QUALITY IMPROVEMENT PROJECT TO ENHANCE ONBOARDING OF NEW ADVANCED PRACTICE PROVIDERS (APPs) AT A UNIVERSITY BASED OUTPATIENT NEUROLOGY CLINIC

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ABSTRACT

Khyati Patel: Quality Improvement Project to Enhance Onboarding of New Advanced Practice Providers (APPs) at a University based Outpatient Neurology Clinic
(Under the direction of Jessica Williams)

OBJECTIVE: A quality improvement project to improve job satisfaction, knowledge/preparation, retention, and patient care through an onboarding process for advanced practice providers in neurology department by implementing an online learning portal paired with a face-to-face lecture series and mentorship experience.

BACKGROUND: The American Academy of Neurology Workforce Task Force (WFTF) report data suggests that for most states, the current demand for neurologist services already exceeds the supply, and by 2025 the demand for neurologists will be even higher. This makes attracting and retaining non-physician, advanced practice providers (APPs) to neurology even more important.

DESIGN: A pre-implementation survey assessing the baseline knowledge in neurology and role transition factors was administered. Using Malcolm Knowles’ (1980) adult learning theory as a guide, participants underwent self-learning through online portal, face-to-face lectures and mentorship experience. A post-implementation survey was administered to assess onboarding experience and feedback on process evaluation measures.

RESULTS: Three advanced practice providers with experience ranging from three months to one year were recruited for the study. Participants underwent a nine-week implementation period. Decrease in mean scores on the 11-item abbreviated Misener nurse practitioner job
satisfaction scale (MNPJSS) (2.36 vs. 2.12) meant a positive change in job satisfaction, post implementation. There was an increase in perceived confidence from 33% to 100% in available education, training, support, and resources as well. There was an increase in mean scores from 4.22 to 4.89 on the site specific questions measuring knowledge and job satisfaction, indicating a positive change. Retention of participants was monitored over the nine-week project period; however, assessing retention rate may not be meaningful given the small number of participants and short time period.

CONCLUSIONS: This project addressed two significant problems currently facing healthcare, a shortage of neurology specialists and retention of APPs. The positive outcomes indicate that this project can serve as a model for other neurology and specialty clinics facing the same challenges.

Keywords: Advanced practice provider, onboarding, online learning, job satisfaction, role transition, retention
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CHAPTER 1: INTRODUCTION AND SCOPE

Introduction

The American Academy of Neurology Workforce Task Force (WFTF) report predicts a future shortfall of neurologists in the United States. The WFTF data suggests that for most states, the current demand for neurologist services already exceeds the supply, and by 2025 the demand for neurologists will be even higher, due in large part to the rapidly aging population in the United States (Freeman, Vatz, Griggs, & Pedley, 2013). Current projections indicate that by 2030, the US population will increase by 12% to 359 million with the population of 65 years and older projected to increase by 55% (Kirch & Petelle, 2017). There is also a serious physician shortage predicted for the upcoming years (Kirch & Petelle, 2017). This makes recruiting non-physician, advanced practice providers (APPs), such as nurse practitioners (NPs) and physician assistants (PAs) to neurology even more important.

Practice Problem Statement

In the light of the predicted shortage of neurologists, the UNC Hospitals outpatient neurology clinic has started hiring more APPs. Although there are future plans of opening more positions for APPs within the department, there is no specific onboarding plan in place. Onboarding is a process through which new hires learn the attitudes, knowledge, skills, and behaviors required to function effectively within an organization. The degree to which an organization is able to make new hires feel welcome and prepare them for their new jobs faster has a direct impact on their successful contribution to the organization (Human Resources Director, 2013). Elevating employee performance is a primary target of the onboarding process.
The Society for Human Resource Management (SHRM) has determined that an effective onboarding program boosts employee productivity by as much as 11% (Pollock, 2019). A study by the Aberdeen Group found that 54% of organizations with a formal onboarding process experience greater productivity and 50% experience better employee retention (Pollock, 2019). During the onboarding process, new employees are connected with resources internally and externally that help them perform their role along with providing job-specific training, skills, and knowledge (Pollock, 2019). Through onboarding, companies can help their new employees become more connected with their colleagues, more engaged and knowledgeable about their work, and more likely to stay (Cable, Gino, & Staats, 2013).

