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Laidlaw Scholar Research – How can Scientists Engage with the Public to Explain AMR and the Role of Vaccination in Addressing AMR

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1. Introduction

Antimicrobial resistance (AMR) is a global threat that gives rise to more difficult-to-treat infections, currently projected to cause over 8 million deaths globally per year by 2050. (Naghavi et al., 2024). However, public knowledge regarding AMR remains insufficient. For instance, in focus groups conducted by Essilini et al. (2020), the consequences of antibiotic resistance were not a primary concern and remained largely unclear to participants. While framing the issue as a threat that undermines modern medicine helps the public understand the vast breadth of AMR's current and future impacts (Wellcome Trust, 2019), many individuals still express an incomplete understanding punctuated by misconceptions. They find disaster framing messages such as “apocalypse” and “superbugs” meaningless and difficult to respond to with individual actions. (Wojcik et al., 2024) (Singh-Phulgenda et al., 2023)

By preventing infections, vaccines can reduce AMR through multiple interacting pathways: directly preventing drug-resistant infections, preventing viral infections that lead to inappropriate antibiotic use and secondary bacterial complications. reducing overall antimicrobial consumption and decreasing the selective pressure that drives resistance development. (Holm et al., 2022), (Tadesse et al., 2023). Their principle in tackling AMR is well known but still poorly recognized in policy and practice. As a result, there is an emerging need to explain the benefits of vaccination to the public for preventing AMR. Indeed, the impact of vaccines on AMR based on the summary of the WHO’s report is tremendous, namely 515000 deaths averted, $28 million saved, $30 billion in hospital cost reductions and $20 billion in productivity savings and 2.5 billion fewer antibiotic doses used. (Dougan & Hugo-Webb, 2025).

Nowadays, social media platforms are frequently used in health communication campaigns in which interactional and communal elements contributing from exposure to behavior change are exhibited. As compared to the hierarchy of effects model (HOE), social media allows for multidirectional and wider sharing of messages, and the past decade has seen great enthusiasm for leveraging the potential of social media as a key vehicle in driving and amplifying health campaigns. (Kite et al., 2023). Increasingly, health organizations have sought to endorse their dedicated networks of health content creators who can serve as credible sources for broadcasting organization-specific health information and tackling misinformation. (Powell & Pring, 2024). Chen’s finding suggested that coordinating health content creators to release AMR-related videos on YouTube coinciding with an international event on AMR, as defined as Pulse, increased audience interactivity in terms of the number of comments which also emphasized the lack of research on how to design video content, particularly AMR-specific content, to improve audience engagement. (Chen et al., 2026a).

2. Objectives

This essay aims to apply previous evaluations done to list the key elements and methods that allow scientists to effectively engage with the public to explain AMR and the role of vaccination. It serves as a reference for content creators utilizing social media platforms to design videos that are more engaging in disseminating healthcare information, especially AMR-related contents. Moreover, the essay also provides the essential metrics that help to determine the result of engagement regarding the content published online.

3. Methodology

Watching videos including long-form videos and Shorts published online, and literature review are the main methods used to collect evidence for this essay, with keywords in the search strategy as Scientists, Antimicrobial resistance and Vaccination being included along with the use of research operators AND, OR. Videos should relate to AMR or/and vaccination to be included as part of the evidence. This study focuses on the effect of antimicrobial resistance on global health, current methods that scientists have used to emphasize the seriousness of the issue, strategies that scientists have utilized to explain the effectiveness of vaccines, the reaction of the public towards these engagements and the solutions to alleviating vaccine hesitancy vaccination for preventing AMR.

