



# Implementation and Preliminary Effectiveness of a Multidisciplinary Telemedicine Pilot Initiative for Patients with Chronic Non-Cancer Pain in Rural and Underserved Areas at a Major Academic Medical Center

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**Background:** Arkansas lacks adequate access to high-quality pain care, as evidenced, in part, by it having the second highest opioid prescribing rate in the United States. To improve access to high-quality treatment of chronic pain, we developed the Arkansas Improving Multidisciplinary Pain Care and Treatment (AR-IMPACT) Telemedicine Clinic, a multidisciplinary and interprofessional team of specialists who provide evidence-based pain management for patients with chronic pain.

**Methods:** We conducted a single-arm pilot trial of the AR-IMPACT Telemedicine Clinic with rural, university-affiliated primary care clinics. We assessed the AR-IMPACT Telemedicine Clinic using an implementation framework and preliminary effectiveness measures. Specifically, we assessed 5 of the 8 implementation outcomes of the framework (ie, penetration, adoption, acceptability, appropriateness, and feasibility) using a mixed methods approach. To evaluate implementation outcomes, we used surveys, interviews, and administrative data. We used electronic health record data to measure preliminary effectiveness (ie, changes in average morphine milligram equivalents per day and pain and depression scores).

**Results:** The AR-IMPACT team saw 23 patients that were referred by 13 primary care physicians from three rural, university-affiliated primary care clinics over one year. Of the 19 patients willing to participate in the pilot study, 12 identified as women, 31.6% identified as Black, and over 50% had less than a bachelor's level education. Patients rated the clinic positively with high overall satisfaction. Referring physicians indicated high levels of appropriateness, acceptability, and feasibility of the program. AR-IMPACT team members identified several barriers and facilitators to the feasibility of implementing the program. No changes in preliminary effectiveness measures were statistically significant.

**Conclusion:** Overall, the AR-IMPACT Telemedicine Clinic obtained moderate penetration and adoption, was highly acceptable to patients, was highly acceptable and appropriate to providers, and was moderately feasible to providers and AR-IMPACT team members.

**Keywords:** chronic, non-cancer pain, telehealth, opioid therapy, multidisciplinary team

## Introduction

Exacerbated by the COVID-19 pandemic,<sup>1</sup> the United States is facing an opioid epidemic that was predominantly initiated by overprescribing of opioid therapy for chronic pain.<sup>2,3</sup> Opioid pharmacotherapy can be complicated by adverse

outcomes including physical dependency, abuse, addiction, cognitive dysfunction, and increasing rates of overdose deaths.<sup>4–10</sup> Proper management of chronic pain involves a multi-pronged and multidisciplinary approach<sup>11,12</sup> defined as a combination of pharmacotherapy,<sup>11,13</sup> behavioral interventions, (eg, cognitive behavioral therapy),<sup>12</sup> complementary and alternative interventions (eg, yoga), and visits with specialists from various disciplines (eg, physical therapists, pain interventionalists).<sup>11</sup>

Rural states, such as Arkansas, have been disproportionately affected by the opioid epidemic.<sup>14–17</sup> While the Arkansas opioid prescribing rate has dropped from 106.1 opioid prescriptions per 100 persons in 2017 to 75.8 per 100 persons in 2020, Arkansas remains the second highest prescribing state in the nation (national average in 2020 was 43.3 opioid prescriptions per 100 persons).<sup>18,19</sup> Opioid overprescribing in Arkansas and other rural states can be attributed, in part, to a lack of access to high-quality, multidisciplinary pain care.<sup>20</sup> Relatedly, low-quality pain care is common among older persons, racial and ethnic minorities, and persons with incomes below the federal poverty level—underserved populations common in Arkansas.<sup>21</sup>

To bring high-quality, multidisciplinary pain care to underserved populations in the state, we developed and piloted the Arkansas Improving Multidisciplinary Pain Care and Treatment (AR-IMPACT) Telemedicine Clinic. The goal of the AR-IMPACT Telemedicine Clinic is to provide underserved patients with chronic pain and their treating primary care physicians an efficient, multi-pronged and multidisciplinary approach to pain management. Unlike other common programs such as Project ECHO and University of Washington TelePain programs,<sup>22,23</sup> the AR-IMPACT Telemedicine Clinic is innovative in that it is patient-facing. The present study assesses implementation outcomes and preliminary effectiveness of the AR-IMPACT Telemedicine Clinic over a 12-month period.

