

1 **Protocols for Management of Underserved Patients Undergoing Arthroplasty: A**
2 **National Survey of Safety Net Hospitals**

3
4 **Abstract**

5 *Introduction*

6 Although it has been shown that perioperative protocols enhance arthroplasty care and
7 safety, it is not known how prevalent their use is in safety net hospitals, which operate
8 with a mandate to treat the poor and underserved. Understanding the elements currently
9 included in standard perioperative arthroplasty protocols at various institutions may help
10 guide future interventions and policy aimed at improving underserved patients'
11 outcomes.

12 *Methods*

13 In this cross-sectional study, safety net hospitals were asked to complete a survey over
14 the phone, via email or in person regarding existence and elements of perioperative
15 management protocols for total hip arthroplasty (THA) and total knee arthroplasty
16 (TKA). Implementation barriers were also addressed. Specifically, survey questions
17 sought to determine the total yearly number of arthroplasty procedures performed at each
18 institution and better understand, among other elements, the following: presence of
19 preoperative pain management protocols, inpatient care pathways, use of social workers
20 and involvement of physical therapy services. Descriptive statistics were calculated and
21 reported.

22 *Results*

23 Over 90% of safety net hospitals performing arthroplasty utilized regional anesthetic
24 techniques, inpatient clinical care pathways and inpatient physical therapy. However,
25 16.7%, 20.0%, 23.3% and 73% lacked social services, anesthesia preoperative clinics,
26 inpatient pain management protocols and preoperative sobriety pathways, respectively.

27 *Conclusions*

28 Barriers to receiving arthroplasty care included lack of qualified surgical personnel and
29 concerns about surgical risk in vulnerable patient populations. These findings suggest that
30 further effort is warranted to expand and improve arthroplasty care for the underserved to
31 ensure safety and high quality outcomes.

32

33 Introduction

34 In high-resource settings, total hip arthroplasty (THA) and total knee arthroplasty
35 (TKA) have been found to be very effective surgical procedures in improving quality of
36 life, reducing pain, and improving function (1-3). The introduction of care pathways and
37 pain management protocols in particular have provided a systematized approach to
38 arthroplasty, resulting in cost reductions, fewer complications, reduced length in hospital
39 stays, and improved self-reported outcomes (4-9). For instance, it has been suggested that
40 hospitals with pain management protocols for arthroplasty, such as use of peripheral
41 nerve blocks with non-opioid analgesics, have led to fewer side effects and less opiate
42 use among their patients (10,11). In addition, availability of inpatient social services and
43 physical therapy protocols have been shown to decrease length of hospital stay and
44 improve self-reported patient satisfaction (1). Hospitals with a high volume of
45 arthroplasty invariably employ more of these management protocols to ensure improved
46 outcomes (12,13).

47 Although it is clear that perioperative protocols enhance arthroplasty patient care,
48 it has been suggested that safety net hospitals, institutions that have a mandate to treat the
49 underserved, may lack the resources or motivation for standardizing care (12-14).
50 Information from the authors' own safety net hospital, for example, has revealed that
51 outpatient social service support, preoperative patient education, and a dedicated
52 orthopaedic inpatient unit with care protocols are lacking for arthroplasty patients (13).
53 Such deficiencies may well jeopardize safety and outcomes for patients treated at safety
54 net institutions. Despite evidence that care management protocols are of benefit and that
55 there are challenges to providing them in safety net hospitals, no studies have yet been

56 done to survey the management protocols of safety net hospitals in the United States to
57 provide a national perspective. The purpose of this study is to determine the prevalence
58 of arthroplasty management protocols within safety net hospitals and to identify barriers
59 for implementation of such protocols at these institutions. The authors of this study
60 hypothesize that a significant proportion of safety-net hospitals will not report having
61 formalized perioperative protocols in place for patients undergoing arthroplasty, a factor
62 that may lead to poorer surgical outcomes.

63

64

65 Methods

66 In this institutional review board (IRB) exempt, cross-sectional study, safety net
67 hospitals located in the US were asked about the existence of perioperative management
68 protocols for arthroplasty and their barriers for implementation. Hospitals in the National
69 Association of Public Health and Hospitals (NAPH) listing that had at least 100 beds
70 were included in this study (15). Hospitals that did not have a mandate to serve the poor,
71 were less than 100 beds in size, did not respond after seven attempts at communication or
72 did not perform arthroplasty procedures were not included.

