What your educational video performance can tell you and why you should be looking.

John Huber[1], Judith Dexheimer W[2], Adam Lane[1], Aaron Williams[2], Priscila Badia[1], Stella Davies[1], and Christopher Dandoy[1]

[1]Cincinnati Children's Hospital Medical Center Division of Bone Marrow Transplantation and Immune Deficiency
[2]Cincinnati Children's Hospital Medical Center

September 12, 2022

Abstract

Timely and relevant patient and family education can improve quality of life and outcomes for transplant families. Video's popularity as an education medium has been increasing as the barriers to video production and consumption have decreased. To better understand the usage characteristics our education videos we obtained aggregated video performance statistics from YouTube for the Arabic, English, and Spanish versions of five division created bone marrow transplant educational videos. Comparing video views to patient transplants, considering patient language and transplant date, we found that views per patient by language were highest with Spanish language videos with a mean of 1.17 (range: $0.35 - 1.88$), followed by English language videos at 0.96 (range: 0.52-2.41) and Arabic language videos trailed with a mean of 0.37 (range: 0.15-0.58) views per patient. Lifetime average watch percentages across all videos was 65.7% (range: 22.3% - 85.7%), with the non-English videos consistently having lower average viewing percentages. These data give important insights into our education delivery systems and the degree to which our content engages each of our patients and families.

Introduction

Hematopoietic stem cell transplantation (HSCT) is an effective treatment for many malignant conditions, marrow failure syndromes, and immune deficiencies in children, adolescents, and young adults[1,2]. Patients undergoing HSCT are hospitalized for extended periods (months), and recovery can be prolonged (years)[3,4]. Patients report feeling underprepared for procedures and side effects, and caregivers struggle to perform new and complex care processes after discharge.[3,4]

Access to timely and relevant education during transplant can lower anxiety and stress, improve compensating behaviors and adherence, increase self-management, and lead to better outcomes[5]. Video is an increasingly popular medium for patient-centered educational content, and advances in technology have significantly lowered barriers to video production[6]. Educators can capture and edit high-quality audio and video using ordinary smartphones, which are easily accessible to patients. The cost of video delivery, once a significant expense, is now near-zero with the rise of ad-supported streaming platforms such as YouTube®.[7,8]

Positive results in controlled studies may lead centers to assume the benefit of video-based education will translate directly into an uncontrolled setting, where patients and families can decide, with anonymity, how long to view each video, or even if to view it at all. Without usage metrics, a video's performance can be opaque to its creator, leaving little ability to understand if the intended benefits are delivered and, if so, delivered equitably across socioeconomic and cultural boundaries. Our goal was to understand better our video utilization in patients and caregivers undergoing pediatric HSCT.

Methods

This study was reviewed by the Cincinnati Children's Hospital Medical Center (CCHMC) Institutional Review Board and deemed to be non-human subjects IRB 2021-0468.

CCHMC is a large, urban pediatric medical center; the transplant service performs approximately 100-120 transplants annually. In 2016, the division of Bone Marrow Transplant and Immune Deficiency at CCHMC partnered with the internal marketing department and created educational videos for patients and caregivers undergoing HSCT. Families are informed of the YouTube-hosted videos through the Bone Marrow Transplant Education page on the main hospital website, printed education materials, and one-on-one communications with the care manager.

Fifteen videos were selected for analysis, representing the five transplant topics, each delivered as separate videos in the three most common patient languages spoken at CCHMC: English, Spanish, and Arabic (Table 1). These educational videos were selected due to their "unlisted" status on YouTube, meaning that the videos can only be viewed if someone had a direct link and are not available through YouTube searches or recommendations, supporting a better comparison between view counts and patients transplanted.

YouTube offers aggregated video performance statistics for videos. The available data include the aggregated overall view count and overall average watch percentage for each video over a specified time range. These data were obtained for each of the videos on the YouTube Analytics site[9]. It is important to note that individualized view data are not provided.

