

IMPACT OF POST-GRADUATE ORTHOPEDIC ASSESSMENT EDUCATION ON NEW  
GRADUATE NURSE PRACTITIONER RESIDENTS: A QUALITY IMPROVEMENT  
PROJECT

A DOCTOR OF NURSING PRACTICE PROJECT SUBMITTED TO THE GRADUATE  
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## **Dedication**

This is dedicated to my Mom, Don, my beautiful wife Junko and her family.

## **Acknowledgment**

I would like to express my deep and sincere gratitude to my committee chair Dr. Alice Tse, PhD, APRN, FAAN, along with my content expert Katy Page, APRN, and my third reader Dr. Karen Tessier, PhD, RN who shared their knowledge and provided me with endless support throughout this project. Their dedication, meticulous scrutiny and expert advice enabled me to accomplish this undertaking.

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Nobody has been more important to me in my pursuit of this education than my family. I am extremely grateful to my Mom, Don, and Junko whose love, support, and guidance are with me in whatever I pursue.

## **Abstract**

New graduate nurse practitioners (NPs) undergo a particularly challenging year immediately following graduation as they transition from students to seasoned healthcare professionals. Research suggests that new graduate NPs lack the preparation, confidence, and competence to perform their duties in an efficient manner leading to less-than-optimal outcomes for patients. Low back pain, as one of the most common complaints faced in primary care, is an area where new graduate NPs have been reported to lack confidence in their assessment skills. A quick yet thorough clinical assessment of back pain can result in an accurate and timely diagnosis, symptom control, and better communication with other healthcare professionals while at the same time eliminating unnecessary medical negligence claims.

The goal of this project was to provide the NPs undergoing their NP residency at a Federally Qualified Health Center (FQHC) with educational seminars to educate them on how to provide an efficient and thorough musculoskeletal assessment for patients presenting with a chief complaint of low back pain. The NP residents were then asked to fill out both pre-implementation and post-implementation questionnaires to determine whether the seminars improved the residents' levels of confidence and, competence and enabled them to communicate with other healthcare professionals more effectively.

The data gathered prior to and following the educational seminars provided ample evidence that continuing education about musculoskeletal assessment can better equip new graduate NPs to provide better assessments, more accurate and detailed diagnosis, and improved communication with other healthcare professionals.

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## **Problem, Background, and Significance**

Immediately following graduation, new graduate NPs begin to undergo a particularly challenging transitional phase when they leave their comfort zone as either a student or a Registered Nurse and establish themselves among the other healthcare professionals as a NP. This transitional phase occurs during the first year of practice as an NP. Many factors play a role in determining the success or failure of each new graduate NP's first year of practice. Lack of confidence in their skills and lack of preparation are two of the common areas that have been recognized as playing a part in determining whether they experience a successful transition or not (Hart & Bowen, 2016).

A systematic review of several large-scale studies from 12 countries found the most common patient-reported reasons for primary care visits were related to cough, back pain, and abdominal symptoms (Finley et al., 2018). Low-back pain (LBP) was second only to upper respiratory problems for primary care visits each year, with a lifetime prevalence of 70% to 85% (Jensen, 2004; Park, 2018; Wheeler, 2019).

Despite its widespread prevalence, new graduate NPs are typically not well-prepared to assess low-back pain. Jensen (2004) noted that "although the scientific reliability and validity of clinical signs in the lower back are lacking, a careful, confident, caring, and systematic approach to the clinical assessment of patients presenting with low back pain can be undertaken within the time constraints of a busy general practice" (p. 400). To ensure that serious underlying conditions are not being missed, "a thorough clinical assessment of back pain need not consume excessive time, and is a guard against the ever-increasing threat of medical negligence, as well as enabling progress in terms of pain and disability to be accurately monitored" (Jensen, 2004, p. 393). Effective orthopedic assessment can result in an accurate and timely diagnosis, symptom

control, and better communication with other healthcare professionals. Misdiagnosis and improper treatment protocols may lead to worsening of conditions and potential for long-term consequences such as atrophy, nerve damage, and undiagnosed fractures. New graduate NPs frequently lack the confidence in their skills to assess musculoskeletal complaints, and also feel as though they lacked the preparation while in NP school to assess difficult musculoskeletal cases following graduation (Hart & Bowen, 2016). Additional musculoskeletal assessment education and resources for the new graduate NP residents will provide for better assessments, more accurate and detailed diagnosis, and improved communication with other healthcare professionals which can ultimately play a role in strengthening interprofessional relationships with other healthcare professionals.

### **Needs Assessment**

The Federally Qualified Health Center (FQHC) clinics in both Waiola and Kapolei are training grounds for the NP residents where they experience multiple patient visits daily during their rotation. The importance of being efficient as well as accurate in evaluating musculoskeletal complaints when treating patients is of paramount importance due to the high volume of patients who come through the clinic regularly. Also, because the NP residency program is only one year in length, the NP residents must be able to improve on their visit times with patients because every patient they see in the residency program provides the potential for valuable learning experiences that contribute to progress on their path to becoming a competent NP.

New graduate NPs lack the skills, confidence, and competence to assess a patient with a musculoskeletal issue quickly and accurately. This leads to longer patient interaction times that lead to bottlenecks of the clinic's flow and decreased patient satisfaction. Providing the NP residents attending the FQHC residency program with additional education and resources for

musculoskeletal assessment can help them develop confidence in their assessment skills, make them more efficient at accurately diagnosing patients with back pain, and lead to better patient care and improved communication with other healthcare providers. Since low back pain is a common condition presenting in the primary care setting, it makes sense to address the lack of preparedness, confidence, and communication skills in new graduate NPs with other healthcare professionals to improve the efficiency of care in that setting. For purposes of this Doctor of Nursing Practice (DNP) project, the term “healthcare professionals” was selected because patient charts are often shared among other providers and not solely with specialists. Healthcare professionals encompass all providers including specialists.

## **Literature Synthesis**

### **Search Strategy**

A systematic review of the literature was conducted which included CINAHL, One Search Manoa, and PubMed. Searches utilized several techniques and tools. Search terms included keywords, phrases, and subject headings. Many search terms included some variation of “Nurse Practitioner,” “APRN,” “NP” and “Advanced Practice Nurse” in combination with other terms such as, “education,” “residencies,” “residency programs,” “new graduates,” “confidence,” “competence” and “orthopedic assessment”. Search strategies included Boolean operators such as “AND” and “OR” Limits and filters utilizing publication date and article type were also used. The dates of the articles included in this synthesis ranged from 2004 to 2020.

### **Number of Studies**

A search of CINAHL originally yielded 1437 publications and PubMed initially yielded 1031 publications. After removing duplicate articles and reviewing abstracts for relevancy 26 articles were selected for this literature synthesis. Inclusion criteria for selection of the 26 articles

consisted of applicability to the project focus and recency of publication. Mosby's Quality of Evidence tool (Ackley, Swan, Ladwig, & Tucker, 2008) was used to grade the level of evidence. According to Mosby's grading system for the Levels of Evidence (Ackley et al., 2008), Level 1 is the highest level of evidence and includes systematic reviews or meta-analyses; six articles met this criterion. Level II includes experimental designs; one article met this criterion. Level III includes quasi-experimental designs; five articles met this criterion. Level IV includes case-controlled, cohort and longitudinal studies; one article met this criterion. Level V includes correlation studies; three articles met this criterion. Level VI includes descriptive studies; ten articles met this criterion. Level VII is the lowest level of evidence and includes opinions of authorities and/or reports of expert committees; four articles met this criterion.

### **The Challenge of Role Transition**

Immediately following graduation, new graduate NPs undergo a challenging time as they leave their comfort zone as either a student or a Registered Nurse and establish themselves among the other healthcare professionals as a NP. Studies suggested that currently, NP turn-over rates are twice the rate of medical doctors (Barnes, 2015). Recent evidence noted that some of the main reasons new graduate NPs experience such a challenging transitional experience in their first year of practice include lack of confidence in their education/ preparation and lack of mentorship and interprofessional partnerships (Hart & Macnee, 2007). Prevailing literature indicated that the consequence of new graduate NPs lacking mentorship, confidence in their skills, and support from other healthcare professionals is job dissatisfaction ultimately leading to high turnover rates (Barnes, 2015; Faraz, 2016; Kopf, Watts, Meyer, & Moss, 2018; Sargent & Olmedo, 2013; Schofield & McComiskey, 2015; Sullivan-Bentz et al., 2010).

