

# Multimodal Care for Knee and Hip Osteoarthritis: A Pilot Feasibility Study of a Novel Approach to a Common Problem

Kathryn A. Miller, MD; Linda M. Baier Manwell, MS; David Rabago, MD

## ABSTRACT

**Background:** Osteoarthritis is common and debilitating. Evidence-based care exists; there is a gap between recommended and received care. Multimodal treatment is recommended, with unknown effectiveness. We report pilot feasibility data for a new university-based clinic providing multimodal care for knee and hip osteoarthritis (KHOA).

**Methods:** Quality-improvement case series with the first 50 patients. A multidisciplinary team provided care. Feasibility outcomes included treatment duration, patient adherence, provision of guideline-recommended care, and satisfaction. Secondary outcomes included self-reported and objectively assessed patient measures.

**Results:** Fifty patients (59±10.5 years, 32 female) received guideline-recommended care; 40 adhered to 3.83±2.21 follow-up visits over 12.24±7.79 months; satisfaction was high. Objectively assessed outcomes improved, but self-reported outcomes did not.

**Discussion:** Early data suggest multimodal care for knee and hip osteoarthritis is feasible and may be associated with improved outcomes.

## BACKGROUND

Knee and hip osteoarthritis (KHOA) are the most common forms of arthritis, affecting over one-third of older Americans. Their prevalence is rising with the population's age and weight; 43% of Wisconsin adults report functional limitations due to arthritis.<sup>1</sup> KHOA leads to increased morbidity and mortality, lost productivity, and worsening quality of life.<sup>2</sup> It is associated with metabolic

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**Author Affiliations:** Division of General Internal Medicine, Department of Medicine, University of Wisconsin School of Medicine and Public Health (UWSMPH), Madison, Wis (Miller, Baier Manwell); Department of Family Medicine and Community Health, UWSMPH, Madison, Wis (Rabago).

**Corresponding Author:** Kathryn A. Miller, MD, Division of General Internal Medicine, Department of Medicine, University of Wisconsin School of Madison and Public Health, 2828 Marshall Court, Suite 100, Madison, WI 53705; phone 608.263.1631; email Kathryn.Miller2@uwmf.wisc.edu.

syndrome, diabetes, cardiovascular disease, and falls,<sup>2</sup> which complicate the management of each.

KHOA treatment is challenging and should be tailored to individual patient needs.<sup>3</sup> Care can involve surgery, which is expensive, has risks, and is not available or appropriate for everyone. Many patients require long-term medications, including nonsteroidal anti-inflammatory drugs and opioids, which have limited effectiveness and major side effects; curbing opioid use is a national priority. National agencies including The Institute of Medicine call for new approaches to osteoarthritis care.<sup>4</sup>

Practice guidelines and consensus statements recommend 6 evidence-based core care strategies: (1) education on disease and self-management; (2) assessments of pain, function, and quality of life; (3) nutritional assessment and counseling with weight loss for overweight patients; (4) medication counseling and management; (5) physical activity counseling and management; and (6) psychological health assessments of coping and mood.<sup>5</sup> Each strategy improves outcomes but is only partially effective. Little is known about patient receipt of core strategies. A European study found only 48% of patients with knee osteoarthritis receive guideline-recommended treatment.<sup>6</sup> A US study of frail patients over age 75 reported that 57% received some guideline-recommended care for osteoarthritis.<sup>7</sup> A medical record review of KHOA care at UW Health from 2011 to 2017 revealed that only 33% of patients received all core care components. Interviews by the study team with UW Health primary care physicians and patients revealed patient and care team barriers to provision and uptake of guideline-driven care.

Coordinated delivery of all core care elements across multi-specialty teams, ie, multimodal care, may be synergistic<sup>8</sup> and is

recommended for ongoing KHOA management by the Osteoarthritis Research Society International (OARSI).<sup>5</sup> No reports describe multimodal KHOA care in the United States and the evidence for it worldwide is limited.<sup>9</sup> In 2017, the lead author (KAM) founded the UW Health Knee and Hip Comprehensive Non-Surgical Osteoarthritis Management Clinic (UW KHOA Clinic) to provide individually tailored, multimodal care. We conducted a pilot-level quality improvement (QI) project to explore clinic feasibility and initial patient-oriented effects.

## METHODS

### Study Design

Data from the UW KHOA Clinic (July 1, 2017 to June 30, 2019) were analyzed. Institutional Review Board review was not required; in accordance with federal regulations, this QI project does not constitute research as defined under 45 CFR 46.102(d). This report follows Squire 2 guidelines for QI reporting.