## Methods

### Description of the AR-IMPACT Telemedicine Clinic and Study Design

The AR-IMPACT Telemedicine Clinic is composed of a multidisciplinary and inter-professional team of specialists from the University of Arkansas for Medical Sciences (UAMS). These specialists included a primary care physician/palliative care physician, physical therapist, addiction medicine psychiatrist, pain medicine physician, and a clinical pharmacist; specialists common in pain treatment models.<sup>24–26</sup> Prior to conducting the current study, we previously evaluated the educational arm of AR-IMPACT which consists of providing continuing medical education on opioid therapy for chronic pain and opioid use disorder treatment to clinicians.<sup>27</sup>

Using the AR-IMPACT team, we conducted a single-arm pilot trial of the AR-IMPACT Telemedicine Clinic with three rural, university-affiliated primary care clinics using a consultation model (ie, patients were referred to the AR-IMPACT team for a single consultation). To promote buy-in, we were invited to provide information on the AR-IMPACT Telemedicine Clinic at a group meeting of the primary care providers from these primary care clinics. Patients were referred to the program by their primary care provider, in conjunction with a licensed clinical social worker. The social worker coordinated with the patient to complete the intake paperwork for the program and schedule the patient's appointment with the AR-IMPACT team. Patients referred to the program had a single consult, via telemedicine from either their home or local primary care clinic, with the AR-IMPACT team. In this appointment, each member of the AR-IMPACT team did an assessment with the patient and allowed the patient to ask any questions. Assessments included mobility and range of motion evaluations (performed by the physical therapist), screening for opioid use disorder and other mental health disorders (eg, depression, tobacco use disorder; performed by the addiction psychiatrist), evaluations for whether the patient could be a good candidate for interventional procedures (performed by the interventional pain physician), evaluations of pain-related issues (eg, sleep hygiene, cognitive deficits) and setting of SMART goals (performed by the primary care/palliative care physician).<sup>28</sup> After the patient interview, the AR-IMPACT team members met briefly (10 minutes) together to develop a treatment plan. The plan was then discussed with the patient by the team and a final plan was documented in the patient's electronic medical record for the primary care provider to review and implement.

## Study Population

Patients with chronic pain and meeting at least one of the following characteristics were eligible for referral to the AR-IMPACT Telemedicine Clinic: (1) patients on opioid regimens of over 90 morphine milligram equivalents per day, (2) patients who have tried two or more treatment options with limited relief, (3) patients in need of opioid tapering assistance, or (4) patients suspected, but not confirmed, of having opioid use disorder. Patients with these characteristics were chosen because of the complexity of their pain care that typically then requires additional specialists to manage.

## Evaluation Plan

We used a mixed methods approach<sup>29</sup> and the implementation outcomes framework as defined by Proctor et al 2011<sup>30</sup> to evaluate the AR-IMPACT Telemedicine Clinic from its initiation (May 2020) to May 2021. The Proctor et al 2011 implementation outcomes framework is a commonly used framework to conceptualize and evaluate successful implementation of healthcare interventions.<sup>31–33</sup> The framework is composed of 8 implementation outcomes. For this evaluation, we assessed the outcomes of penetration, adoption, acceptability, appropriateness, and feasibility. Three outcomes were not assessed (ie, fidelity, implementation cost, and sustainability) as we did not have outside observations of the clinic appointments (for fidelity), bill for our services (to assess implementation cost) or have enough time pass before the point of data collection (for sustainability). See Proctor et al 2011 and other cited resources for further explanation of each implementation outcome.<sup>30,34,35</sup>

In addition to implementation outcomes, we also evaluated preliminary effectiveness.<sup>36</sup> While this study was not powered to assess changes in effectiveness measures, information was collected on preliminary effectiveness to prepare for a larger trial with the AR-IMPACT Telemedicine Clinic.

## Measures and Analysis

We used surveys, interviews, administrative data, and electronic health record data to measure the 5 implementation outcomes and preliminary effectiveness. We used the Acceptability of Intervention Measure, Intervention Appropriateness Measure, and Feasibility of Intervention Measure,<sup>37</sup> a validated survey instrument (all three measures in one instrument), to assess portions of acceptability (among providers), appropriateness, and feasibility. Additional questions were added to the end of this validated survey instrument to ask about barriers and facilitators to referring patients to AR-IMPACT. We also used patient satisfaction questions, adapted from a validated questionnaire assessing patient satisfaction with telehealth services, to assess acceptability among patients.<sup>38</sup> Patient satisfaction ratings were assessed on eleven Likert scale questions focused on different aspects of the consultation process. We report descriptive statistics from the patient satisfaction and physician surveys.

Interviews were conducted with patients and the AR-IMPACT team members to assess acceptability and feasibility respectively. Patient interview questions were guided by the i-PARIHS framework,<sup>39</sup> conducted by MG, and lasted roughly 30 minutes. Patient interviews were recorded and transcribed verbatim; codes were then generated using MAXQDA 2020.<sup>40</sup> Codes were categorized into four i-PARIHS constructs (Innovation, Recipients, Inner Context, and Outer Context). Inner and outer context refers to barriers that may be within the clinic or program and outside of the clinic or program (eg, upper administration, policy restrictions) respectively. AR-IMPACT team member interviews lasted approximately an hour and were conducted 12 months after the initiation of the AR-IMPACT Telemedicine Clinic. Interview questions were modified from the Consolidated Framework for Implementation Research interview guide (CFIR; version 1.0).<sup>41</sup> Interviews were recorded and transcribed verbatim; codes were then generated using MAXQDA 2020. Codes were categorized into the five CFIR constructs (Intervention Characteristics, Inner Setting, Outer Setting, Characteristics of Individuals, and Process).<sup>42</sup>

