

Creating and Implementing a Protocol for the Management of Patients in Skeletal Traction: A Quality Improvement Project

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ABSTRACT

Introduction. Skeletal traction use generally has decreased over generations and is used most often for temporary fracture stabilization. Proper nursing management of patients in skeletal traction is crucial. A hospital protocol was created and implemented to educate and direct registered nurses (RNs) in the care of patients requiring skeletal traction.

Methods. A skeletal traction management protocol was drafted and implemented as hospital policy. Twenty-nine RNs from an orthopaedic unit at a level I trauma center attended a financially compensated, 45-minute, in-person, off-shift educational session. An anonymous pre-test utilizing a 5-point Likert scale was completed to assess RN knowledge and comfort regarding the following topics of traction care: pin care, manual traction, frame assembly, weight application and removal, skin evaluation, neurovascular checks, and reporting issues. The RNs were provided with a copy of the new hospital policy and key points were highlighted and demonstrated. After the demonstration, the RNs were given a post-test to assess their perceived knowledge and comfort with traction care.

Results. Statistically significant improvements in RN knowledge and comfort were seen in six of the seven evaluated topics. The greatest increase was seen in the manual traction topic. No significant change regarding neurovascular checks was observed with this topic having the highest pre-test scores.

Conclusions. A hospital protocol was created successfully and implemented that significantly improved the level of RN knowledge and comfort with the management of patients requiring skeletal traction. Future studies should assess the effectiveness of annual education regarding the traction policy. *Kans J Med* 2021;14:240-242

INTRODUCTION

The use of skeletal traction devices to treat musculoskeletal injuries and deformities dates to the time of Hippocrates with the use of wooden rods, levers, and ropes to aid in the reduction of fractures.¹ Skeletal traction systems became more sophisticated over generations with important figures like Russell, Steinmann, and Kirschner credited for advancing skeletal traction systems in the early 1900s.² The standard medical treatment of femur fractures at that time was a combination of closed reduction, continuous traction, and splinting. Patients would spend weeks in the hospital requiring continuous labor-intensive care,

often being left with poor outcomes and long-term complications.³ Nursing knowledge and management of skeletal traction systems was crucial to achieve proper function and prevent complications.

With the advent of anesthesia, antisepsis, and skeletal imaging in the late 19th century, more fractures began to be treated with some form of internal fixation. Consequently, skeletal traction became more of a temporary measure used prior to definitive surgical fixation.³⁻⁵ Although this led to a decrease in the amount of time patients spent in continuous traction, the care of a patient in traction remained a key skill set for nursing staff. The importance of these nursing skills was highlighted in 1974, when “The Do’s and Don’ts of Traction Care” was published, illustrating the important concepts with which nurses managing traction systems must be familiar.⁶

The nursing management of patients in skeletal traction is a demanding task and it remains a crucial skill set for nurses caring for orthopaedic trauma patients.⁷ In their practice of skeletal traction care, nurses continuously monitor the traction system to ensure proper use without harm to the patient. They perform traction pin site care to prevent infections and their diligent efforts to monitor neurovascular status and mobilize the patient are invaluable in preventing complications.⁸

Skeletal traction devices are utilized most often as a means of temporary stabilization until definitive surgical fixation can take place. As continuous skeletal traction use has declined in the modern orthopaedic era, nursing education regarding specific traction systems and the care of a patient in traction also has decreased.^{7,9} At our level I trauma center, a gap was noticed in the education and training of nurses in this area. Our orthopaedic floor nurses and aides were uncomfortable managing temporary traction systems due to a lack of education regarding the systems. The purpose of this quality improvement project was to educate our nursing staff on the set-up and maintenance of commonly used traction systems and to create a well-defined protocol outlining the care responsibilities regarding patients in skeletal traction.

