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An educational video improves physician knowledge of a health care law that affects patient care during hospital clinical practice

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Abstract
When public health laws are passed that affect clinical practice within hospitals, it is important to educate physicians about best practices in implementing these laws into routine patient care in hospitals. An educational video was developed to inform physicians about a new state public health care law. This study sought to determine whether an educational video about a new state public health care law improves physicians’ knowledge of the law and how to implement the law during clinical practice. A total of n=33 internal medicine physicians participated in this study. This study found that an educational video was successful in increasing physician knowledge about a new public health care law that affects clinical practice. The utilization of validated educational videos may provide a useful resource when attempting to provide education about new public health laws that effect the provision of medical care.

Background
When public health laws are passed that affect hospital clinical practice, it is important to educate physicians about best practices in implementing these laws into routine patient care. Only showing physicians the language of the law or a summary of the law may not provide sufficient information about how the law should be practically applied during clinical practice. In order to provide the most information, in the shortest timeframe, to the greatest number of physicians, utilizing videos to educate physicians has become an increasingly popular method of instruction (1-3). Although the use of instructional videos is becoming a common occurrence in medical education, many of the videos being produced are not validated for their educational content (3).

Furthermore, limited research exits on whether video education actually results in physician knowledge acquisition during continuing medical education. However, there is evidence that video education does work to increase knowledge during medical school education (4-6). In the limited research done on video education in the realm of clinical practice and continuing medical education, very few educational videos have been validated and these videos were made to train physicians in specific practice areas, such as surgical technics (7-9). There are no studies which validate an educational video about the implementation of a new public health law that affects clinical practice.
One area of clinical practice which requires the implementation of a law in every day clinical practice is the identification of the appropriate surrogate decision maker for an incapacitated patient. In order to obtain information about the patient’s health history, goals, values, and preferences and to make decisions about medical treatments, physicians must be able to identify the correct surrogate, often in urgent or emergent situations (10-13). A change in a state public health law for identifying surrogate decision makers provided the opportunity to conduct a study examining whether an educational video about a new state level health care law would improve both physicians’ knowledge of the law and how to implement the law during clinical practice. This study validated the use of a video to educate physicians about how to apply a new state law during clinical practice.

**Methods**

An educational video was developed to inform physicians about a new state surrogate health care consent law. In order to obtain content validity, the video content and script underwent expert review by physicians, lawyers, and communication experts. The resulting video consisted of a narrator reviewing the characteristics of the new law, how the new law will effect patient care, and how to apply the law during clinical practice. The video used simple graphics to highlight important parts of the new law. The video was recorded in a professional studio on the university campus and lasted three minutes and thirty seconds.

In order to validate the video as an educational intervention, internal medicine physicians working within a statewide health care organization were invited via email to participate in the study during October of 2018. Internal medicine physicians were selected for this study as they are the physicians who are most impacted by the new law. Physicians were asked to complete a pretest which consisted of seven questions about the new law prior to watching the video. The questions were part of a validated survey regarding physician knowledge of the health care law that had been used in a previous study (13). The questions posed hypothetical vignettes which asked physicians to identify the legal surrogate medical decision maker from a list of options. The questions had one objectively correct answer based on the law. At the conclusion of the video, physicians were then asked the same seven questions about the new law. The study was conducted using REDCap, a secure survey administration application. All physicians were deidentified and assigned an individual study identification number. The university IRB approved this study.

**Statistical Methods**
Basic frequencies and percentages were calculated for each of the demographic variables. The seven questions were scored on whether the physicians’ knowledge improved (i.e. whether the physicians’ answers went from incorrect to correct). A summation score based off those seven improvement outcomes was then generated, giving a final score that indicates how many of the seven were improved upon, with a possible range of 0 to 7. Demographic variables were also analyzed to determine if there was a significant difference in the summation score between categories using rank-sum tests, due to the ordinal nature of the data. Frequencies and percentages were also generated to show the number of correct responses for each of the seven questions before the video and after the video, using McNemar’s test for paired dichotomous variables to determine if there was a significant increase in the seven knowledge questions. Summation scores for the seven questions were also calculated for pre-video and post-video, with the non-parametric paired signed-rank test being used to see if there was a significant change. All analytic assumptions were verified and analyses were performed using SAS v9.4 (SAS Institute, Cary, NC).

**Results**

A total of n=33 internal medicine physicians participated in this study. Almost all of the physicians were attending or staff physicians (n=31, 94%), and 97% of these physicians work primarily in the inpatient setting (Table 1). Participating physicians were primarily white, males, who have been practicing medicine for less than 10 years. There were no significant differences in change scores between categories for any demographic variables.

**Table 1. Demographics (n=33).**

<table>
<thead>
<tr>
<th></th>
<th>Frequency (Percentage)</th>
<th>Median (range); Rank-sum p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specialty</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>33 (100)</td>
<td>3 (0, 6); p=n/a</td>
</tr>
<tr>
<td><strong>Current Professional Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attending/Staff Physician</td>
<td>31 (93.9)</td>
<td>3 (0, 6); p=.2996</td>
</tr>
<tr>
<td>Resident</td>
<td>1 (3.0)</td>
<td>2 (2, 2)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (3.0)</td>
<td>0 (0, 0)</td>
</tr>
<tr>
<td><strong>Setting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inpatient</td>
<td>32 (97.0)</td>
<td>3 (0, 6); p=.1654</td>
</tr>
</tbody>
</table>
Each of the seven questions saw an improvement in correct answers post-video, with five (questions 1, 2, 3, 5, and 6) reaching statistical significance with McNemar’s test and one (question 7) being marginally non-significant (Table 2). The proportion of increased ranged from 0.46 (95% CI: 0.26 – 0.67) for question 7 to 1.00 (95% CI: 0.03 – 1.00) for question 4, although only one participant missed it pre-video. The next highest was question 2, with 0.92 (95% CI: 0.62 – 1.00) (Table 3).

