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# Randomized pilot trial measuring knowledge acquisition of opioid education in emergency department patients using a novel media platform

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#### ABSTRACT

Background: The number of active opioid analgesic prescriptions has risen steadily, causing increases in nonmedical opioid use, addiction, and overdose. Insufficient focus on patient discharge instructions has contributed to lack of patient awareness regarding dangers of opioids. This study examines whether an educational Khan Academy - style animation discharge instruction on the dangers and safe usage of opioid analgesics elicits higher knowledge acquisition than current standard of care. Additionally, it measures the feasibility of implementing this video discharge instruction in the emergency department (ED). Methods: Fifty-two English-speaking patients aged 18 years or older receiving an opioid prescription were enrolled in this study. Patients were randomized into 2 groups. The standard of care group received verbal instruction and an informational sheet, whereas the video animation group received a 6-minute video on proper usage of opioids in addition to standard of care. Video content was sourced from samhsa.gov and administered within the ED prior to discharge. Both groups received a 26-question test regarding the dangers and safe usage of opioids immediately after education. An unpaired t test compared knowledge acquisition between the 2 groups. Results: Fifty-four patients were approached, 52 patients enrolled; 27 in the standard group and 25 in the animation group. The standard of care group averaged 65% knowledge acquisition (16.8/26 correct), whereas the animation group averaged 82% acquisition (21.2/26 correct). The video animation significantly increased patient knowledge acquisition about opioid medications' risks and proper usage and disposal (P D .001). Conclusion: It can be concluded that medical knowledge acquisition is improved in the video animation group compared with the current standard of care (P D .001). It can also be concluded that it is feasible to implement a novel media platform to educate patients receiving opioid analgesics in the ED (96.1%).

#### **KEYWORDS**

Analgesics; drug overdose; emergency services; multimedia; narcotics; opioid; opioid-related disorders; patient discharge; prescriptions; standard of care; surveys and questionnaires

#### Introduction

#### Background and importance

Opioid misuse is a threat to the safety and public health of our society. Over the past 2 decades, there has been an alarming increase in the number of opioid analgesics prescribed in the United States.<sup>1-3</sup> An emphasis on pain as the "5th vital sign" has contributed to a higher rate of opioid prescriptions annually, despite a steady number of patients reporting pain nation- wide.<sup>4</sup> In response, various guidelines regulating physician and pharmacist prescribing practices have been set by national- and state-level agencies.<sup>5-7</sup> However, few regulations and interventions currently guide patient education of opioids, including discharge instructions.

Despite the fact that nearly 15% of the American population is illiterate, research suggests that emergency department dis- charge instructions are often poorly written, requiring at least an 11th grade education to fully comprehend the medical information presented.<sup>8-13</sup> Insufficient patient awareness of the risks of opiate diversion and addiction has contributed to the large spike in nonmedical opiate use, misuse, addiction, overdoses,<sup>14,15</sup> and deaths.<sup>16</sup> In the emergency department (ED) setting, discharge instructions are delivered by the treating nurse and typically consists of a brief, simple discussion of the patient's diagnoses, follow-up plan, and printed paper instructions on disease course. Given the chaotic environment, prevalence of acute medical issues, and low nurse-to-patient ratios, it is often difficult to administer a standard, comprehensive, and effective discharge instruction in the emergency department.

Better health literacy is necessary to reduce consumer costs, improve patient access to health information, and empower consumers to bridge health disparities.<sup>17,18</sup> However, one-on- one or group education is both time- and staffintensive. Studies have shown that a video discharge instruction, including a tablet-based platform, is effective in increasing patient under- standing of their diagnosis and subsequent care.<sup>19,20</sup> These computerized interventions are a relatively inexpensive alternative to standard of care in-person patient education that show promise for sustained knowledge retention and behavioral health changes.<sup>11,21-23</sup>

#### Goal of this investigation

The objective of this study was to determine whether an educational intervention via a brief video discharge instruction could achieve higher knowledge acquisition than does the current standard of care discharge instructions.

#### Methods

#### Study design and setting

This randomized pilot trial was conducted in the emergency department of a large, urban academic hospital. All experiments were carried out in accordance with the institutional review board guidelines at the home institution.

#### Selection of participants

Patients, with a chief complaint of pain, were screened by physicians (with the assistance of research associates) during the hours of 8 am to 12 am 7 days a week. Inclusion criteria were age over 18 years, unimpaired cognitive function, and receiving an outpatient prescription for opioid analgesics. Exclusion criteria included those who were pregnant, with active cancer, under the age of 18, unable to speak English, having altered mental status, or who were incarcerated. A convenience sample of patients were screened by physicians and approached by research associates. The patients were then informed about the objectives and procedure of the study and verbally consented for participation.