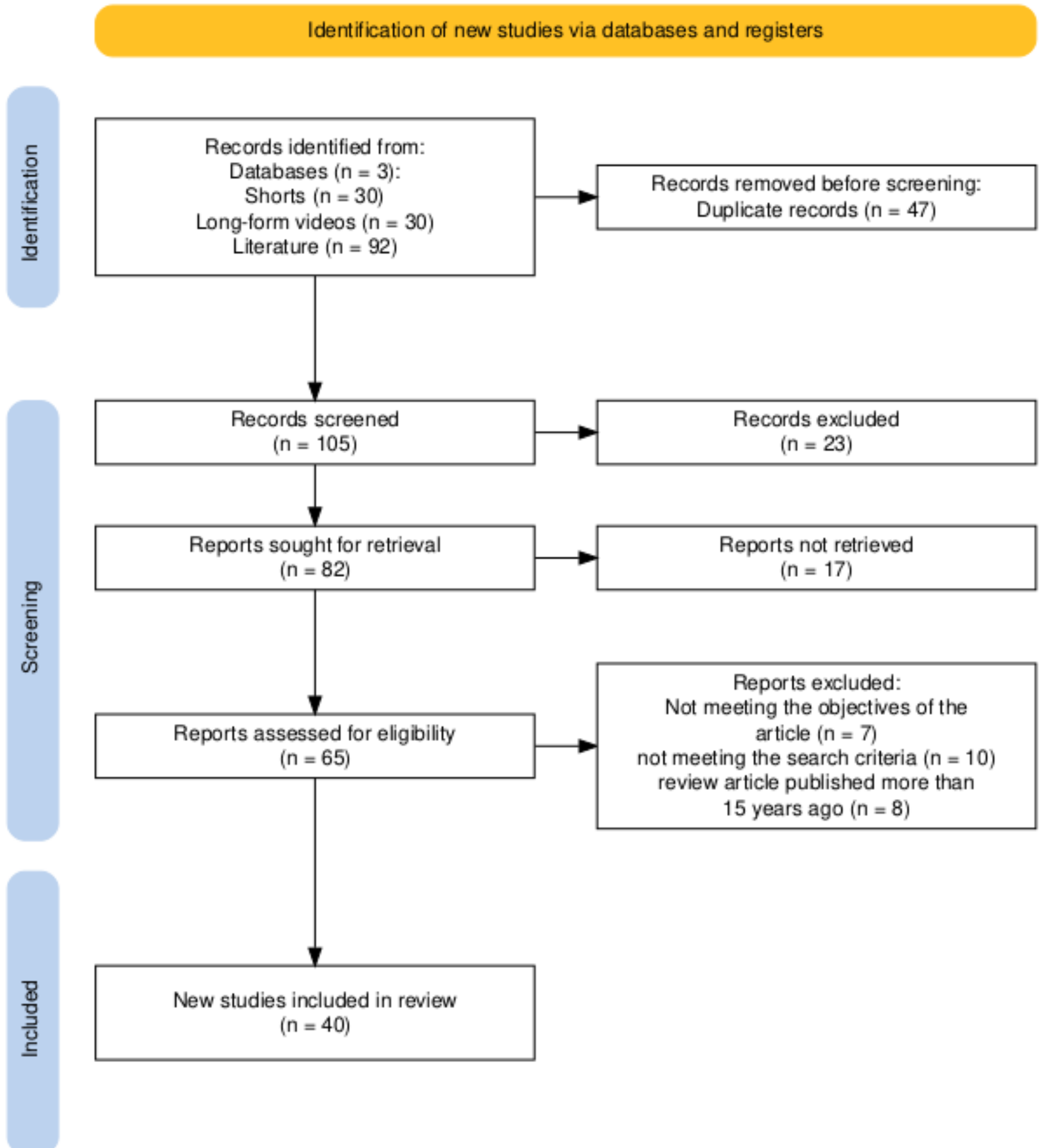
3.1 Eligibility criteria: Inclusion and exclusion criteria

Studies were considered eligible if they met either of the following criteria:
(1) studies evaluating the impact of AMR on public health, (2) studies investigating the current engagement methods used by scientists in recent 15 years, (3) studies reflecting the public reactions towards the relationship between AMR and the role of vaccination, and (4) studies illustrating the key elements that make a more engaging public outreach
The following studies were excluded: (1) not meeting the objectives of the article, (2) university theses, (3) not meeting the search criteria, (4) book chapters or books, and (5) review article published more than 15 years ago.

4. Results

In the first phase of study selection, 30 Shorts, 30 long-form videos and 92 literatures were found in the PubMed electronic database. After thoroughly reviewing the abstracts and watching the videos, 12 Shorts, 7 long-form videos and 28 articles are being removed due to duplication. 23 records are further excluded upon further screening Totally 40 studies identified from PubMed and other reliable sources including contents from global conversations and governmental websites are included.

4.1 PRISMA Flow Diagram



**PRISMA Flow Diagram showing the studies identified*

4.2 Impact of social media platforms

It is found that the largest video-based social media platform YouTube has a great number of “clinician content creators” or “health influencers” which refer to certain healthcare professionals who have generated a large network of followers through their active social media presence and have been referred to as “health influencers”, “health content creators”, or “clinician content creators”. (Liu et al., 2024). These individuals have gathered more subscribers (individuals who follow their channels and regularly watch their videos) than international and national medical organizations such as the WHO (approximately 874000 subscribers) and the United States Centers for Disease Control and Prevention (approximately 637000 subscribers), shedding light on the importance of circulating healthcare information through online channels by individual efforts.

4.3 Means to improve the impact of using social media platforms for healthcare education

The impact of the coordinated social media content release on audience engagement is studied, which evaluated the audience engagement (views, likes, and comments) of the content released onto YouTube on the Pulse date using the publicly available engagement data. Pulse date refers to the period when coordinating a health content creator network to disseminate social media videos on the topic of AMR, coinciding with an international event on AMR. The engagement data of the Pulse videos at the 6-month point from the time of release is collected to allow for the cumulative growth in video engagement to plateau. With engagement analytics extracted from publicly available YouTube data using YouTube Data application programming interface (Google Cloud, no date) and the playlist ID as well as the API key being entered into predetermined code using R software. (Posit, no date), (R Core Team, 2022), the comparison between the Pulse videos with each creator's baseline performance indicates an insignificant difference in the number of views or like count. However, the Pulse videos had a significantly greater number of comments, reflecting an increased engagement regarding the public discussion of AMR. (Chen et al., 2026a).

**Table showing the comparison of engagement between "Pulse" videos and creator's baseline videos (Chen et al. 2026a)*

Engagement metrics	Hodges-Lehmann estimator, median difference (95% CI)	P value
View count	−82.0 (−190.3 to 58.5)	.26
Like count	0.50 (−6.3 to 10.5)	.93
Comment count	15.5 (5.5 to 24.0)	<.001

[a]Values are shown as Hodges-Lehmann median difference (95% CI). Paired differences in engagement (views, likes, and comments) were assessed using the Wilcoxon signed-rank test.

