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# The Impact of Infographics for Health Education on a Short-Term Medical Service Trip to the Dominican Republic

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**Abstract:** This study evaluated the impact of an infographic on patient recall of health information during a medical service trip. During two service trips in May 2018 and May 2019, patients with a history of high blood pressure from an underserved community in the Dominican Republic received an anonymous four-question pre-assessment evaluating their knowledge of high blood pressure prevention and treatment. The provider then educated the patients about high blood pressure prevention and treatment using an infographic. The patients received an identical post-assessment. The median total scores for 2018 and 2019 were 75% on the pre-assessment versus 87.5% on the post-assessment ( $p = 0.021$ ). The study suggests infographics may increase recall of health information for patients on medical service trips and lays the foundation for more studies using educational tools to teach patients with language, cultural, and health literacy barriers.

In the past twenty years, there has been exponential growth in short-term medical service trips.<sup>1</sup> For this article, the definition of short-term medical service trips will follow that of the systematic review of Sykes: “trips in which volunteer medical providers from high income countries travel to low and middle-income countries to provide health care over periods ranging from 1 day to 8 weeks.”<sup>1</sup> Guidelines for short-term medical service trips recommend emphasizing education, training, and empowerment of community members rather than focusing solely on providing care.<sup>2,3</sup> Almost half of the trips included in the systematic review by Sykes contained an educational component for local providers or community members.<sup>1</sup> According to a patient education and counseling analyses by Mullen, patient education and counseling contribute to behavior change for disease prevention.<sup>4</sup> However, after the authors’ literature review, there appear to be no current studies evaluating different techniques for educating patients seen during short-term medical service trips.

Implementing optimal educational techniques can be difficult on a short-term medical service trip and is often complicated by language barriers, cultural differences, and varying levels of health literacy. The nature of infographics seems well-suited for such situations. Infographics combine visual images with minimal verbiage to convey a message to its target audience.<sup>5</sup> Infographics can communicate information faster and more efficiently than words alone.<sup>6</sup> Therefore, infographics can be particularly helpful when a language barrier is involved.

Infographics have also been shown to increase understanding of content. One study by Schillinger and colleagues found that using pictures during patient education increased the likelihood that patients chose the correct dose of warfarin.<sup>7</sup> Visual displays have also been shown to support learning and retention for students,<sup>8</sup> and can increase a patient’s general comprehension of their health risk information.<sup>9</sup> In addition, infographics combined with counseling can help increase comprehension in patients with low health literacy. The addition of pictures to words (both written and spoken) can increase “patient attention, comprehension, recall, and adherence”.<sup>10</sup> A study by Arcia and colleagues illustrated that using infographics to convey health information to patients with low health literacy motivated patients to take steps toward improving certain health issues.<sup>11</sup>

In the Dominican Republic, cardiovascular disease accounts for 39% of deaths.<sup>12</sup> During the team’s medical service trips to the Dominican Republic, hypertension was the most common chronic disease state seen in the clinic. Consequently, the researchers chose to target this disease state in the study. The purpose of this study was to evaluate the impact of an infographic on patients with history or new diagnosis of high blood pressure to recall health information about

preventing and lowering high blood pressure during a short-term medical service trip.

## Methods

Every year since 2014, the Butler University student group Christian Healthcare Providers Organization works with Barnabas Task, a non-profit organization, a local Dominican Republic church, and Pontificia Universidad Católica Madre y Maestra medical students to provide healthcare services to an underserved community in the Dominican Republic. The interprofessional teams from 2018 and 2019 consisted of pre-medical, pre-dental, pharmacy, physician assistant, nursing, and information technology students. The team also included pharmacists, physicians, nurse practitioners, and nurses from the United States and physicians and medical students from the Dominican Republic. The clinic consisted of triage, diagnostic, spiritual counseling, and pharmacy stations. Patients 18 years and older seen in the clinic with a past medical history of hypertension or an elevated blood pressure defined as greater than 120/80 mmHg during one week in May 2018 and May 2019 were asked to participate in an anonymous pre- and post-assessment to evaluate the utility of an infographic in aiding patient recall of preventing or lowering high blood pressure health information.

