Original Research Article

The Impact of a Twitter-supplemented Educational Intervention to Promote Training in Social Determinants of Health Among Medical Residents

ABSTRACT

Aims: To assess the effectiveness of using Tweetorials in educating medical residents about social determinants of health (SDoH) and satisfaction with Tweetorials as an educational tool.
Study design: Quantitative Analysis
Place and Duration of Study: Montefiore Medical Center, July 2021 to August 2021.
Methodology: Two peer-reviewed publications relating to SDoH were adapted into Tweetorials and traditional journal club PowerPoint presentations, which became the basis of the two interventions given to medical residents via Zoom. We administered surveys that asked participants to self assess their knowledge regarding SDoH topics, their competency in discussing these with patients, and satisfaction with the session. The SDoH surveys were given before and after the intervention to assess any change in SDoH knowledge and competency.
Results: A total of 83 medical residents across three specialties participated in the study. After the Traditional Journal Club intervention and Tweetorial interventions, self-assessed SDoH knowledge improved in a number of areas. The Tweetorial intervention resulted in greater improvement in SDoH knowledge. SDoH competency also improved in a number of areas after both interventions.The mean satisfaction score for the traditional journal club was 2.67/5, and the mean satisfaction score for the Tweetorial intervention was 2.61/5, with no significant difference between the two interventions (*P*=0.66).

Conclusion: Tweetorials can serve as an effective educational tool to teach medical residents about social determinants of health.

Keywords: Clinical research informatics (educational needs), physician education, user acceptance and resistance, social media, Twitter

1. INTRODUCTION

Social media has grown in popularity over recent years as a vehicle for medical education[1]. Social media platforms reach a vast number of learners and allow flexibility compared to traditional, synchronous methods of learning, such as lectures[2]. As social media becomes an integral part of the culture of the next generation, barriers to learning from these platforms decrease along with the learning curve[3].

The onset of the COVID-19 pandemic strengthened the need for this virtual learning modality to complement training in the medical field as in person teaching ceased for a period of time[4]. Educators utilized innovative forms of teaching such as telemedicine, virtual rotations, and virtual conferences[5]. During the pandemic, the use of social media platforms gained momentum as the need for asynchronous learning became evident in teaching resident trainees[6].

One social media platform gaining traction in the medical community is Twitter[2]. Twitter allows users to generate Tweets, which are text posts consisting of a maximum of 280 characters and can include pictures, media links, and polls[2]. Twitter's use of hashtags enable users to amplify certain topics and easily connect with a particular community[7]. In 2015, there were at least 24 medical journal clubs using

Twitter to host discussions, and over 2,000 doctors verified on Twitter in 2013[8-10]. Different medical specialties, such as Nephrology, Infectious Diseases, and Dermatology, have been using Twitter to host journal clubs, promote mentorship within the field, and share research findings with the medical community[8,11,12]. These doctors have also been using a specific social media educational tool called Tweetorials to facilitate medical education in their respective fields[13]. A Tweetorial is a series of individual threaded Tweets used to educate users about a certain topic[13]. With a Tweetorial, users are offered helpful literature links at their fingertips, as well as interactive aspects like polls or surveys, which have been shown to result in a greater user participation[13]. Tweetorials can serve as a link not only to medical education but also as a forum for advocacy and community collaboration, making them powerful tools to educate people about various topics, such as social determinants of health[14].
Social determinants of health (SDoH) are the conditions that people are born into and live under that affect their health, such as the neighborhoods they live in and their income levels[15]. In recent years, more emphasis has been put on incorporating SDoH screening and addressing these issues as part of clinical care[16]. However, one barrier to effectively carrying out these actions is the lack of understanding about SDoH among physicians[17]. SDoH can create barriers to the effective care plans and thus negatively impact the health of patients; therefore it is imperative that physicians have sufficient training in this area[18]. Using Twitter can further increase evidence based knowledge surrounding topics such as SDoH.

To close this knowledge gap related to SDoH, we utilized Tweetorials as an innovative method of learning in graduate medical training programs. The main goal of this project was to see how social media-based education via Tweetorials impacted medical residents' knowledge and ability to converse with patients in regards to SDoH, specifically through the use of Tweetorials. We compared the effectiveness of Twitter-based interventions compared with synchronous video conference-based journal clubs delivered through the Zoom platform.