Additionally, formal onboarding is critical for APPs as graduate education and training do not prepare APPs to take on a role in a subspecialty area like neurology, thus, requiring training to happen on the job. Role transition from a registered nurse to an advanced practice role can be challenging and can also affect job satisfaction and retention (Finneran & Kreye, 2019). Role transition to become an APP in neurology from another specialty is also very demanding due to the complexity of the subject matter. The APPs at the outpatient neurology clinic have expressed, through informal conversations, that there is a lack of organization and structure for the learning materials provided. They receive materials from different faculty, but they struggle in how to approach learning the complicated subject matter of neurology. This validates a lack of proper neurology education and training for APPs. An effective onboarding process is imperative in providing essential training to APPs in neurology to ensure optimal patient care.

**Purpose of Project**

The purpose of this quality improvement project is to improve job satisfaction, knowledge/preparation, retention, and patient care through an onboarding process for APPs in
the outpatient neurology clinic at UNC Hospitals by implementing an online learning portal paired with a face-to-face lecture series, and mentorship experience. This learning portal will serve as an organized platform to house learning resources in neurology.

**Significance to Healthcare**

Through this DNP project I seek to address two significant problems currently facing healthcare, a shortage of neurology specialists and retention of APPs. If successful, this project can serve as a model for other neurology clinics facing the same challenges.
CHAPTER 2: REVIEW OF LITERATURE

A review of literature was conducted to examine the effect of onboarding interventions, including transitional support programs, structured orientation, and online professional development resources on APP job satisfaction, knowledge/preparation, and retention. A search was performed using PubMed, Google Scholar, and CINAHL. The keywords used were: education in neurology, nurse practitioner training, nurse practitioner residency programs, continuing education, online education, online training, e-learning, knowledge transition, role transition, physician shortage, orientation, onboarding, nurse practitioner retention, professional developments, perceptions, attitudes, opinion, experience, view, reflection, and beliefs. These words were used in combination using AND/OR using the advanced search feature of the search engines. I also used the MeSH terms as keywords. The search mode with CINHAL was ‘Boolean/Phrase’ with ‘apply equivalent subjects’ marked. Full text articles was applied as the only limiter. The years for published date was left open; however, research within last 5 – 6 years were highly considered with exceptions made for up to 10 years if the article provided key information. References from the key articles were also retrieved and reviewed. A total of 25 articles were reviewed and 8 articles were included in the synthesis. Inclusion criteria were terms related to nurse practitioner and nurse onboarding and orientation and job satisfaction or retention, role transition from nurse to nurse practitioner in any subspecialty field, and online learning/training for nurse practitioners. The articles excluded were those not related to these topics directly, articles that were expert opinions or commentaries, and the articles that did not provide with specific data about the variables of interest. The review revealed that there are no
published articles focusing on nurse practitioner onboarding and orientation specific to the field of neurology; thus, this review focuses on nurse practitioners in general, or in different specialty areas. The following themes organized the review of literature: role transition as a nurse practitioner, structured onboarding and orientation process, retention rate and job satisfaction in new nurse practitioners, and e-learning for nurse practitioner training.

Eight articles were included in the review of literature. Out of these, three used formal and phased onboarding as an intervention. These three articles had consistency in using a detailed and comprehensive plan for the onboarding process. One article looked at the effect of mentorship. This was done by sending out an anonymous survey to all practicing nurse practitioners in one state to assess the effect of mentorship on job satisfaction. Lastly, three articles looked at the effect of online or web based educational materials on knowledge. Out of these, one study found that a combination of face-to-face sessions paired with online materials was slightly more effective in improving skills and knowledge. The other two studies measured effectiveness of organized learning modules in web-based format on improving knowledge.