Administrative data were collected on the number of clinics adopting AR-IMPACT (to measure adoption), the number of days between patient intake and consultation, the number of patient summaries uploaded into the patient's electronic health record (both to measure feasibility), the number of patients receiving consultations, the number of physicians referring patients to AR-IMPACT, and patient demographic information (all three to measure penetration). Electronic health record data were obtained to measure preliminary effectiveness. Specifically, we assessed changes in patient opioid prescriptions, self-reported

**Table 1** AR-IMPACT Telemedicine Clinic Pilot Outcome Measures

Outcome	Participants	Instrument	Data Source
Penetration	Patients	Number of patients receiving consultations and their demographic information	Administrative Data
	Providers	Number of physicians referring patients to AR-IMPACT	Administrative Data
Adoption	Clinics	Number of clinics adopting AR-IMPACT	Administrative Data
Acceptability	Providers	Acceptability of Intervention Measure	Survey
	Patients	(1) Questions about i-PARIHS domains and (2) Patient satisfaction	(1) Interviews; (2) survey
Appropriateness	Providers	Intervention Appropriateness Measure	Survey
Feasibility	Providers	Feasibility of Intervention Measure	Survey
	AR-IMPACT Team Members	Questions derived from the Consolidated Framework for Implementation Research domains	Interviews
	Providers	Number of days between patient intake and consultation	Administrative Data
	Providers	Number of progress notes uploaded into the patient's electronic health record	Administrative Data
Preliminary Effectiveness	Patients	Changes in patient (1) opioid prescriptions, (2) self-reported pain and function levels using the Pain, Enjoyment, General Activity (PEG) scale, (3) self-reported depressive symptoms using Beck's Depression Inventory-II scale between referral and 3 months after AR-IMPACT consultation	(1) Electronic Health Record Data; (2–3) Survey

pain and function levels, and self-reported depressive symptoms between referral and 3 months after the AR-IMPACT consultation. Patient prescription data were gathered from the patient's electronic medical record. Prescriptions were converted to average morphine milligram equivalents per day to standardize across medication types. Pain and function levels were measured by the Pain, Enjoyment, General Activity (PEG) scale.<sup>43</sup> Depressive symptoms were measured by Beck's Depression Inventory-II.<sup>44</sup> We used paired t-tests to evaluate changes in these measures from baseline to 3 months after the AR-IMPACT consultation.<sup>45</sup>

A summary of the implementation outcomes and preliminary effectiveness measures and corresponding information on the participant type (eg, providers), instrument used, and data source are summarized in Table 1. This study was reviewed by the UAMS Institutional Review Board and determined to not be human subjects research (#260482). All participants provided informed consent for publication of anonymized responses.

## Results

### Penetration

A total of 13 physicians referred 23 patients to the AR-IMPACT Telemedicine Clinic. Our goal was to receive 2 referrals every clinic, which was held every two weeks (maximum of 52 patients). Therefore, our referral rate was about half of our maximum potential rate. Four (17.4%) patients opted not to have their data used in reporting. Of the 23 patients, 4 had their visit from their home. The rest had the visit from the primary care clinic, in which the primary care provider was not involved. However, the clinic nurse and social worker generally facilitated the process by checking the patient in and bringing the patient to a room with the telemedicine equipment. Of the 19 participating patients, 12 identified as women, and ages ranged from 20–81 years ( $M = 51.7$ ,  $SD = 14.7$ ; Table 2). Roughly half identified as White (52.6%) with another 31.6% identifying as Black. Educational attainment was low among this cohort; specifically, 21.1% did not finish high school. A significant proportion of patients had insurance through Medicare/Medicaid only (47.4%), and of the patients that completed the income portion ( $N=10$ ), the majority (80%) made less than \$18,000 per year.

**Table 2** Patient Sociodemographic Characteristics

	<b>N (%) or Mean <math>\pm</math> SD</b>
<b>Age (N = 19)</b>	51.7 $\pm$ 14.7
	Range: 20–81
<b>Sex (N = 19)</b>	
Female	12 (63.2)
Male	7 (36.8)
<b>Racial background/Ethnicity (N = 19)</b>	
Black	6 (31.6)
White	10 (52.6)
Hispanic	1 (5.3)
Native American/Alaskan Native	1 (5.3)
More than one race	1 (5.3)
<b>Education (N = 19)</b>	
Did not finish high school	4 (21.1)
High school graduate/GED	4 (21.1)
Completed trade school	1 (5.3)
Some college	1 (5.3)
Associate's degree	1 (5.3)
Bachelor's degree	4 (21.1)
No answer given	2 (10.6)
<b>Income (N = 10)</b>	
\$0 to \$999 per month (\$0 to \$11,999 per year)	4 (40.0)
\$1000 to \$1499 per month (\$12,000 to \$17,999 per year)	4 (40.0)
\$1500 to \$1999 per month (\$18,000 to \$23,999 per year)	0 (0)
\$2000 to \$2499 per month (\$24,000 to \$29,999 per year)	0 (0)
\$2500 to \$2999 per month (\$30,000 to \$35,999 per year)	1 (10.0)
Do not know/Not sure	1 (10.0)
<b>Health insurance provider (N = 19)</b>	
Medicare/Medicaid only	9 (47.4)
Private insurance only	4 (21.1)
Both Medicare/Medicaid and Private insurance	6 (31.6)
<b>Health Literacy (N = 10)</b>	
<i>How confident are you filling out forms by yourself?</i>	
All of the time	6 (60.0)

