YouTube as a source of information for do-it-yourself face masks: A content analysis

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Research article

Keywords: YouTube, COVID-19, social media, face masks, infectious disease, public health, prevention

Posted Date: August 17th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-47542/v1>

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Abstract

Background

Homemade cloth products are increasingly being used as a preventive measure against COVID-19, with various methods promoted through do-it-yourself (DIY) videos available on YouTube and other websites. While guidance has been provided by key organisations on how to create face masks, the extent to which this is being accurately disseminated is currently unknown.

Methods

A key word search of YouTube using the terms “face/cloth mask” and “diy face/cloth mask” was completed on 18 April 2020. Total and category video content scores determined using the 18-point scoring system in the author-designed checklist. Criteria grouped by: reasons and caveats for use (three criteria), manufacturing instructions (six criteria), instructions for use (five criteria), re-use (three criteria), and cleaning instructions (one criteria). Total scores of ≥ 9 were classified as useful, and those < 9 classified as not useful out of a maximum score of 18.

Results

Of the 400 videos screened, 261 videos were retained for analysis. 91.7% ($n = 242$) were categorised as non-useful, compared to 8.3% ($n = 22$) as useful. Overall, useful videos scored higher across all assessed content evaluation categories. Manufacturing instructions were the most common content featured in the videos, with re-use and cleaning instructions featuring the least.

Conclusions

Currently, there is a lack of comprehensive, best-practice information on face masks being disseminated through YouTube. The information gaps identified in these findings present an opportunity for authoritative sources to focus communication efforts on promoting best-practice guidance while advice continues to be updated on universal face mask use.

Background

Face masks are increasingly being used by the public as a personal protective measure to reduce the spread of SARS-CoV-2, despite differing recommendations from health authorities worldwide detailing their use in community and public settings.¹ In light of global concerns relating to supply shortages of personal protective equipment (PPE) for healthcare workers (HCWs),² cloth face coverings³ have increasingly been promoted as a substitute for medical-grade masks for public use.

While previous research on the efficacy of cloth face mask coverings has cautioned against their use in HCWs,⁴ a precautionary approach^{5,6} may be attributed to the increase in their use, despite the currently limited evidence supporting their use in public settings.^{5,7} This may be in response to government cues or directives on the use of cloth face coverings, such as guidance from the World Health Organisation (WHO)⁸ and the Centers for Disease Prevention and Control (CDC).³ Mass face mask use has also been suggested as a means for actively demonstrating altruism and solidarity to the collective global response to the pandemic.⁹

It is within this environment that a proliferation of do-it-yourself (DIY) instructions to create face masks have appeared on various social media channels, including YouTube. The user-generated nature of social media platforms has seen individuals and organisations contribute and exchange information about the SARS-CoV-2 pandemic with considerable reach and speed,¹⁰ including guidance on how to produce face masks for use. The trust in, and perceived legitimacy of, information shared through social media platforms,¹⁰ highlights the need to ensure that accurate, and best-practice information is promoted, particularly as it is disseminated and engaged with.¹⁰

Key organisations including the WHO⁸ and the CDC are continuing to update their advice and recommendations on universal face use, including guidance on the manufacture and best-practice use of cloth face coverings.^{8,11} However, it is currently unclear to what extent these messages are being accurately disseminated through YouTube videos. As such, this review examines the types of messages that are being promoted on face masks, including their use and creation to the public through YouTube.

Methods

Search strategy

A key word search of YouTube was conducted on 18 April 2020, using the search terms “face masks” and “diy face mask”. The results were sorted by relevance as per YouTube’s default search functions, and data for the first 200 videos for each search term extracted. These search parameters were comparable to other similar studies.^{12,13}

Videos were excluded from the analysis if (1) they were a news or opinion item on the use of face masks, (2) did not have DIY as the primary content, (3) were on an unrelated topic, such as the use and production of cosmetic masks, and (4) not in the English language. Duplicate videos, identified as having the same YouTube web address, were also excluded.