2. METHODS

2.1 Study Setting and Subjects

Through grant funding provided by the American Medical Association, this medical education implementation research project was conducted at the Montefiore Medical Center, an urban tertiary care medical institution located in the Bronx, with the goal to enhance and evaluate medical resident training in SDoH. The study was conducted from July 2021 to August 2021. Men and women who were 18 years or older and medical residents from the Internal Medicine, Pediatrics, or Obstetrics and Gynecology (OB/GYN) departments at Montefiore were recruited. There were no exclusion criteria. Institutional Review Board approval was obtained at the Albert Einstein College of Medicine.

2.2 Intervention Development and Implementation

The educational materials presented in the interventions were adapted from two key hallmark papers (Cottrell et al. "Using Health Information Technology to Bring Social Determinants of Health into Primary Care: A Conceptual Framework to Guide Research" and De Marchis et al. "Assessment of Social Risk Factors and Interest in Receiving Health Care-Based Social Assistance Among Adult Patients and Adult Caregivers of Pediatric Patients"), and this was adapted into a traditional PowerPoint format and a Tweetorial[19,20]. All presentations were conducted via the online video conference website Zoom. Because the Tweetorial method of learning was one that people may not be familiar with, we chose to present the Tweetorial in a synchronous manner to allow us the flexibility to address any technical issues or questions in real time. The Tweetorial Tweets were posted on the Twitter account made specifically for this study, and residents followed along on Twitter on their personal cellular devices. The Pediatrics and OB/GYN residents were randomized one-to-one to either the Tweetorial or Traditional Journal Club intervention. All Internal Medicine residents participated in the Tweetorial intervention.

A series of six sessions were held where the interventions were implemented over Zoom. Those with a Twitter account followed along and interacted with the Tweetorial presentation on their devices. Participants who did not have an existing Twitter account, were given access to a premade account. The adapted Cottrell presentations were used in all sessions except for the one with the Pediatrics residents as the Pediatrics department opted to use a different paper specific to their specialty. Thirty participants were in the Traditional Journal Club intervention group and fifty-three were in the Tweetorial group.

2.3 Data Collection

The online application REDCap was utilized to generate the surveys given to the participants and securely collect data. Participants' demographic information was gathered. In addition, pre and post-data were collected to assess knowledge of SDoH and competency in screening for and addressing SDoH with patients. The same surveys assessing SDoH knowledge and competency were given before and after the intervention to analyze any change in these areas. The series of questions used in this first survey were adapted from the studies performed by Klein et al. and Gard et al[17,21]. Participant satisfaction with the given intervention was assessed via the client satisfaction questionnaire (CSQ-8)[22].

2.4 Statistical Analysis

The Shapiro-Wilk test was used to check the normality assumptions for all continuous variables. All variables satisfied the conditions for parametric tests based on the test *P* -value. Baseline characteristics of the study population were evaluated using descriptive statistics. Age, gender, post graduate year, race/ethnicity were summarized and compared between Tweetorial and Traditional Journal Club intervention using two sample t-test for continuous variables, and chi-square or fisher's exact test for categorical variables.

Two sample t-test was used to assess if there was any difference in the average session satisfaction scores between intervention groups. Paired t-test was used to determine if there was a change in SDoH competency and knowledge across all participants before and after the training sessions. Repeated measures ANOVA was performed to assess if the pre-post time effect is dependent on the type of intervention received. SDoH competency and knowledge were classified into 3 levels ordered into novice/minimal, competent, and highly experienced. Frequency tables were produced to compare the proportion of each experience level for each question between the intervention groups before and after the training sessions.

Statistical analyses were carried out using SAS 9.4 (SAS Institute Inc., Cary, NC, USA) and the significance level was set to $P < 0.05$.