We compared each video's views to the number of patients going through the transplant process during each video's lifetime (from the video upload date to January 2022). We identified relevant patients from the CCHMC HSCT database using the infusion date of the first transplant. Patients who underwent their first transplant concurrent to or after each video's release date were selected. The patient's language was extracted from the electronic health record (EHR).

Mean views per patient was calculated using the total video views of each topic and language divided by the number of patients undergoing the first transplant during the video's release. Overall topic and languages watch percentages were calculated using weighted means with topic and language performance weighted by view count. Pearson correlation coefficient was computed to explore the relationship between video length and average watch percentage.

Results:

Five hundred eighteen (518) Arabic, English, or Spanish patients underwent their first transplant at CCHMC from March 2016 through January 2022. These languages represent the three most common patient languages, with English (77%), Arabic (19%), and Spanish (4%), with all other languages accounting for less than 1% of patients. Views per patient across all topics were less than 1.0, with a mean of 0.86 per patient (range: 0.24 - 2.08).

Views per patient by language were highest with Spanish language videos with a mean of 1.17 (range: 0.35 – 1.88), followed by English language videos at 0.96 (range: 0.52-2.41) and Arabic language videos trailed with a mean of 0.37 (range: 0.15-0.58) views per patient. (Figure 1a)

Hosted file

image1.emf available at https://authorea.com/users/507113/articles/585644-what-your-educational-video-performance-can-tell-you-and-why-you-should-be-looking

Lifetime average watch percentages across all videos was 65.7% (range: 22.3% - 85.7%), with the non-English videos consistently having lower average viewing percentages. (Figure 1b) Pearson correlation coefficient for Video Length vs. Avg Watch percentage was -0.352. (Figure 1c)

TABLE 1: Video View Statistics by Language	TABLE 1: Video View Statistics by Language

TABLE 1: Video View Statistics by Language	TABLE 1: Video View Statistics by Language
Video Title	Language
What to expect on the BMT unit.	Arabic
	English
	Spanish
What to eat on the BMT unit.	Arabic
	English
	Spanish
How to collect and prepare buccal swab samples.	Arabic
	English
	Spanish
How to take a temperature.	Arabic
	English
	Spanish
What to do if your child has a fever.	Arabic
	English
	Spanish
Summary by Language	Arabic
	English
	Spanish
Overall	
Avg Watch % is unavailable below a minimum view count threshold	** Avg Watch % is unavailable below a minimum vie

Discussion

This is the first study to evaluate parent and caregiver utilization of educational YouTube videos in pediatric HSCT. We found, that on average, 40-70% of each video is viewed. The average watch percentage can provide insight into what happens once viewing begins. The difference in watch percentage between the languages concerned as well as non-English videos (Spanish and Arabic) had a lower mean watch percentage than their English equivalents. Non-English versions of videos are typically longer, and the correlation between video length and average watch time is negative, but also weak (-0.352), suggesting that other factors are likely contributing to their poor performance.

We can ask important questions about our system by using views per patient data as a proxy metric for our education delivery processes. Are we seeing the number of views we would expect given the number of transplants we perform? Is there a system-level reason why video topic or language differences exist?

In next steps, our team will examine our video delivery processes to ensure system reliability and survey our patients and families to identify barriers to watching the current videos. We anticipate that these efforts will present change opportunities both in the system and content areas.

Limitations:

Exactly what YouTube records as a "view" isn't technically known to the public to discourage attempts to inflate view counts. Estimating viewers from view counts is inexact. A video's view count would be the same if 50 people watched once or 25 people watched twice. We also do not know if the person watching the video is a patient or family member. While the videos are not searchable or recommended on YouTube, links to the videos are posted on our public website enabling access to those other than our patients and families.

Conclusion

3

The delivery of video-based educational content offers an extraordinary opportunity to understand the educational benefit delivered to our patients and families. Modern video streaming platforms, such as YouTube, can provide detailed reports of viewers' engagement to assist creators in understanding how often their video is viewed and for how long. These data give us valuable insights not just for the whole population, but if the content is available in multiple languages, we can begin to understand its impact on individual demographic subgroups.

