

# How Well Are Nurse Practitioners Prepared to Treat Common Musculoskeletal Conditions?

A. J. Benham ▼ Kathleen A. Geier

**BACKGROUND:** Musculoskeletal disorders affect a third of the U.S. population and are among the most prevalent, costly, and debilitating medical conditions. Basic familiarity with musculoskeletal conditions is essential for all primary care providers, including nurse practitioners (NPs).

**PURPOSE:** The purpose of this study was: (1) to estimate the quantity of musculoskeletal education provided in NP programs; (2) to evaluate NPs' perceptions of their own confidence in providing musculoskeletal care versus other areas of primary care; and (3) to determine how well NPs score on a test of basic musculoskeletal knowledge.

**METHODS:** An online self-reporting survey was conducted to evaluate NPs' knowledge, competence, and confidence in treating common musculoskeletal disorders.

**RESULTS:** Most NPs receive fewer than 10 hours of musculoskeletal education, are subjectively less confident about their musculoskeletal skill set compared to other areas of primary care, and lack the basic knowledge to competently manage musculoskeletal problems in primary care.

**CONCLUSION:** The findings of this study confirm earlier conclusions that, like our physician colleagues, the vast majority of nurse practitioners lack adequate preparation to manage common nonsurgical musculoskeletal problems.

## Background

Musculoskeletal disorders affect a third of the U.S. population and are among the most prevalent, costly, and debilitating medical conditions (United States Bone and Joint Initiative, 2014). The National Arthritis Data Workgroup anticipates that by 2020, nearly 60 million individuals with musculoskeletal conditions will require evaluation and treatment (Helmick, Lawrence, Pollard, Lloyd, & Heyse, 2005). The U.S. Bone and Joint Initiative (USBJI) estimates that between 2009 and 2011, direct care costs for musculoskeletal diseases were more than \$796 billion. According to USBJI, disability rather than mortality is the prime driver of indirect costs associated with musculoskeletal diseases, with lost wages accounting for an additional \$77 billion in indirect costs (Yelin, Cisternas, & Watkins-Castillo, n.d.-a).

In March 2015, the U.S. Department of Health and Human Services estimated that 16.4 million previously uninsured individuals are covered through the Affordable Care Act (ObamaCare Enrollment Numbers, 2015). The Association of American Medical Colleges projects a shortage of some 45,000 primary care physicians by 2020 (Mann, 2013). The supply of specialty care providers, such as orthopaedists, is expected to be even more restricted (Canin & Wunsch, 2009). Under these circumstances, nurse practitioners (NPs) are increasingly being called upon to ensure access to care at all levels. Given the developmental changes associated with aging, and the fact that many common medical conditions involve musculoskeletal sequelae, NPs must be prepared to competently recognize, manage, and appropriately refer musculoskeletal problems. It is, therefore, essential for our profession to ask: How well are NPs prepared to manage musculoskeletal conditions in primary care settings?

A review of the literature yields little information about the musculoskeletal content of NP program curricula. One recent study reported on the musculoskeletal education, confidence, and knowledge of a small group of NPs ( $n = 8$ ) who were assessed before and after participation in an intensive orthopaedic education program (Benham & Geier, 2014). Preliminary results indicated that while most NPs lack adequate preparation to manage musculoskeletal problems, their skills and confidence improve with focused musculoskeletal training. To validate these findings, similar studies on larger populations of NPs are needed. The threefold purpose of this study was (1) to estimate the quantity of musculoskeletal education provided in NP programs; (2) to evaluate NPs' perceptions of their own confidence in providing musculoskeletal care versus other areas of primary

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care; and (3) to determine how well NPs score on a test of basic musculoskeletal knowledge.

## Participants, Setting, and Study Design

### RECRUITMENT AND SURVEY PROCEDURES

Following the institutional review board approval from a regional health education facility in northern California, an online self-reporting population survey using a descriptive/exploratory questionnaire was posted on a secure website. The website (Survey Monkey) protected the anonymity of study participants and the security of the data. From mid-June through mid-September 2014, NPs practicing in the United States were recruited via online professional list-serves and social media, through contacts made by the investigators at professional meetings and conferences, and through local nursing schools and professional associations. Potential participants were provided with a web link and invited to take an anonymous self-administered survey assessing musculoskeletal education, self-perceived clinical confidence, and musculoskeletal knowledge. Participants were offered the chance to win a \$500 cash prize as an incentive to complete the online survey.