#### Interventions

Upon consent, patients were randomized into 1 of 2 groups by a random number generator. Participants were randomized into the video animation group or the standard of care (SOC) education group (Figure 1). The SOC group received verbal discharge instructions from nursing staff and a medication information sheet for opioids. This handout contained information about side effects, including drowsiness, altered mental status, constipation, respiratory depression, etc. It also cautions against the concomitant use of opioids with other drugs such as benzodiazepines and alcohol or before "operation of heavy machinery." The content is very similar, although does not exactly mimic, the content in our video animation intervention. In addition to the standard of care information, the video group also received a 6-minute video dis- charge instruction on opioid safety and proper usage, storage, and disposal that can be found at https://youtu.be/5FYNBvgmdsE. The content of this video was sourced from the Substance Abuse Mental Health Administration (SAMHSA) and vetted by 2 board-certified emergency medicine practitioners at our institution.<sup>24</sup> The video utilized a Khan Academy-style animation in which a whiteboard and markers illustrate content matter in synchronization with a voiceover narration.

#### Methods and outcome measures

A researcher loaded a tablet computer with the video animation that the subject could view at his or her own pace. The survey was similarly loaded on the tablet and then self-administered by patients. Each cohort completed an identical survey that was estimated to take 5 minutes in total (Survey 1). Survey 1 collected demographic information and tested opioid knowledge immediately after education. It consisted of a series of questions based on information from the Substance Abuse and Mental Health Service Administration (SAMHSA). A power calculation indicated a target enrollment of 50 patients; 25 each for the SOC and video animation groups. After data collection was complete, the number of correct answers for each respondent was summed, averaged by group and used in an unpaired t test to determine if there was a statistically significant difference between the 2 groups. Cohen's d effect size was calculated.



Figure 1. CONSORT flow diagram for the screening and enrollment procedures of this 2-arm, randomized pilot trial.

The primary outcome was knowledge acquisition of opioid education. This was scored on a numeric scale ranging from 1 to 26, based on the number of correct responses to the questions from Survey 1. Each of the 6 tested questions had multiple correct answers. Each correct response was weighted equally and received 1 point, whereas incorrect responses received no points. The survey score is a summation of the correct answers.

#### Results

#### Characteristics of study subjects

A total of 54 patients were approached for enrollment between December 2015 and April 2016; 52 patients were enrolled, 27 in the standard of care group and 25 in the education group. The population was made up of 44% white, 40% Hispanic, 6% Asian, 6% black, and 4% other. The average age of the standard of care group was 34 years, whereas that of the video animation group was 41 years. There were no significant differences between the ages or gender compositions of both groups (P < .05)

#### Main results

Twenty-five out of 26 (96%) subjects completed the video animation and survey. One patient (4%) was discharged prior to completing the survey. Correct survey answers were summed and averaged by group. The standard of care group averaged 65% knowledge acquisition, 16.80 points out of 26 maximum points (SD 4.53), whereas the video animation group averaged 82% knowledge acquisition or 21.20 correct points out of 26 (SD 4.98). The video animation group displays a statistically significantly higher number of correct responses than the SOC group, t(50) 3.33 (*P* .001). Cohen's *d* effect size was 0.92. There were notable differences between the standard of care group and video animation group in questions regarding the side effects and proper disposal of prescription pain killer. There were no differences in questions regarding activities to avoid, signs of addiction, long-term effects, and substances exacerbating opioid medication (Table 1).

#### Discussion

#### Importance and relevance

ED patients given a brief animation video discharge instruction showed higher knowledge acquisition regarding the safe use of prescribed opioids relative to those given standard of care dis- charge instructions (P. 001, Cohen's d 0.92). In particular, patients in the video animation group scored higher than those in the SOC group on questions regarding the side effects and proper disposal of opioids (Table 1). It has been shown that many patients are not well educated about the importance of understanding the side effects of opioid use and associated risks of improper storage,<sup>25-27</sup> and this lack of knowledge has led to adverse patient-centered events.<sup>28</sup> Future education and interventions to reduce the risk of prescribed opioids might center on the side effects of these medications. Despite acknowledged needs for increasing patient education, there is a dearth of patient-centered health literacy data with regards to opioid use. Nearly 70% of individuals suffering from opioid addiction indicated that they obtained their pills from a friend or family member, who in turn obtained them from a single doctor.<sup>29,30</sup> However, few studies have developed a patient-centered postdischarge series of instructions for implementation.<sup>27</sup> McCarthy et al. found that an informational sheet elicited significant improvements in knowledge retention compared with verbal instruction. However, they concluded that not all aspects of knowledge were improved, necessitating a better means of information transference.<sup>28</sup> Atzema et al. found that using an iPad video platform led to higher understanding of key concepts around diagnosis and subsequent care.<sup>20</sup> This study specifically looks at the impact of media education on knowledge acquisition in the emergency department. Our pilot study also showed that patients lack sufficient knowledge about the safe disposal of opioids and may suggest that educational and behavioral interventions could reduce the burden of disease. We argue that the incorporation of a brief self-administered educational animation video tool might be more effective than traditional paper discharge instructions. Future interventions may analyze the potential time and cost savings of this promising educational platform.