## **Confidence and Preparedness**

New NP graduates experience a lack of confidence in their educational preparation and clinical experiences. The literature suggested that 51% of new graduate NPs perceived themselves as being “only somewhat or minimally prepared following graduation (Hart & Macnee, 2007, p. 37). Other studies provided similar conclusions such as the research by Sargent and Olmedo (2013) which found that as many as 70% of new graduate NPs perceived themselves as being “somewhat uncomfortable” and 55% “somewhat prepared” in the NP role. Similarly, Hart and Bowen (2016) indicated that 43% of surveyed new graduate NPs defined themselves as being “somewhat prepared” for practice following graduation. These studies all suggest lack of confidence is related to a lack of preparedness with regards to NPs upon graduation (Heitz, Steiner, & Burman, 2004).

## **Factors Impacting New NP Performance**

Beggs (2018) determined a correlation between confidence, familiarity with their surroundings and experiences, mentorship, and satisfaction while transitioning into an experienced NP. Likewise, Heitz et al. (2004) determined that NPs have identified gaps in their training in their first year of practice resulting in feelings of inadequacy and self-doubt. Other research also described a pattern of lack of preparation, decreased clinical competence and readiness, feelings of inadequacy in assuming clinical responsibilities, and decreased perceived competence (Harper, McGuinness, & Johnson, 2017; MacKay, Glynn, McVey, & Rissmiller, 2018; Painter, Sebach, & Maxwell, 2019; Rugen, Harada, Harrington, Dolansky, & Bowen, 2018; Sciacca & Reville, 2016; Twine, 2017; Zapatka, Conelius, Edwards, Meyer, & Brienza, 2014). The published literature reported that across many different settings new graduate NPs feel unprepared to practice which ultimately translated into difficulty with their NP transition

into practice. As a result, the Institute of Medicine recommended that institutions provide transitional programs to address the gaps in knowledge and skills faced by new NPs (Schofield & McComiskey, 2015). Current recommendations for the transition of new NP supported the idea of having additional post-graduate training or increased rigor during the NP education to help minimize the problems associated with lack of preparation in school (Barnes, 2015).

### **Support and Mentorship**

Although there is limited research regarding mentorship for NPs, several authors agreed that mentors are a key component that contributes to the success of new graduate NPs as they transition into practice (Barnes, 2015; Beggs, 2018; Brown, Poppe, Kaminetzky, Wipf, & Woods, 2015; Bush & Lowery, 2016; Dillon, Dolansky, Casey, & Kelley, 2016; Faraz, 2016; Harbman et al., 2017; Heitz et al., 2004; Poronsky, 2013; Rugen, Dolansky, Dulay, King, & Harada, 2018; Rugen, Harada, Harrington, Dolansky, & Bowen, 2018; Sargent & Olmedo, 2013; Sciacca & Reville, 2016; Sullivan-Bentz et al., 2010; Twine, 2017; Zapatka et al., 2014). Research findings suggested that there is a difference in mentorship provided by colleagues, healthcare professionals from different professions, and friends and family; however, more information is needed regarding the ideal structure for the mentoring/ mentorship program (Poronsky, 2013; Sullivan-Bentz et al., 2010). Schofield and McComiskey (2015) determined that not only was there a need for postgraduate fellowships or residencies, but also, medical doctors provided significant positive outcomes when they served as mentors for new NPs.

Barnes (2015) noted that one significant difference between new graduate NPs and new registered nurse (RN) graduates when they first begin their career following school is that the latter is provided with an extensive period where they are oriented to their new career. They are also supported throughout a portion of their transition with orientation programs, mentorship,

and training. These factors give the new graduate RNs a significant advantage over the new graduate NPs who are not provided with these benefits. The result of the Barnes (2015) study provided evidence that not only did the mentorship have a significant impact on the new employee, but the orientation also provided a sense of confidence in their surroundings which ultimately made their transitional experience much easier. This suggested that mentorship and orientation along with a nurturing environment may play a role in increasing the NP's self-confidence and ensuring a smoother and more successful transition period. Finally, according to Zapatka et al. (2014), new graduates tended to participate in postgraduate training programs because they provided the mentorship necessary to bridge the gap to practice following school.

### **Limitations/Gaps/Weaknesses in the Evidence**

The primary limitation and weakness of the studies included that there was limited research regarding new graduate NPs and specific features of their initial year as a healthcare practitioner and resident. Further, no research was located which discussed specific issues such as knowledge, confidence, and competence levels regarding new NPs' performance of orthopedic/ musculoskeletal assessment of the low back.

### **Summary**

The current research supports the need for additional education and mentorship for new graduate NPs to help build their confidence, raise their level of competence, and make the transitional period they experience following school easier. Additional education also provides the opportunity for new graduates to develop their skills and it promotes communication and strengthening relationships with other healthcare professionals.

## **Problem Statement**

The problem to be addressed by the DNP project is the lack of knowledge, competence, and confidence in orthopedic assessment and the inability to communicate findings of back pain with other healthcare professionals by new NP residents. Back pain is one of the most common medical conditions which prompts many patients to seek care in a primary care setting. New graduate NPs frequently lack the confidence in their skills to assess musculoskeletal complaints, and also feel as though they lacked the preparation in their NP educational program to manage difficult musculoskeletal cases. The lack of confidence and preparation results in longer and less effective patient interaction times which lead to bottlenecks of the clinic's flow, decreased patient satisfaction and decreased quality of care. Providing the NP residents attending the FQHC's residency program with additional education and resources for musculoskeletal assessment can help them develop knowledge, competence, and confidence in their assessment skills. It can also make them more efficient at accurately diagnosing patients with back pain which will lead to better communication skills with other healthcare professionals.

## **PICO Statement**

For new graduate NPs, does receiving additional orthopedic assessment education compared to not receiving any additional orthopedic assessment education increase their level of knowledge, confidence, and competence in performing orthopedic assessment and their ability to communicate with other healthcare professionals? This PICO question is asked in the context of the FQHC NP residency program.

## **Purpose and Goals**

The purpose of this project was to design an educational program and curriculum for the new graduate NP residents at one FQHC with education and resources to increase their

knowledge and enhance their ability to competently and confidently assess patients who present with low back complaints leading to better communication skills with other healthcare professionals. The goal was to demonstrate the effectiveness of this educational seminar coupled with the use of orthopedic resources that focus specifically on orthopedic assessment of the low back. The long-term goal was to increase the competence of the new graduate NP residents at assessing low back complaints, improving the new graduate NP residents' confidence in their skills as well as their efficiency at accurately diagnosing patients with low back pain. Ultimately, this will lead to better patient outcomes and improved interprofessional communication and relationships among healthcare professionals.

### **The Iowa Model-Revised**

The Iowa Model-Revised ("The Iowa Model Revised," 2016) served as the guide for the methodology of this project. The first step of the model was to identify a trigger, which is the lack of competence of the new graduate NP resident to complete a low-back pain assessment. Secondly, the problem was determined to be a priority for the agency, allowing the project to move forward. In the next step, a team was formed with the NP resident director and the DNP student, and the experts who developed the low back pain assessment teaching modalities were consulted. The YouTube channels, *Bob & Brad* (n.d.) and *Physiotutors* (n.d.) were YouTube sites that were both created by physical therapists who have several years of experience making educational videos about orthopedic assessments of musculoskeletal conditions including for the low back and pelvis. Next, research was gathered to analyze possible recommendations for a practice change. The literature was critiqued using Mosby's grading system and the literature was synthesized into emerging themes. Once the evidence was determined to adequately support a practice change, a pilot program involving the education on low back pain assessment was

initiated. After the implementation of the project, the final step was the evaluation of the data. The practice change was considered for full adoption by the agency and findings of the project were disseminated. The Iowa Model-Revised is an appropriate framework for the project as it provided guidelines to help translate research findings into implementation strategies at the project site.

### **Qualifications of the DNP Student**

The DNP student who implemented this project graduated from Palmer College of Chiropractic with honors (*cum laude*) in 2002 and passed all his Chiropractic and Physical Therapy boards. Board exams were taken in the United States and Canada.

