

# Adding a Physical Therapist to the Health Care Team in an HIV Clinic Increases Physical Therapy Referrals and Reduces Opioid Prescriptions Provided for Chronic Musculoskeletal Pain in Patients Living With HIV

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**Background.** Musculoskeletal (MSK) pain is common in people living with HIV (PLWH). Health care providers sometimes prescribe opioids to control pain, which may lead to opioid misuse. An interdisciplinary approach that includes physical therapy has been successful in managing MSK pain in various health care settings. Therefore, we sought to find the impact of recruiting a physical therapist (PT) on the number of opioid prescriptions and physical therapy referrals made by physicians in training to manage MSK pain in PLWH.

**Methods.** We performed a retrospective chart review of patients seen by Internal Medicine physicians in training in an HIV clinic in Detroit before (2017) and after (2018) recruiting a PT to the health care team and collected demographic and clinical data. We also surveyed the trainees to assess how the PT addition influenced their learning. Institutional review board waiver was obtained.

**Results.** Results showed that of all PLWH seen at the clinic, 28/249 (11%) and 37/178 (21%) had chronic MSK pain in the 2017 and 2018 data sets, respectively. In 2017, all 28 patients with MSK pain were prescribed opioids. This decreased in 2018 after the PT addition (10/37 patients;  $P < .0001$ ). The number of physical therapy referrals significantly increased after the PT addition (2017: 5/28 patients; 2018: 17/37 patients;  $P = .03$ ). Trainees felt that the PT helped improve their examination skills and develop a treatment plan for patients.

**Conclusions.** The addition of a PT encouraged physicians in training to utilize nonopioid management of MSK pain in PLWH and enhanced their learning experience, as perceived by the trainees.

**Keywords.** HIV; musculoskeletal pain; opioid abuse; physical therapy.

Pain is a common symptom among people living with HIV (PLWH) and has been reported by 55%–61% of patients presenting to ambulatory HIV clinics [1–3]. PLWH are prescribed opioids in response to their pain complaints at higher rates compared with the general population and have a high risk of opioid misuse due to higher rates of risk factors for misuse (eg, history of alcohol abuse, sexual abuse, psychiatric comorbidities, etc.) [4–7]. Decreasing the prescription of opioids has the benefit of reducing potential for misuse [8] and transmission of HIV to others [9]. However, providers who care for patients in community health care clinics, especially in underserved communities,

often lack access to other resources such as interdisciplinary pain programs consisting of physical therapists [10]. The effects of integrating physical therapists into clinical settings have been evaluated in various health care settings, all of which showed improved patient care and satisfaction, better treatment outcomes, and more efficient clinical practice [10–12]. Physical therapists have also been shown to be more aware of different musculoskeletal (MSK) pain management options than medical students, physician interns, residents, and all physician specialists, with the exception of orthopedic physicians [13]. However, after conducting a review of the medical literature, we did not identify primary research articles that explored the effects of a multidisciplinary team that included a physical therapist on the management of MSK pain in PLWH. Therefore, we developed a program that introduced a physical therapist to the health care team, with the intention of changing the way we manage MSK pain in PLWH by increasing physical therapy referrals and improving trainee education on pain management, and we also explored the effect of this intervention on the subsequent number of opioid prescriptions provided by the physicians in training to patients.

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## METHODS

### Intervention

The program introduced a physical therapist (PT) to the health care team. The PT was present at the Internal Medicine (IM) HIV clinic between January and May 2018 and provided daily education on musculoskeletal evaluation to physicians in training while also co-evaluating patients with pain complaints to develop a tailored pain plan. The physical therapist also advised physicians in training on how to effectively refer patients to physical therapy, what therapeutic modalities were available through physical therapy, and how to identify suitable community resources such as community exercise/physical activity programs for their patients.