While not providing answers as to why our videos perform as they do, the data collected gives us a framework for understanding what their current performance is today. These data, captured over time, will support our quality improvement activities, allowing us to see how changes to our delivery system or video content affect our performance metrics.

References

1. Barriga F, Ramírez P, Wietstruck A, Rojas N. Hematopoietic stem cell transplantation: clinical use and perspectives. Biological Research 2012;45:307-16.

2. Copelan EA. Hematopoietic stem-cell transplantation. N Engl J Med 2006;354:1813-26.

3. Szulczewski L, Mullins LL, Bidwell SL, Eddington AR, Pai ALH. Meta-Analysis: Caregiver and Youth Uncertainty in Pediatric Chronic Illness. J Pediatr Psychol 2017;42:395-421.

4. Tillery R, Joffe NE, Mara CA, Davies SM, Pai ALH. Longitudinal examination of family efficacy following pediatric stem cell transplant. Psychooncology 2018;27:1915-21.

5. Dahodwala M, Geransar R, Babion J, de Grood J, Sargious P. The impact of the use of video-based educational interventions on patient outcomes in hospital settings: A scoping review. Patient Educ Couns 2018;101:2116-24.

6. Chatterjee A, Strong G, Meinert E, Milne-Ives M, Halkes M, Wyatt-Haines E. The use of video for patient information and education: A scoping review of the variability and effectiveness of interventions. Patient Educ Couns 2021;104:2189-99.

7. Madathil KC, Rivera-Rodriguez AJ, Greenstein JS, Gramopadhye AK. Healthcare information on YouTube: A systematic review. Health Informatics J 2015;21:173-94.

8. Liu M, Cardenas V, Zhu Y, Enguidanos S. YouTube Videos as a Source of Palliative Care Education: A Review. J Palliat Med 2019;22:1568-73.

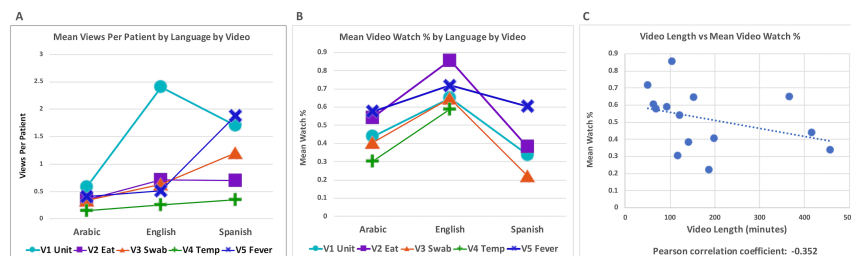9. You Tube Analytics. 2022. at https://analytics.youtube.com.)

FIGURE 1. View and Watch Results. (A) Mean Views Per Patient by Language, (B) Mean Video Watch % by Language, (C) Video Length vs Mean Video Watch %

A

Mean Views Per Patient by Language by Video

B

Mean Video Watch % by Language by Video

C

Video Length vs Mean Video Watch %
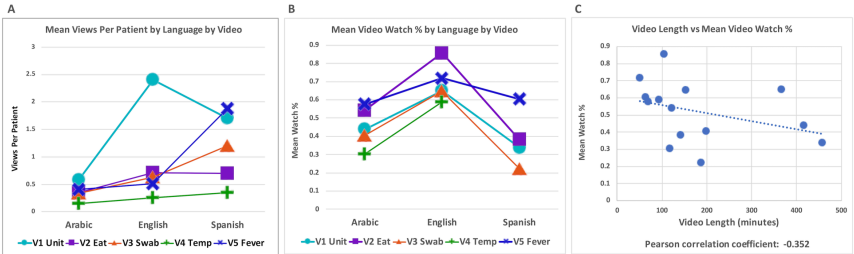
Pearson correlation coefficient: -0.352

FIGURE 1. View and Watch Results. (A) Mean Views Per Patient by Language, (B) Mean Video Watch % by Language, (C) Video Length vs Mean Video Watch %