### SURVEY DESCRIPTION

The survey instruments used were previously developed and validated to assess physicians' musculoskeletal education, confidence, and knowledge. The survey consists of 51 questions divided in three sections: demographics, confidence, and knowledge. Completion is estimated to take 25 minutes. The first section includes 10 questions regarding practice setting, years of experience, and musculoskeletal education. The second section consists of 16 questions aimed at assessing NPs' self-confidence in managing common medical and musculoskeletal disorders. Confidence is measured on a 10-point Likert scale with responses varying from 1 (*not confident*) to 10 (*extremely confident*). Seven of the confidence survey items address musculoskeletal conditions and 9 address common medical issues as a basis for comparison. Confidence question content includes physical examination techniques, management of common clinical complaints, and broader principles relevant to caring for patients with common musculoskeletal and other nonorthopaedic medical conditions. Confidence scores were averaged for each question and reported as the mean of all responses. The third section of the survey is a 25-item test developed by Freedman and Bernstein to assess the musculoskeletal knowledge of medical students and residents (Freedman & Bernstein, 1998). The test was used and scored in a manner consistent with earlier studies involving physicians and medical residents. One point was awarded for each correct answer and a passing score of 70% was set in accordance with the recommendation of 240 internal medicine resident program directors, who reviewed and endorsed the examination.

## Results

### NP COHORT DEMOGRAPHICS

One hundred eighty-five practicing NPs participated in the survey. Of those, 114 (62%) responded to items in all three sections. The remainder ( $n = 71$ ; 38%) did not respond to any questions assessing musculoskeletal knowledge, suggesting test fatigue, disinterest, or uncertainty about the subject matter. Demographic and educational data for all 185 participants are presented in Tables 1 and 2, respectively.

### NP CONFIDENCE

All 185 participants completed the confidence section. Results are summarized in Tables 3 and 4. Overall, when asked to subjectively rate their confidence in performing various procedures using a scale of 1–10, participants were nearly twice as comfortable with their ability to assess and treat general medical conditions than they were with managing musculoskeletal conditions (mean confidence scores 6.2 and 3.4, respectively). The NPs felt less comfortable performing a complete musculoskeletal examination (mean score 6.1) than performing pulmonary, cardiovascular, or neurological examinations (mean confidence scores 7.8, 7.4, and 7.0, respectively). The only medical procedure participants felt less confident about than reducing a shoulder was performing a lumbar puncture (mean score 1.7 and 1.4, respectively). Nurse practitioners were nearly three times more confident with principles of health maintenance than they were with principles of bracing, casting, and rehabilitation associated with fracture care.

Chi-square tests were performed for the demographic items and the musculoskeletal confidence categories to determine whether a relationship existed between the variables. The musculoskeletal confidence scores were assigned to poor, average, good, and excellent categories. There was a significant relationship between musculoskeletal confidence categories and the number of years in practice as a NP ( $\chi^2_{(12)} = 27.67$ ;  $p = .006$ ), the number of continuing education units (CEUs) on musculoskeletal topics ( $\chi^2_{(9)} = 43.14$ ;  $p = .001$ ), and percentage of patients with musculoskeletal conditions ( $\chi^2_{(12)} = 28.80$ ;  $p = .004$ ). The relationships between musculoskeletal confidence categories and estimated hours of musculoskeletal content in the NP program, age groups of the patients, and the number of patients seen in a typical day did not reach significance.

### MUSCULOSKELETAL KNOWLEDGE

One hundred fourteen (62%) of the total 185 respondents completed the 25-item test of basic musculoskeletal knowledge. Among those completing the test, the lowest raw score was 1.0 and the highest was 24. The median raw score was 8, and the mean raw score was 8.5. The mean number of items answered incorrectly was 16.5. Only six participants (5.2%;  $n = 114$ ) answered at least 18 questions correctly to achieve a passing score of 70%. Of those, four participants (3.5%;  $n = 114$ ) achieved scores of 88% or greater.

**TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF PARTICIPATING NURSE PRACTITIONERS**

	Frequency	%
Number of years in practice as a nurse practitioner		
0–5	74	40.0
5–10	30	16.2
10–15	30	16.2
15–20	26	14.1
≥25	25	13.5
Practice focus		
Family practice	101	54.6
Geriatrics	4	2.2
Occupational medicine	2	1.1
Pediatrics	5	2.7
Specialty practice, unspecified	41	22.2
Women's health	12	6.5
Other	19	10.3
Practice setting		
Private practice	65	35.1
University/academic clinic	31	16.8
Student health services	25	13.5
Community clinic (nonprofit)	22	11.9
Hospital	16	8.6
Public clinic (county, VA, etc.)	10	5.4
Occupational medicine clinic	2	1.2
Home health service	1	0.5
Other	13	7.0
Number of patients seen in an average day		
1–5	8	4.3
5–10	29	15.7
10–20	107	57.8
20–30	36	19.5
>30	5	2.7
Estimated percentage of patients with musculoskeletal conditions		
10%–20%	66	35.7
21%–40%	66	35.7
41%–60%	18	9.7
61%–80%	15	8.1
81%–100%	20	10.8

The raw scores were categorized into poor, average, good, and excellent, and chi-square tests were performed to determine whether the raw score categories were related to demographic variables. The raw score categories were significantly related to the number of CEU hours on musculoskeletal topics ( $\chi^2_{(9)} = 26.90$ ;  $p = .001$ ), the number of patients seen in a typical day ( $\chi^2_{(12)} = 30.02$ ;  $p = .003$ ), and percentage of patients with musculoskeletal conditions ( $\chi^2_{(12)} = 27.33$ ;  $p = .007$ ).

**TABLE 2. ESTIMATED MUSCULOSKELETAL EDUCATION**

	Frequency	%
Hours of musculoskeletal content in NP program		
0–5	47	25.4
5–10	83	44.9
10–20	43	23.2
>20	11	5.9
CEU hours on musculoskeletal topics		
None	33	17.8
1–15	88	47.6
16–30	43	23.2
>30	21	11.4

Note. CEU = continuing education unit; NP = nurse practitioner.

The relationship between raw score categories and, number of years in practice as a NP, estimated hours of musculoskeletal content in NP program, age group of patients, setting of primary practice, and focus of practice did not reach significance.

## Discussion

Generalizing results of any survey-based study depends on potential differences between responders and nonresponders. In this case, participating NPs were all self-selected and presumably at least partially motivated by a financial incentive for completing the survey. The principal limitation of this study is its relatively small size compared to the entire population of NPs. Improving financial incentives, shortening the survey, and continuing to collect data both online and on paper may improve NP participation in future studies. Another limitation is the speculative nature of responses to questions concerning curriculum content and the prevalence of musculoskeletal complaints in day-to-day practice. The issue of nonresponsiveness to the musculoskeletal knowledge items by 38% of the total respondents may also be significant, especially if it reflects discomfort with the subject matter. A formal analysis of the demographics of the subset of participants who chose not to respond to those items may provide important clues about the reasons for their lack of participation.

All of the participants in this study were working as NPs at the time of the study. While more than 70% reported having 10 or fewer hours of musculoskeletal content in their NP programs, nearly two thirds of the NPs estimated that more than 20% of their patients present with musculoskeletal complaints. This raises significant questions about quality of care the NPs are providing, since 95% ( $n = 108$ ) of the 114 respondents who completed the musculoskeletal knowledge section failed to achieve a passing grade of 70%.

The performance of NPs in this study was even more dismal than the 50%–85% failure rates demonstrated in numerous studies of medical students, residents, staff physicians, and medical instructors taking the same test over the past 17 years. Perhaps even more telling is the fact that, despite a chance to win a significant financial

**TABLE 3. CONFIDENCE PERFORMING NONMUSCULOSKELETAL PROCEDURES**

Procedure	Mean	SD
Comprehensive pulmonary examination	7.8	1.91
Comprehensive neurological examination	7.0	1.86
Comprehensive cardiovascular examination	7.4	1.96
Performing/interpreting 12-lead electrocardiogram	5.0	2.71
Performing/evaluating a chest x-ray	4.5	2.80
Performing a lumbar puncture	1.4	1.40
Evaluating and treating jaundice	6.1	2.31
Evaluating and treating asthma	7.5	2.02
Principles of health maintenance	9.0	1.34
Overall nonmusculoskeletal confidence	6.2	

Note. 1 (not confident) to 10 (extremely confident).

reward for completing the entire survey, 71 respondents (38%) declined to answer any of the musculoskeletal knowledge questions at all.