### **Data Collection Procedure and Methods**

#### **Data Collection**

For this project, the data were collected through several DNP student-designed questionnaires. The content of the questionnaires mapped to the DNP Project's teaching intervention: the new-graduate NPs' confidence, competence, and knowledge of orthopedic/musculoskeletal assessment for patients who present with a chief complaint of low back pain. Furthermore, the new graduate NPs determined the ease of use of the educational resources that were used for this project. Appendix A contains the authorization from the FQHC to implement this project on-site and with new graduate NP residents.

#### **Measures**

**Pre- and Post-Implementation Questionnaires.** The questionnaires developed by the DNP student consisted of questions regarding the participant's knowledge and competence, as well as perceived confidence level in performing low back pain assessments and an assessment of the participant's step-by-step approach used when assessing a patient with a low back complaint (see Appendix B).

### **Pre-Implementation Questionnaire**

- 1) Participants were asked to answer multiple-choice knowledge questions.
- 2) Participants were asked to rate their knowledge on the topics that were to be taught in the two seminars using a 5-point Likert-type scale.
- 3) Participants were asked to rate their confidence on the topics that were to be taught in the two seminars using a 5-point Likert-type scale.

### **Seminar 1 and Seminar 2 Post-Implementation Questionnaire**

- 1) Participants' knowledge was measured with multiple-choice questions. The knowledge questions for Session 1 reflected the material presented in Session 1. Knowledge questions for Session 2 reflected the material presented in Session 2, as well as the questions incorrectly answered by the respondents from Session 1..
- 2) Participants were asked to rate their knowledge on the topics that were taught in the seminar using a 5-point Likert-type scale.
- 3) Participants were asked to rate their confidence on the topics that were taught in the seminar using a 5-point Likert-type scale.

### **One-Month Post-Implementation Questionnaire**

- 1) All questions on the pre-implementation questionnaire
- 2) Open-ended questions:
  - Describe the algorithm that you use when you assess a patient with a chief complaint of back pain.
  - Describe any barriers or obstacles you may have encountered in this project that may have hindered your learning.

- Please describe any recommendations that you feel might make the learning experience better in future projects like this one.
- How did the seminars impact your assessment of a patient with a low back complaint?
- Describe your overall experience in participating in this project.
- Describe the impact of the seminars on your ability to effectively communicate with other healthcare professionals.

### **Educational Resources and Practice Opportunities**

The use of existing educational resources included a website developed by the DNP student and the residents were given full access to use with (a) an algorithm for diagnosing low back complaints, and (b) YouTube channels showing musculoskeletal assessment videos. The two YouTube channels used to create the website are *Bob & Brad* (n.d.) and *Physiotutors* (n.d.). Both YouTube channels are owned and updated by licensed physical therapists and all the videos used for this project were thoroughly vetted to ensure the accuracy of the content. Both channels provided written consent to embed their videos on the website free of charge and obligation. Appendix C presents the emails from the “Bob and Brad” and “Physiotutors” providing permission for embedding their training videos onto this project’s website.

**Educational resources to be developed by the DNP student.** These included two instructional seminars approximately 60-90 minutes long and a question-and-answer period at the end to help strengthen and reinforce key concepts.

**Opportunities for practice.** The residents were able to perform the assessments taught at the seminars on each other and on the DNP student to experience the techniques firsthand. This learning approach had the added benefit and potential to elicit physical, physiological, and

biomechanical challenges that the residents may encounter and provided opportunities to ask questions that they experienced while performing the orthopedic assessment techniques on both themselves and their colleagues.

## **Methods**

**Create website.** The website had instructional videos that provided a brief explanation of appropriate orthopedic tests that residents were able to use to help isolate specific structures and tissues of the musculoskeletal system. The website also included videos that explain other important assessment techniques such as neurological assessment, range of motion, and posture and gait evaluation techniques and interpretation. Appendix D lists the contents of this project's website.

**Implementation.** Two educational seminars were provided during the residents' regular Wednesday afternoon meeting time. The seminars involved a direct demonstration of appropriate orthopedic assessment techniques as well as a question-and-answer period for the residents to further develop their understanding of the orthopedic tests and overall assessment strategy. During the seminars, the residents were asked to complete surveys to establish assessments of their confidence and knowledge both pre-implementation (baseline) and post-implementation. The surveys were completed at the beginning, at the completion of the first and second seminars, and finally, one month after the completion of the second seminar (total of four surveys) to determine whether they were able to retain the information presented to them while they participated in the project. Appendix E provides each seminar's topics.

### **Timeline.**

- Pre-implementation questionnaire (baseline) - July 9, 2020
- Seminar 1 post-implementation questionnaire - July 9, 2020

- Seminar 2 post-implementation questionnaire - July 16, 2020
- Post-implementation (four weeks after Seminar 2) - August 13, 2020

### **Data Analysis**

The success of the project was measured by evaluating the new graduate NP resident's confidence and competence in assessing patients with low back complaints. The new graduate NP residents participated by completing surveys and answering written questions designed to measure their knowledge on orthopedic assessment both before, immediately following, and one month after the educational intervention. All the numerical collected data were compiled into an excel spreadsheet and analyzed to determine participants' responses prior to the seminar:

- Knowledge scores
- Self-rating of knowledge
- Self-rating of confidence
- Answers to the open-ended questions
  - Overall, I found this seminar to be beneficial to me as a member of a healthcare team.
  - Did you find the educational seminars valuable?
  - Would you recommend this educational seminar to other residents?

The participants' responses to the open-ended questions in the Seminar 2 post-implementation and one-month post-implementation questionnaires were copied/typed verbatim into Word. The qualitative evaluation was completed by Katy Page, APRN (content expert), and the DNP student.

Thematic analysis was conducted to determine:

- (a) Barriers or obstacles that hindered participants' learning:

Describe any barriers or obstacles you may have encountered that could have hindered your learning.

- (b) Whether the seminars contributed to the participants' learning and what recommendations did they feel would make it a better learning experience:  
Please describe any recommendations that you feel might make the learning experience better in future projects like this one.
- (c) Whether the participants now have a systematic approach to assessing a patient with a low back complaint:  
Describe the algorithm that you use when you assess a patient with a chief complaint of back pain.
- (d) Impact of the DNP student's seminars on the participants' ability to conduct a low back assessment:  
Describe the impact of the seminars on how you assess a patient with a low back complaint.
- (e) Whether the seminars had an impact on the participants' ability to effectively communicate their findings of a low back complaint with other healthcare professionals:  
Describe the impact of the seminars on your ability to effectively communicate your findings of a low back complaint with other healthcare professionals.

The competence of the new graduate NP in performing a low back assessment was determined by evaluating the efficacy of the participant's description of their low back pain algorithms pre- and post-intervention. The effectiveness of the seminar was evaluated through the questions asking about barriers, obstacles, and what would have made the learning

experience better. Finally, asking about the impact of the seminars on the residents' ability to perform a low back assessment and communicate their findings with healthcare professionals enabled the gathering of valuable data regarding whether the goals of this project were achieved.

### **Human Subjects Consideration**

This DNP project involved making judgments about a program to improve or further develop program effectiveness and inform decisions about future programming within an organization (University of Hawai'i Human Studies Program, August 2, 2018). These quality improvement tasks are intended for internal organizational use only and not to provide generalizable or theoretical knowledge. As such, there were no plans to randomize subjects to different treatments, nor was personally identifiable information collected. Standard, evidence-based practices were implemented, and data were reported as an aggregate of the population. Prior to the onset of this project, the author had completed the Collaborative Institutional Training Initiative (CITI) training for research ethics and compliance, and Health Insurance Portability and Accountability Act (HIPAA) training on patient privacy protections. This project was always conducted with the utmost respect for patient confidentiality in all aspects during the phases implemented. This proposal was also reviewed by a committee consisting of University faculty and clinical experts familiar with clinical research to ensure that there was adequate human subjects' protection.

### **Results**

Responses obtained from the residents were analyzed using mean scores and thematic qualitative analysis. The sample consisted of three DNP/FNP graduates participating in the residency program which began in August 2019 and concluded in August 2020. All participants of the FQHC NP residency program were invited to join this project.

