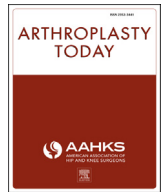




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Arthroplasty in patients with rare conditions

## Joint replacement surgery in homeless veterans

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## ABSTRACT

Total joint arthroplasty (TJA) in a homeless patient is generally considered contraindicated. Here, we report our known medical and social (housing and employment) results of homeless veterans who had TJA. Thirty-seven TJAs were performed on 33 homeless patients (31 men) at our hospital between November 2000 and March 2014. This was 1.2% of all TJAs. Average age was 54 years. Average hospital stay was 4.1 days. There were no major inpatient complications. Thirty-four cases had at least 1-year follow-up in any clinic within the Veterans Affairs health care system. There were no known surgery-related reoperations or readmissions. At final follow-up, 24 patients had stable housing and 9 were employed. The extensive and coordinated medical and social services that were provided to veterans from the Department of Veterans Affairs contributed to our positive results.

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## Introduction

The Veteran population is disproportionally affected by homelessness. There are an estimated 49,933 homeless veterans, comprising over 8% of the American homeless population [1]. As in the general population, some veterans, including homeless veterans, develop severe and debilitating osteoarthritis of the hip or knee.

Joint replacement surgery is an effective and widely used treatment for advanced arthritis of the hip and knee. Overall, 14,349 primary joint replacement cases were performed in the Veterans Affairs (VA) health care system in 2015 [2]. From fiscal year 2011 to fiscal year 2015, joint replacement case volume in the VA health care system increased 21% [2]. Many studies have shown the positive impact of joint replacement surgery on health-related quality of life, mobility, and pain reduction in the general population [3]. By relieving pain and improving function, joint replacement surgery allows patients to preserve an independent lifestyle that contributes to social interaction and psychological well-being [4–6]. These

benefits are seen early in the postoperative period and can last for decades [5,7,8].

Despite these potential benefits, recommending joint replacement surgery to a homeless veteran is difficult due to comorbidities that are prevalent in the homeless population. Smoking, alcohol misuse, drug dependency, food insufficiency, obstructive lung disease, liver conditions, renal insufficiency, dental problems, and many psychiatric conditions have all been found to be more prevalent in the homeless population compared with the nonhomeless population [9]. Overall, homeless individuals are about twice as likely to have untreated chronic medical conditions, struggles with substance abuse, and mental illness than the general population [9–11]. In addition to the medical risks caused by these various chronic medical conditions, substance abuse and mental illness may compromise a patient's ability to adhere to postoperative precautions and thus increase their risk of postoperative complications. High prevalence of poor dentition put the homeless at increased risk of transient bacteremia, which may subsequently seed a prosthetic implant [12,13]. Unsanitary living conditions also pose a concern for proper hygiene and wound care. In addition, there is evidence that the rate of methicillin-resistant *Staphylococcus aureus* colonization among the homeless may be 10–20 times greater than it is in the general population [14]. Exacerbating matters, homeless patients commonly lack access to transportation for reliable follow-up. Understandably, homelessness is generally

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considered to be a contraindication to elective joint replacement surgery.

Many of these homelessness-related risk factors for postoperative complications, however, are manageable or reversible. This is particularly true in the VA health care system where there are resources that are not available to the general population. At our institution, all patients (homeless or nonhomeless) presenting with advanced osteoarthritis of the hip or knee undergo a thorough preoperative screening process. In addition to a thorough history and physical examination, all patients are routinely screened with standard preoperative laboratory tests that include complete blood count, comprehensive metabolic panel, and international normalized ratio. Among other medical problems, these tests serve to identify abnormalities in liver or renal function that are prevalent in homeless patients and trigger appropriate referrals to specialists as needed. All patients are screened for blood glucose abnormalities and HbA1C which will trigger a referral to the primary care doctor to manage uncontrolled diabetes. In addition, we screen all surgical patients for HCV antibody, which will trigger a referral to the liver clinic if hepatitis is poorly controlled or viral infection was not previously known. We discontinued screening for HIV after we found that we failed to identify any patients who were HIV positive who were not already known to be HIV positive. All patients undergo a drug screen and will not proceed to surgery if the drug screen returns a positive result for any substance that is not prescribed. All patients are also screened for alcohol misuse, currently with the AUDIT-C [15], although other screens were used before our adoption of the AUDIT-C. For both drug and alcohol abuse, surgery is deferred and patients are referred to alcohol and drug treatment programs that are available from the VA. All chronic conditions such as diabetes, coronary artery disease, hypertension, pulmonary disease, renal disease, and hepatitis are evaluated and optimized by the primary care physician or the appropriate specialist. Psychiatric conditions that are deemed to be poorly controlled are referred to a mental health professional. The patient's dentition is evaluated and VA dental care is arranged if needed. As a part of obtaining the social history, we identify if the veteran is homeless. If so, a social worker will see the patient preoperatively to develop a plan for safe postoperative disposition and postoperative care (including rehabilitation) commonly to a VA-specific facility. The unified electronic medical record in the VA system is essential to keep track of the patient's status and progress through the clearance process. The surgery will not proceed unless the patients clear all these medical screening processes and have a safe and clean postoperative destination arranged.