3. RESULTS

3.1 Demographics

We analyzed data from 83 medical residents across 3 specialties: Pediatrics, Internal Medicine, and OB/GYN (Table 1). 30 people received the Traditional Journal Club intervention, and 53 received the Tweetorial intervention. The average ages of the Traditional Journal Club and Tweetorial interventions were 28.9 and 28.1 years, respectively. In both interventions, a majority of the participants were female (Traditional Journal Club=80%; Tweetorial=56.6%). In the Traditional Journal Club, a the largest group of residents was PGY-2 residents (40%). In comparison, PGY-1 residents made up the majority of the Tweetorial group (67.9%). In the Traditional Journal Club group, the most represented group was Asian (46.7%). This differed from the Tweetorial group where most participants identified as Caucasian (46%).

Table 1. Demographic Characteristics of Participants

	Traditional Journal Club *(n=30)*	**Tweetorial *(n=53)***	***P*-value**
Age (years)			0.15
Mean	28.93 (SD ± 2.05)	28.08 (SD ± 2.76)	
Gender, *n (%)*			**0.03**
Female	24 (80.0%)	30 (56.6%)	
Post-Graduate Year, *n (%)*			**<0.01**

PGY1	9 (30.0%)	36 (67.92%)	
PGY2	12 (40.0%)	7 (13.21%)	
PGY3	7 (23.33%)	7 (13.21%)	
PGY4	2 (6.67%)	3 (5.66%)	
Race/Ethnicity, *n (%)*			0.07
Hispanic/Latino	5 (16.67%)	4 (8.0%)	
Asian	14 (46.67%)	13 (26.0%)	
Black or African American	1 (3.33%)	4 (8.0%)	
White or Caucasian	10 (33.33%)	23 (46.0%)	
Other	0 (0.0%)	6 (12%.0)	
Note: 3 participants not included in race/ethnicity category in Tweetorial Group due to non-response			

3.2 Self-Assessed SDoH Knowledge and Competency

After the Traditional Journal Club intervention, the medical residents' self-assessed SDoH knowledge improved in a variety of skill sets including: engaging families in a conversation about housing conditions (*P*=0.01), food security (*P* =0.01), and domestic violence concerns (*P*=0.03), (Table 2).

Table 2. Self-Reported Knowledge Scores Pre- and Post-Intervention—Traditional Journal Club

Survey Question (rating scale)	**Pre-Intervention mean score**	**Post-intervention mean score**	**Mean difference (SE)**	***P*-value**
I'd rate my capability in engaging families in a conversation about housing conditions as:	2.59(0.82)	2.86(0.64)	0.27(0.1)	**0.01**
I'd rate my capability in engaging families in a conversation about food security as:	2.52(0.83)	2.82(0.66)	0.32(0.1)	**0.01**

I'd rate my capability in engaging families in a conversation about transportation barriers to medical care as:	2.62(0.98)	2.73(0.77)	0.18(0.11)	0.1
I'd rate my capability in engaging families in a conversation about financial barriers to medical care as:	2.48(0.78)	2.77(0.69)	0.27(0.12)	**0.03**
I'd rate my capability in engaging families in a conversation about child or elderly care needs as:	2.59(0.82)	2.73(0.77)	0.14(0.1)	0.19
I'd rate my capability in engaging families in a conversation about legal help needs as:	2.17(0.85)	2.59(0.73)	0.36(0.18)	0.06
I'd rate my capability in engaging families in a conversation about domestic violence concerns as:	2.31(0.71)	2.73(0.63)	0.41(0.17)	**0.03**

Note: Responses were recorded as 1=novice, 2=minimally knowledgeable, 3=competent, 4=highly experienced, 5=expert

After the Tweetorial intervention, self-assessed SDoH knowledge improved in the following topics: engaging families in conversation about housing conditions (*P*=0.02), child or elderly care needs (*P*=0.01), and legal help (*P* =0.001), (Table 3). Based on the ANOVA calculations, the two SDoH knowledge topics in which there was a significant difference between the two intervention groups was engaging families in conversations about child or elderly care needs (time-point *P* <0.01, intervention *P*=0.03) and legal help needs (time-point *P*=0.002, intervention *P*=0.02).