METHODS

An orthopaedic skeletal traction policy was drafted (see Appendix at website: journals.ku.edu/kjm) and approved by the associated hospital system. Registered nurses (RNs) from the orthopaedic unit at the level I trauma hospital were enrolled in a required 45-minute in-person educational session regarding the new policy. They were assigned to one of three sessions based on scheduling availability and they were compensated for their time. Assessment of the policy implementation and associated educational session was performed with a pre-test and post-test design to quantify improvements in comfort and knowledge.

Sessions were initiated with anonymous completion of the “Skeletal Traction Pre-Test” (see Appendix at website: journals.ku.edu/kjm) by all present nursing staff. After collection of the pre-tests, a 30-minute presentation using Microsoft® PowerPoint® and visual demonstrations regarding the newly implemented skeletal traction policy was given by two orthopaedic residents. A copy of the policy and a simplified checklist (see Appendix at website: journals.ku.edu/kjm) were distributed to all the participants prior to the presentation and all pertinent points were highlighted. A vacant hospital bed with appropriate components of a skeletal traction system allowed for the demonstration of proper assembly and manipulation of the system. Tips, tricks,

and pitfalls of all topics were included in the presentation. All questions from the RNs during and after the presentation were answered. A nursing supervisor was present during the session to facilitate and answer any questions within the scope of nursing. After the demonstration, each individual anonymously completed the “Skeletal Traction Post-Test” (see Appendix at website: journals.ku.edu/kjm). The content of the pre-test and post-test were identical and used as a learning assessment tool to allow for quantification and statistical analysis.

After the three sessions had been completed, matched pre-test and post-test data were compiled into Microsoft® Excel®. All questions from the survey, except for two, were in the form of a 5-point Likert scale. These Likert scale items investigated nurse “knowledge” and “comfort” regarding specific aspects of skeletal traction systems and the care of patients in skeletal traction. Nurse knowledge was self-reported with “1” representing “no knowledge” and “5” indicating “expert knowledge”. Similarly, nurse comfort was self-reported with “1” representing feeling “distressed by the task” and “5” representing feeling “at ease or comfortable with the task”. The topics included pin care, manual traction, frame assembly, weight hanging and removal, evaluation of the skin, neurovascular checks, and an established protocol for reporting issues. All knowledge item responses were totaled, as were all comfort items, and differences between pre- and post-test were calculated. Of the remaining questions, one asked for the year the RN started working for the hospital system, and the other was a “yes or no” response to assess perception of any existing orthopaedic traction policy. The year the nurse started working on this unit was used as a surrogate for years of orthopaedic nursing experience by subtracting their response from the year of this survey.

After consultation with a biostatistician, pre-test and post-test Likert data were compared using a two-tailed Wilcoxon signed-ranks test. A p value of 0.05 was accepted as a statistically significant result. The continuous variable, years of nursing experience, was assessed for normality using the Kolmogorov-Smirnov Test. Results showed normality could not be assumed. Therefore, bivariate associations between Likert scale items, knowledge difference and comfort difference, and years of experience were evaluated with Spearman’s Rho. All statistical tests were conducted with Social Science Statistics, an online statistics calculator found at <https://www.socscistatistics.com/tests/>. At the recommendation of the consulting biostatistician, the revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) were used as a framework during the preparation of this manuscript.¹⁰

RESULTS

Participants in the educational sessions included 29 RNs. Nursing experience on this unit ranged from new-hire nurses to veteran nurses with 27 years of experience. The median nursing tenure was 3.0 years (0.5, 6.0). Pre-test results demonstrated that 11 of the 29 nurses (38%) were under the impression that there was a prior skeletal traction policy in place, when in fact there was not.

Table 1 summarizes survey responses, reported as medians and interquartile ranges. With the exceptions of neurovascular check for both knowledge and comfort, results for all pre- and post-test item differences were significant with p values being 0.004 or less. The lowest pre-test item observed was for frame assembly comfort for which the median response was 2.0 (2.0, 4.0). This response increased to 4.0 (4.0, 4.0) for the post-test, which was the largest score improvement

among all items tested. Conversely, neurovascular check knowledge and comfort questions demonstrated the highest pre-test scores and the least improvement in post-test scores.