As with the previous studies involving physicians, this study found that certain demographics predicted both self-assessed confidence and objective performance among NPs. Specifically, there was a significant correlation between test scores and continuing musculoskeletal education, the number of patients seen in a typical day, and the percentage of patients with musculoskeletal conditions. Musculoskeletal confidence was also significantly correlated with NP experience, continuing education, and percentage of patients with musculoskeletal conditions. Interestingly, neither knowledge nor confidence scores were correlated with the amount of musculoskeletal content in NP programs. Given that 94% (n = 174) of respondents received fewer than 20 hours of musculoskeletal content and 70% (n = 130) received fewer than 10 hours, this may indicate both poor quality and inadequate quantity of musculoskeletal content in NP programs. Findings of correlations between improved test scores and greater experience and exposure to patients with musculoskeletal conditions suggest that musculoskeletal curricula should include time for structured skill acquisition and clinical experience as well as didactic learning opportunities.

**TABLE 4. CONFIDENCE PERFORMING MUSCULOSKELETAL PROCEDURES**

Procedure	Mean	SD
Musculoskeletal examination	6.1	2.13
Aspiration of knee	2.7	2.80
Aspiration of shoulder	2.5	2.67
Reduction of shoulder	1.7	1.63
Diagnosis of foot	6.2	2.20
Acromioclavicular separation	3.2	2.66
Fracture principles	3.4	2.65
Overall musculoskeletal confidence	3.7	

## Conclusions

The results of this study confirm earlier findings that, like our physician colleagues, the vast majority of NPs lack adequate preparation to manage common nonsurgical musculoskeletal problems. It is possible that since most musculoskeletal conditions are not imminently life threatening, their place in medical and nursing education has not traditionally been prioritized. Given an aging, increasingly overweight, and sedentary population, the burden of musculoskeletal disease is growing, often in conjunction with comorbid conditions such as hypertension, cardiac disease, diabetes, and asthma (Yelin, Cisternas, & Watkins-Castillo, n.d.-b). With growing evidence of the importance of movement and exercise in preventing and treating more “serious” chronic conditions, the value of primary care providers in promoting musculoskeletal health, treating musculoskeletal conditions effectively, and preventing disability is becoming more apparent.

The findings of this study suggest that just as physicians’ musculoskeletal knowledge and confidence improve significantly with education and experience, so do NPs’. If NPs are to respond to the growing demand for musculoskeletal care safely and cost-effectively, musculoskeletal topics need to be addressed much more aggressively in NP education programs, in both the classroom and clinical rotations. Musculoskeletal conditions may also need to figure much more prominently in certification examinations and continuing education requirements to appropriately reflect the prevalence of musculoskeletal conditions in primary care practice and their cost both personally and societally.

As a first step toward effecting these changes, additional studies are needed to further validate the current findings in the larger NP population and to evaluate the current musculoskeletal content of NP programs in the United States. The latter could be undertaken simultaneously with efforts to increase awareness among NP program directors of the discrepancy between growing demand for safe, cost-effective nonsurgical musculoskeletal care and NP readiness to provide it. Finally, realistic strategies for increasing musculoskeletal curriculum content, including clinical skills and learning opportunities, need to be developed, tested, and implemented in conjunction with musculoskeletal content experts and NP educators and program directors.

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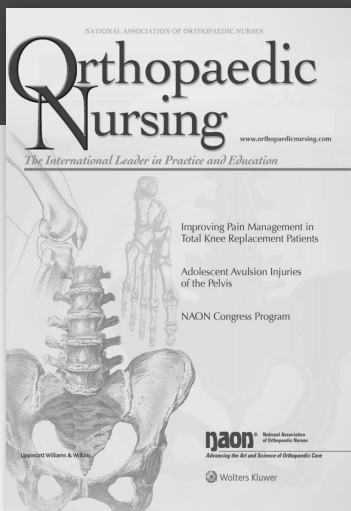
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