## Knowledge Question Scores

**Pre-implementation knowledge survey (baseline).** This consisted of eighteen multiple-choice questions to test the residents' baseline knowledge of performing a low back assessment. These questions focused on anatomy, anatomical landmarks, ranges of motion, orthopedic and neurological tests. The mean score on the knowledge questions was 28% correct (Table 1).

**Post-implementation Seminar 1 knowledge survey.** This consisted of 10 multiple-choice questions to test the residents' knowledge of performing a low back assessment immediately following the completion of Seminar 1. The ten questions were extracted from the pool of 18 baseline questions. This was to determine whether the content covered in the first seminar was effectively explained to the residents in a way they could understand. The mean score on the knowledge questions was 57% correct (Table 1).

**Post-implementation Seminar 2 knowledge survey.** This knowledge survey consisted of seven multiple-choice questions immediately following the completion of the second seminar. The seven questions used for this questionnaire were extracted from the pool of 18 baseline questions. The total average score on the knowledge questions was 81% correct (Table 1).

**Four-weeks after Seminar 2 knowledge survey.** Seventeen questions were extracted from the pool of 18 baseline questions to determine if the content covered was retained and useful. The mean score on the knowledge questions was 84% correct (Table 1).

Table 1  
Knowledge scores

Time	Total Possible Score	Average Score	Average % Correct
Seminar 1 Pre	18	5.0	28
Seminar 1 Post	10	5.7	57
Seminar 2 Post	7	5.7	81
4 Weeks Post	17	14.3	84

N=3

## Self-Rating of Knowledge

The questionnaires contained 2 multiple-choice questions using a Likert-type scale ranging from 1 “very low” to 5 ‘very high’ for the residents to self-rate their knowledge in performing a low back assessment. The residents’ mean self-rating of their knowledge scores increased from 1.67 (baseline), 2.67 (post-Seminar 1), to 4.0 (for both post-Seminar 2 and 4-weeks after Seminar 2) (Table 2).

Table 2

Time	Mean
Pre-implementation	1.67
Seminar 1 Post	2.67
Seminar 2 Post	4.00
4 Weeks Post	4.00

N=3

## Self-Rating of Confidence

The participants’ baseline self-rating of their confidence was 2.0 and it continued to increase from a mean score of 4.0 after Seminar 2 and through the four weeks after the completion of both seminars (Table 3).

Table 3

Time	Mean
Pre-implementation	2.00
Seminar 1 Post	3.00
Seminar 2 Post	4.00
4 Weeks Post	4.00

N=3

**Additional questions related to evaluation of the seminars.** The Seminar 2 and the 4-weeks post-questionnaire also contained six questions using a Likert-type scale ranging from 1 “strongly disagree” to 5 “strongly agree” to solicit their ratings of:

- a. How beneficial the seminar was for them as a member of the health care team; the participants’ mean scores were 4.67 for both instances (Table 4).

- b. How valuable the seminars were; mean scores of 5.0 were recorded (Table 5).
- c. Self-perceived ability to perform a low back assessment as a result of the seminar; the participants' mean score was 4.0 at the end of Seminar 2 (Table 6).
- d. Recommendation of this seminar series to other [NP] residents; the resident's mean self-rating scores were 4.0 for both surveys (Table 7).
- e. Overall self-determined knowledge to perform a low back assessment post-training; the self-rated mean score was 4.67 for the Seminar 2 post-survey (Table 8).
- f. Overall confidence in performing a low back orthopedic assessment post-training; the residents recorded a self-rating mean score of 5.00 (Table 9).

Table 4

Overall, I found this seminar to be beneficial to me as a member of a healthcare team. (rated on a Likert-type scale ranging from 1-5)

Time	Total	Mean
Day 2 Post	14	4.67
4 Weeks Post	14	4.67

N=3

Table 5

Did you find the educational seminars valuable? (rated on a Likert-type scale ranging from 1-5)

Time	Total	Mean
Day 2 Post	15	5.00
4 Weeks Post	15	5.00

N=3

Table 6

As a result of the educational seminar, I am better prepared to perform a low back assessment. (rated on a Likert-type scale ranging from 1-5)

Time	Total	Mean
Day 2 Post	12	4.00

N=3

Table 7

Would you recommend this educational seminar to other residents? (rated on a Likert-type scale ranging from 1-5)

Time	Total	Mean
Day 2 Post	12	4.00
4 Weeks Post	12	4.00

N=3

Table 8

Following this seminar, I would rate my knowledge on the topics covered about low back orthopedic assessment as (rated on a Likert-type scale ranging from 1-5)

Time	Total	Mean
Day 2 Post	14	4.67

N=3

Table 9

Following this seminar, I would rate my confidence on the topics covered about low back orthopedic assessment as (rated on a Likert-type scale ranging from 1-5)

Time	Total	Mean
Day 2 Post	15	5

N=3

Two open-ended questions were asked to obtain feedback from the residents about barriers or obstacles that may have interfered with their ability to learn the information and to solicit their recommendations to improve the project. They were asked to:

- a. “Describe any barriers or obstacles you may have encountered that could have hindered your learning.” The residents’ responses were: “none,” “no barriers, Kelsey did a great job,” and “I really enjoyed the seminars; however, I wish we could have had a few more because I learned a ton.”
- b. “Please describe any recommendations that you feel might make the learning experience better in future projects like this one.” The residents’ responses were “none, Kelsey did a wonderful job,” “none,” and “case study at the end of the seminar,” and “make all the residents perform the orthopedic tests.”

## Open-End Questions

The final section of this questionnaire consisted of 5 open-ended questions to solicit feedback about barriers or obstacles that may have interfered with their ability to learn the information and to solicit recommendations for the project. The residents were asked to:

“Describe any barriers or obstacles you may have encountered that could have hindered your learning.” To this question, the responses were as follows; (a) “None” (b) “I thought it was well done. Thank you” and (c) “Thanks for teaching us. I wouldn’t change anything.”

“Please describe any recommendations that you feel might make the learning experience better in future projects like this one.” The responses provided by the residents were as follows; (a) “More classes to cover other areas of spine and extremities.” (b) Case studies would help me to learn information better, however, you did a great job.” and (c) “No changes, good job.”

“Describe the algorithm you use when you assess a patient with a chief complaint of back pain.” The responses received from the residents were, (a) “HPI → AROM → PROM → Orthopedic test” (b) Adam’s sign- flexion= disk, extension=facet and lateral ROM sprain/strain” (c) History is most important, Adam’s sign- consider, AROM before PROM and Ortho tests to confirm Dx.”

“Describe the impact of the seminars on how you assess a patient with a low back complaint?” Responses were: (a) “It was great to learn how to assess a low back complaint because we didn’t learn much in our ortho rotation.” (b) “Seminars provided me with many more tools to evaluate low back complaints.” (c) “Excellent presentations, very detailed explanations with vivid examples. Used volunteers to demonstrate which really helped.”

“Describe the impact of the seminars on your ability to effectively communicate your findings of a low back complaint with other healthcare professionals?” The responses to this

question were, (a) I am now much more comfortable when I am evaluating a patient with a low back complaint. As a result, I feel like I can express my findings with confidence.” (b) I feel as though I am much more confident documenting as well as communicating with other healthcare professionals.” (c) “I can definitely implement what we were taught and share my findings with colleagues and other professionals.”

With regards to the website created as a resource for the residents, although the residents initially showed interest in having the website available as a resource for them to use, it did not appear to be used very often by the residents as a reference for musculoskeletal complaints they encountered in practice. From the introduction of the website at the first seminar until 3 months following the implementation of this project, the website has only been accessed a total of 12 times.

## **Discussion**

### **Knowledge Questionnaires**

The scores for the initial pre-implementation multiple-choice questions were low as would be expected in someone with no education or experience in the material that was to be covered in the seminars. However, as the project progressed throughout all its stages, the scores showed a consistent improvement, with the final scores the highest. This was likely the result of the seminars and the steady reinforcement provided to the residents to ensure they had a solid grasp of the content. This became evident following the introduction of the content reviews at the second seminar when the residents’ scores improved significantly from the previous post-implementation questionnaire.

### **Self-Rating of Knowledge and Confidence**

The self-ratings of the residents regarding both their perceived knowledge and confidence improved throughout the duration of the project. The format of the seminars along with the steady reinforcement of the material helped them to build a foundation of knowledge enabling them to feel comfortable with their understanding of the fundamentals of performing an orthopedic assessment on a patient with a complaint of low back pain.

