

YouTube™ as an Instructional Source for Appropriate Metered Dose Inhaler Use

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ABSTRACT A metered-dose inhaler (MDI) is commonly used for treatment and management of asthma, chronic obstructive pulmonary disease, and other respiratory diseases. When used appropriately, an MDI is highly efficacious in aiding patients with respiratory disease. To date, the content, comprehensiveness, and accuracy of YouTube™ videos covering a wide variety of topics have been mixed. The purpose of this study was to evaluate English language MDI instructional videos available on YouTube™. The YouTube™ platform was used to create a sample of 58 unique videos which were scored for overall video quality and audio quality as well as inclusion of established MDI instructional criteria: (1) remove cap and shake inhaler, (2) exhale slowly and fully, (3) place mouthpiece between lips, (4) actuate MDI at onset of inhalation, (5) inhale at less than maximal rate, (6) hold breath for at least 5 second, and (7) recap mouthpiece.

72.4% of the videos were rated as “good” visual quality and 74.1% of the videos were rated as “good” audio quality, indicating that the majority of videos that were rated should not impair the viewer from seeing and hearing how to use an MDI. Additionally, a majority of the videos include steps (1), (2), (3), (4), and (6), which indicates that YouTube™ is a reliable source of patient information regarding how to use an MDI. The lower inclusion rates of step (5), inhaling at a less than maximal rate, and step (7), recapping the mouthpiece, could hinder a viewer’s understanding of how to correctly use an MDI. However, most of the videos still teach viewers how to use an MDI with a satisfactory degree of accuracy. Most clinicians in the United States could confidently refer asthma patients to YouTube™ to find instructions on how to correctly use a metered-dose inhaler (MDI).

Introduction

A metered-dose inhaler (MDI) is a commonly used medication delivery system for the treatment and management of asthma, chronic obstructive pulmonary disease, and other respiratory diseases. When used consistently and appropriately, an MDI is highly efficacious in aiding patients with respiratory disease manage their symptoms and improve their quality of life. It is common for patients to use their MDIs incorrectly [1,2], so many doses of medication, per container, are often wasted. Furthermore, consumer medication information accompanying MDIs has shown to be suboptimal due to excessively high reading demands, out-of-order step-by-step instructions, and a variety of poor layout features [3].

Until recently, patients received the majority of their medical information and instructions directly from medical professionals, including physicians, nurses, and pharmacists. However, widespread Internet use has enabled patients to search relatively easily for and retrieve various health-related information. YouTube™, founded in 2005, is a free video-sharing site where anyone, regardless of background or expertise, can publish a video on any topic [4]. Currently, over 4 billion YouTube™ videos are viewed throughout

the world on a daily basis [5]. Despite safety concerns related to content contained within health-related YouTube™ videos [6], individuals routinely use this platform to access health-related information [7].

To date, the content, comprehensiveness, and accuracy of YouTube™ videos covering a wide variety of topics such as human papillomavirus vaccination [8], lumbar discectomy [9], breast reconstruction [10], and rheumatoid arthritis [11] have been mixed. Most studies have found that a YouTube™ search for medically related content typically produces both good quality videos and misleading ones. For example, 54.9% of videos were considered “good” and 30.4% of videos were considered “misleading” in a study of 102 relevant rheumatoid arthritis videos [11]. However, to our knowledge, the content, quality, and accuracy of MDI instructional videos available via the YouTube™ platform has yet to be explored. While dedicated time for patient MDI instruction is often limited in busy clinical settings, MDI video instruction has shown to improve inhaler technique among children [12]. Therefore, to address this gap in the literature, the purpose of this study was to evaluate English language MDI instructional videos available on YouTube™.

Methods

The YouTube™ platform (www.youtube.com) was searched over a 24-hour time period in May, 2014 from Solon, Ohio. In line with the study purpose, we sought to identify a comprehensive collection of videos depicting MDI instructions for use. The following 4 search terms were used to identify videos for inclusion within our study, including: (1) asthma inhaler use, (2) asthma inhaler, (3) metered dose inhaler how to use, and (4) metered dose inhaler technique. Inclusion criteria were as follows: (1) English language, (2) demonstration of how to use an MDI, and (3) intended for a patient (lay) audience.

To begin, each search term was entered into the YouTube™ platform. Videos appearing on the first two pages (approximately 20 videos per page) of each search term were identified. A complete list of videos (n=154), generated across all search terms combined, were saved and printed. Next, each printed list was carefully reviewed and duplicate videos were identified. Of the 154 videos identified, there were 66 (42.9%) duplicates; therefore, the sample was composed of 88 unique videos. Each unique video was downloaded and saved, via SaveFrom.net (<http://en.savefrom.net/>) [13], in its entirety as an MP4 360P file. Additionally, screenshots were taken of each unique video's title, username of the individual and/or organization uploading the video, number of "likes" and "dislikes," number of views, date uploaded to YouTube™, and all posted comments.