The pre- and post-assessment interventional study was granted exemption status by the Butler University Institutional Review Board. The clinic saw patients with both acute and chronic illnesses. The most common chief complaints were pain and runny eyes/nose, and the most common chronic disease encountered was hypertension. Due to the high burden of hypertension, the infographic was crafted by the authors utilizing the 2017 Management of Hypertension Guidelines to showcase the most important points of preventing and lowering high blood pressure.<sup>13</sup> The infographic was created by the authors as part of an advanced pharmacy practice experience project. The infographic was bilingual, written in both English and Spanish. Pre- and post-assessments were created by the authors to assess recall of the health information on the infographic. The pre- and post-assessments were created from information located on the infographic and consisted of four multiple-choice questions that were identical. This study utilized a pre-assessment to consider patients’ prior knowledge of healthy living strategies to prevent and lower high blood pressure – see Appendix A below for the full pre- and post-assessment question set. The pre- and post-assessments were located on the front and back, respectively, of the same sheet of paper and contained no personal identifying information. This strategy helped to match the pre- and post-assessments with each patient and maintained the patients’ anonymity. Assessments were not included from patients who did not complete both the pre- and post-assessments. The pre- and post-assessments were piloted by pharmacy students, pharmacy professors, Dominican Republic

medical students, and Spanish translators (n=10) to provide feedback on content and understanding of the questions and infographic.

Most patients with past medical history of hypertension or an elevated blood pressure were presented with a voluntary pre-assessment while waiting to be seen by the provider. The pre- and post-assessments were available in both English and Spanish to match the patients' preferences. Translators were provided for patients unable to read. During the patients' appointment with the provider, they were provided with the infographic. The provider (and translator if needed) utilized the infographic to educate the patients about healthy living strategies to prevent and lower blood pressure which focused on a balanced diet, exercise, medication adherence, and smoking cessation. After the patients had seen the provider, they were asked to complete a post-assessment while waiting for their medications at the pharmacy. Due to the set-up of the clinic, and busy nature, not all patients received the pre- and post-assessments.

Differences between pre- and post-assessment scores were evaluated for each participant. The statistical analyses were conducted using the IBM Statistical Package for Social Sciences (SPSS) Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA). The differences between the total scores for the pre- and post-assessments were evaluated using the Wilcoxon signed-ranks test with a predetermined level of significance ( $\alpha$ ) of 0.05. The differences in scores between each pre- and post-question were analyzed using the McNemar test.

### Results

Forty-four patients were asked to complete the pre- and post-assessment during the 2018 and 2019 trip combined, and thirty-five completed both the pre- and post-assessment for an overall response rate of 80%. Overall, patients' median total scores were higher on the post-assessment compared with the pre-assessment. The median total scores for 2018 and 2019 combined were 75% on the pre assessment versus 87.5% on the post-assessment ( $p=0.021$ ). Total percent correct questions (Table 1) were higher for post-assessment questions on all questions except for question 4 in 2018 where pre- and post-assessment scores were the same – see Appendix B for complete results from Table 1.

### Discussion

To the researchers' knowledge, this was the first study to evaluate the impact of the use of an infographic on patients' recall of health information during a short-term medical service trip. The most important finding was that all questions had the same or higher positive responses in the post-assessment compared with the pre-assessment. Although the differences between each question for the pre- and post-assessment were not statistically significant, the post-assessment scores for each question were higher for all questions except question 4 in 2018. Additionally, the median total scores were statistically significantly higher for the post-assessment compared with the pre-assessment. Patient education and counseling are an important aspect of patient care and on changing behaviors for primary prevention of disease.<sup>4</sup> Based on the findings of this study, the use of infographics in patient education and counseling had a positive impact on patient recall of health information.

There are several additional areas for research in the use of infographics on short-term medical service trips. Although we did not perform a formal assessment of patient and healthcare professional perceptions of the infographic, we received positive feedback from many patients and healthcare professionals in our clinic. Patient and healthcare professionals' perceptions of the infographic is a future area of study. Another area of study for short-term medical service trips is the use of an infographic for other disease states and long-term recall of health information.