To the authors' knowledge, no reports have been published on the outcomes of joint replacement surgery in a homeless patient population. The purpose of this study is to report on the complications, readmissions, reoperations, follow-up rate, final living situation, and employment status of homeless veterans who had joint replacement surgery at our institution.

### Case series

Following institutional review board approval, we searched our medical records for patients who underwent primary total hip or knee arthroplasty (ICD-9 codes V43.64 or V43.65) at our institution from November 2000 to March 2014 and who carried the diagnosis of lack of housing (V60.0) or inadequate housing (V60.1). Charts were then individually reviewed to verify that patients were indeed homeless immediately before surgery. Homelessness was defined as living in a shelter, motor vehicle, hotel, friend's home, or tent.

The VA Computerized Patient Record System across all VA health care facilities was reviewed to determine demographics, length of stay, discharge location, length of orthopaedic follow-up,

**Table 1**  
Preoperative patient demographics.

Age, mean (SD), y	53 (7.6)
BMI, mean (SD), kg/m <sup>2</sup>	31.7 (6.3)
Charlson Comorbidity Index, mean (SD)	2 (1.3)
Patients with stable psychiatric illness, %	22 (59.5)
Former substance abusers (none active), %	28 (75.7)
Using narcotic pain medicines preoperatively, %	3 (8.1)
Preoperative living situation, %	
Shelter	21 (56.8)
Friend	5 (13.5)
Vehicle	4 (10.8)
Hotel	4 (10.8)
Camping	3 (8.1)

BMI, body mass index; SD, standard deviation.

length of radiographic follow-up, length of follow-up of any kind in any VA clinic, complications, reoperations, final housing status, and employment at final follow-up. In addition, because urgent and emergent care obtained at facilities outside of the VA system are usually coordinated with and approved by the VA, visits to non-VA facilities were also generally identifiable.

From November 1, 2000 to March 31, 2014, a total of 2964 primary total hip, total knee, or unicompartmental knee replacement surgeries were performed at our institution. In this period, we identified 33 patients who were homeless immediately before surgery. Thirty-seven primary joint replacement surgeries performed in these 33 patients were included in our analysis. Among the 37 joint replacement cases, 35 were performed on men and 2 on women. The mean age at the time of surgery was  $53.7 \pm 7.6$  years (range 38–74 years). Additional demographic data are shown in Table 1.

There were 18 total knee replacements, 18 total hip replacements, and 1 unicompartmental knee replacement performed. There were 3 minor in-hospital complications in 2 cases. Two patients had urinary retention requiring recatheterization and one of these patients also experienced a transient peroneal nerve palsy. The average length of stay was  $4.1 \pm 1.4$  days (range 2–7 days). Of the 37 cases, there were 17 discharges to an inpatient rehabilitation facility, 13 discharges to a shelter, 3 discharges to a friend's home, 3 discharges to a family member's home, and one discharge to a hotel. Among the 30 discharges to an inpatient rehabilitation facility or a shelter, 24 of these discharges were to a veteran-specific facility.

Follow-up rates at various time points after surgery are shown in Table 2. At 1 year, 13 cases (35%) had radiographic follow-up, 11 cases (30%) had orthopaedic clinic follow-up, and 34 cases (92%) had a follow-up visit in any clinic within the VA health care system.

There were three complications related to surgery that presented following discharge from the hospital. All three led to emergency department visits by the patients. There were two hematomas that were managed conservatively with observation, and one hip dislocation that was treated with closed reduction. At final follow-up for all the patients, we identified no readmissions, reoperations, infections, major medical complications, or deaths.

At final follow-up, 24 patients had found stable housing, 6 had temporary housing arrangements, 2 had returned to homelessness, and 1 patient's housing status was unknown. In addition, 3 patients were working full time and 6 were working part time. The remaining 24 patients were unemployed.

### Discussion

Ending veteran homelessness is a priority for the Department of Veterans Affairs [1]. Uninsured homeless veterans are a vulnerable population who depend on the VA for their health care [16]. Homelessness is generally considered to be a contraindication to joint replacement surgery. We are unaware of a study that provides

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