We reviewed the 88 unique videos to verify that they met all established inclusion criteria. A total of 30 videos were excluded (non-English [n=4], demonstrated MDI use in animals [n=2], and did not demonstrate actual MDI use [n=24]) from the non-duplicate sample pool. Therefore, a total of 58 unique videos composed the final sample and were evaluated, as described below, in detail.

The first (SR) and second (MM) author independently watched and evaluated each of the videos using a standardized evaluation sheet. Using criteria developed by Sorensen and colleagues [14], video quality and audio quality were assessed on a 3-point scale (1=good [clear visuals and text, with some professional graphics or effects/no difficulty understanding spoken words, music], 2=fair [regular video quality, average text clarity, "home" video/ speech difficult to understand, distracting audio or background sounds],

3=poor [visuals are blurry, grainy, or difficult to understand/no audio]). Additionally, using established MDI step-by-step instruction criteria from the U.S Department of Health and Human Services [15,16], each video was evaluated for inclusion of each of the demonstrated steps: (1) remove cap and shake inhaler (MDI1), (2) exhale slowly and fully (MDI2), (3) place mouthpiece between lips (MDI3), (4) actuate MDI at onset of inhalation (MDI4), (5) inhale at less than maximal rate (MDI5), (6) hold breath for at least 5 seconds (MDI6), and (7) recap mouthpiece (MDI7).

Once all videos had been evaluated, both reviewers independently entered their data directly into a Microsoft Excel spreadsheet. Once complete, the senior author, Dr. Lorraine S. Wallace, Associate Professor of Family Medicine at The Ohio State University College of Medicine, merged both sets of scores into a single Microsoft Excel spreadsheet to assess inter-rater reliability. Using percent agreement, overall inter-rater reliability for video quality was 75.9%, audio quality was 72.4%, and overall MDI step-by-step instructions was 91.6% (range per individual MDI instruction=79.3% to 96.6%). When scoring discrepancies arose, the senior author (LSW) reviewed all videos in their entirety and served as the tiebreaker. Once complete, a final Microsoft Excel sheet was constructed. Descriptive analyses were computed to describe study findings.

Results

The 58 unique videos used for this study were collected in May of 2014 and the data are shown in Tables 1 and 2. Table 1 indicates the scoring criteria for both visual and audio quality of the videos, which indicate whether or not the viewer is generally able to see and hear the video clearly. 72.4% of the videos were rated as "good" visual quality and 74.1% of the videos were rated as "good" audio quality.

Table 2 refers to the inclusion of each step of the established MDI protocol [15,16]. The data for the first step (MDI1) indicates that 98.3% of the videos show that the cap is removed and the inhaler is shaken. MDI2 indicates that 87.9% of the videos show that the user exhales slowly and fully. MDI3 shows that 94.8% of the videos include the user placing the mouthpiece between the lips. MDI4 shows that 96.6% of the videos include actuating the MDI at the onset of inhalation. MDI5 indicates that 79.3% of the videos include that

the user inhales at a less than maximum rate. MDI6 indicates that 86.2% of the videos show the user holding their breath for at least 5 seconds. Finally, MDI7 shows that only 36.2% of the videos include the recapping of the mouthpiece. MDI5 and MDI7 are included in the data at a much lower frequency than the rest of the MDI protocol.

Discussion

The visual and audio quality data for the videos indicates that the majority of videos that were rated should not impair the viewer from seeing and hearing how to use an MDI. About three out of every four videos were rated as "good" in both categories. The visual and audio characteristics of these videos provided the viewers with a video quality that would allow them to learn how to use an MDI successfully.

The high frequencies of the MDI1, MDI2, MDI3, MDI4, and MDI6 data indicate that almost all of the videos included these steps. This is important because these steps provide the foundation for how to use an MDI correctly. Removing the cap and shaking the inhaler, exhaling slowly and fully, placing the mouthpiece between the lips, actuating the MDI at the onset of inhalation, and holding your breath for at least 5 seconds all provide the viewer with essential information on how to use an MDI. The fact that the majority of the videos include these steps is a good indication that YouTube™ is a reliable source of patient information regarding how to use an MDI.

The frequencies of MDI5 and MDI7 are much lower than the rest of the MDI protocol, especially for MDI7. Most videos recognize the other steps of the protocol without much disparity, but the lower inclusion rates of steps 5 and 7 could hinder a viewer's understanding of how to correctly use an MDI. Based on their inclusion in the standard MDI criteria, inhaling at a less than maximal rate and recapping the mouthpiece are necessary steps that viewers need to know when using an inhaler. Despite these lower frequencies, most of the videos should still be considered satisfactory at teaching viewers how to use an MDI correctly.