### Data Collection Procedure

We performed a retrospective chart review of all patients seen by IM physicians in training at the Wayne State University HIV clinic in Detroit, Michigan, from January 2017 to May 2017 (2017 data set), and also between January 2018 and May 2018 (2018 data set). As the PT was introduced to the health care team between these 2 time periods, we were able to compare outcome measures related to patient management before vs after the PT's introduction. All patient data were collected from NextGen electronic medical records after obtaining an institutional review board (IRB) waiver from Wayne State University. The patient data were de-identified and recorded in a database that was set up on the REDCap web application for this study. Demographic variables, as well as outcome measures, were constructed as nominal variables to enable numerical data collection and efficient statistical analyses.

We also surveyed IM physicians in training at the HIV clinic utilizing questionnaires, before and after introducing the physical therapist to the health care team, to assess how the addition of the physical therapist changed their knowledge in treating MSK pain in HIV patients.

### Outcome Measures

We looked at 3 primary outcome measures in this study. The first primary measure was the change in the proportion of opioid prescriptions provided by physicians in training to treat MSK pain before vs after the introduction of the physical

therapist. The second measure was the change in the proportion of physical therapy referrals made by physicians in training before vs after the addition of the physical therapist to the team. Finally, we quantified the perceived knowledge of physicians in training in treating MSK pain in HIV patients before vs after PT introduction, based on their survey responses.

### Statistical Analyses

The Fisher exact test was used to assess if there were statistically significant differences in outcome measures between the 2017 (before PT addition) and 2018 (after PT addition) data sets. The alpha level was set to .05 to establish significance for the test in all comparative analyses.

## RESULTS

### Patient Characteristics

The total number of patients seen by physicians in training in the HIV clinic during the 2017 and 2018 time periods was 249 and 178, respectively. Of these patients, only those who had self-reported musculoskeletal pain symptoms or were found to have signs of MSK pain during assessment were selected for further analyses. Accordingly, 28 out of the 249 patients seen in 2017 (11%) and 37 out of 178 (21%) patients seen in 2018 had MSK pain symptoms/signs and therefore were chosen for further comparative analyses. The demographic information of patients who presented with MSK pain symptoms/signs in 2017 and 2018 was obtained from the electronic medical record and is presented in [Table 1](#).

### Symptom Prevalence

As patients had 1 or more types of MSK pain symptoms and to be consistent, only 3 broad types of MSK pain were selected to be statistically compared across the 2 data sets. The selected types were chronic back pain, upper extremity pain, and lower extremity pain. Of these 3 types of MSK pain, chronic back pain was the most commonly seen, and 21 of 28 patients from the 2017 cohort (before PT addition; 71.43%) and 16 out of 37 patients from the 2018 cohort (after PT addition; 43.24%) had chronic back pain, which yielded a significant difference between the 2 groups ( $P = .04$ ). The prevalence of lower (2017: 35.71%; 2018: 24.32%;  $P = .41$ ) and upper extremity (2017:

**Table 1. Demographic Characteristics of Patients Seen Before (2017) and After (2018) Including a Physical Therapist in the Health Care Team**

Variable	Before Including Physical Therapist (2017; n = 28)	After Including Physical Therapist (2018; n = 37)
Age, y		
Mean ± SD	50.86 ± 6.25	50.97 ± 11.13
Range	38–66	25–67
Gender, %		
Female	35.71	37.84
Male	64.29	59.46
Transgender (male to female)	0	2.70

7.14%; 2018: 13.51%;  $P = .69$ ) pain did not significantly differ between the 2 groups.

### Opioid and Nonopioid Treatment

All 28 patients (100%) with MSK pain were prescribed opioids before the addition of the physical therapist. However, this proportion significantly decreased after the addition of the physical therapist, such that only 10 out of 37 patients (27.03%) were prescribed opioids ( $P < .0001$ ). Also, a significantly higher proportion of patients were provided with nonopioid interventions other than physical therapy after the addition of the physical therapist compared with before the addition of the PT (2017: 57.14%; 2018: 94.59%;  $P = .0005$ ). These interventions included orthopedics referrals (18.92%), nonopioid analgesic prescriptions (70.27%), braces/assistive devices/orthotics (8.11%), and other supportive measures including but not limited to rest and using ice packs (45.95%).