The clinic was designed by the lead author and medical director (KAM) and stakeholder colleagues, informed by OARSI recommendations<sup>5</sup> to: (1) decrease gaps between guideline-recommended and received care, (2) improve KHOA-specific outcomes, and (3) reduce the negative impact of common associated conditions including medication-related adverse effects. Clinical operations were developed over 8 months with input from patients, clinicians, and UW Health administrative leadership. The clinic opened in July 2017 at 1 day per week.

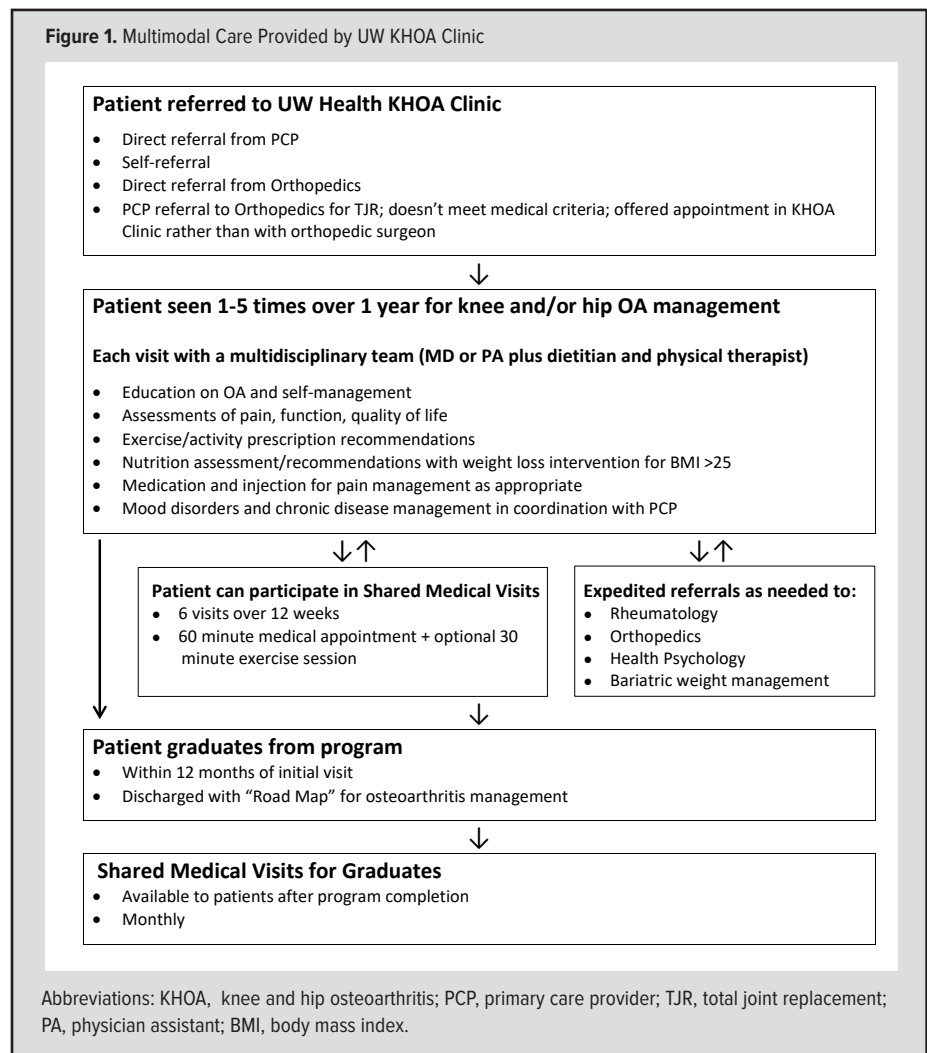
### Participants and Settings

Eligibility criteria included adult patients with a diagnosis of knee or hip osteoarthritis who visited the UW KHOA Clinic at least once.

### Intervention

A team comprised of a general internist, physical therapist, and dietitian provided multimodal care guided by patient history, symptoms, health, and function (Figure 1). Expedited referrals were made to health psychologists, and for ultrasound-guided injections, nerve blocks, and rheumatologic or orthopedic care as needed. Patients were seen 1 to 5 times over 6 to 12 months and could choose to participate in shared medical visits (six 1-hour visits over 12 weeks) to focus on lifestyle changes, goal setting, recipe