Table 3. Self-Reported Knowledge Scores Pre- and Post-Intervention—Tweetorial

Survey Question (rating scale)	**Pre-Intervention mean score**	**Post-intervention mean score**	**Mean difference (SE)**	***P*-value**
I'd rate my capability in engaging families in a conversation about housing conditions as:	2.4(0.74)	2.69(0.71)	0.33(0.13)	**0.02**
I'd rate my capability in engaging families in a conversation about food security as:	2.43(0.72)	2.62(0.68)	0.22(0.14)	0.12
I'd rate my capability in engaging families in a conversation about transportation barriers to medical care as:	2.51(0.8)	2.62(0.68)	0.22(0.15)	0.16
I'd rate my capability in engaging families in a conversation about financial barriers to medical care as:	2.46(0.73)	2.54(0.69)	0.19(0.15)	0.21
I'd rate my capability in engaging families in a conversation about child or elderly care needs as:	2.25(0.76)	2.43(0.77)	0.38(0.14)	**0.01**
I'd rate my capability in engaging families in a conversation about legal help needs as:	1.81(0.81)	2.19(0.84)	0.54(0.15)	**0.0001**

I'd rate my capability in engaging families in a conversation about domestic violence concerns as:	2.4(0.69)	2.43(0.77)	0.14(0.15)	0.36

Note: Responses were recorded as 1=novice, 2=minimally knowledgeable, 3=competent, 4=highly experienced, 5=expert

The Traditional Journal Club had 58.6% of participants rating themselves as competent, highly experienced, or expert in engaging families in conversations about child or elderly care needs before the intervention, compared to the Tweetorial intervention which had 35.9% of participants rating themselves as competent, highly experienced, or expert. After the Traditional Journal Club intervention, 63.6% rated themselves as competent, highly experienced, or expert in engaging families in conversations about child or elderly care needs, which is a 5% increase from before the intervention. In the Tweetorial intervention, 54% rated themselves as competent, highly experienced, or expert which is an 18.2% increase and significantly greater than the Traditional Journal Club intervention (*P*=0.03). In the Traditional Journal Club intervention, 37.9% of participants rated themselves as competent, highly experienced, or expert in engaging families in conversations about legal help needs, compared to 20.8% in the Tweetorial intervention. After the intervention, the number of participants rating themselves as competent, highly experienced, or expert in engaging families in conversations about legal help needs was 54.5% and 40.5% for the Traditional Journal Club and Tweetorial interventions, respectively. This corresponds to a 16.6% increase in the Traditional Journal Club intervention and a 19.8% increase in the Tweetorial group after the intervention for this particular area, making the Tweetorial intervention the more effective education method for this SDoH knowledge area (*P*=0.02).

Table 4. Comparison of SDoH Knowledge Change Pre and Post-intervention

	Traditional Journal Club			**Tweetorial**			
Survey Question	**% rating as competent or higher pre-intervention**	**% rating as competent or higher post-intervention**	**Net change**	**% rating as competent or higher pre-intervention**	**% rating as competent or higher post-intervention**	**Net change**	***P*-value**
I'd rate my capability in engaging families in a conversation about housing conditions	58.62%	72.73%	14.11%	56.60%	66.66%	10.06%	0.2062
I'd rate my capability in engaging families in a conversation about food security as	51.72%	68.19%	16.47%	49.05%	67.56%	18.51%	0.4935
I'd rate my capability in engaging	58.17%	63.64%	5.47%	58.49%	62.17%	3.68%	0.4696

families in a conversation about transportation barriers to medical care as:							
I'd rate my capability in engaging families in a conversation about financial barriers to medical care as:	51.73%	63.64%	11.91%	51.93%	59.46%	7.53%	0.3374
I'd rate my capability in engaging families in a conversation about child or elderly care needs as	58.62%	63.64%	5.02%	35.85%	54.05%	18.20%	**0.0276**
I'd rate my capability in engaging families in a conversation about legal help needs as:	37.93%	54.54%	16.61%	20.76%	40.54%	19.78%	**0.0221**
I'd rate my capability in engaging families in a conversation about domestic violence concerns as:	44.83%	63.64%	18.81%	47.17%	54.05%	6.88%	0.4415

Note: Responses were recorded as 1=novice, 2=minimally knowledgeable, 3=competent, 4=highly experienced, 5=expert

After the Traditional Journal Club intervention, SDoH competency improved in the following areas: identifying resources within Montefiore to address SDoH challenges (*P*=0.01), identifying resources outside Montefiore to address these challenges (*P*=<0.0001), and referring patients to resources outside of Montefiore to address these challenges (*P*=0.007), (Table 4).