The principal findings were that coordinating health content creators to release AMR-related videos on YouTube coinciding with an international event on AMR, defined as Pulse, increased audience interactivity in terms of the number of comments but did not enhance overall reach compared with sporadic releases. This suggests that coordinated campaigns may enhance interactive engagement among audiences, but coordination alone may not be sufficient to drive greater overall reach, thereby stressing on the significance of improving the engagement effectiveness of the online content from the root. (Chen et al., 2026a)

While the use of engagement analytics such as views cannot directly translate to impact on AMR-related behavioral change, the concept of "engagement" is considered critical success when modelling the process can lead to behavioral change due to social media exposure. (Kite et al., 2023). Chen's study showed that internet media channels demonstrated the greatest level of engagement. As compared with independent channels, those videos had significantly more views per day, like count, comment count. Comparing with non-profit or medical organizations, such videos have more views per day, like count, comment count. Internet media also shows greater like count and comment count compared with channels by healthcare professionals. Educational channels run by non-healthcare professionals shows greater engagement than non-profit or medical organizations, seen in views per day, like count and comment count. (Figure 2). (Chen et al., 2026b). This could be due to demographic and behavioral similarities between the messenger and the recipient can improve the effectiveness of the communication. (Dolan et al., 2010)

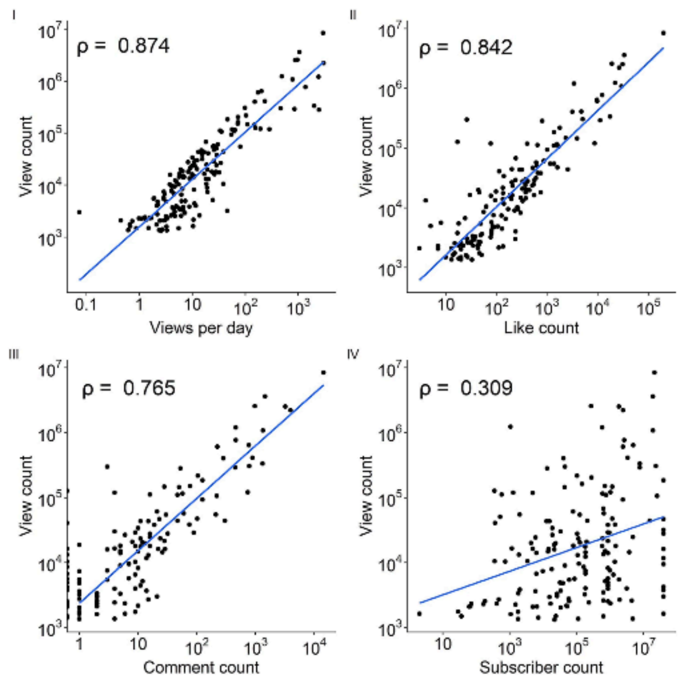
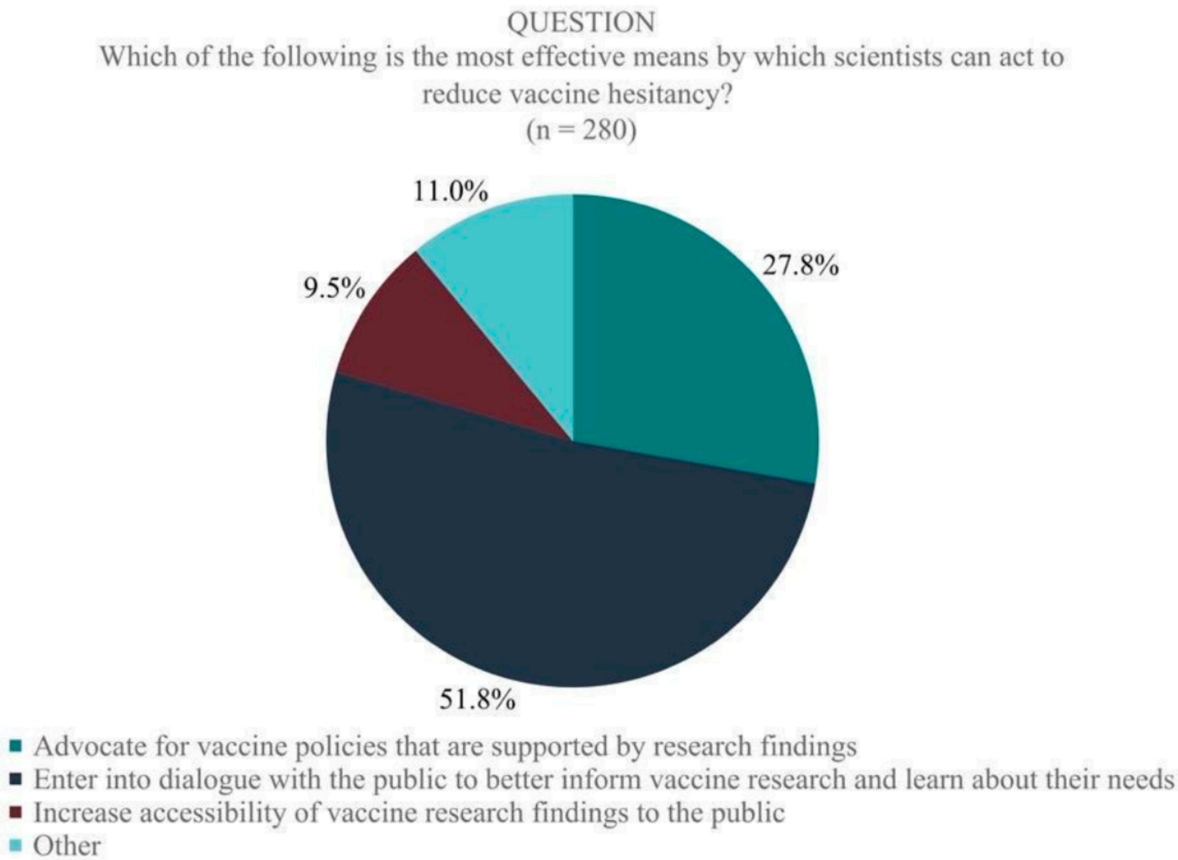


