The use of digital web-based video training for correct inhalation technique during the COVID-19 pandemic

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To the Editor:

The use of inhalative therapy in pulmonary disease has been shown to effectively control symptoms and even slow down disease progression [1, 2]. This is particularly paramount for the treatment of COPD and bronchial asthma, which are the largest contributors to the global respiratory disease burden [1–3]. However, errors in inhalation technique and device handling are common, and can subsequently affect therapy efficacy [4]. This can then lead to insufficient treatment, increasing healthcare costs, and higher carbon dioxide emissions [4]. Based on a broad international consensus regarding the need for structured, high-quality, repetitive inhaler technique training [1, 2, 4], the German Respiratory League (Deutsche Atemwegsliga e.V.) has been producing training videos since 2011, which teach both patients and healthcare professionals proper inhaler techniques. These are short, device-specific videos that are scientifically validated during the production process [5, 6]. Moreover, they have been shown to significantly reduce errors in inhalation technique, even without supplementary instruction by physicians or therapists [5, 7–10]. The videos are web-based, easily accessible *via* YouTube (www.youtube.com/c/AtemwegsligaDe), free of charge, and translated into several languages (English, Russian, Turkish, Greek, Arabic, Farsi and Slovak). A recent study analysed the use of these videos over the past decade and highlighted the rising impact of web-based inhalation training. The analysis showed a steady increase in the number of views each year, with >850 000 views in 2020 alone. Further observations included an annual trend, with two peak viewing periods in spring and late fall, while the international versions of the videos received ∼23% of the total number of views [5].

In the advent of the coronavirus disease 2019 (COVID-19) pandemic, patients with respiratory diseases were particularly advised to reduce direct contact with other people, including physicians, in order to avoid disease transmission. Accordingly, the development of digitally based interactions between patients and therapists became increasingly important. The present study therefore set out to assess the use of web-based inhaler-device training during the initial phase of the COVID-19 pandemic. The primary end-point was the total number of views of all previously analysed videos (n=144) [5], while the secondary end-point was the analysis of translated video views, as described elsewhere [5]. Given the steady increase in views over the past decade, as well as the assumption that web-based training would be more frequently used in times of reduced personal contact, it was hypothesised that videos views would significantly increase compared to the growth rates observed during pre-COVID-19 years.

A time-series analysis was performed using an autoregressive integrated moving average (ARIMA) (1,1,1) model (IBM SPSS). The cumulated monthly views from January 2012 to December 2019 served as the data baseline. The analysis period ran from January 2020 to December 2021. For the forecast period, a 95% prediction interval was calculated. The total views per year, the growth rate and the proportion of translated videos views were each calculated.

The cumulated total number of views by the end of 2021 was 3 736 667. The overall proportion of translated video views was 25%. The results of the time-series analysis are shown in figure 1a. During the first wave of COVID-19 infections that occurred in Germany during March 2020, the number of monthly video views peaked within the upper limit of the 95% prediction interval. However, by the end of 2020, the number of views fell below the lower limit of the 95% prediction interval and remained there until the

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Scientifically validated web-based training videos for proper inhalation technique were increasingly used by an international audience during the pandemic. Translations into additional languages would support a larger patient population. https://bit.ly/3lYQwsD