Additionally, this study lays the foundation for more research evaluating infographics for educational use in any area with a language barrier and/or low health literacy. Thirty-five percent of U.S. adults fall in the lowest health literacy categories of basic and below-basic health literacy skills, and health literacy needs are magnified in underserved populations. Among Blacks and Hispanics, 58% and 66%, respectively, are in the lowest health literacy categories. Low literacy, less education, and poverty are also associated with lowest health literacy.<sup>14</sup> Infographics could be used to educate individuals with moderate to low health literacy.

### Limitations

The study had a small sample size. The clinics saw 421 patients with 36 patients having high blood pressure or a history of high blood pressure in 2018 and 317 patients with 26 patients having high blood pressure or a history of high blood pressure in 2019. Even though the intent was for all patients with high blood pressure or a history of high blood pressure to receive pre- and post-assessments, not all of them were asked to complete the pre- and post-assessment due to the clinic set-up, the team remembering to give the assessment, and the busy atmosphere of the clinic. In the future, adding an education station would be beneficial to the patients and the researchers.

Other limitations were with the assessment. Question four was negatively worded and may have caused confusion with participants. This question had the same percent answered correctly for the pre- and post-assessment in 2018. The assessment was piloted by Dominican Republic medical students and translators but was not tested by the general Dominican Republic population who present to the clinic. Receiving feedback from this population would have strengthened the assessment. Translators were used to help give the pre- and post-assessment and explain the infographic. There could have been bias and variation amongst the translators on how they read the questions and answers to the patients. Given the short-term nature of the clinic, there was not an opportunity for long-term follow-up with these patients. However, our infographic was given to providers and community health education (CHE) workers to use as learning tools in their communities.

### Conclusion

This study can influence health care professionals where there are significant barriers to health education. Utilizing unique techniques to educate and empower underserved communities is an area that merits further investigation. Although there was a small sample size and limited follow-up, the positive results of this study can lay the foundation for further studies on maximizing patients' educational retention in the short-term clinical setting.

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## Appendix A

Pre- and Post-Assessment Questions for 2018 and 2019  
(Bolded answers are counted as correct)

1. Which is the most effective way to lower your blood pressure?
  - a. **Lowering the amount of salt you eat**
  - b. Smoking a pack of cigarettes a day
  - c. Drinking 1 beer
  - d. Taking your blood pressure medications only when you do not feel well
2. Which of these is high in potassium and may help lower your blood pressure?
  - a. Rice
  - b. Chicken
  - c. **Plantains**
  - d. Apples
3. What is the maximum recommended amount of alcoholic beverages per day for men and women?
  - a. **Less than or equal to 1 for women and 2 for men**
  - b. Less than or equal to 2 for women and men
  - c. Less than or equal to 2 for women and 3 for men
  - d. Less than or equal to 3 for women and men
4. Which of these below is NOT a good way to lower blood pressure?
  - a. Eating a fruit for breakfast
  - b. **Smoking a few cigarettes a day**
  - c. Riding your bike for 30 minutes
  - d. Taking your blood pressure medication as directed

## Appendix B

Table 1: Mean Percentage of Correct Responses from Pre and Post Assessments

	Pre 2018	Post 2018	Pre 2019	Post 2019	Pre Combined	Post Combined	P value <sup>a</sup>
Question 1	88.9% (n=18)	89.5% (n=19)	43.8% (n=16)	62.5% (n=16)	67.6% (n=34)	77.1% (n=35)	0.219
Question 2	61.1% (n=18)	78.9% (n=19)	8.3% (n=12)	40% (n=15)	40% (n=30)	61.8% (n=34)	0.070
Question 3	68.4% (n=19)	89.5% (n=19)	90.1% (n=11)	69.2% (n=13)	76.7% (n=30)	81.3% (n=32)	1.000
Question 4	89.5% (n=19)	89.5% (n=19)	50% (n=12)	53.3% (n=15)	74.2% (n=31)	73.5% (n=34)	1.000

<sup>a</sup> Statistically significant at P < 0.05.