FIGURE 2
Correlation plot of video engagement analytics.

**Diagram showing the correlation plot of video engagement analytics (Chen et al. 2026b)*

Chen's work also showed that videos mentioning governmental policies/legislations and those that included interviews with AMR-related experts appeared less engaging. This is likely because of the stronger resonance between the public and non-profit or medical organizations, and a distrust in official bodies, as seen in vaccination programs. It is therefore important to address vaccine hesitancy while engaging with the public through social media platforms, thereby empathizing with their concerns and building a deeper connection to facilitate the engagement effectiveness. (Chen et al., 2026b).

A large majority of Welch's sample (90.7%) supported the idea that "scientists have a role in reducing vaccine hesitancy among the public". When asked the most effective means by which scientists can act to reduce vaccine hesitancy, about half (51.8%) saw their role as through direct dialog with the public to better inform vaccine research and learn about their needs. Another (27.8%) believed the most effective role for scientists was to advocate for vaccine policies that are supported by research findings, while 9.5% believed the most effective means by which scientists could act to reduce vaccine hesitancy was by increasing the accessibility of vaccine research findings to the public. (Welch et al., 2023).



Scientists' roles in reducing vaccine hesitancy (Welch et al., 2023)

4.4 Effectiveness of previous work done to alleviate vaccine hesitancy

Between February and April 2024 Kirklees Public Health Commissioned Community Champions to carry out a programme of work to increase MMR uptake in low uptake communities, aiming to improve awareness of MMR vaccine and supporting informed decision making, increase understanding of the risks associated with contracting measles, improve awareness of how to access vaccines including eligibility criteria and gaining important insights around barriers, key themes and learning. This included 946 one-to-one conversations in North and South Kirklees and 49 group visits, with 496 additional individuals reached as part of the group visits. As a result of these conversations, 761 people (53%) said they had an improved understanding if measles including signs and symptoms, 593 people (41%) had an improved awareness of vaccines and how and where to get them, 159 people were signposted to get a vaccine which accounts for around 10% of the total population reached. (Local Government Association, 2026)

The Report of the Sage Working Group on Vaccine Hesitancy suggested the Complacency, Convenience and Confidence ("3Cs") model as one of the most useful models which is intuitive and thus the easiest to grasp. Confidence is defined as trust in 1) the effectiveness and safety of vaccines; 2) the system that delivers them, including the reliability and competence of the health services and health professionals and 3) the motivations of the policymakers who decide on the needed vaccines. Vaccine complacency exists where perceived risks of vaccine-preventable diseases are low and vaccination is not deemed a necessary preventive action. Vaccine convenience is measured by the extent to which physical availability, affordability and willingness-to-pay, geographical accessibility, ability to understand (language and health literacy) an appeal of immunization services affect uptake. (World Health Organization, 2014). As a result, it is highly recommended for scientists to collect individual concerns about vaccines and address these concerns using the 3Cs model through social media platforms.

Chen's studies illustrated the key elements that improve the engagement effective for videos about AMR: Firstly, having specially designed thumbnails was associated with significantly greater number of views, views per day, likes and comments. Secondly, having texts in the thumbnail was associated with greater views per day, likes and comment counts. Moreover, animation content was associated with a greater number of views. Including elements of humor appeared very important in generating engagement, yet only 12 out of 163 (7%) reviewed AMR videos included this. No association was found between videos styles and the level of engagement. Notably, having additional interviewees in the video was associated with an adverse association with engagement, especially when in the presence of expert interviewees. Including an introduction, background music, high visual quality and channel owner's engagement activities with viewers were not associated with greater engagement. Videos that were accredited as health-related content was not associated with greater engagement.