### **Ratings of Educational Seminars as Valuable and Beneficial for Healthcare Team Member**

The residents consistently provided the highest possible ratings. Their responses demonstrate they recognized the seminars covered what they would need to know to effectively perform an orthopedic assessment as a healthcare professional. In addition, the increased knowledge and skills lead to their high ratings of how beneficial the seminar was to their performance as a healthcare team member.

### **Recommendation of the Seminars to Other Residents**

The residents' scores of "agree" are likely because they felt there were some ways the seminars could have been even more effective. This was supported by their suggestions such as involving case studies to help them learn and having more seminars because of the amount of content covered.

Although the results were positive across the board, the amount of content and the nature of the content makes it hard to process in such a condensed period. Although the reviews of the subject matter did help to reinforce it, additional repetitions and the introduction of different learning methods such as case studies and more student interaction in performing the orthopedic tests could have made the material easier to digest for the residents.

## **Knowledge and Confidence**

Regarding the responses to the question “Following this seminar, I would rate my knowledge and confidence on the topics covered about low back orthopedic assessment as: the “very high” ratings to these questions indicated they understood that although they had a solid grasp of the information discussed over the two 120-minute seminars, they still had plenty to learn on this vast topic. The residents demonstrated their improved knowledge and confidence in not only performing the techniques but also communicating their findings with other healthcare professionals as they were able to effectively describe their own strategy of assessing a patient with a complaint of low back pain.

## **Relationship of Results to Purpose/Goals/Objectives**

As a quality improvement project, the goal was to improve the knowledge, confidence, and competence of the residents when faced with a patient with a chief complaint of low back pain. The design was intended to be responsive to the participant’s learning needs and therefore the project remained open to ongoing change and modification throughout the duration of the implementation stages. As additional time for the review of the content was added to the project’s implementation, the results indicated the participant’s knowledge, confidence, and competence in the assessment of a chief complaint of low back pain increased.

## **Implications**

This project demonstrated the high level of knowledge retention of the new graduate NPs in the educational seminars, and their openness to learning techniques for treating patients with musculoskeletal complaints. Programmatic refinements, such as frequent reviews of important concepts, implementation of case studies, and increased resident participation in performing orthopedic tests should be included in future program offerings.

## **Strengths & Limitations**

### **Strengths**

A strength of this project was the selection of an appropriate setting for the seminars. The room provided for a quiet environment that was intimate in nature. This allowed for the residents to engage in the learning process openly without interruption.

The small sample size (n=3) was a strength. This allowed the DNP student to adjust the presentation of the seminars to the group's learning needs. The seminars progressed at a comfortable pace for the residents which ensured that ample time was provided for reviewing concepts, answering questions, and ensuring that all three residents had a solid grasp of all information prior to moving onto the next topic. The individualized feedback from the participants was significant following the Day 1 post-implementation questionnaire results as it allowed for the implementation of additional review and Q&A sessions to reinforce the key concepts discussed in the seminars which ultimately led to a better outcome.

The project's design used a quality improvement format. This enabled specific attention to be given to the characteristics of the participants and the uniqueness of the content.

The final strength of this project was the content expert's involvement in the seminars because they were able to provide vital feedback that allowed for important changes and adaptations to take place at the clinic site to ensure the best possible outcome.

### **Limitations**

One limitation of this project was the sample size (n=3). It is not representative of a larger population of new NPs graduating in any given year.

The second limitation of this project was the format itself. This project was a quality improvement project rather than an experimental design. Quality improvement projects do not

contain the same components of an experimental design such as (a) control (b) randomization, and (c) replication. Because of this, a quality improvement project lacks the ability to demonstrate a cause-and-effect relationship and the results are not generalizable.

A third limitation was the consistency in the questions selected for gathering data in this project. One of the questions was inadvertently omitted from the final questionnaire which made the data analysis less consistent with regard to the size of the knowledge-based questions.

Another notable limitation to this project is the fact that the project was implemented during the COVID-19 pandemic. This is a significant weakness because the need for infection control measures resulted in the FQHC transitioning most of its care delivery to telehealth visits rather than in-person visits. Because of this, the residents were unable to perform many of their patient visits in-person, including conducting orthopedic tests on their patients. This lack of ability to practice the tests they were taught may have resulted in less retention of knowledge of the techniques they learned at the seminars.

Finally, the last limitation of this project was the lack of time available to present the information to the participants. The amount of information that was covered was squeezed into two 120-minute sessions leaving the participants with too much information to digest in too short a time. If more content in this area were to be included, it would likely be beneficial to plan for a longer period of time to cover the material so the participants would each have a better chance to perform all the orthopedic tests and also allow for the chance to ask any additional questions they may have had.

### **Sustainability**

As a result of the success of this project, the FQHC residency program coordinator has requested the continuation of the low back assessment seminars as well as other musculoskeletal

regions for the new graduate NP residents at the FQHC to help ease the transitional period they experience in their first year of practice. The intention going forward is to continue the seminars on a yearly basis and to make video recordings of the seminars to be used as a learning resource for new graduate nurse practitioners and also to use as an educational resource for self-reflection for the purpose of improving future seminars. Because of challenges new graduate NPs encounter once they enter the workforce and because of the favorable outcome of this project, this appears to be an area that requires more exploration to help new graduate NPs as they make the transition from school to becoming seasoned healthcare professionals.

### **Dissemination Plan**

To ensure the continued success of this project, adjustments will be made to the educational seminars based on the feedback provided by the new graduate NP residents to improve the efficiency and effectiveness of educating the residents on performing a low back assessment. The redesigned program could consist of four 120-minute seminars consisting of the same content with the addition of additional review sessions, case studies and more time focused on allowing the residents to gain more hands-on training of the orthopedic tests to ensure that they establish a solid understanding of both the techniques and the underlying concepts. Next, the project will be expanded to include other residency programs here on the island and eventually to include locations across the mainland.

To contribute knowledge to the nursing profession, this DNP Project will be submitted for publication. Additional dissemination venues may include institutional committees, local and national nurse practitioner organizations, and making poster or podium presentations at local and national meetings.

## DNP Essentials

The Essentials of Doctoral Education for Advanced Nursing Practice (American Association College of Nursing, 2006) were developed (2006) to assure DNP programs meet the eight foundational competencies that are core to the role of advanced practice nurses. These essentials were key to the project in that they established a baseline of principles to ensure that the project was conducted in a safe manner, respectful of patient privacy, and based on evidence in the literature to promote practice change within the field of nursing. This was also achieved using effective communication and leadership skills while working with the new graduate NPs to promote collaboration within the field of nursing to improve the outcomes of patients with complaints of low back pain.

The following table displays the DNP Essentials and links each to the Project.

AACN DNP Essential	Project Activities
Essential I. Scientific Underpinnings of for Practice, Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking, and Essential VIII: Advanced Nursing Practice	The DNP student conducted a needs assessment of the project site and recognized the impact of a lack of knowledge and skills about low back pain assessment on the performance of new NP graduates. The need for an empowering educational strategy was identified and an intervention was formulated.
Essential III. Clinical Scholarship and Analytical Methods for Evidence-Based Practice, Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care, and Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes	Throughout the course of this project, the DNP student reviewed available evidence in the literature to formulate an intervention that was based on a previously identified low back pain management best practice. The use of technology and interprofessional collaboration formed the basis of the intervention.
Essential V. Health Care Policy for Advocacy in Health Care and Essential VII: Clinical Prevention	Demonstration of meeting these Essentials occurred as the DNP student instructed the new NP graduates to promote the physical/psychosocial health of their patients

and Population Health for Improving the Nation's Health	through the conduct and communication of an effective low back pain assessment. By improving their clinical practice, the new graduate NPs were able to improve the health of their patients, minimize the long-term health consequences of poorly assessed, and managed complaints of low back pain.
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### **Conclusion**

This project was successful in achieving the goal of this project which was to provide the new graduate NP residents of the FQHC with educational seminars to educate them on how to provide an efficient and thorough musculoskeletal assessment for patients presenting with a chief complaint of low back pain. Although this project was successful, it is clear from the responses of the residents to the open-ended questions that there are factors such as additional educational seminars, case studies on low back complaints, and more hands-on training with regards to orthopedic seminars that if implemented could result in better results in future projects. Because of this, and the significant number of low back complaints encountered by NPs in the primary care setting, it stands to reason that more work in this area could prove to be beneficial for the field.

