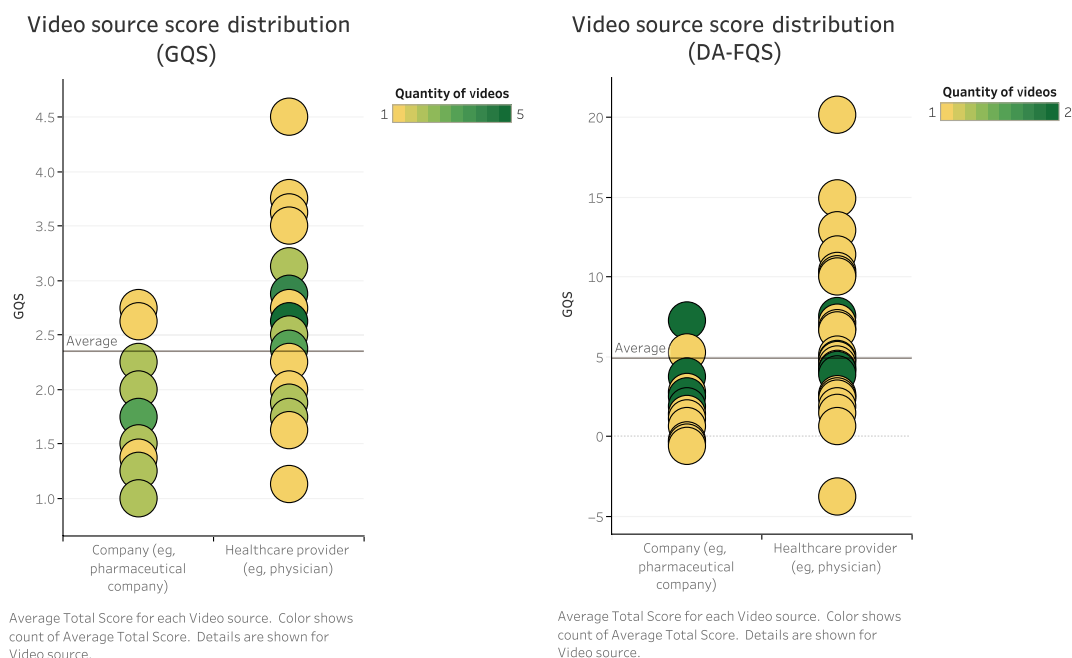


FIGURE 3 Video score distributions by global quality score (GQS) and food allergy data quality score (FA-DQS) [Colour figure can be viewed at wileyonlinelibrary.com]

previously published reports on the quality of YouTube videos for other medical conditions.^{6,9,12-21}

We found that more than 1 in 4 (26.3%) food allergy-related videos on YouTube had misleading information. This is a rate that is comparable to similar studies of information found on YouTube for other diseases, such as inflammatory bowel disease (24%),⁹ anorexia (29%),¹² and rheumatoid arthritis (30%).²²

Alternative diagnostics and treatment options for food allergy depicted in YouTube included the following: kinesiology; IgG testing; pulse testing; water fast; juicing; Ayurveda; apple cider therapy; yoga; visualization of not having a food allergy; and sea moss. None of these alternative methods have been shown to be efficacious for diagnosis or management of food allergy based on methodologically sound evidence.^{1,23}

Figure 1 compares FA-DQS vs GQS on food allergy YouTube videos. There was high degree of correlation between DQS and GQS scores by video source ($P < .0005$). Videos by professional societies had the highest FA-DQS (7.27) and GQS (2.79), while alternative medicine videos had the lowest FA-DQS (1.41) and GQS (1.45). There was no mean score of GQS above 3 (scale 1-5), indicating food allergy videos have a poor video flow. Healthcare provider videos were the second highest rated videos for FA-DQS (6.12) and GQS (2.60). Our newly created scoring system to rate food allergy videos (FA-DQS) correlates with previous published GQS for other medical conditions.

Over 67% of the videos come from other healthcare providers, media, and patient sources. This indicated the quantity of low scores as dictated by the change in color for volume (dark green circles) located near the bottom of the scoring chart (Figure 3).

TABLE 4 Top 10 food allergy videos

Rank	Video source	Type of source	Link	Average total score
1	The Consortium of Food Allergy Research	Healthcare provider	https://www.youtube.com/watch?v=_VukGWHd1XA	20.1
2	Ann & Robert H. Lurie Children's Hospital of Chicago	Professional society	https://www.youtube.com/watch?v=a9qdS1fKbTw	17.5
3	Healthblogr.com	Other healthcare provider	https://www.youtube.com/watch?v=wwLBuuwaUU0	17.4
4	The Food Allergy & Anaphylaxis Network	Professional society	https://www.youtube.com/watch?v=TOEobQYgKNI	16.5
5	Food Allergy Research & Education	Professional society	https://www.youtube.com/watch?v=uPkg-jVHMt0	16.3
6	Unilever Food Solutions UK & IRE	Media	https://www.youtube.com/watch?v=UyDqrhQLOHM	15.6
7	Aleric Heck (YouTube)	Patient and/or patients parents	https://www.youtube.com/watch?v=n4oReTYBorc	15.3
8	safefoodTV	Healthcare provider	https://www.youtube.com/watch?v=PTBI3hCPT94	14.9
9	D News	Media	https://www.youtube.com/watch?v=Mjr9h_QmdeM	14.3
10	Ana Pena (YouTube)	Patient and/or patients parents	https://www.youtube.com/watch?v=xq_aKBqylvk	14.1

This indicates why the average is low for both models and why the 2 best videos sources (healthcare provider and professional society) are overlooked due to their smaller proportion of overall videos.

An important component of any food allergy evaluation is patient and caregiver education which includes food avoidance measures, food label reading, epinephrine auto-injector demonstration, and food allergy action plan.¹ However, social media support is usually not discussed during food allergy evaluation. We believe it is important for healthcare providers to discuss social media as a source of healthcare information and advice,²⁴ to be aware of unproven and controversial diagnostics and alternative treatments of food allergy, and discuss these with their patients and their families. Healthcare providers should be able to direct their patients to sources of sound evidence-based educational information for food allergy, such as web-based educational materials,^{25,26} accurate food allergy apps,²⁷ and high-quality evidence-based Food allergy YouTube videos. We have included the 10 top rated YouTube videos on food allergy for patients and their caregivers (Table 4).

There are several limitations to our study. We did not include all available YouTube videos on food allergy. Our findings cannot be extended to non-English language videos as they were excluded. YouTube videos change over time, and our study only analyzed a snapshot in time (June 6 to July 16, 2016). Although most of the reviewers were not board-certified allergists, there was an overall high degree of agreement among reviewers when scoring the videos for FA-DQS (ICC = 0.820; $P < .001$).

5 | CONCLUSION

Patients and their family members will continue to search for health-care information online as their first point of reference.⁴ Patient support organizations play a vital role in creating, supporting, and distributing high-quality patient education videos.⁴ When used correctly, social media may improve chronic disease care.²⁴ There is a need for high-quality, evidence-based, educational videos on food allergy. To improve this form of patient education, the authors proposed the following: (i) make specific recommendations to patients and their families on sound educational evidence-based videos on food allergy (Table 4), (ii) creation of more attractive videos by production of YouTube videos presented by a popular figure (eg, a celebrity or athlete) presenting accurate information sponsored by healthcare professionals.⁶

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