4.5 Analysis of different elements in videos with health-related content that can increase engagement

**Table showing the association between all investigated video characteristics and engagement analytics (Chen et al. 2026b)*

Categories	Signaling questions	Options	View count			Views per day		Comment count			Like count		
			n	Median (IQR)	p-value	Median (IQR)	p-value	n	Median (IQR)	p-value	n	Median (IQR)	p-value
Thumbnail	Is the thumbnail a screenshot during the video or specially designed?	Special feature	**73**	**20,822 (4007–115,694)**	**0.014**	**19.3 (5.0–72.3)**	**0.001**	**71**	**268 (49–1,477)**	**0.004**	**70**	**13 (3–77)**	**0.001**
		Screenshot during the video	90	9908 (2759–27,962)		6.7 (3.1–18.1)		78	92 (33–328)		66	5 (1–16)	
	Does the thumbnail contain texts?	Yes	98	15,650 (4206–84,557)	0.069	**14.3 (5.1–52.4)**	**0.004**	**91**	**229 (54–905)**	**0.004**	**83**	**11 (3–59)**	**0.015**
		No	65	8222 (2697–31,757)		6.6 (2.9–18.1)		58	79 (33–315)		53	5 (1–16)	
	Does the thumbnail contain channel logo?	Yes	43	15,048 (3899–41,350)	0.858	11.0 (5.8–33.4)	0.287	42	189 (61–516)	0.595	41	9 (2–47)	0.591
		No	120	13,328 (3287–51,619)		9.6 (3.6–28.5)		107	140 (35–607)		95	9 (1–29)	
Introduction	Does the video have an introduction?	Yes	123	14,781 (3803–49,035)	0.589	10.5 (4.0–30.0)	0.596	114	189 (44–646)	0.243	106	9 (2–43)	0.407
		No	40	9986 (2882–43,593)		8.1 (4.1–22.4)		35	94 (40–255)		30	6.5 (1–15)	
	Does the video introduction mention the video topic/aim?	Yes	99	15,908 (3899–54,798)	0.429	10.7 (4.2–31.2)	0.268	92	196 (45–677)	0.796	85	10 (2–47)	0.847
		No	25	12,332 (3043–38,415)		6.7 (2.9–26.1)		23	170 (45–580)		22	7 (3–27)	
	Does the video introduction include a question?	Yes	29	13,233 (2763–115,694)	0.728	10.7 (4.2–80.7)	0.436	27	136 (39–1,477)	0.789	25	11 (2–53)	0.631
		No	95	14,781 (3924–39,570)		10.3 (4.0–27.0)		88	189 (46–571)		82	9 (2–29)	
	Does the video start music immediately?	Yes	102	12,783 (3241–43,907)	0.479	9.0 (4.1–28.4)	0.798	90	136 (37–623)	0.903	83	8 (1–40)	0.481
		No	61	16,252 (3764–61,050)		11.0 (4.0–30.4)		59	188 (45–532)		53	10 (2–24)	
	Does the video start narration immediately?	Yes	53	16,457 (4454–93,715)	0.338	11.0 (4.2–54.7)	0.358	51	188 (40–443)	0.759	45	9 (2–47)	0.903
		No	104	13,620 (3351–43,534)		10.2 (4.1–28.0)		94	146 (44–646)		88	9 (1–29)	
	Does the video introduce the channel name immediately?	Yes	96	16,070 (4181–55,247)	0.102	10.6 (5.0–30.1)	0.163	**89**	**237 (78–656)**	**0.008**	**84**	**11 (2–50)**	**0.031**
		No	67	9601 (2488–44,167)		7.2 (3.0–29.5)		60	70 (27–331)		52	5 (1–17)	
	Length of introduction (s)	n	Median (IQR)		0.471								
		123	12 (7–27.3)										

**Continued*

Categories	Signaling questions	Options	View count			Views per day		Comment count			Like count		
			n	Median (IQR)	p-value	Median (IQR)	p-value	n	Median (IQR)	p-value	n	Median (IQR)	p-value
Music	Does the video have music?	Yes	88	12,783 (3177–44,900)	0.91	8.6 (3.3–32.4)	0.862	78	113 (34–623)	0.446	71	5 (1–27)	0.148
		No	52	16,070 (3691–74,382)		11.1 (4.2–33.2)		49	188 (45–558)		44	11 (4–34)	
		Partly (during introduction and/or ending)	23	15,048 (3963–42,575)		10.8 (5.0–23.9)		22	270 (83–494)		21	10 (3–30)	
	Is the video music track named?	Yes	**28**	**33,494 (4992–132,961)**	**0.038**	**25.5 (6.8–80.0)**	**0.009**	26	393 (45–1,544)	0.083	26	14 (2–104)	0.093
		No	90	9431 (3018–27,685)		6.7 (3.4–23.3)		79	111 (31–376)		72	5 (1–17)	
	How fast is the music playing? * beats per minute	Slow (up to 76 bpm*)	30	15,288 (3324–52,233)	0.828	11.5 (3.5–37.0)	0.507	26	170 (37–788)	0.821	26	13 (1–58)	0.810
		Medium (76 to 120 bpm)	36	10,428 (3967–26,183)		8.6 (3.8–24.0)		30	117 (47–553)		23	5 (1–22)	
		Fast (> 120 bpm)	31	14,513 (2656–115,398)		10.7 (4.9–93.4)		30	113 (28–485)		27	5 (1–20)	
Animation	Does the video contain animations?	Yes	**81**	**16,394 (5487–111,868)**	**0.016**	12.2 (4.7–62.0)	0.054	72	216 (38–1,361)	0.332	64	8 (1–48)	0.725
		No	82	9524 (2632–29,827)		9.0 (3.5–20.0)		77	136 (45–379)		72	9 (2–22)	
	Does the animation follow a color scheme?	Yes	58	20,182 (7742–114,738)	0.335	18.2 (5.6–63.5)	0.528	54	235 (44–1,369)	0.886	46	10 (1–43)	0.809
		No	22	13,196 (5392–24,124)		8.9 (4.7–41.2)		18	218 (48–728)		17	5 (1–50)	
	Does the animation have a main character feature?	Yes	40	14,033 (5350–112,825)	0.68	14.9 (4.6–66.2)	0.658	35	135 (63–1,477)	0.484	31	5 (1–44)	0.661
		No	38	18,041 (5952–49,824)		9.9 (5.6–28.6)		33	241 (38–445)		29	9 (1–28)	
	Does the animation have sound effects	Yes	19	40,725 (9241–209,646)	0.24	19.8 (4.6–244.8)	0.493	15	114 (28–6,137)	0.798	14	8 (0–651)	0.851
		No	62	14,287 (4940–64,612)		11.0 (4.7–53.7)		57	229 (44–800)		50	8 (1–30)	