(Continued)

**Table 2** (Continued).

	<b>N (%) or Mean ± SD</b>
Most of the time	1 (10.0)
Some of the time	2 (20.0)
A little of the time	1 (10.0)
None of the time	0 (0)
<b>Regional Center Location (N = 19)</b>	
Southwest	16 (84.2)
Northwest	2 (10.6)
North Central	1 (5.3)
<b>Distance from clinic in miles (N = 10)</b>	7.8 ± 6.05
	Range: 2–20

### Adoption

Patients were referred from three of eight university-affiliated primary care clinics. All eight clinics were invited to refer patients. These three clinics were located in the corners of the state. The clinics included UAMS Southwest (located in Texarkana, AR), UAMS Northwest (located in Fayetteville, AR), and UAMS North Central (located in Batesville, AR). For reference, the AR-IMPACT team was located in Little Rock, which is in central Arkansas.

### Acceptability

Of the 13 physicians that referred patients, 10 were from UAMS Southwest, two from UAMS Northwest, and one from UAMS North Central. Seven physicians (53.8%) completed the Acceptability of Intervention Measure, Intervention Appropriateness Measure, and Feasibility of Intervention Measure.<sup>37</sup> Physicians’ responses to the Acceptability of Intervention questions were generally positive (Mean=4.63; Standard Deviation=0.45). Table 3 contains the full list of Likert-scale questions and corresponding responses; the Appendix contains the full list of the open-ended questions and corresponding responses.

**Table 3** Primary Care Physician Response Frequencies (n = 7)

	<b>Strongly Disagree</b>	<b>Somewhat Disagree</b>	<b>Neither Agree Nor Disagree</b>	<b>Somewhat Agree</b>	<b>Strongly Agree</b>
<b>Acceptability of Intervention Measure</b>					
The AR-IMPACT program meets my approval.	0	0	0	3	4
The AR-IMPACT program is appealing to me.	0	0	0	2	5
I like the AR-IMPACT program.	0	0	0	2	5
I welcome the AR-IMPACT program.	0	0	0	2	5
<b>Intervention Appropriateness Measure</b>					
The AR-IMPACT program seems fitting for patients with chronic pain.	0	0	0	1	6
The AR-IMPACT program seems suitable for patients with chronic pain.	0	0	0	1	6
The AR-IMPACT program seems applicable for patients with chronic pain.	0	0	0	2	5

(Continued)

**Table 3** (Continued).

	Strongly Disagree	Somewhat Disagree	Neither Agree Nor Disagree	Somewhat Agree	Strongly Agree
The AR-IMPACT program seems like a good match for patients with chronic pain.	0	0	0	1	6
<b>Feasibility of Intervention Measure</b>					
The AR-IMPACT program seems implementable in my practice.	0	0	0	3	4
The AR-IMPACT program seems possible.	0	0	0	1	6
The AR-IMPACT program seems doable.	0	0	0	2	5
The AR-IMPACT program seems easy to use.	0	0	1	2	4

**Table 4** Themes from Patient Interviews Identified for Each I-PARIHS Construct

i-PARIHS Constructs	Sub-Codes
<b>Innovation</b> <ul style="list-style-type: none"> <li>Codes relating to perceptions of any aspect of the AR-IMPACT consultation</li> </ul>	<ul style="list-style-type: none"> <li>Knowledge about the consultation</li> <li>Satisfaction with the consultation</li> <li>Relative advantage</li> </ul>
<b>Recipients</b> <ul style="list-style-type: none"> <li>Codes relating to characteristics about the patient, primary-care physicians, and consultation staff</li> </ul>	<ul style="list-style-type: none"> <li>Motivation to seek new treatment</li> <li>Values and beliefs about doctors and medicine</li> </ul>
<b>Inner Context</b> <ul style="list-style-type: none"> <li>Codes relating to descriptions of clinic experiences related to chronic pain treatment</li> </ul>	<ul style="list-style-type: none"> <li>Experience with doctors and treatments for chronic pain</li> </ul>
<b>Outer Context</b> <ul style="list-style-type: none"> <li>Codes relating to descriptions of societal experiences related to chronic pain treatment</li> </ul>	<ul style="list-style-type: none"> <li>Environmental or societal factors impacting treatment for chronic pain</li> <li>The impact of Covid-19 on receiving treatment</li> </ul>

Eight patients completed the survey and interview. Patient ratings were generally positive regarding satisfaction, with more than half of patients answering in the affirmative (Somewhat Agree or Strongly Agree) for every question. [Supplemental Table 1](#) contains the full list of questions and responses. For the qualitative interviews with these patients, codes are presented in [Table 4](#), grouped by each of the i-PARIHS constructs (ie, Innovation, Recipients, Inner Context, and Outer Context) and respective sub-codes (see below under each construct).