Data collection

For each video, expert-driven, popularity and heuristic measures as described by Gabarron et.al (2013)¹⁴ were extracted. This included: title of the video, duration, location, publisher/source, number of subscribers, total viewership, and number of days on YouTube. A calculation of viewership per day was

completed and used in the analysis, under the assumption that this was a more accurate parameter than total viewership.¹⁵ Public ratings were also recorded, which include the “likes” and “dislikes” allocated by users, noting that this function is not always engaged with by viewers.

Qualitative information was also gathered, including types of material recommended for use in the manufacture of DIY face masks, and recommended cleaning agents. General commentary relating to the reasons for use of face masks were also captured, where relevant.

Content analysis

The videos were assessed using an author designed checklist (K.L., H.S., A.C.) to review: (1) reasonings for the promotion of DIY masks, and (2) key recommendations for the creation, use and care instructions for DIY face masks. The criterion used in the checklist to assess the video content were taken from a review of government and public health agency recommendations^{3, 16–19}, and available research literature^{20, 21} on the use of DIY face masks as a personal protective measure. A score of 1 point was issued against each individual criterion met during the assessment of the video, within the categories of: reasons and caveats for use, manufacturing instructions, instructions for use, re-use, and cleaning instructions. This included assessment of the audio-visual content contained within the video, in addition to the information contained within video descriptions. Videos which had a total score of ≥ 9 were classified as useful, and those < 9 classified as not useful out of a maximum score of 18. The usefulness classification is to be interpreted as an indication of the comprehensiveness of the information contained with the video in relation to DIY face masks.

Each video was independently assessed by a single reviewer (K.L.), who was also responsible for identifying, assessing, and scoring the video content. This was to ensure a standardised process for the evaluation. All findings including discrepancies, were discussed with two other authors (H.S., A.C.).

Data analysis

Data was entered and reviewed in Microsoft Excel (Microsoft 365, Version 2004; Microsoft), with analysis completed in SPSS for MS Windows 26.0 (IBM, Armonk, NY). Descriptive statistics, including mean, median, standard deviation (SD), interquartile range (IQR) and percentage, were reported as appropriate. Determination of statistical significance was completed using t-tests and the Mann-Whitney *U* test for parametric and non-parametric values, respectively. For all calculations, $P < .05$ was considered significant.

Role of the Funding source

The authors received no specific funding for this work.

Results

A total of 400 videos were screened, with a total of 264 videos retained for analysis. This followed the removal of duplicates (n = 72), and other videos which did not meet the inclusion criteria. This included content which were a news or opinion item on the use of face masks (n = 31), did not have DIY as the primary content (n = 8), were on an unrelated topic, such as cosmetic face masks (n = 23), and content that was not in the English language (n = 2).

The majority of videos (n = 242, 91.7%) were categorised as 'non-useful' using the author designed checklist, with only 8.3% (n = 22) categorised as 'useful'. However, useful videos had a higher median duration compared to non-useful videos (7:28 minutes vs. 3:42 minutes), with this a significant difference. Useful videos also had higher median number of likes, dislikes and viewership per day, compared with non-useful videos, but these results were not statistically significance (Table 1).

Table 1
Summary of descriptive statistics relating to video characteristics

Variable	Useful (n = 22)	Non-useful (n = 242)	P-value
Duration (min)	10:22 (7:28–14:39)	7:00 (3:42–11:58)	0.02
No. of views	184133.5 (71936.8–683055.3)	188076.5 (29165.5–698005.8)	0.66
No. of likes	5500.0 (1300.0–14750.0)	2000.0 (409.5–8775.0)	0.07
No. of dislikes	144.0 (47.0–368.8)	115.5 (19.8–413.3)	0.68
Viewership per day calculation	22727.2 (5052.9–38955.3)	10655.0 (2724.7–32729.3)	0.32
Note: Values are median (interquartile range), or as otherwise indicated			