**Figure 1.** Multimodal Care Provided by UW KHOA Clinic

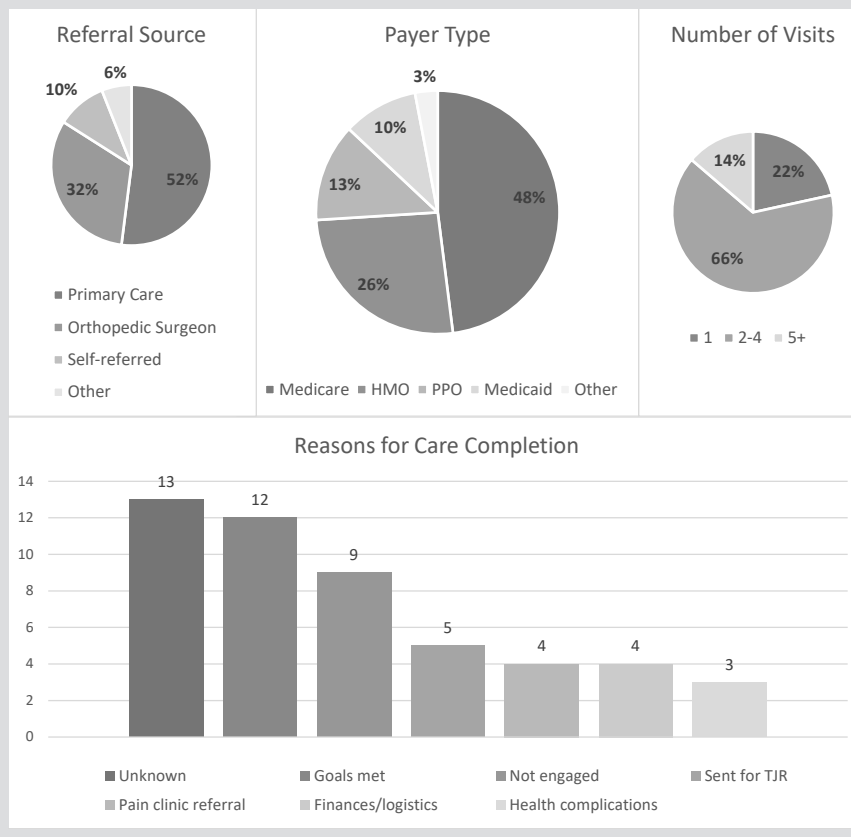


sharing, pharmacologic options, and the role of surgical intervention. These visits were physician-led with support from clinic multidisciplinary team members. A no-cost, 30-minute exercise session was available after each visit.

### Outcome Measures

The primary clinic feasibility outcomes were treatment duration, patient adherence, patient satisfaction, and percent of patients receiving all 6 evidence-based core care strategies: (1) disease/self-management education; (2) pain, function, quality of life assessments; (3) nutritional assessment/counseling with weight loss for body mass index (BMI) >25; (4) medication counseling/management; (5) physical activity counseling/management; and (6) coping/mood psychological health assessments. Secondary outcomes included self-reported and objectively assessed patient measures: Pain and Mental Health subscales from the Veterans Rand 12-Item Health Survey (VR-12); Hip Disability and Osteoarthritis Outcome Score (HOOS) and/or the Knee Injury and Osteoarthritis Outcome Score (KOOS); 3 tests of function (Timed Up and Go [TUG], 30-Second Chair Stand, Single Leg

**Figure 2.** UW KHOA Clinic Operations (Referral Source, Payer Type, Number of Visits Completed, and Reason for Discharge for the First 50 Patients)



Abbreviations: PPO, Preferred Provider Organization; HMO, Health Maintenance Organization; TJR, total joint replacement.

Stance); and BMI. Outcomes were assessed in person at each clinic visit.

### Sample Size and Analysis

Uptake of multimodal care for KHOA has not been assessed. For this pilot project, a convenience sample of the first 50 consecutive patients who completed a visit at the clinic was used. Descriptive statistics described the sample (mean ± standard deviation). Baseline and follow-up variables were compared using paired 2-tailed *t*-tests. A 2-sided *P*-value <0.05 was used to determine statistical significance.

### RESULTS

Baseline characteristics for the first 50 patients (Table) indicate that most were female (64%) and middle-aged (59±10.5 years). Nearly half (44%) were active or former tobacco users, and 44% had ≥ 5 coexisting conditions. Multi-joint osteoarthritis was prevalent, with 48% reporting pain in more than 1 hip and/or knee. One-third (32%) were taking chronic opioid medications. Average weight was 256 pounds and most (82%) had a BMI ≥ 30 kg/m<sup>2</sup>. VR-12 scores reflected moderate to high disease severity and pain, and moderate to low general health and functional status.

Half of patients (52%) were referred by primary care (Figure 2) and insured by Medicare (48%). The most common visit frequency was 2 to 4 times. The most frequent reasons for clinic discharge were lost to follow-up (26%), goals met (24%), and lack of engagement (18%).

All 50 patients received recommendations and assessments related to the 6 core evidence-based care strategies during their first visit. Patient satisfaction data limited to this cohort of 50 patients are not available; aggregate data for all patients seen through June 2019 indicate that 87.7% would highly/very highly recommend the clinic to a friend. Reasons for dissatisfaction were frustration about not being seen by an orthopedic surgeon or not being a candidate for total joint replacement.