**Continued*

Categories	Signaling questions	Options	View count n	View count Median (IQR)	View count p-value	Views per day Median (IQR)	Views per day p-value	Comment count n	Comment count Median (IQR)	Comment count p-value	Like count n	Like count Median (IQR)	Like count p-value
Presenter/ interviewees	Is the presenter accreditation shown?	Yes	59	10,547 (3579–28,447)	0.134	9.9 (4.1–19.0)	0.191	57	140 (46–379)	0.264	51	7 (1–22)	0.254
		No	99	14,324 (3628–113,781)		10.6 (4.1–59.2)		87	229 (36–1,469)		80	11 (2–83)	
	Main narrator/presenter gender	Male	**62**	**12,262 (3394–36,529)**	**0.046**	**8.6 (3.2–27.2)**	**0.045**	59	114 (40–553)	0.32	**50**	**5 (1–18)**	**0.046**
		Female	83	16,394 (4817–112,793)		11.0 (4.9–63.0)		75	202 (47–1,365)		72	13 (3–58)	
		Both	4	3320 (2599–4,975)		3.9 (1.8–8.9)		4	141 (44–231)		4	5 (3–9)	
	Does the video have additional interviewees?	Yes	40	4396 (2334–22,257)	**0.009**	6.3 (3.3–15.4)	**0.050**	37	52 (27–239)	0.012	33	3 (1–15)	0.095
		No	**123**	**15,048 (4629–59,067)**		**10.9 (4.2–37.0)**		112	206 (46–654)		103	10 (2–40)	
	Does the video have expert interviewees?	Yes	37	5445 (2329–24,325)	**0.028**	6.5 (3.3–16.9)	0.113	34	77 (34–254)	0.073	30	5 (1–16)	0.333
		No	**126**	**14,647 (4293–56,471)**		10.8 (4.2–35.2)		115	202 (45–640)		106	10 (2–32)	
	Does the video have lay interviewees?	Yes	14	11,278 (2705–166,866)	0.964	8.3 (4.1–62.5)	0.710	13	52 (26–800)	0.324	13	2 (2–53)	0.902
		No	148	14,033 (3745–44,897)		10.4 (4.1–28.7)		135	188 (45–582)		122	9 (1–30)	
	Number of interviewees	n	Median (IQR)		0.5711								
		40	3 (1–5)										
Social interactions	Does the video encourage social interactions?	Yes	106	14,781 (4008–53,630)	0.257	10.8 (4.5–33.1)	0.177	97	190 (46–656)	0.251	91	9 (1–39)	0.251
		No	57	9446 (2697–43,362)		9.2 (3.3–24.5)		52	135 (34–409)		45	10 (2–28)	
	Does the channel owner reply to the top comments?	Yes	11	17,605 (3938–37,729)	0.412	24.4 (6.6–29.9)	0.947	10	265 (68–554)	0.741	11	12 (9–26)	0.741
		No	105	18,153 (4239–109,891)		11.2 (5.0–46.2)		104	238 (77–901)		105	11 (4–57)	
	Does the channel owner like the top comments?	Yes	13	18,040 (13,035 – 47,456)	0.976	11.2 (8.3–25.6)	0.287	13	331 (204–612)	0.287	13	16 (7–30)	0.287
		No	104	17,824 (3673–110,385)		11.4 (4.6–48.3)		102	205 (50–848)		104	11 (3–51)	
Visual quality	What is the visual quality of the video	> = 1080p	118	10,532 (3018–44,226)	0.182	9.7 (4.0–33.1)	0.984	107	136 (36–619)	0.555	97	9 (2–47)	0.555
		< 1080p	45	19,806 (4950–54,961)		10.0 (4.5–24.5)		42	206 (56–496)		39	9 (1–23)	
Humor	Does the video include elements of humor?	Yes	**12**	**115,547 (34,642 – 412,501)**	**0.001**	**42.4 (18.6–579.8)**	**0.002**	**11**	**2,575 (317–14,411)**	**0.004**	**9**	**301 (23–768)**	**0.004**
		No	151	12,332 (3133–40,889)		9.0 (3.8–25.8)		138	136 (39–496)		127	8 (1–25)	
YouTube Health	Is the video highlighted as "health-related content" by YouTube?	Yes	33	14,006 (3957–38,119)	0.895	10.0 (5.0–16.9)	0.926	32	138 (74–256)	0.875	25	7 (4–15)	0.875
		No	130	13,647 (3241–53,630)		10.1 (3.7–35.0)		117	152 (34–656)		111	9 (1–40)	

Bold values indicate video characteristics that were significantly associated with the indicated engagement metric.