Individuals were the primary content contributors (n = 239, 90.5%), followed by news and media outlets (n = 13, 4.9%), and organisations including commercial entities (n = 12, 4.5%). 90% of useful and non-useful videos were created by individuals. Organisations had the highest median number of subscribers at 169000.0 (37750.0–283750.0), followed by news and media outlets at 110000.0 (37650.0–1855000.0), and individuals at 36500.0 (8380.0–180000.0). The majority of the videos were produced in North America, namely the United States (n = 175, 66.3%), followed by Asia (n = 45, 17.0%), Europe (n = 12, 4.5%), Africa (n = 2, 0.8%), and Oceania (n = 4, 1.5%). 9.8% (n = 26) of videos did not have a location listed in their YouTube channel description.

Content evaluation

Overall, the YouTube videos categorised as useful had higher mean scores compared to non-useful videos across all assessed content evaluation categories (Table 2). Across both useful and non-useful videos, manufacturing instructions had the highest mean score compared to all other categories, with the difference not statistically significant (4.2 ± 1.0 vs 2.6 ± 1.0 , $p = 0.45$).

Table 2
Summary of total content evaluation score results grouped by categories of useful (n = 22)
and non-useful (n = 242)

Content evaluation category	Useful (n = 22)	Non-useful (n = 242)	P-value
Reason and caveats for use (out of 3)	2.0 ± 0.6	0.8 ± 0.8	0.00
Manufacturing instructions (out of 6)	4.2 ± 1.0	2.6 ± 1.0	0.45
Instructions for use (out of 5)	2.5 ± 1.1	0.8 ± 0.7	0.00
Re-use instructions (out of 3)	1.0 ± 0.8	0.1 ± 0.3	0.00
Cleaning instructions (out of 1)	0.8 ± 0.4	0.1 ± 0.3	0.32
Values are mean ± SD or as otherwise indicated			

Reasons and caveats for use

Videos categorised as useful had higher overall percentage scores against all assessed criteria relating to the presence of reasons and caveats for use of face masks compared to non-useful videos (Table 3). The inclusion of a reason for using cloth face masks was present in more than half the videos across both categories, with identification of population groups in which face masks should not be used referenced the least.

The reasons promoted for the use of face masks were broadly associated with the themes of individual protection and as a response to PPE shortages. From an individual perspective, face masks were described in some videos as a means for protecting individuals from “spreading droplets to others”, and for some, as a means for “helping me stop touching my face”. Most videos across both categories, particularly those originating from the United States, also referenced the CDC’s recommendations to wear cloth face masks when going outside as a key reason. PPE shortages saw masks being referenced as an alternative to purchasing medical masks, either because of known shortages, but largely, to preserve medical masks for use by HCWs. Some videos originating from the United States, also accompanied this reasoning with an appeal for viewers to create DIY masks for donation to hospitals. HCWs were described in some videos as using cloth face masks as an additional covering over medical masks, to prolong the use of a medical mask underneath.

Disclaimers on the effectiveness of the DIY mask being promoted in the video were a feature of most videos, with many encouraging their audience to “do their own research”.

Manufacturing instructions

Manufacturing instructions were the main content features across all videos analysed (Table 2). The most common DIY instructions were for stitched masks (both hand- and machine-sewn) compared to assembled masks. A minority of videos included DIY instructions for both stitched and assembled masks within the same content (Table 3).

Table 3

Frequency of adherence against content evaluation checklist criteria, grouped by categories of useful (n = 22) and non-useful (n = 242)

