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SHORT RESEARCH REPORT

"Bite-sized" rivaroxaban patient education and its effect on knowledge

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Impacts on practice

- The educational videos described and studied in this manuscript may be implemented in a hospital setting to improve patient knowledge regarding rivaroxaban.
- Patient knowledge on rivaroxiban can be expected to improve immediately, after watching three educational videos, and be retained for at least seven days.

Background

Adverse events related to oral anticoagulants were the top reason for emergency room visits in the United States from 2013 to 2014. Most of these visits were associated with warfarin (85.7%), although apixaban, dabigatran, and rivaroxaban were implicated as well [1]. Internationally, rivaroxaban demonstrated a major and nonmajor bleeding rate of 1.5 and 10.7%, therefore patient education of adverse events is essential [2]. To improve education on anticoagulants, a toolkit was released by the Institute of Safe Medicine Practices in 2017. The toolkit contains 23 recommendations surrounding patient education, including ensuring an appropriate reading level for materials (6th grade) and specific recommendations on educational content. The toolkit mentions the use of supplemental tools, such as videos and handouts [3].

Video education has shown efficacy for many topics, including breast self-examinations, prostate cancer screening, and treatment adherence [4]. It can increase patients' knowledge and satisfaction while decreasing health professionals time spent providing education [5]. In addition to videos, pictograms have been shown to improve medication comprehension, and are often used together [6]. Currently, a small number of studies have assessed warfarin educational videos [7–9]. One study evaluated knowledge gain in 15 patients after watching a warfarin education video. Patients' knowledge of warfarin improved on a 12-question quiz from a score of 57.5% pre-video to 70% post-video, and 87% of patients were satisfied with the video [7]. In a study of warfarin education presented on an iPad, there was a 47% increase in knowledge from the pre- to post-test. There was no difference in satisfaction between healthcare provider and video education [8]. Currently there are no validated studies with publicly available rivaroxaban educational videos. Therefore, the purpose of this study was to evaluate the impact of rivaroxaban videos on improving patient knowledge and provide the videos for the public's use.

Methods

This was a single-center quasi-experimental study, conducted at a 772-bed teaching hospital in Detroit, Michigan between December 2014 and April 2015. Patients were included if they were hospitalized, between 18 and 90 years of age and continued home rivaroxaban or initiated on rivaroxaban during their hospital stay. Patients were identified for inclusion via Sentri7 system (SENTRI7®, Pharmacy OneSource, Madison, WI, US). This system alerted the study pharmacist when rivaroxaban was ordered in the

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hospital computer system. Patients were excluded if they were unwilling or unable to execute study procedures or if they were pregnant. Only the first patient admission during the study period was included for analysis. The institutional review board approved the study and written informed consent was obtained from all patients enrolled.

The primary outcome of this study was the change in knowledge as measured by change in questionnaire scores between the pre- and immediate post- test. Secondary outcomes of this study included evaluation of 7 day knowledge retention and evaluating if knowledge scores were dependent on if patients were previously on any anticoagulants, education level and indication.

Video development

Prior to patient recruitment, three separate rivaroxaban educational videos (each approximately 5 min in length) were developed in English, utilizing pictures, minimal written words, with the primary author reading a script. Two questionnaires to assess knowledge were also developed (Online Resources). The two versions of the questionnaire were identical except for one question concerning what to do for missed doses, which varied depending on whether the patient was taking rivaroxaban once daily versus twice daily. These questionnaires, written at a sixth-grade reading level per a Flesch-Kincaid analysis, were identical at all timepoints. The videos and questionnaires addressed six main constructs: (1) medication purpose, (2) how to take the medication, (3) management of missed doses, (4) identifying adverse events, (5) when to seek emergency treatment, and (6) management of interacting medications. Three videos were made to address three indications for rivaroxaban: stroke reduction in atrial fibrillation, post-surgical DVT/PE prophylaxis, and treatment or prevention of recurrent DVT/PE. Five specialists with expertise in anticoagulation therapy performed content validation of the questionnaires. The videos and questionnaires were then pilot tested by seven associates with no prior medical training. In addition, a short satisfaction survey was developed to be completed by participants after the video (Online Resources).