### Innovation: AR-IMPACT Telemedicine Clinic

#### Knowledge About the Consultation

Patients indicated little knowledge about the consultation prior to their appointment. All patients indicated that they knew nothing or “not much.” One patient remarked: “I didn’t know nothing about it. The doctor set up the appointment for me, told me it’d be a teleconference. And that’s all I knew about it.”

#### Satisfaction with the Consultation

Patients indicated high satisfaction with the consultation. Patients felt like the team was friendly, listened to their problems, and cared about helping them with their pain. As one patient said

Well I felt confident because all of them were talking to me, and explaining things to me, and they seemed like, they were very friendly and they will take an interest in my problem. And when a person or persons do that, you kind of gain a little, you know, confidence in what they were telling me.

## Relative Advantage

Patients specified the team approach was advantageous over their current care. Several patients (N=4) mentioned that being able to talk to several different specialists and get more than one opinion was very valuable. It was also mentioned that being able to see the specialists at the primary care clinic, instead of making a trip to the urban center was beneficial.

## Recipients of AR-IMPACT Telemedicine Clinic

### Motivation to Seek New Treatment

Motivation to seek new treatment was the primary chief complaint of why patients wanted to be referred to the AR-IMPACT Telemedicine Clinic. Many patients indicated they had tried different treatments for their pain without improvement. One patient said: “I wanted to find somebody that can help me, you know. And I was willing to do anything to do that.”

### Values and Beliefs About Doctors and Medicine

Several patients (N=3) indicated a general distrust of doctors and medicine. Patients stated that many doctors either do not believe them about their pain or encouraged unwanted medication; “Yes, I’m very mistrusting. I mean, I just felt like, you know, it was always pill pushing. Push the pill and I’m not a pill taker.” However, many patients indicated that it was trust in their current primary care physician that gave them confidence to be referred to the AR-IMPACT Telemedicine Clinic. One patient said: “Yes. And I trust my doctor... Because he’s the one that set it up for me to do and I kind of liked it. He hasn’t led me astray.”

## Inner Context

### Negative Experience with Doctors and Treatments for Chronic Pain

Patients were relatively negative about their past experiences receiving treatment for chronic pain, leading to their distrust of doctors. One patient specifically mentioned:

First off, a lot of doctors especially around this kind of area, don’t believe that you’re hurt. Or they believe that they know your pain even though they’ve never been in it. You know, I know there’s a lot of people that do that for pills... I honestly believe more doctors are in it these days for the insurance money than to help patients. Yeah, I know not all doctors are like that, but there are a lot that are.

## Outer Context

### Environmental or Societal Factors Impacting Treatment for Chronic Pain

Patients indicated societal stigma for those in chronic pain. Patients mentioned that people tend to look at them like they are faking or that they are just looking for pain pill prescriptions. One patient mentioned how this impacted her mental health:

First it fosters depression and then when you get depressed you don’t want to come out, and then society, looks at us like we’re faking. They really think we’re faking, ‘oh you’re not that bad, my neck hurts sometimes’. Or ‘You’re just saying that.’

## The Impact of COVID-19 on Receiving Treatment

A few patients mentioned the difficulty of getting treatment during the COVID-19 pandemic. Patients mentioned problems such as delays, not wanting to go into a hospital for fear of catching the virus, and problems using public transportation to see their doctor. When asked about receiving treatment during COVID-19, one patient said, “I have to use public transportation, so that is kind of a problem.”

## Appropriateness

Like the Acceptability of Intervention domain, physicians’ responses to the Intervention Appropriateness questions were generally positive (M=4.79; SD=0.37; Table 3).

## Feasibility

Average time between patient referral and consultation was approximately three weeks. A progress note was uploaded into the electronic health record for each of the 23 patients who had a clinic visit with the AR-IMPACT team. Like the