Category	Item #	Item Description	Useful (n = 22)	Non-useful (n = 242)
Reason and caveats for use	1	The video includes a reason for using cloth face masks	21 (95.5)	126 (52.1)
	2	The video notes that cloth face coverings are not surgical masks or N-95 respirators, or the equivalent of	19 (86.4)	67 (27.7)
	3	The video notes population groups that cloth face masks should not be used on (i.e. children under 2 years, or on individuals who have breathing difficulties, unconscious or incapacitated and would need assistance to remove the cover)	4 (18.2)	3 (1.2)
Manufacturing instructions	1	The viewer is recommended to use 100% cotton or cotton blend fabrics	21 (95.5)	78 (32.3)
	2	The video provides instructions on creating a stitched mask or assembled (i.e. piece of cloth and two bands)	Stitched – 15 (68.2); Assembled – 5 (22.7); Both – 2 (9.1)	Stitched – 162 (66.9); Assembled – 77 (31.8); Both – 3 (1.2)
	3	The viewer is recommended to use filters within the mask	14 (63.6)	98 (40.5)
	4	The video includes directions around the size and shape of the mask (e.g. template) and highlights the importance of producing a product of the correct size	19 (86.4)	173 (71.5)
	5	The video notes that the cloth face mask should be breathable	6 (27.3)	11 (4.5)
	6	The video includes guidance on manufacturing conditions (i.e. sterilising material prior to use, all individuals involved in making face masks should be symptom-free, wash hands thoroughly and sanitise workstations with disinfectant (if sewing))	10 (45.5)	14 (5.8)
Instructions for use	1	The video notes that only new or properly disinfected masks should be used	11 (50.0)	8 (3.3)
	2	The video contains instructions to wash hands with soap and water or alcohol-based sanitiser before and after touching mask	6 (27.3)	1 (0.4)
Values are the number of videos in compliance with the criterion (% of sample)				

Category	Item #	Item Description	Useful (n = 22)	Non-useful (n = 242)
	3	The video demonstrates fitting of the masks around the mouth, nose and chin (verbal or visual demonstration)	21 (95.5)	141 (58.3)
	4	The video notes that the masks should be picked up and removed by touching ear loops or ties only (including visual demonstration)	13 (59.1)	19 (7.9)
	5	The video references that face masks should be used in combination with proper handwashing and physical distancing hygiene practices.	4 (18.2)	15 (6.2)
Re-use instructions	1	The video includes reference to duration of use for cloth face masks	5 (22.7)	2 (0.8)
	2	The video includes instructions on when to re-use the mask (e.g. washing after each use)	11 (50.0)	14 (5.8)
	3	The video includes storage instructions	5 (22.7)	0 (0.0)
Cleaning instructions	1	The video includes instructions on how to effectively wash the mask	18 (81.8)	34 (14.0)
Values are the number of videos in compliance with the criterion (% of sample)				

Nearly all useful videos (n = 21, 95.5%) included a recommendation to use 100% or cotton blend fabrics to create the DIY masks. This was an explicit reference to the use of cotton, with some videos suggesting bandanas or t-shirts as a potential source. This contrasts with the non-useful videos, where only 32.3% (n = 78) included a recommendation on the use of cotton in creating DIY face masks. While bandanas and t-shirts also featured as recommendations for source material, the type of fabric to be used in creating DIY masks was frequently non-specified. Other materials suggested for use included denim, leather, sanitary pads, filter material (e.g. HEPA), paper towels and tissues.

Filters were recommended for use in both useful and non-useful videos (63.6% vs. 40.5%, respectively). Materials recommended for use included paper towels, coffee filters, HEPA grade filter material (either purchased or obtained from repurposing vacuum bags), and air-conditioning filter material. For some videos, user concerns on the safety of HEPA filters, due to concerns on filters containing fibreglass or being contrary to manufacturers' instructions, often resulted in updates to the video content. As an example, some videos which recommended the use of HEPA filters often had updates or added disclaimers discouraging the use of this material following the upload the video. However, these updates were commonly added into the description section of the video, with the audio-visual content not edited to reflect any of the updated or additional information.

Guidance on the dimensions for the face masks were included in more than half of all videos analysed, with this described in the audio-visual content, and often supplemented with a template for user

download. Ensuring breathability and description of manufacturing conditions were the least described content features across both useful and non-useful videos.

Instructions for use

YouTube videos categorised as useful had a higher overall mean score for criteria relating to instructions for use compared to non-useful videos (2.5 ± 1.1 vs 0.8 ± 0.7 , $p = 0.00$).