With an enrollment rate of 96.1%, this pilot study demonstrates that it is feasible to implement a video discharge instruction in a busy clinical setting. With the growing demands of physicians and nurses and decreased time spent at the bedside, this approach to educating patients about opioid use and misuse is a promising method to potentially initiate patient behavioral changes. Future studies should determine whether video discharge instructions improve long-term opioid knowledge retention and elicit positive behavioral changes.

#### Limitations and future direction

There were several limitations to this study. This was a single- site pilot study using a convenience sample. Although back- ground knowledge was not measured, study participants were randomized to minimize chance background knowledge differences between the cohorts. Due to a lack of standardized nurse verbal education, we are unable to assess the standardization of the verbal opioid discharge process. We do believe that, although we did not formally measure the standard of care dis- charge process, the positive difference delineated in the video intervention group shows that there is a significant improvement on knowledge acquisition when compared with current discharge

practices.

All patients discharged with opioid analgesics were eligible for enrollment in this study, regardless of whether the patient had chronic or acute pain. Although this may introduce a potential bias between the 2 cohorts in terms of baseline opioid knowledge rates, we hope that the randomization process would help eliminate any potential differences in this study. Future studies may research these differences in baseline opioid knowledge rates.

There is general consensus on the immediate utility of a media platform in educating a diverse population, but little is known of the long-term benefits. The flexibility and portability of a media platform allows these interventions to occur after discharge in a holding area or potentially at home. The next steps would be to validate this intervention with a large, multi- site trial. Finally, we did not measure long-term knowledge retention of either group, nor did we measure behavioral changes in our patients. Future studies should take these 2 longitudinal aspects into account.

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#### Author contributions

Bharath Chakravarthy, MD, MPH: Lead researcher—Oversaw study creation, patient enrollment, and manuscript authorship; primary manuscript editor. Shashank Somasundaram: Research personnel—Oversaw and participated in patient enrollment, data analysis and primary manuscript authorship. Jennifer Mogi BS, BA: Co-researcher—Assisted in creation of study and animated video; manuscript editor. Roshan Burns, BS: Research personnel—Assisted in study creation and IRB passage, researched and created video content for study. Wirachin Hoonpongsimanont, MD, MS: Co-researcher—Oversaw patient enrollment in study, study troubleshooting; manuscript editor. Warren Wiechmann, MD, MBA: Co-researcher— Aided in definition of study variables and manuscript editing. Shahram Lotfipour, MD, MPH: Co-researcher—Oversaw patient enrollment in study, study troubleshooting; manuscript editor.

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### Appendix: Opioid education study patient survey

Please complete the survey below. Thank you!

- 1. Age \_\_\_\_
- 2. Gender
  - °Male
  - °Female
- 3. Race/Ethnicity
  - White, non-Hispanic
  - Black, non-Hispanic
  - HispanicorLatino/a
  - Asian or Pacific Islander
  - o American Indian, Alaskan Native, or Native Hawaiian
- Other
- 4. Which of the following is (are) side effects while using prescription pain killers?
  - Vision changes\*
  - Drowsiness<sup>\*</sup>
  - Constipation\*
  - Allergic reactions\*
  - Slowedbreathing\*
- 5. Which activities should be avoided while using prescription pain killers?
  - Driving a vehicle<sup>\*</sup>
  - Signing legal documents\*
  - Supervising children<sup>\*</sup>
  - Operating machinery\*
  - Swimming<sup>\*</sup>
- 6. Which of the following is (are) sign(s) of prescription pain killer dependence or addiction?
  - Restlessness\*
  - New onset of pain<sup>\*</sup>
  - o Hunger
- 7. Which of the following is (are) long-term consequences of the pain killer use?
  - Less effectiveness\*
  - Dependence<sup>\*</sup>
  - Addiction\*
  - Vision Changes
- 8. Which of the following substances could increase side effects of prescription painkillers?
  - Acetaminophens such as Tylenol, Sudafed, or Dayquil\*
  - Ibuprofen such as Advil, Vicks, or Excedrin\*
  - Benzodiazepine such as Xanax, Valium, Ativan, or Versed\*
  - Alcohol\*
  - Nutritional supplements
- 9. What should you do with extra pain killer medication pills?
  - Save them for another time you need them
  - Mix with coffee grounds and throw them in the trash\*
  - Return them to pharmacy
  - Share them with friends or family

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