**Table 5** Themes Identified from AR-IMPACT Team Interviews from Each CFIR Construct

CFIR Constructs	Sub-Codes
<b>Characteristics of Intervention</b> <ul style="list-style-type: none"> <li>Codes relating to attributes of the intervention that influenced its success</li> </ul>	<ul style="list-style-type: none"> <li><b>Evidence strength and quality</b></li> <li><b>Relative advantage</b></li> <li><b>Adaptability</b></li> <li><b>Cost</b></li> </ul>
<b>Individuals Involved</b> <ul style="list-style-type: none"> <li>Codes relating to characteristics about the AR-IMPACT team members and their beliefs</li> </ul>	<ul style="list-style-type: none"> <li><b>Knowledge and beliefs about intervention</b></li> <li><b>Personal attributes</b></li> </ul>
<b>Inner Setting</b> <ul style="list-style-type: none"> <li>Codes relating to factors within the AR-IMPACT team and organization</li> </ul>	<ul style="list-style-type: none"> <li><b>Networks and communication</b></li> </ul>
<b>Outer Setting</b> <ul style="list-style-type: none"> <li>Codes relating to factors outside of the AR-IMPACT team and organization</li> </ul>	<ul style="list-style-type: none"> <li><b>Patients' needs and resources</b></li> </ul>
<b>Implementation Process</b> <ul style="list-style-type: none"> <li>Codes relating to factors in the implementation process that contributed to its success</li> </ul>	<ul style="list-style-type: none"> <li><b>Champions</b></li> <li><b>Executing</b></li> </ul>

Acceptability of Intervention and Intervention Appropriateness domains, physicians' responses to the Feasibility of Interventions questions were also generally positive ( $M=4.58$ ;  $SD=0.47$ ; Table 3).

Key informant interviews were conducted with all five members of the AR-IMPACT team (ie primary care physician/palliative care physician, physical therapist, addiction medicine psychiatrist, pain medicine physician, clinical pharmacist), a key research assistant to the team, and a behavioral health specialist who advocated for referrals at one of the participating clinics. Coding of interviews with key informants responsible for the implementation of AR-IMPACT yielded 9 sub-codes that were situated within the CFIR framework. These sub-codes (see below under each construct) and their relevant CFIR constructs (ie, Intervention Characteristics, Inner Setting, Outer Setting, Characteristics of Individuals, and Process) are also presented in Table 5.

## Characteristics of Intervention

### Evidence Strength and Quality

Multiple AR-IMPACT team members indicated that multidisciplinary models for pain management have shown better effectiveness and were the model for the AR-IMPACT Telemedicine Clinic. Members believed that the strength and quality of the evidence indicated that a multidisciplinary approach to pain management would be beneficial to patients in Arkansas. A unique aspect that was added was performing the team-based consultation via telemedicine. One team member explained:

There aren't many true multidisciplinary chronic pain clinics operating in Arkansas as a whole, including Little Rock, where they have access to a psychiatrist, a physical therapist, a pain physician, and PCP, someone who can actually look at all aspects of it, a pharmacist, I need to include that as well.

### Relative Advantage

The AR-IMPACT team agreed that there were several advantages of the AR-IMPACT Telemedicine Clinic over other treatments. Seeing all the specialists at once via telemedicine reduced the travel time and cost for patients. Many patients would not have been able to travel to the urban city to see the specialists in person and seeing five separate specialists could take a year or more if seen separately. Seeing each of the specialists separately would also likely not confer the same benefit as seeing them together. One team member said: "even if you see them separately, they're not all coming

together to discuss the patient as a whole, and how they each can work together to reach the goal” indicating that the team model’s synergy is a key advantage. Lastly, the team said that a key piece of the consultation was working with the patient to establish what the goals and priorities of the patient were. They felt this made the patients feel like they were being heard and self-empowered to make beneficial changes in their life.

### Adaptability

The core part of the program was to offer a multidisciplinary, team-based consultation to patients with chronic pain, via telemedicine. The team indicated some areas of adaptability outside of that core function. One area that the team adapted was the length of the referral paperwork. The team received feedback from a social worker who was assisting patients that the patients were frustrated with the length of the intake paperwork. The team was able to condense the forms after receiving this feedback.

The team also indicated there was some hesitancy on the part of the physicians for the team to give recommendations to the patients before talking to the patients’ primary care providers from the rural clinics. For this reason, the team adapted their recommendations, as one team member describes:

Because you know, the other thing that we were trying to do there was tailor to the patients as the individuals because we didn’t want to spend an hour with the patient, and then walk away and not give them any recommendations about the next steps. So, what we tried to do specifically for [primary care clinic] to tailor both to the individuals and the physicians there was we tried to make the recommendations to the [primary care clinic] patients more generic, higher level, and then when we wrote it up to the physician provided more details.

### Cost

Cost had positive and negative factors for the AR-IMPACT Telemedicine Clinic. On the clinic side, cost was a negative attribute. There is uncertainty around billing and cost structure would look like for a team of five specialists if the program was not grant funded. Financial feasibility was indicated as one of the greatest challenges of the program.

So, I think one of the biggest disadvantages of this AR-IMPACT model is how costly it would be in a traditional system. When you have this many specialists, the question is, how do we work out billing if we weren’t grant funded? And what would that look like? ...it would be a pretty expensive intervention for most patients.

For the patients in the pilot program, cost was a positive attribute, because they received the intervention free of charge and limited costs to travel, which is key when patients drive long distances in a rural state where most counties are designated as medically underserved areas.<sup>46</sup> However, as indicated above, that may not be the case in a larger roll-out, and it is unclear how insurance coverage would handle it.