**Frequency of each AMR-related topic and association with engagement analytics (Chen et al. 2026b)*

Is the AMR topic mentioned?		View count n	View count %	View count Median (IQR)	View count p-value	Views per day Median (IQR)	Views per day p-value	Like count n	Like count %	Like count Median (IQR)	Like count p-value	Comment count n	Comment count %	Comment count Median (IQR)	Comment count p-value
Actions against AMR	Y	116	71.2	11,129 (3445–43,393)	0.365	8.8 (4.0–25.5)	0.161	104	69.8	140 (38–515)	0.320	95	69.9	9 (2–27)	0.544
	N	47	28.8	16,231 (3532–102,792)		18.0 (4.1–45.8)		45	30.2	190 (45–1,010)		41	30.1	10 (1–125)	
Mechanisms of AMR	Y	115	70.6	**18,153 (5065–81,643)**	**<0.001**	**12.2 (4.6–42.0)**	**0.002**	106	71.1	**249 (48–752)**	**0.001**	99	72.8	**11 (3–55)**	**<0.001**
	N	48	29.4	4231.5 (2334–14,482)		6.0 (2.8–14.0)		43	28.9	78 (25–200)		37	27.2	2 (0–10)	
Antimicrobial usage and over-prescription	Y	113	69.3	12,332 (3470–43,362)	0.728	9.9 (4.0–28.5)	0.603	102	68.5	161 (43–551)	0.864	95	69.9	9 (2–27)	0.968
	N	50	30.7	15,146 (3324–66,216)		10.5 (4.1–37.3)		47	31.5	135 (37–759)		41	30.1	8 (1–102)	
Severity of AMR (epidemiology; consequences without)	Y	97	59.5	13,422 (3043–43,484)	0.444	9.9 (3.7–25.6)	0.401	88	59.1	140 (42–530)	0.596	82	60.3	9 (2–28)	0.899
	N	66	40.5	14,554 (3755–85,549)		10.6 (4.3–46.0)		61	40.9	190 (45–753)		54	39.7	8 (1–55)	
Agricultural and environmental factors linked with AMR	Y	77	47.2	11,710 (3298–44,285)	0.552	6.7 (3.7–34.6)	0.296	68	45.6	135 (42–616)	0.849	62	45.6	11 (2–47)	0.233
	N	86	52.8	15,640 (3970–49,824)		10.6 (4.2–28.9)		81	54.4	188 (44–558)		74	54.4	7 (1–21)	
Antibiotics and mechanisms of action	Y	55	33.7	**28,025 (7743–147,772)**	**<0.001**	**19.3 (6.4–92.0)**	**<0.001**	50	33.6	**479 (136–2379)**	**<0.001**	47	34.6	**16 (8–175)**	**<0.001**
	N	108	66.3	8781 (2583–28,047)		6.8 (3.1–19.9)		99	66.4	84 (33–328)		89	65.4	4 (1–16)	
Governmental policies/ Legislations	Y	50	30.7	8459 (2468–26,411)	**0.031**	5.7 (2.9–15.3)	**0.011**	45	30.2	98 (27–415)	0.068	41	30.1	7 (1–28)	0.262
	N	113	69.3	**16,231 (4007–67,938)**		**11.2 (4.7–38.6)**		104	69.8	206 (46–658)		95	69.9	9 (2–38)	

**Continued*

Is the AMR topic mentioned?		View count				Views per day		Like count				Comment count			
		n	%	Median (IQR)	*p*-value	Median (IQR)	*p*-value	n	%	Median (IQR)	*p*-value	n	%	Median (IQR)	*p*-value
Drug development in antibiotics and AMR	Y	48	29.4	17,031 (3966–79,877)	0.149	14.0 (4.7–42.0)	0.219	46	30.9	240 (45–788)	0.128	44	32.4	**13 (4–79)**	**0.042**
	N	115	70.6	10,547 (3260–37,375)		9.0 (4.0–28.1)		103	69.1	111 (41–479)		92	67.6	6 (1–21)	
Novel research in AMR (e.g., phage therapy, novel diagnostics)	Y	39	23.9	3764 (2635–49,060)	0.091	6.7 (3.0–35.7)	0.346	37	24.8	107 (45–561)	0.702	35	25.7	10 (2–42)	0.648
	N	124	76.1	15,478 (4904–46,915)		10.6 (4.4–29.4)		112	75.2	189 (43–605)		101	74.3	8 (1–28)	
Interviews with AMR-related experts	Y	36	22.1	6069 (2284–28,318)	**0.043**	6.3 (3.0–15.1)	0.054	34	22.8	77 (33–304)	0.061	31	22.8	4 (1–19)	0.208
	N	127	77.9	**14,513 (4008–59,067)**		10.7 (4.3–37.0)		115	77.2	202 (46–701)		105	77.2	10 (2–47)	
AMR- related laboratory experiments	Y	33	20.2	23,522 (3631–117,913)	0.184	**19.0 (6.2–56.5)**	**0.038**	32	21.5	**369 (51–1913)**	**0.045**	29	21.3	**21 (5–283)**	**0.006**
	N	130	79.8	13,328 (3394–40,074)		8.9 (3.7–25.9)		117	78.5	135 (43–415)		107	78.7	7 (1–22)	
AMR patient experiences/cases	Y	27	16.6	15,908 (3320–50,848)	0.917	9.2 (3.9–30.3)	0.998	26	17.4	136 (45–643)	0.922	24	17.6	9 (2–59)	0.788
	N	136	83.4	13,328 (3445–45,078)		10.2 (4.1–29.4)		123	82.6	152 (44–560)		112	82.4	9 (1–28)	