Limitations

There are several limitations to consider when reviewing this study. The collected data only represents a snapshot of available materials on YouTube™. The data were collected over a 24-hour period and screened for videos that were in the English language and intended for human patients. Furthermore, only videos that came up in the first two pages of the results were used. Also, only the following search terms were included: (1) asthma inhaler use, (2) asthma inhaler, (3) metered dose inhaler how to use, and (4) metered dose inhaler technique. Therefore, once duplicates and irrelevant videos were excluded, only 58 unique videos composed the final sample. As a result, since the data are limited in number and by search term, language, and patient type, we are unable to make generalizations on the quality of all YouTube™ videos as a source of patient information. Additionally, due to the fact that the data were collected in Solon, Ohio and limited to English language videos, there may be low external validity when comparing the results of this study to YouTube™ videos of other cultures and languages.

Conclusion

Most clinicians in the United States could confidently refer asthma patients to YouTube™ to find instructions on how to correctly use an MDI, especially if the video is affiliated with a credible medical organization. For example, physicians could provide patients with links to accurate and high-quality videos. This gives patients an opportunity to learn how to use their inhaler in the comfort of their own home rather than in the clinician's office. This prevents patients from feeling rushed and it gives them the ability to replay the video as many times as needed. This study is specifically limited to MDIs, but could be used as a foundation for future studies on whether YouTube™ and other social media sites can be considered reliable sources of patient information on various topics.

References

1. Lurslurchachai L, Krauskopf K, Roy A, Halm EA, Leventhal H, Wisnivesky JP. Metered dose inhaler technique among inner-city asthmatics and its association with asthma medication adherence. *Clin Respir J* 2014;8:397-403.

2. O’Conor R, Wolf MS, Smith SG, Martynenko M, Vicencio DP, Sano M, Wisnivesky JP, Federman AD. Health literacy, cognitive function, proper use and adherence to inhaled asthma controller medications among older adults with asthma. *Chest* In Press.

3. Wallace LS, Roskos SE, Weiss BD. Readability characteristics of consumer medication information for asthma inhalation devices. *J Asthma* 2006;43:375-378.

4. YouTube™. Available at: <https://www.youtube.com/> [last accessed 10 Dec 2014].

5. Goodwin D. YouTube now serving 4 billion videos daily. Search Engine Watch. Available at: <http://searchenginewatch.com/sew/news/2141050/youtube-serving-billion-videos-daily> [last accessed 10 Dec 2014].

6. Lau AYS, Gabarron E, Fernandez-Luque L, Armayones M. Social media in health - what are the safety concerns for health consumers? *HIM J* 2012;41:30–35.

7. Gabarron E, Fernandez-Luque L, Armayones M, Lau AY. Identifying measures used for assessing quality of YouTube videos with patient health information: a review of current literature. *Interact J Med Res.* 2013;2:e6.

8. Ache KA, Wallace LS. Human papillomavirus vaccination coverage on YouTube. *Am J Prev Med.* 2008;35:389-392.

9. Brooks FM, Lawrence H, Jones A, McCarthy MJ. YouTube™ as a source of patient information for lumbar discectomy. *Ann R Coll Surg Engl* 2014;96:144-146.

10. Tan ML, Kok K, Ganesh V, Thomas SS. Patient information on breast reconstruction in the era of the world wide web. A snapshot analysis of information available on youtube.com. *Breast* 2014;23:33-37.

11. Singh AG, Singh S, Singh PP. YouTube for information on rheumatoid arthritis--a wake up call? *J Rheumatol* 2012;39:899-903.

12. Carpenter DM, Lee C, Blalock SJ, Weav-

er M, Reuland D, Coyne-Beasley T, Mooneyham R, Loughlin C, Geryk LL, Sleath BL. Using videos to teach children inhaler technique: a pilot randomized controlled trial. *J Asthma* 2014;31:1-7.

13. SaveFrom.net Available at: <http://en.savefrom.net/> [last accessed 10 Dec 2014].

14. Sorensen JA, Pusz MD, Brietzke SE. YouTube as an information source for pediatric adenotonsillectomy and ear tube surgery. *Int J Pediatr Otorhinolaryngol.* 2014;78:65-70.

15. Fink JB, Rubin BK. Problems with inhaler use: a call for improved clinician and patient education. *Respir Care* 2005; 50:1360–1374.

16. Williams MV, Baker DW, Honig EG, Lee TM, Nowlan A. Inadequate literacy is a barrier to asthma knowledge and self-care. *Chest* 1998; 114:1008–1015.