Table 1. Comparison of pre- and post-test responses by subject area.

Subject area	Pre-test ¹	Post-test ¹	p ²
<i>Knowledge</i>			
Pin care	3.0 (3.0, 4.0)	4.0 (4.0, 5.0)	< 0.001
Manual traction	3.0 (2.0, 3.0)	4.0 (4.0, 5.0)	< 0.001
Frame assembly	3.0 (2.0, 4.0)	4.0 (4.0, 4.5)	< 0.001
Weight removal/application	3.0 (2.0, 4.0)	4.0 (4.0, 5.0)	< 0.001
Skin evaluation	4.0 (3.0, 4.5)	4.0 (4.0, 5.0)	0.004
Neurovascular check	4.0 (4.0, 5.0)	5.0 (4.0, 5.0)	0.754
Reporting issues	4.0 (3.0, 4.0)	5.0 (4.0, 5.0)	0.001
Total knowledge	25.0 (20.0, 26.0)	29.0 (27.5, 29.0)	< 0.001
<i>Comfort</i>			
Pin care	3.0 (2.5, 4.0)	4.0 (4.0, 5.0)	< 0.001
Manual traction	3.0 (2.0, 3.0)	4.0 (3.0, 4.5)	< 0.001
Frame assembly	2.0 (2.0, 4.0)	4.0 (4.0, 4.0)	< 0.001
Weight removal/application	3.0 (2.0, 4.0)	4.0 (4.0, 5.0)	< 0.001
Skin evaluation	4.0 (3.0, 4.0)	4.0 (4.0, 5.0)	0.001
Neurovascular check	4.0 (4.0, 5.0)	5.0 (4.0, 5.0)	0.508
Reporting issues	4.0 (3.0, 4.0)	5.0 (4.0, 5.0)	0.001
Total comfort	24.0 (19.5, 26.0)	28.0 (27.5, 33.0)	< 0.001

¹Median (interquartile range)

²Results are from Wilcoxon signed-rank test

Correlation between years of experience and pre-test total scores showed a low-to-moderate linear association: rho = 0.451, p = 0.014 for knowledge pre-test total, and rho = 0.463, p = 0.011, for comfort pre-test total. However, this association appeared to decline somewhat for post-test responses: rho = 0.402, p = 0.031 for knowledge total, with rho = 0.335, p = 0.076, for comfort total. When comparing years of experience to change in total scores, no significant linear associations were observed: rho = 0.060, p = 0.756 for knowledge difference, with rho = 0.063, p = 0.747 for comfort difference.

DISCUSSION

As surgical techniques have improved, skeletal traction in orthopaedic traumatology has transitioned from a definitive treatment modality to a temporary stabilization method. Proper nursing care of patients in traction is labor-intensive and is vital in preventing complications that can arise from bed confinement and traction pin sites.¹¹ For this quality improvement project, the aim was to fill an important educational gap that was reported by the nursing staff, as well as to produce a well-defined protocol that could be implemented on a local and system-wide scale.

We successfully created and implemented a hospital protocol for orthopaedic trauma patients in skeletal traction devices. We also provided a nursing education session and checklist to aid in their labor-intensive care of these patients. All nurses who participated in our

program showed a significant increase in their knowledge of and comfort with traction systems and in the care for these patients.

This study was conducted over a limited time period in a frequently changing sample of orthopaedic floor nurses. The subjects completed the pre-exam, experienced the educational course, and subsequently completed the post-exam questionnaire in the same setting. As the orthopedic floor nursing staff was ever growing and changing, it would be reasonable to repeat this session annually or semi-annually in an attempt to improve nursing knowledge and comfort with skeletal traction and verify the results of this study.

From a systems perspective, this skeletal traction management protocol may be a good educational tool for all orthopaedic nurses within the health care system. Further improvement may be possible by administering this educational course to the nursing staff on an annual basis. Future directions to study the efficacy of this nursing education program may include the longitudinal assessment of patients being treated with skeletal traction to determine if there are improved clinical outcomes and fewer adverse effects of treatment.

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