Table 2. Overall correct responses (all 33 participants)

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-Video</th>
<th>Post-Video</th>
<th>McNemar’s p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>8 (24.2)</td>
<td>22 (66.7)</td>
<td>.0010</td>
</tr>
<tr>
<td>Q2</td>
<td>21 (63.6)</td>
<td>32 (97.0)</td>
<td>.0009</td>
</tr>
<tr>
<td>Q3</td>
<td>12 (36.4)</td>
<td>30 (90.9)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Q4</td>
<td>32 (97.0)</td>
<td>33 (100)</td>
<td>1.0000</td>
</tr>
<tr>
<td>Q5</td>
<td>17 (51.5)</td>
<td>28 (84.9)</td>
<td>.0023</td>
</tr>
<tr>
<td>Q6</td>
<td>13 (39.4)</td>
<td>31 (93.9)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Q7</td>
<td>9 (27.3)</td>
<td>16 (48.5)</td>
<td>.0707</td>
</tr>
</tbody>
</table>

Values are frequencies (percentages) with p-values from McNemar’s test for paired categorical data.
Table 3. Improvement from pre- to post-video

<table>
<thead>
<tr>
<th>Question</th>
<th>Those that answered incorrectly 1st time</th>
<th>Those that answered correctly 2nd time</th>
<th>95% Confidence interval for proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>16/25 (0.64)</td>
<td></td>
<td>(0.43 – 0.82)</td>
</tr>
<tr>
<td>Q2</td>
<td>11/12 (0.92)</td>
<td></td>
<td>(0.62 – 1.00)</td>
</tr>
<tr>
<td>Q3</td>
<td>19/21 (0.91)</td>
<td></td>
<td>(0.70 – 0.99)</td>
</tr>
<tr>
<td>Q4</td>
<td>1/1 (1.00)</td>
<td></td>
<td>(0.03 – 1.00)</td>
</tr>
<tr>
<td>Q5</td>
<td>12/16 (0.75)</td>
<td></td>
<td>(0.48 – 0.93)</td>
</tr>
<tr>
<td>Q6</td>
<td>18/20 (0.90)</td>
<td></td>
<td>(0.68 – 0.99)</td>
</tr>
<tr>
<td>Q7</td>
<td>11/24 (0.46)</td>
<td></td>
<td>(0.26 – 0.67)</td>
</tr>
</tbody>
</table>

Discussion

The results of this study show that an educational video was successful in increasing physician knowledge about a new public health law that affects patient care during clinical practice. In the case of surrogate health care consent laws, not applying the law correctly during clinical practice has been shown to result in both legal and ethical violations as well as a delay in patient care (10-12). The negative impacts on clinical practice could potentially be alleviated through the use of validated educational videos about new laws and how to implement new laws during clinical practice. Additionally, this study shows that acquiring the requisite knowledge necessary to apply new laws in clinical practice does not need to be a time consuming and daunting task as it may be accomplished through a short educational video. Short videos are easy to produce and disseminate and can reach physicians around the state or country through online resources such as social media platforms and professional organization message boards.

Validation of this video was important. Although the video worked to educate physicians overall, validation revealed places of both strength and weakness in the effectiveness of the educational video. For instance, physicians scored higher on knowledge questions associated with parts of the video that provided practice vignettes for how to apply the law during clinical practice. Conversely, the validation showed that the video needed to either provide more information or refine the way in which information was provided about question number one, as
evidenced by 33% of physicians answering this question incorrectly in the post-video test. The results of the validation suggest that adding an additional clinical vignette that physicians can use to practice the application of the law during clinical practice would be helpful for the information presented in question number 1. The majority of videos used in medical education appear to lack the step of validation. The results of this study show that taking the extra time to validate educational videos is important for ensuring that the information conveyed is appropriately reaching physicians and resulting in true knowledge acquisition.

This study has two limitations. First, physicians’ knowledge acquisition of the health care law was assessed immediately after watching the video and therefore, it is unknown whether the physicians maintained this knowledge long term. Second, this study did not assess whether the video helped physicians implement the new law during clinical practice; however, the assessment questions did include hypothetical situations which would commonly be found during clinical practice and knowledge of the new law was needed to correctly resolve.

**Significance for Public Health**

As the world of medicine and public health expand their online footprints, new ways are needed to provide knowledge of new public health laws. To our knowledge, this is the first study which sought to validate an educational video about a health care law that affects the provision of medical care. Although further studies are needed, this study is important because it shows educational videos may provide a useful resource as a way to improve understanding about how to interpret and apply new public health laws.

**Declarations**

*Ethics approval and consent to participate:* The Indiana University IRB approved this research study. IRB# 1809495704

*Consent for publication:* Not applicable

*Availability of data and materials:* The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

*Competing interests:* The authors declare that they have no competing interests.

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Authors Contributions: Drs. Comer and Torke were responsible for the study design, data collection, interpretation of data, and writing the manuscript. Mr. Slaven was responsible for data analysis, interpretation of data, and writing the manuscript.

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