Table 5. Self-Reported Competency Scores Pre- and Post-Intervention—Traditional Journal Club

Survey Question (rating scale)	**Pre-Intervention mean score**	**Post-intervention mean score**	**Mean difference (SE)**	***P*-value**

Understanding the neighborhoods/communities where your patients come from	2.43(0.82)	2.38(0.86)	-0.05(0.15)	0.75
Recognizing the impact of community assets and barriers to health	3.13(0.57)	2.95(0.79)	-0.18(0.11)	0.1
Identifying challenges to optimal health care that affect patients of low socioeconomic status	3.2(0.61)	2.91(0.75)	-0.23(0.13)	0.1
Discussing these challenges during your patients' routine office visits	2.6(0.67)	2.73(0.7)	0.23(0.13)	0.1
Identifying resources within Montefiore that are available to address these challenges	2.2(0.81)	2.64(0.79)	0.5(0.18)	**0.01**
Identifying community resources outside of Montefiore to address these challenges	2.03(0.61)	2.64(0.79)	0.59(0.11)	**<0.0001**
Referring patients to resources within Montefiore to address these challenges	2.33(0.71)	2.64(0.79)	0.27(0.13)	0.06
Referring patients to local community resources outside of Montefiore to help address these challenges	2.1(0.72)	2.64(0.79)	0.57(0.19)	**0.007**

Note: Responses were recorded as 1=novice, 2=minimally knowledgeable, 3=competent, 4=highly experienced, 5=expert

The following areas had significant improvement in SDoH competency after the Tweetorial intervention: identifying community resources outside of Montefiore to address these challenges (*P*=0.04), referring patients to resources within Montefiore to address these challenges (*P*=0.02), and referring patients to local community resources outside of Montefiore to help address these challenges (*P*=0.0001), (Table 5). However there was no significant improvement in post intervention SDoH competency scores in one intervention compared to the other.

Table 56 Self-Reported Competency Scores Pre- and Post-Intervention—Tweetorial

Survey Question (rating scale)	**Pre-Intervention mean score (SD)**	**Post-intervention mean score (SD)**	**Mean difference (SE)**	***P*-value**
Understanding the neighborhoods/communities where your patients come from	2.47(0.7)	2.51(0.69)	0.14(0.1)	0.17
Recognizing the impact of community assets and barriers to health	3.13(0.59)	3.03(0.64)	-0.03(0.12)	0.82
Identifying challenges to optimal health care that affect patients of low socioeconomic status	3.19(0.52)	3.03(0.55)	-0.16(0.1)	0.11
Discussing these challenges during your patients' routine office visits	2.72(0.63)	2.86(0.63)	0.19(0.13)	0.15
Identifying resources within Montefiore that are available to address these challenges	2.26(0.62)	2.41(0.76)	0.24(0.13)	0.07
Identifying community resources outside of Montefiore to address these	2.04(0.76)	2.27(0.8)	0.35(0.16)	**0.04**

challenges				
Referring patients to resources within Montefiore to address these challenges	2.25(0.7)	2.43(0.83)	0.32(0.13)	**0.02**
Referring patients to local community resources outside of Montefiore to help address these challenges	1.91(0.77)	2.38(0.86)	0.65(0.15)	**0.0001**

Note: Responses were recorded as 1=novice, 2=minimally knowledgeable, 3=competent, 4=highly experienced, 5=expert

3.3 Satisfaction Scores

The mean satisfaction score for the Traditional Journal Club intervention was 2.67/5. In comparison, the mean satisfaction score for the Tweetorial intervention was 2.61/5. Based on post-intervention feedback there was no significant difference in satisfaction between the Tweetorial and Traditional Journal Club groups (*P*=0.66) (Table 6). There were two categories that had a mean score less than two among both interventions, “Received the kind of learning you wanted/expected” (Traditional Journal Club=1.74, Tweetorial=1.49) and “Would you recommend our learning materials to a colleague?” (Traditional Journal Club=1.68, Tweetorial=1.77).