73 Data from each hospital was collected via a REDCap survey form administered
74 either through electronic mail or phone call (Appendix 1). Demographic information that
75 may affect surgical outcomes, including hospital region as determined by percentage of
76 arthroplasty procedures performed on safety net patients, and total number of THA and
77 TKA procedures per year, were extracted (7,8,12,16,17). In addition, the use of
78 preoperative pain management, inpatient care pathways, and postoperative management
79 protocols, including the use of social worker and physical therapy services, were also
80 determined. One representative from each hospital who was qualified to describe
81 arthroplasty services at their respective institution was interviewed (e.g. charge nurse,
82 patient coordinator, orthopaedic surgeon, etc.). The interview began with one of the
83 authors asking the individual if s/he was willing to answer a brief scientific survey
84 regarding arthroplasty at safety net hospitals. If the individual was unwilling to do so, the
85 individual was thanked and no additional data was gathered. If the individual obliged, the
86 survey questions were asked one by one and answers recorded. When a protocol was not

87 found to be in place, the authors asked for reasons why that may be; answers were
88 recorded.

89 As the goal of this study was to determine if steps had been taken at safety-net
90 hospitals to at least begin the process of developing protocols for arthroplasty
91 management, additional details of protocols at each institution were not gathered. A
92 hospital was considered to have patient management protocols if the qualified individual
93 reported it when answering the survey. If an interviewee was unaware or unsure of the
94 presence of such processes, a second individual at that institution was asked to verify
95 whether or not the institution had protocols in place.

96 The authors of this study received no funding for this research. All three authors
97 report no conflicts of interest.

98 Data Analysis

99 Descriptive statistics were used to report all data. Non-parametric variables were
100 summarized as counts or proportions, and continuous variables with normal distribution
101 were described by mean and standard deviation.

102

103

104 Results

105 Out of 92 safety net hospitals eligible for the study, 49 (53.3%) responded to the
106 survey. Nineteen of the 49 responding hospitals (38.8%) did not offer arthroplasty
107 services for their patients. Of the thirty hospitals that did offer THA and TKA, 11
108 (36.7%) performed less than 150 procedures per year (Table 1). Arthroplasty procedures
109 at these hospitals were all supervised by a fellowship trained surgeons (100%), and
110 almost all patients (96.7%) were treated with a clinical care pathway, a standardized care
111 developed by each institution for their arthroplasty patients. Over 90% of arthroplasty
112 patients treated in these safety net institutions had access to regional anesthesia
113 techniques and to inpatient physical therapy management. However, only 25 of the 30
114 hospitals (83.3%) offered social services, 24 (80%) offered a preoperative anesthesia
115 evaluation clinic, and 23 (76.7%) utilized an established pain management protocol. Of
116 particular interest was the finding that only 26.7% of hospitals had a preoperative
117 sobriety pathway in place for arthroplasty patients with active substance abuse.

118 Two key reasons were presented to the authors when certain perioperative
119 protocols were found not to exist at various safety-net hospitals that did, in fact, provide
120 arthroplasty care. First, monetary resources were a major limitation. In order to develop
121 evidence-based protocols and have the appropriate staffing in place, significant funds are
122 needed. Many safety-net hospitals reported not having the necessary financial resources.
123 Second, numerous safety-net hospitals described the challenges surrounding change at
124 medical institutions as being a barrier to protocol development. While a handful of
125 institutions did note that protocols were in different stages of development, many
126 suggested that there was no set timeline for implementation.

127

128 *Issues in Institutions Where Arthroplasty Not Offered*

129 For safety net hospitals that did not offer arthroplasty, several themes emerged.

130 First, several hospitals reported that the large volume of trauma prevented the scheduling

131 of routine elective procedures, such as THA and TKA. Second, emphasis on the care of

132 orthopaedic trauma patients resulted in a dearth of qualified arthroplasty personnel.

133 Finally, several hospitals cited concerns about the risks of arthroplasty surgery in their

134 particular patient populations and the absence of mechanisms to address such risks.