### Inner Setting

#### Networks and Communication

Quality communication was maintained by the AR-IMPACT team members. The team was close-knit and had worked together on a previous program to provide education to clinicians. Members indicated that the team made decisions together regarding when to adapt the program. Communication between team members during the consultations was stated as an unexpected added benefit. One team member said:

You know, so we use [Microsoft] Teams quite a bit for our patient interviews, and we always had like a team chat going, while the patient is talking. And there was lots of conversation in between physicians...you know, one provider’s asking another, what do they think about this about what the patient said, so there was a lot of chat in between providers. It really wasn’t the case where it was this provider did their thing, this provider did their thing, and then all the recommendations came together, you know, in isolation.

## Outer Setting

### Patients' Needs and Resources

The AR-IMPACT Telemedicine Clinic was patient-centered and took care to meet the needs of its patients with chronic pain. Most of the patients lived in rural areas and would not have access to the array of specialists provided by the AR-IMPACT Telemedicine Clinic. Providing the consultation service to patients in rural areas was one of the key objectives of the program. The team also coordinated with behavioral health specialists at participating sites to identify ideal candidates and help them through the referral process. These behavioral health specialists were one of the most instrumental pieces in getting patients enrolled and ready for the consultation. One team member stated:

One of the first questions that we would ask is what is most important to the patient. So better understanding their priorities, values, what matters to them, and what their goals were, not just in the big picture, but what their goal was and their expectation of us as a panel, while we were there serving them for that hour's time. So I would say, as part of patient centered care, which is all of our goal, they were at the heart of what we were trying to do to better improve their quality of life and their pain.

## Characteristics of Individuals

### Knowledge and Beliefs About the Intervention

The individuals on the team were knowledgeable about the state of the literature on best practices for treating chronic pain. Prior to the current intervention, the team provided educational lectures and consultations to clinicians around the world. One team member said: "we did over 80 presentations, 63 or 64 of which are on learn on demand [an online platform for continuing medical education], so for enduring materials" demonstrating their expertise on the topic of chronic pain management.

## Implementation Process

### Champions

The team identified several champions that were integral to the implementation of the AR-IMPACT Telemedicine Clinic. The first champion was Director of Behavioral Health for the university-affiliated, primary care clinics who supported the team with the initial rollout after funding. She guided the team in contacting the physicians at the primary care clinics for the initial presentations. The second champion was the Chief Medical Officer for the university-affiliated, primary care clinics. This champion referred the most patients to the AR-IMPACT Telemedicine Clinic and gave testimonials about his experience with referring patients to the physicians at the other primary care clinics. The third champion for the AR-IMPACT Telemedicine Clinic was the behavioral health specialist/licensed clinical social worker at UAMS Southwest. She was seen by the team as playing a central role to getting patients referred to the clinic. One team member said:

We didn't have a huge budget, so we couldn't fund a logistics person at each site. But when we had buy-in from someone who was willing to do it and wanted to do it on their own, that's when we had some pretty good uptake, like with. [the behavioral health specialist at UAMS Southwest]

## Executing

The AR-IMPACT team implemented the telemedicine clinic according to plan; however, the number of referrals were less than planned. The primary barrier to patient referrals was getting buy-in from physicians. One potential reason the team cited for this is physicians not understanding the benefits of sending a patient with chronic pain to a multidisciplinary group of specialists. One team member said:

I think that sometimes they don't recognize how much psychiatric conditions play into the patient's pain issues. You know, I don't think that they always recognize that if they treat their depression better, that they're going to get better pain outcomes. So, there's probably a lack of seeing a need for some of these other specialists.

Another reason that was cited as a barrier to physician buy-in was a potential lack of trust between physicians and the team from Little Rock. Members of the AR-IMPACT team, as well as the behavioral health specialist at UAMS

Southwest, thought there may be a division between the university-affiliated, primary care clinics and the central UAMS campus. One team member said:

I personally think that there are some deep fractures and long wounds that would have been impossible to heal between us and the regional centers... and I think we were casualties of a lot of those politics.

## Preliminary Effectiveness

### Average Daily Morphine Milligram Equivalents

At intake, 13 out of 19 patients were prescribed opioids, with the six others using muscle relaxers or nonsteroidal, anti-inflammatory medications for pain relief. Of those prescribed opioid therapy, the average MME per day at intake was 60.3, with a range of 10–180 MME (< 50 MME per day recommended by Centers for Disease Control and Prevention guidelines).<sup>47</sup> At post-intervention, four of the 13 patients that were prescribed opioid therapy had decreased their dosages, with one discontinuing opioid therapy. Of those patients that reduced their opioid prescriptions, the average reduction was 13.75 MME per day; however, these differences in means were not statistically different ( $t=-0.496$ ,  $p=0.626$ ).