Bold values indicate video characteristics that were significantly associated with the indicated engagement metric.

Strategic health communication has been key in effectively conveying important health concerns to the public and frameworks guiding effective communication exist, such as the WHO general strategic communication framework centered around six principle (actionable, credible, relevant, timely, understandable and access) and more recently, a social media-based public health campaign framework.

It is also pivotal to look at the interactive nature of social media. The Uses and Gratifications (U&G) framework that Goering et al. applied allowed the finding that individuals seek health-related information on YouTube as means for convenience, online community for social support, exciting entertainment and passing time. As a result, individuals gain satisfaction through a sense of empowerment or a perceived level of control and competence over their healthcare. (Park & Goering, 2016). Similarly, Khan et al. found that individuals were motivated to consume YouTube for relaxation and entertainment. (Khan, 2017). This explains why videos about the mechanisms of AMR and antibiotics are knowledge-based topics that the public may prefer to ask for because they gain personal satisfaction and empowerment which also reflects the public's incomplete understanding of AMR among the public, and many would learn more from internet and social networks. (Chen et al., 2026). Therefore, it is important for scientists to explain AMR and the role of vaccination in a way that empowers individuals to change the phenomenon of AMR through individual efforts. This includes explaining the mechanism of vaccines and how can vaccines be used to combat with AMR.

5. Discussion

Publishing healthcare-related videos on social media platforms is useful to engage with the public. The 30-s YouTube animation video published by the UK Health Security Agency (then Public Health England) in 2015 showing dancing antibiotic pills singing the message "keep antibiotics working" has garnered over 3 million views and directed the greatest number of unique visitors to the main campaign website. (Gilham et al., 2024) (Bhattacharya et al., 2017). Similar videos by Singapore Health Promotion Board were viewed more than 1 million times. (Health Promotion Board Singapore [HPB], 2018). Contrarily, several videos released by WHO to raise awareness about AMR have been viewed fewer times, such as the video "What is antimicrobial resistance" with 11000 views. (World Health Organization [WHO], 2021). The difference in views for videos about similar topics stresses on the importance to evaluate the key elements that differentiate the engagement effectiveness of an online video.

However, increased engagement does not necessarily reflect an increase in awareness. It remains unknown whether engagement with an online video can translate to objective impact on individual's health-related behaviors. The CE4AMR network has recently been used to run projects generating participatory video content and evaluated the impact of such videos on knowledge, attitudes and behaviors on AMR. (Community Engagement for Anti-microbial Resistance [CE4AMR], 2025). As a result, whether incorporating characteristics associated with greater engagement can translate to meaningful impact on individual's behavioral determinants relating to AMR is yet to be explored.

5.1 Opportunities for future work

Current evaluation methods only consider view count, views per day, like count and comment count to determine the engagement effectiveness of online videos. It is recommended to cooperate with content creators to collect more in-depth engagement metrics such as the watch time in YouTube Analytics which is one of the main factors YouTube's algorithms consider when suggesting videos to other viewers. Videos with higher average view durations receive more recommendations and appear more frequently in search results. This creates a virtuous circle to engage with more people.

Moreover, the thematic analysis of qualitative data within viewers comments could also provide insights into how videos impact their health beliefs and health-related behaviors surrounding AMR. (Chen et al., 2026b). This allows scientists to address concerns like vaccine hesitancy effectively to empower individuals, thereby achieving the goal of encouraging more people to receive vaccination to prevent AMR.

6. Conclusion

Engagement can be improved by strategically incorporating video elements that align with audience's inclination for empowerment and entertainment, through collaborating with internet media and educational channels by non-medical professionals, and by partnering with social media influencers who already have a large network of followers. There are many key elements that ensure the production of a highly engaging healthcare-related video content, such as the inclusion of a specially designed thumbnail with texts and channel logo in the format of a screenshot, the inclusion of the channel name of the video immediately, the inclusion of the naming of the music track, the inclusion of animations, and having a female narrator/presenter. Most importantly, including elements of humor helps to generate the highest median of view count.

Notably, a distinctively lower proportion of videos hosted on channels by non-profit and medical organizations were found to have specifically designed thumbnails compared to other channel types even though the videos were of better quality than educational videos from non-medical professionals. However, individuals showed better engagement with non-health related channels which tend to show information of poorer quality. This accentuates the importance of governing the quality of health information across all channel types and emphasizes the significance for videos to include the key elements to raise engagement effectively.

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