Forty patients (80%) returned 1 or more times for ongoing care, attending 3.8±2.1 visits over a maximum of 18 months (Table). Twenty-three (46%) lost weight over the treatment period; 11 (22%) of these lost more than 5% of initial weight. There were no clinically significant improvements in HOOS/KOOS measures or VR-12 physical subscale scores. VR-12 mental health subscale scores showed a statistically significant (*P*=0.022) but not clinically important improvement. Functional status improved. At baseline, 15% of patients completed the benchmark of at least 14 chair stand rises; at end of treatment, 35% reached this goal. At baseline 35% achieved the TUG benchmark of less than 12 seconds to complete the activity; this increased to 50% by treatment end.

### SUMMARY

This pilot-level quality improvement project assessing multimodal care for KHOA suggests 2 principal findings. First, this clinic appears feasible based on patient receipt of guideline-recommended care, their willingness to attend multimodal care clinic visits over time, and a report of high satisfaction with such care. Second, the clinic was able to assess self-reported and objectively assessed outcomes as part of routine clinic function, and some of these outcomes improved. While this pilot-level project is not powered to detect pre-post differences in these outcomes, our findings provide a rationale for expansion of clinic hours and suggest the need for formal outcomes assessment and dissemination work.

These findings are consistent with the limited data on multimodal care for osteoarthritis and other conditions. Somewhat similar care models are reported to be feasible and acceptable

outside of the United States; 1 study reported that patients receiving multimodal osteoarthritis care had significantly higher patient satisfaction scores than usual care.<sup>10</sup> Limitations to the current QI study include those inherent to a QI study, a small sample size, and lack of patient satisfaction data for this specific cohort.

Concomitant multimodal care may offer advantages over serial strategies due to synergy between elements of care.<sup>9</sup> Each of the six evidence-based core treatment strategies for KHOA partially addresses the underlying constellation of factors associated with pain and functional limitation. Removing the barriers to receipt of comprehensive care by offering all core treatment strategies in a single clinic may mitigate barriers for patients. A supportive multidisciplinary team may enhance patients' self-efficacy by reinforcing evidence-based self-management strategies across disciplines.

### Implications for Clinical Care and Research

The positive aspects we report here have been matched by subsequent UW KHOA Clinic experience. There is a 3-month wait for an initial appointment. Future plans include expanding clinical operations to better address patient needs, including implementing daily operation, expanding the current clinic offerings through shared medical visits, and using an online platform to asynchronously support patients between visits. Plans also include robust research efforts to assess patient outcomes and program costs, and conduct of formal efficacy and effectiveness research.

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**Table.** Pilot Outcomes From the First 50 Patients in the UW KHOA Clinic

Outcome	First 50 Patients	40/50 Patients (80%) Completing 2+ Visits		
		Baseline (n=40)	Final (n=40)	P-value
		Average Number of Visits 3.83 (±2.21) Average Duration of Treatment 12.24 Months (±7.79)		
Female sex	32 (64%)	25 (62.5%)		
Age (years)	59±10.5	61±8.25		
Tobacco use				
Current	6 (12%)	4 (10%)		
Former	16 (32%)	14 (35%)		
Coexisting conditions				
0	6 (12%)	3 (7.5%)		
1	4 (8%)	2 (5%)		
2-4	18 (36%)	16 (40%)		
5+	22 (44%)	19 (47.5%)		
Joint involvement				
1 Knee	15 (30%)	13 (32.5%)		
1 Hip	11 (22%)	8 (20%)		
Multi-joint	24 (48%)	19 (47.5%)		
Chronic opioid use	16 (32%)	13 (32.5%)		
Body weight (lbs)	256 (±68.22)	251.05 (±69.23)	241.30 (±67.22)	0.006
BMI (m/kg <sup>2</sup> )	39.11 (±9.56)	39.77 (±9.52)	38.19 (±9.24)	0.005
VR 12 mental subscale <sup>a</sup>	45.44 (±13.77)	42.69 (±12.30)	44.92 (±13.23)	0.022
VR 12 physical subscale <sup>a</sup>	28.98 (±9.57)	28.49 (±9.74)	30.25 (±9.10)	0.101
30 sec chair rise (#no. rises)	9.58 (±4.23)	9.43 (±4.94)	11.51 (±4.56)	<0.001
30 second chair rise (no. of patients completing ≥14)	8 (16%)	6 (15%)	14 (35%)	
TUG (seconds)	12.56 ± 6.78	11.48 (±5.35)	10.93 (±4.92)	0.296
TUG (no. of patients completing in <12 seconds)	12 (24%)	14 (35%)	20 (50%)	

Abbreviations: BMI, body mass index; VR, Veterans Rand; TUG, Timed Up and Go.  
<sup>a</sup>US population norm of 50; lower scores denote more symptoms.

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