### Physical Therapy Referrals

Only 5 out of the 28 patients (17.86%) with MSK pain were given physical therapy referrals in 2017 before the addition of the physical therapist. However, after the addition of the physical therapist, 17 out of the 37 patients (45.95%) with MSK pain received physical therapy referrals, which was a significant increase from before ( $P = .03$ ).

### Trainee Survey Results

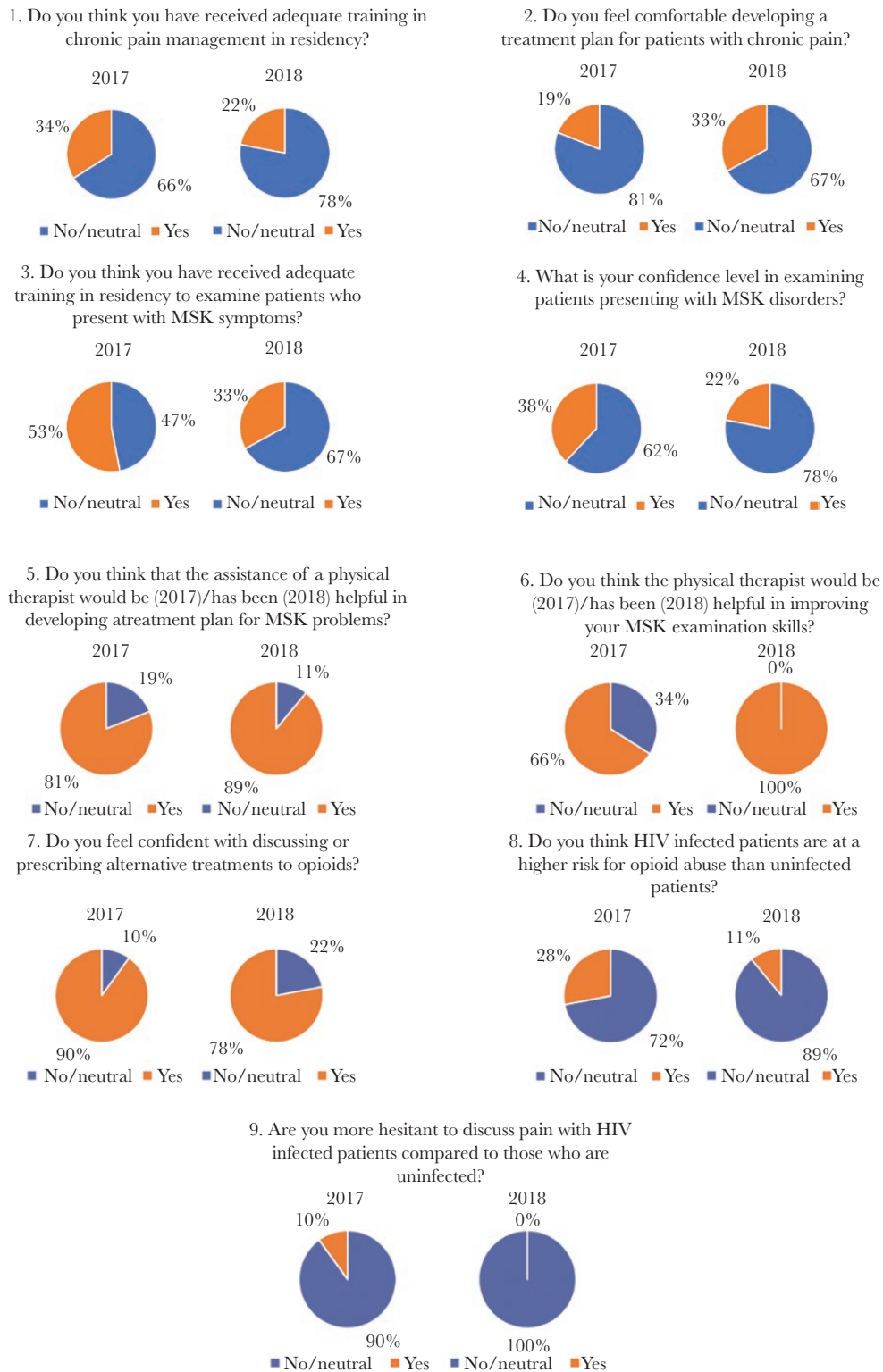
The survey response rate of physicians in training in 2017 and 2018 was 15/20 resident physicians (75%) and 9/21 resident physicians (42.86%), respectively. In addition, 6 Infectious Disease fellows also responded to the survey in 2017. In 2017, 9 resident physicians who responded were interns (PGY 1) and the rest were senior residents (PGY 2–3). In 2018, 2 interns responded to the survey, while the rest were senior residents. In 2017, of all the physicians in training who responded to the survey, 14 were male and 7 were female. In 2018, 5 survey responders were male and 4 were female. All the physicians in training who responded to the survey in 2017 and 2018 had seen at least 1 patient with chronic noncancer pain in the HIV clinic within 3 months before the survey. Also, 95% of respondents in 2017 and 44.44% of respondents in 2018 were concerned about at least 1 of their patients abusing the opioids they prescribed. The degree of knowledge in managing MSK pain in HIV patients before vs after the addition of the physical therapist to the team, as perceived by trainees and reflected in their survey responses, is quantified in the pie charts in Figure 1. The total percentage of trainees who provided “no” or “neutral” responses (sum of the percentage of 1, 2, and 3 responses on a Likert scale of 1–5) vs “yes” responses (sum of the percentage of 4 and 5 responses on a Likert scale of 1–5) to each survey question, in 2017 and 2018, is depicted in Figure 1.