## Appendix A

### DNP project approval at WCCHC Inbox x



**Kelsey Ennila** <ennilak@hawaii.edu>  
to Bobbi ▾

Tue, May 19, 8:49 PM (8 days ago)

Hi Bobbi, how are you? I hope all is well with you. I am writing this email to ask you for permission to implement my DNP project on site at WCCHC with the nurse practitioner residence discussed earlier. Would that still be alright? Thank you Bobbi! Sincerely, Kelsey Ennila



**Bobbi Elisala**  
to me ▾

1:23 PM (19 minutes ago)

Yes it would be fine

Bobbie Elisala, APRN-Rx, MSN, FNP-BC

Nursing Education Director

Waianae Coast Comprehensive Health Center

87-2070 Farrington Hwy. Suite N.

Waianae, Hawaii 96792

PH 808-697-3900

FAX 808-697-3930

## Appendix B

### Measures

#### Pre-Implementation Questionnaire Day 1

- 1) \_\_\_\_\_ of motion should always be performed prior to the other ranges of motion when performing a musculoskeletal assessment?  
A) **active**  
B) passive  
C) manual resistance  
D) it doesn't matter which order
- 2) Which assessment technique most effectively tests for a strain?  
A) active range of motion  
B) **manual resistance**  
C) passive range of motion  
D) active and passive range of motion
- 3) Sprain is an injury to:  
A) either a muscle or a tendon  
B) a tendon  
C) a muscle  
D) **a ligament**
- 4) Strain is an injury to:  
A) **either a muscle or a tendon**  
B) a tendon  
C) a muscle  
D) a ligament
- 5) The iliac crest is the spinal landmark for:  
A) L2/3 disc space  
B) L3 vertebral body  
C) **L4 vertebral body**  
D) L5/S1 disc space
- 6) Which assessment technique most effectively tests for a sprain?  
A) **Passive range of motion**  
B) Active range of motion  
C) Manual resistance  
D) active and passive range of motion
- 7) A facet injury would most likely be irritated by which range of motion?  
A) flexion  
B) **extension**

- C) rotation
  - D) lateral flexion
- 8) L3 myotome is best represented by:
- A) hip flexion
  - B) knee extension**
  - C) foot dorsiflexion
  - D) foot plantar flexion
- 9) L5 myotome is best represented by:
- A) hip flexion
  - B) great toe extension**
  - C) foot plantarflexion
  - D) knee flexion
- 10) L2 myotome is best represented by:
- A) hip flexion**
  - B) great toe extension
  - C) foot plantarflexion
  - D) knee flexion
- 11) Which of the following tests is **not** considered a malingering test?
- A) Waddell's sign
  - B) Bechterew's test
  - C) Gaenslen's test**
  - D) Hoover's test
- 12) Which of the following is **not** considered a component of the Cluster of laslett?
- A) Sacral thrust
  - B) Distraction test
  - C) Noble compression**
  - D) Compression test
- 13) Which of the following is an orthopedic test used to differentiate between Lumbar spine pathology and Sacroiliac (SI) joint pathology?
- A) Morton's test
  - B) Ober's test
  - C) Goldthwait's test**
  - D) Hoover's test
- 14) Which of the following tests is responsible for testing for Iliotibial Band syndrome?
- A) Thomas test
  - B) Distraction test
  - C) Nobel's compression test**
  - D) Gaenslen's test

- 15) Which of the following tests is responsible for testing for Lumbar radiculopathy?
- A) **Straight leg raise**
  - B) Goldthwait's test
  - C) SI compression
  - D) Sacral thrust
- 16) Which of the following tests is responsible for testing for sacroiliitis?
- A) Straight leg test
  - B) Seated Kemp's test
  - C) **Yeoman's test**
  - D) Nobel's compression test
- 17) \_\_\_\_\_ is a test used to determine if the cause of patient's lower back pain is due to herniation or if there are signs of inter-vertebral foramen encroachment.
- A) Distraction test
  - B) Sacral compression
  - C) **Valsalva maneuver**
  - D) Thomas test
- 18) The Straight leg raise is positive for lumbar radiculopathy when you have a reproduction of symptoms at:
- A) **35- 70 degrees**
  - B) 70-90 degrees
  - C) 60-90 degrees
  - D) 20-50 degrees
- 19) Prior to this seminar, I would rate my knowledge about low back orthopedic assessment as:
- a. Very low
  - b. Low
  - c. Neutral
  - d. High
  - e. Very high
- 20) Prior to this seminar, I would rate my confidence in performing a low back orthopedic assessment as:
- a. Very low
  - b. Low
  - c. Neutral
  - d. High
  - e. Very high

## Post-Implementation Questionnaire Day 1

- 1) \_\_\_\_\_ of motion should always be performed prior to the other ranges of motion when performing a musculoskeletal assessment?  
A) **active**  
B) passive  
C) manual resistance  
D) it doesn't matter which order
- 2) Which assessment technique most effectively tests for a strain?  
A) active range of motion  
B) **manual resistance**  
C) passive range of motion  
D) active and passive range of motion
- 3) Sprain is an injury to:  
A) either a muscle or a tendon  
B) a tendon  
C) a muscle  
D) **a ligament**
- 4) Strain is an injury to:  
A) **either a muscle or a tendon**  
B) a tendon  
C) a muscle  
D) a ligament
- 5) The iliac crest is the spinal landmark for:  
A) L2/3 disc space  
B) L3 vertebral body  
C) **L4 vertebral body**  
D) L5/S1 disc space
- 6) Which assessment technique most effectively tests for a sprain?  
A) **Passive range of motion**  
B) Active range of motion  
C) Manual resistance  
D) active and passive range of motion
- 7) A facet injury would most likely be irritated by which range of motion?  
A) flexion  
B) **extension**  
C) rotation  
D) lateral flexion
- 8) L3 myotome is best represented by:

- A) hip flexion
- B) knee extension**
- C) foot dorsiflexion
- D) foot plantar flexion

9) L5 myotome is best represented by:

- A) hip flexion
- B) great toe extension**
- C) foot plantarflexion
- D) knee flexion

10) L2 myotome is best represented by:

- A) hip flexion**
- B) great toe extension
- C) foot plantarflexion
- D) knee flexion

11) Following this seminar, I would rate my knowledge on the topics covered about low back orthopedic assessment as:

- a. Very low
- b. Low
- c. Neutral
- d. High
- e. Very high

12) Following this seminar, I would rate my confidence on the topics covered in performing a low back orthopedic assessment as:

- a. Very low
- b. Low
- c. Neutral
- d. High
- e. Very high

## Post-Implementation Questionnaire Day 2

- 1) Which of the following tests is **not** considered a malingering test?
  - A) Waddell's sign
  - B) Bechterew's test
  - C) Gaenslen's test**
  - D) Hoover's test
  
- 2) Which of the following is **not** considered a component of the Cluster of laslett?
  - A) Sacral thrust
  - B) Distraction test
  - C) Noble compression**
  - D) Compression test
  
- 3) Which of the following is an orthopedic test used to differentiate between Lumbar spine pathology and Sacroiliac (SI) joint pathology?
  - A) Morton's test
  - B) Ober's test
  - C) Goldthwait's test**
  - D) Hoover's test
  
- 4) Which of the following tests is responsible for testing for Iliotibial Band syndrome?
  - A) Thomas test
  - B) Distraction test
  - C) Nobel's compression test**
  - D) Gaenslen's test
  
- 5) Which of the following tests is responsible for testing for Lumbar radiculopathy?
  - A) Straight leg raise**
  - B) Goldthwait's test
  - C) SI compression
  - D) Sacral thrust
  
- 6) Which of the following tests is responsible for testing for sacroiliitis?
  - A) Straight leg test
  - B) Seated Kemp's test
  - C) Yeoman's test**
  - D) Nobel's compression test
  
- 7) \_\_\_\_\_ is a test used to determine if the cause of patient's lower back pain is due to herniation or if there are signs of inter-ventricular foramen encroachment.
  - A) Distraction test
  - B) Sacral compression
  - C) Valsalva maneuver**
  - D) Thomas test