Demonstrations on the fitting of the mask around the mouth, nose and chin were the predominant instructions for use which were highlighted in both useful ($n = 21$, 95.5%) and non-useful ($n = 141$, 58.3%) videos. These demonstrations also appeared to allow for content creators to showcase the results of their DIY efforts.

Information relating to the handling of new and used face masks was present in a greater percentage of useful videos compared to non-useful videos (Table 3). Recommendations on the use of new or properly disinfected face masks, and correct handling of the removal of face masks using the ear loops or ties only was present in more than half of the videos categorised as useful ($\geq 50\%$). This contrasts with the non-useful videos, where only 3.3% ($n = 8$) of videos noted the use of new or properly disinfected masks, and 7.9% ($n = 19$) outlined correct handling for removal (either through verbal recommendations or visual demonstrations).

Encouraging appropriate hand hygiene as part of the handling of face masks was present in less than half of the videos across both categories. References to the use of face masks as an additional personal protective measure in complement to other measures such as appropriate hand hygiene and physical distancing was also present in less than half the useful and non-useful videos, being 18.2% ($n = 4$) and 6.2% ($n = 15$), respectively.

Re-use and cleaning instructions

Similarly, to other categories, useful videos had higher percentage scores across all criteria relating to the re-use and cleaning of face masks compared to non-useful videos (Table 3). However, of all the criteria assessed, information on when to re-use face masks, such as washing after each use was present in only 11 videos (50%) categorised as useful; with all other criteria present in less than half the videos across both categories. Some videos which included instructions on re-using face masks, linked these to the cleaning instructions, where it was noted that only washed masks should be re-used.

Of the useful videos, 22.7% ($n = 5$) included references to the duration of use for cloth face masks, and storage instructions. As an example, some videos recommended using zip-lock bags to store face masks. In contrast, 2 videos (0.8%) of non-useful videos included references to recommended duration of use, with no videos providing guidance on how to store cloth face masks.

Instructions to clean the cloth face mask were present in 81.8% ($n = 18$) of useful and 14.0% ($n = 34$) of non-useful videos. Methods that were recommended to clean cloth face masks included machine wash

on a hot cycle, and then left to air dry. Handwashing was also recommended in some videos, using soap in hot or warm water, and left to air dry. Many videos also included references to the cloth face mask being washable but did not include specific washing instructions.

[INSERT] Table 3 Frequency of adherence against content evaluation checklist criteria, grouped by categories of useful (n = 22) and non-useful (n = 242)

Discussion

The results of our study show that the majority of YouTube videos disseminating information about DIY masks, do not include comprehensive information on the use of face masks, compared to those which do. This result was demonstrated through the greater percentage of videos categorised as non-useful compared to those categorised as useful.

However, useful videos did have higher ratings, as shown through the number of “likes” and “dislikes”, in addition to higher viewership per day. This may be reflective of the perceived quality of the content (for example, clearer instructions on how to construct a DIY mask), the subscriber base, and the relative popularity gained through the ease of sharing videos to social networks. It is difficult, however, to characterise these results as demonstrating the public’s willingness to seek out videos which contain a greater breadth of information on face masks, as this was not explored in the study and the results are not statistically significant.

The main content features across videos analysed in this study related to manufacturing instructions for the creation of DIY face masks, with re-use and cleaning instructions addressed the least. The minimal guidance provided on the conditions for re-use and cleaning of the masks may potentially limit the effectiveness of the cloth face masks produced by viewers, given the likelihood that they will be retained long term and reused multiple times.⁴ This may be reflective of the type and breadth of information disseminated by sources recommending the use of DIY face masks. As an example, the CDC, a frequently referenced source in the videos analysed, updated their guidance to include explicit information on how to wear and wash cloth face coverings^{22, 23} approximately a month after the initial recommendation supporting their use.⁵ Further, the WHO also recently changed its guidance on face mask use, with information focussed on appropriate use and handling⁸. Given the importance of effective communication in educating and encouraging preventive health behaviours in public health emergencies,²⁴ it is important that updated information is disseminated as widely and as quickly as possible, to provide the public with up-to-date, best practice guidance. Further, as viewers were encouraged to “do their own research”, organisations producing this information should seek to include positive indicators of credibility²⁵ and support ease of access (e.g. promoting readability), in acknowledgement of the variability in individuals’ ability to appraise online health information.^{25, 26}