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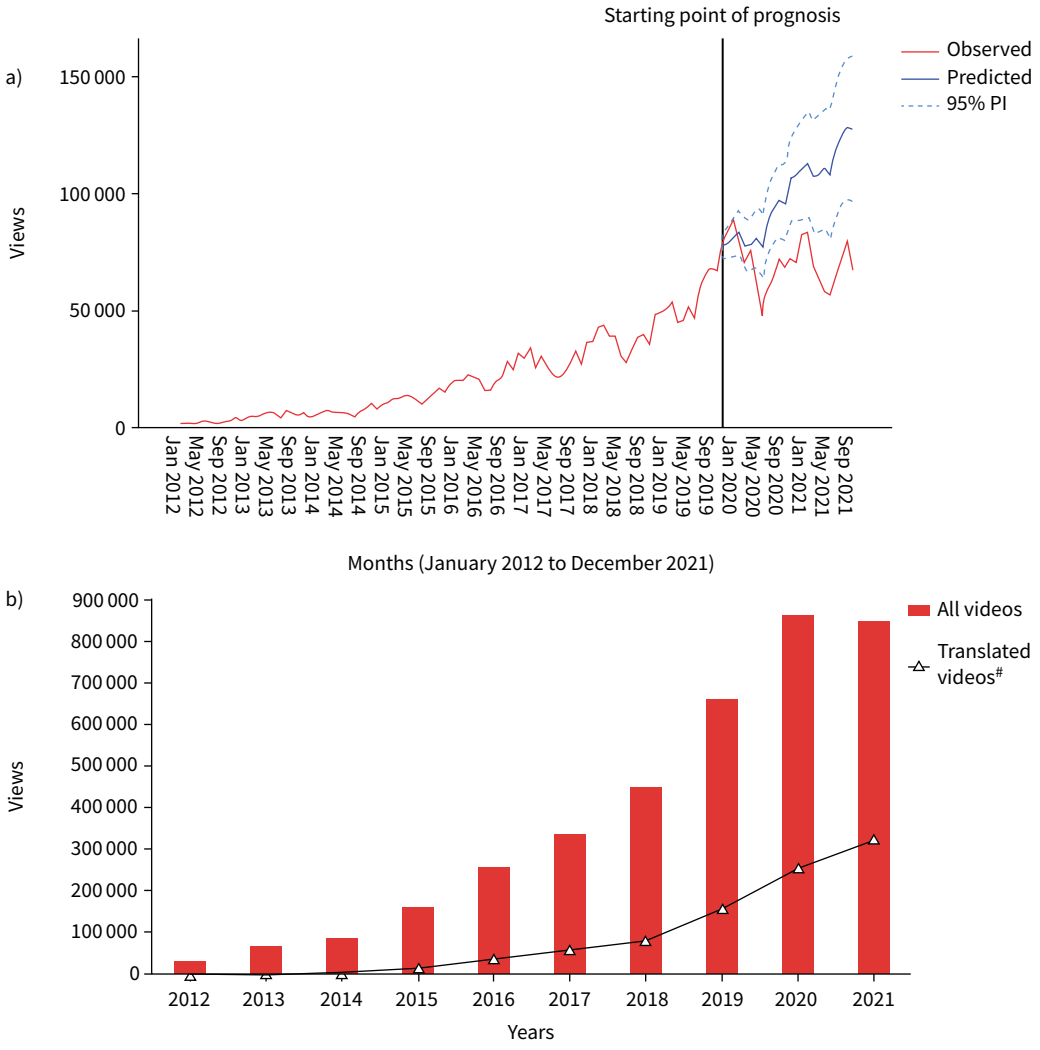

FIGURE 1 Cumulated number of video views: time-series analysis and international videos. a) Time-series analysis of video views. b) Total cumulated yearly video views and cumulated views of international videos. PI: prediction interval; Jan: January; Sep: September. #: translated videos have been available in Turkish since 2013, in English since 2014, in Russian since 2016, in Slovak since 2016, in Arabic/Farsi since 2016 and in Greek since 2020.

end of the analysis period. Figure 1b shows the respective number of cumulated yearly views of all analysed *versus* all translated international videos. The yearly views display a shortfall of 1.6% in 2021 compared to 2020. In contrast, the number of translated international video views rose, comprising 38.3% of views in 2021, compared to 29.6% in 2020 [5]. This trend is caused by a decline in views from two groups: views of videos in the German language had a loss of 13.8% (83 305), and the videos that were translated into Turkish had 28.4% (8573) fewer views compared to 2020 [5].

This pattern towards a significant reduction in the number of views is of concern and contradicts the initial hypothesis. The main results can be summarised as follows: 1) the shortfall in views can mainly be attributed to videos in German; 2) the 10-year trend towards an increase in video views appeared to quell with the onset of the COVID-19 pandemic in Germany; 3) translated international videos received more views than ever before; 4) the previously observed annual trend was mirrored by our hypothesis and is reflected by the data observed, thus confirming the validity of both analyses.

It is interesting to note that after a 10-year period of consistently increasing numbers of views, the decline described earlier coincided with the beginning of the COVID-19 pandemic [5]. The decrease in video

views might be partly explained by less-frequent COPD exacerbations, although this was a global effect and not limited to Germany [11]. This is despite the steady rise in the number of patients that participate in disease management programmes for COPD and bronchial asthma, as well as a spread in the use of video consultations in Germany and worldwide during 2021 [12]. All in all, the reasons for the decline cannot be inferred from the presented data and are most likely multifactorial. However, the present data lead to the conclusion that the use of digital resources such as video consultations and web-based inhalation training do not necessarily mutually reinforce each other, even when the digital resources are well known [5]. This analysis also shows that web-based video training has become an important international digital resource and is increasingly being used by an international audience, even if the analysis points to a lack of inhalation training in Germany. However, the trend in the use of scientifically validated digital training provides insight into the behaviour of patients and health professionals toward digital resources and suggests the following conclusions: for further development, the production of videos in additional languages is necessary to support a larger patient population, especially in low- and middle-income countries where the incidence of COPD and bronchial asthma might be high, but healthcare access is limited [3]. This is where free and easily accessible video training has the potential to become an even more important resource. Future studies should also focus on the complementary use of cost-efficient digital resources and patient compliance regarding digital tools, given that patients and therapists will most likely be using multiple digital resources at the same, and this could ultimately contribute to more consistency in inhalation training worldwide.

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