- 8) Following this seminar, I would rate my knowledge about low back orthopedic assessment as:
- Very low
  - Low
  - Neutral
  - High
  - Very high
- 9) Following this seminar, I would rate my confidence in performing a low back orthopedic assessment as:
- Very low
  - Low
  - Neutral
  - High
  - Very high
- 10) Overall, I found this seminar to be beneficial to me as a member of a healthcare team:
- Strongly disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly agree
- 11) Did you find these educational seminars valuable?
- Strongly disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly agree
- 12) As a result of the educational seminars, I am better prepared to perform a low back assessment:
- Strongly disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly agree
- 13) Would you recommend these educational seminars to other residents?
- Strongly disagree
  - Disagree
  - Neither agree nor disagree
  - Agree
  - Strongly agree

- 14) Following this seminar, I would rate my knowledge on the topics covered about low back orthopedic assessment as:
- Very low
  - Low
  - Neutral
  - High
  - Very high
- 15) Following this seminar, I would rate my confidence on the topics covered in performing a low back orthopedic assessment as:
- Very low
  - Low
  - Neutral
  - High
  - Very high
- 16) Describe any barriers or obstacles you may have encountered that could have hindered your learning:
- 17) Please describe any recommendations that you feel might make the learning experience better in future projects like this one:

### **Post-Implementation Questionnaire One Month Later**

- Which of the following tests is **not** considered a malingering test?
  - Waddell's sign
  - Bechterew's test
  - Gaenslen's test**
  - Hoover's test
- Which of the following is **not** considered a component of the Cluster of laslett?
  - Sacral thrust
  - Distraction test
  - Noble compression**
  - Compression test
- Which of the following is an orthopedic test used to differentiate between Lumbar spine pathology and Sacroiliac (SI) joint pathology?
  - Morton's test
  - Ober's test
  - Goldthwait's test**
  - Hoover's test
- Which of the following tests is responsible for testing for Iliotibial Band syndrome?
  - Thomas test

- B) Distraction test
  - C) Nobel's compression test**
  - D) Gaenslen's test
- 5) Which of the following tests is responsible for testing for Lumbar radiculopathy?
- A) Straight leg raise**
  - B) Goldthwait's test
  - C) SI compression
  - D) Sacral thrust
- 6) Which of the following tests is responsible for testing for sacroiliitis?
- A) Straight leg test
  - B) Seated Kemp's test
  - C) Yeoman's test**
  - D) Nobel's compression test
- 7) \_\_\_\_\_ is a test used to determine if the cause of patient's lower back pain is due to herniation or if there are signs of inter-vertebral foramen encroachment.
- A) Distraction test
  - B) Sacral compression
  - C) Valsalva maneuver**
  - D) Thomas test
- 8) \_\_\_\_\_ of motion should always be performed prior to the other ranges of motion when performing a musculoskeletal assessment?
- A) active**
  - B) passive
  - C) manual resistance
  - D) it doesn't matter which order
- 9) Which assessment technique most effectively tests for a strain?
- A) active range of motion
  - B) manual resistance**
  - C) passive range of motion
  - D) active and passive range of motion**
- 10) Sprain is an injury to:
- A) either a muscle or a tendon
  - B) a tendon
  - C) a muscle
  - D) a ligament**
- 11) Strain is an injury to:
- A) either a muscle or a tendon**
  - B) a tendon
  - C) a muscle

- D) a ligament
- 12) The iliac crest is the spinal landmark for:  
A) L2/3 disc space  
B) L3 vertebral body  
**C) L4 vertebral body**  
D) L5/S1 disc space
- 13) Which assessment technique most effectively tests for a sprain?  
**A) Passive range of motion**  
B) Active range of motion  
C) Manual resistance  
D) active and passive range of motion
- 14) A facet injury would most likely be irritated by which range of motion?  
A) flexion  
**B) extension**  
C) rotation  
D) lateral flexion
- 15) L3 myotome is best represented by:  
A) hip flexion  
**B) knee extension**  
C) foot dorsiflexion  
D) foot plantar flexion
- 16) L5 myotome is best represented by:  
A) hip flexion  
**B) great toe extension**  
C) foot plantarflexion  
D) knee flexion
- 17) L2 myotome is best represented by:  
**A) hip flexion**  
B) great toe extension  
C) foot plantarflexion  
D) knee flexion
- 18) Following this seminar, I would rate my knowledge about low back orthopedic assessment as:
- Very low
  - Low
  - Neutral
  - High
  - Very high

19) Following this seminar, I would rate my confidence in performing a low back orthopedic assessment as:

- a. Very low
- b. Low
- c. Neutral
- d. High
- e. Very high

20) Overall, I found this seminar to be beneficial to me as a member of a healthcare team:

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree

21) Did you find the educational seminars valuable?

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree

22) As a result of the educational seminars, I have the knowledge to perform a low back assessment:

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree

23) As a result of the educational seminars, I have the confidence to perform a low back assessment:

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree
- e. Strongly agree

24) Would you recommend these educational seminars to other residents?

- a. Strongly disagree
- b. Disagree
- c. Neither agree nor disagree
- d. Agree

e. Strongly Agree

- 25) Describe any barriers or obstacles you may have encountered that could have hindered your learning:
- 26) Please describe any recommendations that you feel might make the learning experience better in future projects like this one:
- 27) Describe the algorithm that you use when you assess a patient with a chief complaint of back pain:
- 28) Describe the impact of the seminars on how you assess a patient with a low back complaint?
- 29) Describe the impact of the seminars on your ability to effectively communicate your findings of a low back complaint with other healthcare professionals?

## Appendix C

### Authorization to Use Material from Established Websites



Hi Kelsey, thanks for your message. We are not here right now, but we'll get back to you as soon as we are back! Lots of info can be found on our website <https://www.physiotutors.com/>

10/26/19, 9:36 PM

Hi Kelsey. You can just embed our videos on your website. This can be done on YouTube when you click on "share" - > embed



This way the youtube video is shown on your website. We receive reimbursement through advertisement that is displayed in the videos

## Permission to use videos on my website Inbox x



**Kelsey Ennila** <ennilak@hawaii.edu>  
to schrupp, me ▾

Tue, May 19, 9:04 PM (6 hours ago)



Hi Robert, my name is Kelsey Ennila. I had previously emailed you and asked you permission to embed your videos on a website that I am making as part of a school quality improvement project to become a nurse practitioner. I was hoping that you would be willing to give me permission once again so that I can include our email conversation into my DNP project proposal. I plan on keeping the website up for somewhere between 1 and 2 years and you are free to revoke your permission at any time. I promise to make it professional and I do everything I can to promote you and give you credit for all of your hard work. Thank you in advance and I appreciate your hard work (your videos are amazing). Sincerely, Kelsey Ennila. (808) 753-8593



**schrupp@hbc.com**  
to me ▾

3:48 AM (4 minutes ago)



Hi Kelsey  
You have our permission  
Thanks  
Bob

## **Appendix D**

### **Website Content**

The website that will be designed for the residents at the FQHC will consist of videos from 2 different YouTube channels (“Physiotutors” and “Bob and Brad”). The videos are short instructional videos that explain how to perform orthopedic assessments of musculoskeletal complaints and how to interpret their findings. They will be embedded onto the site and be available to the NP residents so that when they have a patient with a musculoskeletal complaint, they will be able to watch the videos to refresh their memories as to the proper techniques and mechanics of the different orthopedic tests.

## Appendix E

### Seminar #1 Low Back Pain

History is the most important component of developing a differential diagnosis in cases involving the musculoskeletal system.

#### OPQRSTFID or OLDCART

- Onset- when did this begin?
- Provocative/ Palliative- what makes it better/ worse?
- Quality- how would you describe the pain? Sharp, dull, achy, burning...
- Radiate- does the pain radiate anywhere?
- Site- could you point to the pain for me?
- Timing- is there a specific time of day when you notice your pain tends to be worse? Morning, night, following activity...
- Frequency- how often do you have this pain?
- Intensity- on a scale of 0-10 how would you rate the pain? (10 being the worst you can imagine)
- Duration- is the pain constant or intermittent? How long does it last once it has started?