Once consent was obtained, the pre-test questionnaire was administered to the patient to assess baseline knowledge. Patients then watched the single rivaroxaban educational video applicable to their indication. After the video, patients completed the post-test questionnaire (same questionnaire as pre-test). The investigator then administered the satisfaction survey, answered any additional questions related to rivaroxaban, and educated the patient on any identified areas of knowledge deficiency. Patients were provided a YouTube® link for the video to be viewed at any time post-counseling. The investigators called the participants 7 days after the initial viewing of the video to administer the post-test questionnaire. Patients that were not reached after three telephone attempts were recorded as lost to follow up. Data collected from patients and their charts included education level, age, gender, previous anticoagulants taken (including rivaroxaban), phone number, and indication for rivaroxaban.

The sample size was calculated for the primary endpoint using a mean difference in response from pre-test to post-test of 10% with a standard deviation of 20%. Thirty-three pairs of subjects were needed for a power of 0.8 and an alpha of 0.05. Descriptive statistics were used for baseline demographics. The primary outcome, score improvement on post-test from the pre-test at first interaction, was evaluated with a paired *t* test. Change in score from pre-test to seven-day post-test was evaluated with a paired t-test. To evaluate if changes in scores depended on previous anticoagulant use, education level, or indication a mixed analysis of variance was performed. Statistical significance was set as an alpha of < 0.05.

Results

A total of 108 patients were screened for entry into the study. Of these, 59 patients declined to participate and 16 were excluded for being unable to complete study procedures. Reasons for inability to complete the study include: dementia, altered mental status, no video for indication, hearing/vision impairment, did not speak English, and psychological barriers. Eight patients were lost to follow-up for the seven-day evaluation. As a result, 33 patients met final inclusion parameters and were analyzed for the primary endpoint. Baseline patient characteristics are listed in Table 1.

Patients baseline knowledge score was $75.3 \pm 15.3\%$. Knowledge increased from the pre-test to post-test (16.1%,

Table 1 Baseline characteristics

Variable	N (%)
Indication	
Atrial fibrillation	8 (24.2)
VTE treatment or recurrence prevention	9 (27.3)
Post-operative VTE prevention	16 (48.5)
Age group	
18–45	4 (12.1)
46–75	24 (72.7)
76–90	5 (15.2)
Education level	
< High school	5 (15.2)
High school	4 (12.1)
College	24 (72.7)
Previous oral anticoagulant use	16 (48.5)

VTE venous thromboembolism

95% CI 11.5–20.8%) and pre-test to seven-day post-test (12%, 95% CI 7.1–16.9%). Improvement of scores did not depend on previous anticoagulant use, level of education, or indication ($p = \text{NS}$). Patients had improvements ($p < 0.05$) in knowledge on questions related to identifying adverse effects (81.8 to 100%), managing interacting medications (66.7 to 90.9%), what to do with missed doses (42.5 to 87.9%), and when to seek emergency attention (69.7 to 93.9%). Patients had high baseline knowledge regarding indication (93.9%) and how to take the medication (90.9%), therefore did not improve statistically. On the satisfaction survey, 82% of patients said they learned quite a bit or a huge amount and 88% said they found the videos helpful or very helpful. Lastly, 91% of patients would recommend that another patient on rivaroxaban watch the videos.

Discussion

Patients in our study had immediate improvements in knowledge after watching a short video and retained most of the information 1 week later. Improvements were seen in areas related to patient safety, such as identifying adverse effects, avoiding interacting medications, what to do if a dose is missed, and when to seek emergency attention. In addition, the majority of patients reported the videos were helpful and would recommend it to other patients.

Our study agrees with previously published literature evaluating warfarin video education, in which patients' knowledge improved from baseline [7, 8]. Our study differs in that we saw improvements in knowledge that did not depend on previous anticoagulant use, level of education, or indication. This suggests that our video could be utilized by a large group of patients with a consistent effect seen on improvements in knowledge. Although we did not evaluate time spent counseling, previous research has found video education can decrease patient counseling time, therefore our video could be used as an educational adjunct in a busy healthcare environment [9].

There are some limitations to this study. Due to the lack of a comparison group, it is unknown if the rivaroxaban educational videos are better or worse than traditional pharmacist or other health care provider education in the hospital setting. However, we were able to show patient knowledge improved from baseline. Future studies could compare these videos to healthcare provider counseling. The potential for selection bias also exists, as the patients who declined to participate in the study may have differed from the patients who participated in the study (i.e., lower education level, higher acuity of illness, motivation to learn). However, there was a variety of patients with different education levels and ages.

Conclusion

In conclusion, "bite-sized" educational videos improved patient knowledge. Validated video education is an important tool to assist pharmacists and other health care professionals in educating patients. Future studies evaluating the long-term health outcomes and comparison to traditional face-to-face education are warranted in this population.

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