### Pain and Depression Assessments

Eight patients completed pain and depression measures. Their mean pain rating on the pain functioning scale was 8.5 (SD = 1.2; PEG  $\geq 7$  indicative of severe pain interference) at baseline<sup>48</sup> and 7.9 (SD = 1.75) at the three-month follow-up.<sup>43</sup> Differences between mean scores at baseline and at 3 months of follow-up were not statistically different ( $t=0.942$ ,  $p=0.378$ ); however, a moderate effect size for the PEG scale is 0.5.<sup>43</sup> Similarly, their mean score on Beck's Depression Inventory-II was 29.6 (SD = 12.5) at baseline (moderate depression=17-29, severe depression>30)<sup>49</sup> and 23.5 (SD = 17.3) at the three-month follow-up but were not statistically different ( $t=1.655$ ,  $p=0.149$ ). A reduction of 17.5% (roughly 5 points for this cohort) is considered a minimal clinically important change in baseline and follow-up scores on the Beck's Depression Inventory-II.<sup>50</sup>

## Discussion

To our knowledge, this is the first pilot study of a telemedicine, multidisciplinary clinic for chronic pain with an extensive panel of providers. In-person multidisciplinary pain clinics are now quite common in many countries such as the United States, Australia, and Canada.<sup>51-54</sup> With the onset of the COVID-19 pandemic, many clinics had to incorporate more telehealth options than prior to the pandemic, but access remains an issue.<sup>55,56</sup> We evaluated the AR-IMPACT Telemedicine Clinic's goal of providing patients' and physicians' access to a multi-pronged approach to pain management using an implementation framework and patient-centered endpoints of preliminary effectiveness. Implemented over 12 months during the COVID-19 pandemic, the AR-IMPACT Telemedicine Clinic obtained moderate penetration and adoption, was highly acceptable to patients, was highly acceptable and appropriate to providers, and was moderately feasible to providers and AR-IMPACT team members. Despite AR-IMPACT's acceptability among patients, we found a champion working as a logistics person with physicians is the key facilitator to getting patients referred to the program. In fact, most of our patient consults came from the site with the most engaged champion.

Other studies evaluating multidisciplinary, telemedicine-based interventions have used limited multidisciplinary teams. For example, Kroenke et al compared a telephone-delivered collaborative care management intervention (ie, nurse care manager and physician pain specialist) for chronic pain as compared to usual care. They found that, on average, those randomized to receive the telephone-delivered intervention had lower score on the Brief Pain Inventory, a similar instrument for measuring pain and function to the PEG scale.<sup>24</sup> Another study in Australia evaluated clinicians' perspectives of a home-based multidisciplinary telehealth clinic for patients with chronic spinal pain that included specialists in physiotherapy, occupational therapy, psychology, dietetics, and pharmacy. The authors found that clinicians' confidence in providing treatment via telemedicine and acceptance of the model improved over time.<sup>57</sup>

Our study adds to the growing body of literature that acceptability of telemedicine for pain is generally high among patients, particularly high for multidisciplinary clinics, and may improve access to high-quality pain care. A recent study

by Jalilian et al found that 92% of patients seen via telemedicine within a pain division at an urban academic medical center were satisfied with their care via telemedicine.<sup>58</sup> Another study by Harnik et al found patients' acceptance of telemedicine during the COVID-19 pandemic was high overall but lower among those with levels of pain and anxiety higher than the mean indicating telemedicine may not suffice for this subgroup.<sup>59</sup> Another recent narrative review detailed best practices for telehealth use and remote physical examinations.<sup>60</sup> Other studies of single provider delivery of telemedicine interventions for chronic pain have found that patients generally find delivery of these interventions via telemedicine acceptable.<sup>61,62</sup>

## Limitations

This study has several limitations. First, this study used a single-arm pilot design. Therefore, we do not have a comparator group to assess differences in those patients who received a consultation from the AR-IMPACT Telemedicine Clinic and those who received only usual care. Second, this study used a short follow-up period, only 3 months. We did not follow patients beyond 3 months to see if changes were sustained over time (eg, 12 months). Third, our patient follow-up rate to assess preliminary effectiveness and implementation outcomes was low (8 of 19 patients, 42.1%). Therefore, it is difficult to know the full experiences and outcomes of the clinic. Fourth, the consultation model used here limits the interventions that can be implemented by the AR-IMPACT team. Fifth, this study could suffer from self-inclusion bias in that only those physicians who referred to the program were surveyed about the program. Future work should focus on understanding the implementation barriers among those physicians who did not refer to the program.

## Conclusion

The AR-IMPACT Telemedicine Clinic is composed of a multidisciplinary and inter-professional team of specialists who provide patients and physicians a multi-pronged approach to pain management via telemedicine. Overall, the AR-IMPACT Telemedicine Clinic obtained moderate penetration and adoption, was highly acceptable to patients, was highly acceptable and appropriate to providers, and moderately feasible to providers and AR-IMPACT team members. Future studies should evaluate whether this AR-IMPACT model improves access to high-quality pain care and patient-centered measures of effectiveness as compared to usual care.

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