**VINDICATE. Differential diagnosis brainstorming:** Vascular, Infectious, Neoplasm, Drugs, Inflammatory/Idiopathic, Congenital, Autoimmune, Trauma, Endocrine/Metabolic

**Initial question-** Did you injure yourself via trauma? (car accident, fall, lifting... etc.)

**What you might suspect** – possibly a muscle strain, disc lesion, fracture, or a facet injury?

**Follow-up question-** Did you fall on buttocks? Compression or coccygeal fracture  
Was this a sudden hyperflexion injury? Did the pain appear while lifting or twisting? -  
Disc lesion or muscle strain.

Did you have a sudden extension injury? - Facet injury

**Initial question-** Does the pain continue into buttocks or leg?

**What you might suspect-** Tumor, disc lesion, stenosis, or the pain could be referred from either a facet joint or trigger point?

**Follow-up question-** Does the pain extend below the knee? – Nerve root pain due to disc, tumor, stenosis. (facet and trigger point less likely)

Does the pain extend into the buttocks or to the knee? – Lumbar facet, SI joint, and trigger point.

**Initial question-** Do you have any difficulty with urination or defecation?

**What you might suspect-** Potentially it could be a disc lesion, cauda equina, or even constipation?

**Follow-up question-** Do you have any numbness around the groin or genital region? –  
Cauda equina syndrome

Do you have any leg pain when you cough, sneeze or defecate? – Space occupying lesion such as tumor or disc lesion.

Do you have to urinate more often than normal or have difficulty stopping or starting? – Prostate cancer is possible

**Initial question-** Ask the patient if they have experienced any abdominal pain?

**What you might suspect-** AAA or another genitourinary cause?

**Follow-up question-** Is this associated with your menstrual period? – Dysmenorrhea or if severe, consider endometriosis), Pelvic inflammatory disease

Does the pain radiate to the groin? – potential kidney infection or stone

Is there associated weakness in the legs? – Abdominal aneurysm

**Initial question-** Ask if they have experienced significant weight loss (unexpected)?

**What do you suspect-** Cancer, diet, or depression?

**Follow-up question-** Does the patient have a history of cancer, pain not relieved via rest or night pain? – cancer

**Initial question-** Does activity cause weakness in the legs?

**What do you suspect-** Neurogenic or vascular claudication?

**Follow-up question-** Is it quickly relieved with rest? – Vascular claudication

Is the pain relieved when the patient is in a flexed position or after 15-20 minutes of rest?  
– Canal stenosis (Neurogenic claudication)

Rule out red flags - previous hx of cancer/ long term steroids, HIV, previous trauma/ surgery, non-mechanical injury (unrelated to time or activity, weight loss, feeling unwell, fever, deformity, neurological symptoms, etc.)

Other tools that can help in assessing a patient with a musculoskeletal injury include:

- ROS- Valsalva- do you have any shooting pain, numbness, or tingling when you cough, sneeze or bare down to go to the restroom?
- Past medical history- previous history of trauma
- **Postural assessment**
- Gait analysis
- Palpation
- **Range of motion**
- **Orthopedic tests**
- Palpation (static and motion)
- **Neurological tests-** dermatomes, myotomes, and DTR's

## Postural Assessment

Normal curvatures of the spine-

2 Lordosis (Cervical and Lumbar) and 1 Kyphosis (Thoracic)

Scoliosis- structural or functional

### Spinal landmarks-

- C7 vertebral prominens
- T3 base of spine of scapula
- T7 bottom of scapula
- T8 bra strap
- T12 12<sup>th</sup> rib
- L4 iliac crest
- S2 posterior superior iliac spine (just beneath dimples)

### Ranges of motion

Ranges of motion, although helpful, can be deceiving when the patient is experiencing pain.

Examples of this include:

- 1) Cervical spine rotation (ROM) is oftentimes decreased to the side of hand dominance.
- 2) Lumbar flexion can be reduced as the result of tight hip, quadriceps, and hamstring muscles
- 3) Pelvic torsion- ROM can be affected by the innominate bones being rotated in opposite directions in relation to the sacrum. This can cause things such as external foot flare, pronation of the foot on that side, and a tender medial knee on the side of foot flare.

**Active range of motion (AROM)** is when the patient actively contracts their muscles to enable the joint to move through its natural range of motion (ROM).

**Passive range of motion (PROM)** is the process of passively moving a patient's body part through its range of motion

**Manual resistance** is the process of asking the patient to attempt to move a body part through its range of motion while simultaneously providing resistance and therefore not allowing any motion to occur.

When performing a range of motion testing, always perform active range of motion prior to passive range of motion as it will allow you to determine how much ROM the patient is capable of so that you don't hurt them.

Also, when evaluating an extremity injury, always evaluate the non-injured side first as it will allow you to get an idea of what their normal range of motion looks like.

When assessing a range of motion, you want to consider 3 things in particular:

- 1) Does the patient experience any pain at any time while performing ROM?
- 2) How much range of motion (in degrees) is that particular body part capable of?
- 3) When dealing with extremities, is one side capable of greater ROM than the other?

## Sprain vs Strain?

Sprain- ligament

Strain- muscle or tendon

Why does this matter? **Prognosis**

Because ligaments are far less vascular and therefore oftentimes heal slower than a fracture. Muscles on the other hand will heal a lot faster in most cases. (to help you make a more accurate prediction as to how long it will take to heal)

**Passive range of motion** tests MOSTLY for ligamentous structures and joints. No muscle contraction takes place and therefore there shouldn't be any pain. (antagonist muscles could be affected)

**Active range of motion** tests for both muscles and ligamentous structures and joints. With AROM the muscles contract which could cause pain and also the joints and ligamentous structures move which can also result in pain.

**Manual resistance**- tests ONLY for muscular damage (not joint damage) because there is muscular contraction and the joint and ligamentous structures do not move and therefore should not be affected.

Demonstrate ranges of motion- active, passive, and manual resistance  
Normal range of motion for the lumbar spine include

Forward flexion- 40-60 degrees

Extension- 20-35 degrees

Lateral flexion- 25

Rotation-3-18

### Neurological Testing

Dermatomes- L2-5, S1 &S2

Myotomes-

- L2: hip flexion
- L3: knee extension
- L4: ankle dorsi-flexion
- L5: great toe extension
- S1: ankle plantar-flexion/ankle eversion/hip extension
- S2: knee flexion
- S3-S4: anal wink

DTR's- Patellar reflex- L3/4, Achilles reflex- S1/2

## **Seminar #2 Orthopedic Tests**

### **Assessment algorithm**

**Adam's sign-** with regarding ranges of motion.

- 1) Flexion restriction is oftentimes due to a discal lesion.
- 2) Extension restriction is oftentimes due to an irritation to the facet joints.
- 3) Lateral flexion restrictions are often the result of sprains or strains

### **Lumbar spine**

#### **Facet pain/ syndrome**

Seated Kemp's test

Prone lumbar hyperextension test-

### **SI joint**

Cluster of Laslett SI joint provocation/ Distraction, Compression, right-sided thigh thrust, and Sacral thrust

Fabere (hip/ iliopsoas/ SI joint)

Gaenslen's test

Goldthwait's' Test/ (SI joint or Lumbar spine)

Yeoman's test/ sacroiliitis (quads/ iliopsoas)

### **Lumbar radiculopathy**

SLR/ Lasegues test

Neri's sign- flexed neck

Braggard's sign - dorsiflex foot

Bowstring test/ sciatic nerve tension

Reversed Lasègue

Dejerine's Sign - Cough, sneeze, or bear down to go to the restroom will increase the 3 components that comprise Dejerine's Triad. (Valsalva Maneuver)

Slump test

### **Rectus Femoris/ Iliopsoas testing**

Thomas test/ Iliopsoas tightness

Nachlas test/ lumbar spine/ SI joint

Ely's test/ Rectus femoris

### **Hamstring testing**

Tripod sign/ hamstring contractures

90-90 SLR/ Hamstring contractures

### **Piriformis/ Gluteal testing**

Piriformis test

Active Piriformis test

FAIR test/ Deep gluteal syndrome or Piriformis syndrome

Trendelenburg sign/ hip abductors

### **ITB or Tensor fascia lata**

Ober's test

Nobel compression test

### **Malingering tests**

Waddell's Test

Hoover Test

Bechterew's test

Discussion on communication of exam findings with other healthcare professionals

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