How physicians in training perceived the overall impact the physical therapist had on their learning is quantified in Figure 2. Note that the 2 questions depicted in Figure 2 were only asked in the survey presented to trainees in 2018 (after the intervention), and therefore, there are no data from 2017 for comparison. Again, the total percentage of trainees who provided “no” or “neutral” responses (sum of the percentage of 1, 2, and 3 responses on a Likert scale of 1–5) vs “yes” responses (sum of the percentage of 4 and 5 responses on a Likert scale of 1–5) to each survey question is depicted in Figure 2.

## DISCUSSION

Here we present a successful intervention that led to decreased opioid prescriptions for musculoskeletal (MSK) pain in people living with HIV (PLWH), utilizing a collaborative team approach that involved incorporating a physical therapist (PT) into the medical treatment team. This intervention also increased patient access to physical therapy, both through increased physical therapy referrals made by physicians in training and increased trainee knowledge and awareness about the role of physical therapy in MSK pain management.

Physical therapists are known to be more knowledgeable about different MSK pain management options than medical students and physicians in training [13], and our survey results show that trainees found benefit in their clinical presence. Physicians in training noted increased knowledge about exam skills and treatment for MSK pain after the addition of the physical therapist to the team. Specifically, >80% of trainees who took the survey said that the physical therapist helped in improving their examination skills or developing a treatment plan for their patients, and all trainees felt that the physical therapist improved their overall management of MSK pain in HIV patients. Physical therapy techniques have been shown to significantly reduce both chronic pain and the use of opioids among PLWH in other studies well [14]. It is worth noting that the percentage of patients who presented with chronic MSK pain doubled between 2017 and 2018. Although this could have been incidental in nature, it is possible that more people were diagnosed with chronic MSK pain in 2018 due to better training provided by the physical therapist over the preceding 1-year period to trainees, leading to better detection of chronic MSK pain symptoms. However, given that only 11% of patients who visited the clinic between January and May 2017 were considered to have had MSK pain symptoms, and taking this into consideration for subsequent analyses, one could argue that the sample size of the 2017 data set was fairly small, which poses a limitation to this study. Among the different types of MSK pain symptoms presented by patients, the incidence of chronic back pain was noted to be significantly lower in 2018 compared with 2017. Again, this could have been an incidental finding, but it is also possible that patients were more effectively treated for chronic back pain, on average, over a 1-year period,



**Figure 1.** Percentage of trainee responses (number of trainees who gave each response divided by the total number of survey responders) to each survey question, before (2017) vs after (2018) the addition of a physical therapist to the health care team. “No/Neutral” corresponds to the sum of the percentage of 1, 2, and 3 responses on a scale of 1–5. “Yes” corresponds to the sum of the percentage of 4 and 5 responses on a scale of 1–5. Abbreviation: MSK, musculoskeletal.