135

136 Discussion

137 The survey conducted in this study is unique in that it is designed to define, in
138 broad terms, the current status of elective THA and TKA in our nation's safety net
139 hospitals. Many of the hospitals contacted (43 of 92, 46.7%) were unable or unwilling to
140 provide information about their practices, despite having been queried on numerous
141 attempts. Data obtained from institutions that responded to the survey suggest that there
142 exist gaps in both the availability and the quality of care offered. Almost 40% of these
143 hospitals with a mandate to provide care for the underserved do not offer THA and TKA
144 due to lack of surgical personnel, resources, and institutional support. Instead, patients are
145 either referred elsewhere for their arthroplasty procedures or, alternatively, are provided
146 nonoperative treatment (e.g., non-steroidal anti-inflammatory drugs [NSAIDs]), even in
147 the presence of severe disease. Those patients who were referred elsewhere for their THA
148 and TKA procedures frequently could not be followed postoperatively by their outside
149 surgeons due to medical insurance issues.

150 Of the safety net hospitals offering THA and TKA, the large majority reported
151 utilizing inpatient care protocols, regional anesthesia, and inpatient physical therapy
152 services. However, the large majority (73.3%) reported having no sobriety pathways
153 designed to mitigate the risks of substance abuse. In addition, many do not have available
154 inpatient pain management protocols nor comprehensive social services.

155 A major short-coming in the current study is the relatively low response rate to the
156 survey, despite its brevity. When contacted by telephone, personnel from non-responding
157 institutions cited various reasons for not participating, such as heavy workloads, lack of
158 interest in public health research, and concerns about confidentiality. Thus, further

159 studies will be needed to determine whether this study's findings are representative of
160 practices in the remainder of US safety-net hospitals. A second short-coming is that this
161 study's survey did not characterize the patient populations being served by the
162 institutions. Different patient populations have different needs; patient-centered medicine
163 requires developing protocols and processes that, while based in evidence, are tailored to
164 specific populations. Finally, we did not collect information on patient outcomes in those
165 hospitals that did and did not offer arthroplasty treatment.

166 In a recent commentary on arthroplasty care in safety-net hospitals, Arlas and Jergesen
167 identified common challenges faced by arthroplasty patients in safety net populations
168 such as poverty, undiagnosed or undertreated psychiatric disease, and substance abuse
169 (13). Using their own hospital as an example, these authors highlighted challenges in
170 creating optimal arthroplasty practices. For example, the lack of a dedicated orthopaedic
171 inpatient unit resulted in difficulties in the standardization of care protocols and in the
172 coordination of staff roles. Of particular interest is the finding that most hospitals in the
173 survey that offer arthroplasty care lack protocols for dealing with heavy opiate use and
174 substance abuse, both of which have been linked to higher surgical risk and poorer
175 outcomes in arthroplasty (18). One study, for example, found that alcohol misuse was an
176 independent risk factor for poorer postoperative outcomes in patients undergoing primary
177 THA and TKA, leading to longer hospital stays and surgery related complications (18).
178 Of further importance is that other care protocols routinely utilized in better resourced
179 settings often were not present: about a fifth of the surveyed hospitals had no pre-
180 operative anesthesia evaluation program, no post-operative pain management protocols,

181 and no comprehensive perioperative social services. All of these have been shown to
182 enhance arthroplasty outcomes (16,17).

183 There are few reports on THA and TKA outcomes in safety-net hospitals. One recent
184 study has shown that, when compared with a university population, safety-net patients
185 undergoing THA and TKA had a higher incidence of early complications, particularly
186 deep infections, and of reoperations (12). Clearly, if arthroplasty procedures are
187 undertaken in vulnerable safety-net populations, heightened efforts are warranted to
188 mitigate the surgical risks. These authors' survey findings suggest that arthroplasty care
189 in safety net hospitals may well benefit from added scrutiny to assess the availability of
190 care, the quality of care being given, and the surgical outcomes.

191

192 **Conclusions**

193 Patients who seek care at safety net institutions may not have adequate access to
194 arthroplasty services. In those institutions that offer arthroplasty, many appear not to have
195 in place perioperative care protocols that have been shown to optimize surgical outcomes.
196 Future work can compare and contrast specific differences within perioperative protocols
197 at different institutions. Also, additional research can track and compare outcomes (e.g.,
198 complication rate, mortality rate, patient-reported function, pain and depression
199 outcomes, etc.) across safety net institutions to further solidify best practices to ensure
200 safety and care equality. This must be ensured not only in these vulnerable populations in
201 the US but across the globe. Overall, further effort is warranted to expand arthroplasty
202 care for the underserved and to identify opportunities to improve care processes in the
203 safety net institutions where care is given.

204

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209 **Ethical Approval:**

210 The nature of our study allowed for IRB exemption.

211 For this type of study formal consent is not required.

212

213 This article does not contain any studies with animals performed by any of the authors.

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