Table 7. Session Satisfaction Scores by Intervention

Survey Question (rating scale)	**Traditional Journal Club Mean Score *(n=19)***	**Tweetorial Mean Score *(n=39)***	***P*-value**
Quality of the learning materials received (1=excellent, 2=good, 3=fair, 4=poor)	2.21	2.31	0.56
Received the learning you were expecting/wanted (1=”No, definitely”, 2=”No, Not really”, 3=”Yes, Generally”, 4=”Yes, definitely”)	1.74	1.49	0.16
Extent that Tweetorials/Zoom materials met needs (4=”Almost all of my needs have been met”, 3=”Most of my needs have been met”, 2=”Only a few of my needs have been met”, 1=”None of my needs have been met”)	2.53*	2.56	0.89

Would you recommend our materials to a colleague (1="No, definitely not", 2="No, I don't think so", 3="Yes, I think so", 4="Yes, definitely")	1.68	1.77	0.58
Satisfaction with the amount of help received (1="Quite dissatisfied", 2="Indifferent or mildly dissatisfied", 3="Mostly satisfied", 4="Very satisfied")	2.58	2.62	0.84
Materials received helped deal more effectively with problems (4="Very satisfied", 3="Mostly satisfied", 2="Indifferent or mildly dissatisfied", 1="Quite dissatisfied")	2.37	2.36	0.95
Satisfaction with teaching received (4="Very satisfied", 3="Mostly satisfied", 2="Indifferent or mildly dissatisfied", 1="Quite dissatisfied")	2.26	2.46	0.30
Would come back to our program (1="No, definitely not", 2="No, I don't think so", 3="Yes, I think so", 4="Yes, definitely")	2.63	2.69	0.72

* 4 participants not included in third survey question in Traditional Journal Club due to non-response

4. DISCUSSION

The aim of this pilot study was to determine the feasibility and effectiveness of using Twitter, more specifically Tweetorials, as an educational tool to teach medical residents about social determinants of health in comparison to traditional styles of learning, such as journal clubs. Our findings show that the Tweetorial resulted in a greater net increase in self-graded SDoH knowledge and competency in engaging patients about these topics. Additionally, the participants were equally satisfied with the Tweetorial and Journal Club learning formats.

We chose to focus on SDoH as the content of our educational material. It is necessary to identify and understand how disparities in SDoH can negatively affect patients so that doctors can address these issues[23]. Survey results indicated that the participants felt that their knowledge about certain SDoH topics increased after the intervention. These topics included how to engage families in a conversation about housing conditions, food security, child or elderly care needs, legal help needs, and domestic violence concerns. The greater net increase in SDoH knowledge after the Tweetorial intervention in comparison to the traditional journal club suggests that the Tweetorial is the more effective mode of education. This could be due to the fact that the Tweetorial offers the option of using polls and having a discussion in the Tweet's comments, both of which were utilized during the Tweetorial sessions. These interactive features of Tweetorials can help reinforce learning. Previous studies explored the ways Twitter can promote education and named similar reasons for participants' improvement following a Twitter based educational intervention[24].

However, another factor to consider when looking at the effectiveness of Tweetorials is that the Tweetorial group had a greater percentage of PGY-1 participants compared to the Traditional Journal Club group. The PGY-1 residents could have a smaller baseline knowledge about SDoH compared to their seniors, making it easier to expand their knowledge about these topics. Another study by Morrison et

al showed that their SDoH simulation training resulted in the greatest impact among PGY-1 residents[25]. An additional caveat is the absolute competence levels of each SDoH category pre-intervention and their effect on the net increase post-intervention. For example, 58.6% of participants in the Traditional Journal Club group rated themselves as competent, highly experienced, or expert in engaging families in conversations about child or elderly care needs before the intervention, while 35.9% of participants in the Tweetorial group did the same. Therefore, the greater net increase in the Tweetorial group for this SDoH competency may speak more to the fact that it is easier to expand a person's knowledge if their baseline is lower. As a result, it is difficult to definitively determine whether or not Tweetorials are more effective teaching modalities compared to traditional journal clubs. The results indicate at least some level of effectiveness of Tweetorials, and additional studies are needed on this comparison.