which led to the reduced incidence noted in 2018. This could have been facilitated by the PT both directly and/or indirectly through teaching trainees about treatment modalities that

could effectively alleviate chronic back pain. Having said that, a limitation of this study is that we could not obtain documented evidence of patients following up with a physical therapist after

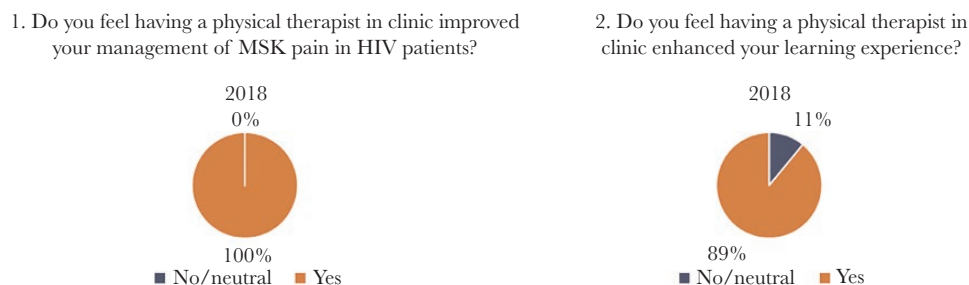
receiving physical therapy referrals in our clinic. This is an important end point that could be used to assess patient outcomes from this intervention and should be included as a variable in a more longitudinal study design in the future, as it would help improve patient-centered care.

We see a significant decrease in opioid prescriptions after the addition of the physical therapist to the health care team. However, a limitation is that some factors that were not controlled for in this study could also have contributed to this result. These factors include greater awareness among physicians in training about opioid misuse, creation of state legislature and new clinic policies advocating for nonopioid pain management options in light of the opioid crisis, and a shift in patient preference to using nonopioid analgesics or more conservative ways to control pain. It is also important to note that we did not follow individual patients over the 1-year period. Instead, the 2017 and 2018 data were collected retrospectively and in a cross-sectional manner. Therefore, it is possible that patients changed providers after a decline in opioid prescriptions or were simply lost to follow-up due to other reasons, thus giving rise to sampling variability between the 2017 and 2018 data sets. Although it is impossible to eliminate all confounding factors, future work could focus on identifying and controlling for quantifiable confounding variables as well as creating a prospective and longitudinal study design to ascertain the reliability of the decline in opioid prescriptions that we see in our study. Also, although a decrease in the number of opioid prescriptions could imply decreased opioid consumption by patients, one cannot assume this with complete certainty. Therefore, it might be useful to quantify opioid prescriptions and subsequent consumption by patients by calibrating opioid use using a more rigorous metric such as morphine milligram equivalents in future work done in this area of research.

With respect to the survey provided to physicians in training, it is evident from the results that the response rate was higher in 2017 than in 2018. The lower response rate in 2018 could have been incidental or could have resulted from the shorter time period over which the survey results were collected and

finalized, compared with 2017. The lower response rate in 2018 could have led to the survey results collected after the PT intervention having lower statistical power and resulted in a more skewed distribution of data, compared with 2017. This could explain some discrepancies in the survey results. For instance, although results from the 2018 survey show that all residents felt that the PT helped improve their management of MSK pain in HIV patients (Question 1 in Figure 2) and a majority felt that the physical therapist enhanced their learning experience (Question 2 in Figure 2), we see a perceived decrease in the confidence of trainees in examining patients with MSK disorders (Question 4 in Figure 1) and in their confidence in discussing or prescribing alternative treatments to opioids (Question 7 in Figure 1) in 2018 vs 2017. Similarly, fewer residents thought they had received adequate training in chronic pain management (Question 1 in Figure 1) or MSK examination skills (Question 3 in Figure 1) during residency in 2018 vs 2017. Although the last 2 questions relate to overall training during residency, as opposed to the direct impact of the PT on training over the 1-year period, the 4 survey questions that suggest lower confidence or knowledge in 2018 vs 2017 could at least be partially explained by the lower sample size of responders in 2018 vs 2017. As the proportion of survey responders in 2017 was almost double the proportion in 2018, the responses provided by trainees after the PT intervention in 2018 might be more useful when analyzed in isolation than in comparison with responses provided by trainees in 2017. Therefore, based on these responses, we believe the PT did adequately contribute to enhancing trainee education in MSK pain management in PLWH, mainly through improving trainees' examination skills and helping them develop effective treatment plans.