While there were mixed references to the promotion of 100% cotton or cotton blend fabrics, and use of various materials as filters, the minimal references to ensuring breathability is of concern. Ensuring that

face masks are created from optimal materials, is critical to maximising filtration efficacy,²⁷ whilst maintaining a balance with comfort and breathability. The mixed references to ensuring the use of cotton or cotton-blends may have resulted from the promotion of using available household items, such as t-shirts and bandanas, to create an accessible, low-cost face mask. Additionally, the differing cultural attitudes towards wearing face masks¹ may have resulted in prioritisation of creating face masks that would be deemed a fashionable item, over a focus on functionality.

Further, while filter materials such as vacuum bags, were recommended for use, an emphasis on breathability was missed. This is of concern if these filter materials are used in population groups unsuitable for face masks, such as children under the age of 2 years, and individuals with breathing difficulties. As these groups were identified in only 18.2% and 1.2% of useful and non-useful videos, respectively, this could result in unintended consequences if used, through the additional burden breathing load for this cohort of individuals.²⁰

While guidance continues to be updated on public use of face masks,^{8, 28} advice on face masks being a complementary measure to other preventative measures, such as hand hygiene and physical distancing remains unchanged.^{8, 29} However, this key message was present in less than half the videos analysed, across both the useful and non-useful categories. This is of concern, as it may perpetuate assumptions that face mask use can instil a false sense of security and reduce adherence to other infection prevention measures.^{5, 30} It has been suggested that mass education campaigns could be used to promote information about the safe use and handling of face masks,³⁰ and this may address the current information gap present in social media.

This study has several limitations. The dynamic nature of YouTube means that there is a limited range in the number of videos that could be included in the analysis, particularly as information relating to SARS-CoV-2 has continued to evolve at a rapid pace. Therefore, these findings merely present a snapshot of the information that was available at the time of the analysis. Further, the study was not powered, and so statistical inferences from the data analysis will be limited. The engagement of a single reviewer to conduct the content analysis was a result of time constraints, which may have resulted in bias despite the use of a content checklist. Future similar studies are recommended to use multiple reviewers, to allow for a statistical determination of interobserver variability.

Conclusions

The use of face masks as an additional personal protective measure in reducing the spread of SARS-CoV-2 has drawn mixed sentiments from governments, academics, and individuals. While advice continues to evolve, there has increasingly been a promotion of DIY guides for face masks through social media channels, such as YouTube. However, the current majority of these videos do not provide comprehensive information covering the use, manufacture, handling, and cleaning of DIY face masks. While YouTube has facilitated the promotion of the use of face masks, there is a current lack of best-practice guidance that is being disseminated. As guidance on universal face mask use continues to be updated, it is

proposed that authoritative sources continue to focus communication efforts on promoting best-practice guidance to empower individuals to create and use safe and effective DIY face masks.

Abbreviations

CDC

Centers for Disease Control and Prevention

DIY

Do-it-yourself

HCW

healthcare worker

PPE

Personal protective equipment

WHO

World Health Organisation

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

Dr. Seale is an editorial board member for BMC Infectious Diseases. The other authors do not have any competing interests to declare.

Funding

The authors received no specific funding for this work.

Authors' contributions

KL conceptualised the study, with the methodology refined by H.S and A.C. KL, H.S, and A.C. designed the data collection tool. K.L completed the data analysis, with all authors contributing to the interpretation of results. K.L. wrote the initial draft, with all authors providing critical feedback to inform revisions to the manuscript. All authors have read and approved the final manuscript.

Acknowledgements

Not applicable

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