Though the content presented in the Tweetorial and journal club did not directly address the SDoH topics asked about, the residents felt more knowledgeable after the intervention. One possible reason for this is that the intervention could have helped refresh the participants' memories about previously learned SDoH knowledge. In one study performed by Gard et al, 84% of medical resident participants had previous SDoH training[17]. Additionally, participants might have also learned more through the discussions held during the session. Addressing SDoH across residencies is important and education delivered through Tweetorials can serve to help trainees navigate patient-caregiver barriers. These results could imply that simply having discussions about SDoH can help medical residents feel more confident in having these conversations with patients.

However, self-graded competency in conversing with patients about these same SDoH topics did not increase after the intervention. Instead competency scores improved in these areas after the intervention: how to identify resources within their hospital system and their communities and how to refer patients to these resources both in their hospital system and the community. One reason for this could be that medical residents may not know how to bring up these SDoH topics with their patients. In contrast, they may feel more comfortable having conversations that are focused on solutions to the SDoH problems their patients are facing. A similar trend was seen in another study focusing on pediatricians' comfort and attitude towards SDoH screening and referring. In this study a greater number of physicians felt comfortable referring to resources compared to inquiring about SDoH[26]. Some doctors also believe that addressing SDoH is outside of their realm of practice[27]. Either of these reasons could have contributed to self-competency scores not improving to a greater extent.

Based on the results of the satisfaction survey, satisfaction for the Tweetorial intervention was comparable to the Traditional Journal Club intervention. The similar satisfaction scores for both methods of learning could be due to the fact that the Tweetorial was presented synchronously as a presentation, which offered limited differences in the experience compared to a journal club. An alternative reason for the satisfaction scores of the two intervention groups being similar is that the participants could have truly felt equally satisfied with the Tweetorial intervention and traditional journal club formats. This would be in line with other studies that showed positive attitudes toward this Twitter centered mode of education[28-30]. A study performed by Zheng et al showed that participants were increasingly satisfied with Twitter centered educational communities if users felt a connection to other participants[23]. Based on this finding, Twitter can be an especially useful educational tool to supplement learning among a class of medical residents who already have that sense of connection to each other. An interesting finding in the satisfaction survey results were the lower scores for these two categories: "Received the kind of learning you wanted/expected" and "Would you recommend our learning materials to a colleague?", which may prompt further studies about the overall quality of resident education.

One limitation of our study was the way the Tweetorial was presented. One study showed that unfamiliarity with the Twitter social media platform was a barrier to utilizing Twitter as a learning resource[31]. In order to remove this barrier, the Tweetorial was presented synchronously. While presenting the Tweetorial in this way decreased the variability between the two intervention groups, it did not allow us to fully see the effectiveness of a Tweetorial in the way it is designed to be used, which is asynchronously with people interacting with the Tweetorial at their own leisure and pace. An additional limitation of the study was that the participants' SDoH knowledge and competency was evaluated in a self-reported manner. This could have led to a bias in which participants perceived their SDoH knowledge

and competency to be improved after the intervention. Because this study was performed with only XXX medical residents, we are unable to assess the external validity of our results.

5. CONCLUSIONS

This education initiative study allowed us to compare the efficacy of teaching about SDoH through Tweetorials versus the traditional learning method of journal clubs. Our results showed that participants across disciplines were equally satisfied with both methods of learning. However, given the fact that Tweetorials offer the opportunity to interact with the content beyond a PowerPoint presentation and can be shared with a wider audience, Tweetorials as a mode of education have the potential to enhance medical residents' learning about various health topics.

Future projects include continuing to use Tweetorials to supplement resident's education or even expanding the use of Tweetorials to educate patients about various health topics. In a time where online education is becoming more commonplace, it is important to study how effective new methods of learning are and strategize ways to improve them.

Our results show that Tweetorials can be an effective mode for educating medical residents about SDoH. Future studies are needed to see how best to use this method in order to optimize learning.

CONSENT

All authors declare that 'written informed consent was obtained from the participants of this study. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

This study was performed in compliance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects and was reviewed by the Albert Einstein College of Medicine Institutional Review Board.

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