Our intervention is a retrospective exploration of the benefits, from a physician standpoint, of a collaborative approach to MSK pain management in PLWH in an ambulatory setting. However, it is important to note that these results were derived from a fairly small data set at a single clinic site, were collected in a cross-sectional manner, and are retrospective in nature. Therefore, prospective studies that include data collected on a larger scale from multiple sites might be needed to further



**Figure 2.** Percentage of trainee responses (number of trainees who gave each response divided by the total number of survey responders) to each survey question, after (2018) the addition of the physical therapist to the health care team. “No/Neutral” corresponds to the sum of the percentage of 1, 2, and 3 responses on a scale of 1–5. “Yes” corresponds to the sum of the percentage of 4 and 5 responses on a scale of 1–5. Abbreviation: MSK, musculoskeletal.

validate and build on our findings. It is also important to note that patient perception of this intervention is not presented in this manuscript. Therefore, future work done in this area must focus on identifying the specific benefits patients gain from such a collaborative intervention, as this will indicate if the intervention actually contributes to better patient outcomes from the standpoint of patients. This could be done by collecting and analyzing patient responses to quality-of-life metrics such as patient-specific functional scales, numeric pain rating scales, and the Oswestry disability index. Finally, satisfaction surveys provided to patients after they are assessed by the physical therapist could further our understanding of how patients perceive this collaborative intervention.

## CONCLUSIONS

In summary, our study results show that the addition of a physical therapist to an HIV care team in an ambulatory clinic in a teaching hospital significantly decreased the number of opioid prescriptions and increased the number of physical therapy referrals provided by physicians in training to people living with HIV. We also found that such a collaborative approach to musculoskeletal pain management in PLWH led to improved trainee education with respect to examining and treating patients presenting with MSK pain, as perceived by physicians in training.

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**Potential conflicts of interest.** All authors: no reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

**Author contributions.** Vinoja Sebanayagam, MSc, completed and submitted documents for IRB review of the project proposal, collected/compiled the 2018 data set, prepared a poster that was virtually presented at the Infectious Diseases Society of America 2020 meeting, and prepared the manuscript. Nichole Chakur, PT, DPT, OCS, is a physical therapist who was a part of the program/intervention this study is based on. She co-evaluated patients alongside resident physicians and educated residents about physical therapy options available to patients. She was one of the principal staff in this project. Nana Ama Baffoe, MSc, performed statistical analyses on the 2017 and 2018 data. Brian Reed, BS, set up a database to save 2018 data and contributed to and supervised data and statistical analyses. Jarrett Weinberger, MD, was one of the principal staff in this project; he helped devise this program/intervention and obtain funding from the Detroit

Medical Center foundation grant for this project. Brandon S. Twardy, MD, PhD, collected/compiled the 2017 data set, presented a portion of 2017 data in the form of a poster at the 2017 IDWeek conference, and provided guidance on collecting the 2018 data. Jennifer Veltman, MD, was the Primary Investigator and recipient of the Detroit Medical Center foundation grant for this project. As one of the principal staff in this project, Dr. Veltman helped devise this program/intervention, supervised data collection, and reviewed the poster and manuscript associated with this project.

**Patient consent.** This is a retrospective study for which demographic and clinical data were obtained from the electronic medical record. As this study was retrospective in nature, patient consent was not obtained before data collection. Therefore, documentation pertaining to the design of this study and data collection/documentation/deidentification protocols were submitted to the Wayne State University Medical Institutional Review Board before data collection. After reviewing all the documents, the Wayne State University Medical Institutional Review Board granted a waiver of HIPAA authorization (IRB exemption) for this study, approved the study, and permitted data collection and presentation of study results.

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