**Role Transition**

Support during the role transition phase had a positive impact, irrespective of the type of support provided (Edwards, Hawker, Carrier, & Rees, 2015). This support is provided during the orientation/onboarding period. Although, the orientation process usually varies depending on the institution, it was found that a formal orientation process was positively correlated to role transition for nurse practitioners in a convenience sample of 352 participants at a national nurse practitioner conference. (p < .001) (Barnes, 2015).
Effect of Structured Orientation on Retention Rate and Job Satisfaction

Studies found that comprehensive orientation and onboarding programs not only increased the retention rate in nurses (1-year retention rates of 90% to 100% compared to national average of 70% to 82.5%) (Asber, 2019), but also in nurse practitioners (post implementation: 83% retention rate compared to 50% pre-implementation) (Langley et al., 2018). Onboarding processes implemented in a phased model (Robeno, Delong, & Taylor, 2019) along with a mentorship experience (mean of 195.26 (SD = 28.29) p < .05 for job satisfaction on Misener Nurse Practitioner Job Satisfaction Scale) (Horner, 2017) was found to positively influence job satisfaction in nurse practitioners. Based on these studies we understand that having a formal orientation and onboarding process is important for nurse practitioners to have a positive role transition and also to increase their retention. These themes supported that not having adequate onboarding and orientation processes for nurse practitioners in our neurology department is a problem that could affect the role transition negatively resulting in decreased retention rates and job satisfaction.

Online Professional Development for APPs

When looking at research done using online resources for nurse practitioner training and support, it was found that a combination of face-to-face sessions along with e-learning was effective in improving knowledge for health professionals, overall (Lawn, Zhi, & Morello, 2017). Two of the studies examined the effectiveness of online learning modules by looking at the knowledge scores before and after going through the online modules. These online learning modules were specifically created for their respective fields. The knowledge of nurse practitioners was assessed before and after going through these educational modules using a self-assessment survey. There was an increase in knowledge scores post assessment, indicating that
learning through online modules is effective. The sample included nurse practitioners learning about back pain ($p < 0.0001$), dermatology ($p < 0.0001$) (Huckstadt, & Hayes, 2005) and oncology ($p = .000$) (Hoffmann, Klein, Connolly, & Rosenzweig, 2018), thus varied subject areas. The evidence discussed above supports the idea of having an online portal that would house modules of different topics within neurology for nurse practitioner training.

**Critical Appraisal**

Melnyk & Fineout-Overholt's (2011) level of evidence classification model was used for critical appraisal of the research articles used in review of literature. In this model, Level I: systematic review or meta-analysis, Level II: evidence obtained from at least one well designed randomized controlled trial, Level III: evidenced obtained from well-designed controlled trials without randomization, Level IV: evidence from well-designed case control and cohort studies, Level V: evidence from systematic reviews of descriptive and qualitative studies, Level VI: evidence from a single descriptive of qualitative study and Level VII: evidence from the opinion of authorities and/or reports of expert committees. Most of the studies included in the synthesis was level IV (Horner, 2017; Huckstadt & Hayes, 2005; Robeano et al., 2019; Hoffmann et al., 2018), and level V (Asber, 2019; Lawn et al., 2017). A study by Barnes (2015) was level VI and a study by Langley et al. (2018) was level VII. There were two systematic reviews of descriptive studies (Asber, 2019; Lawn et al., 2017). Two studies measured outcomes pre and post-intervention (Hoffmann et al., 2018; Langley et al., 2018). None of the studies were randomized control trials. Another weakness was that two studies were noted to give descriptive results only (Robeano et al., 2019; Lawn et al., 2017). All of the studies were from the United States. Total participants combining all the studies were 578 and all the participants were advanced practice providers; nurse practitioners and physician assistants. A majority of these participants ($n = 352$)
were from a national nurse practitioner conference thus, from multiple states. Another 189 participants were also from across multiple states in the US, leaving just 37 participants that were chosen from a single healthcare institution.

**Summary**

In summary, the articles that were part of the review of literature, found that a formal orientation/onboarding process improved role transition among nurse practitioners along with increased retention rate. When the onboarding process included mentorship experience, this positively affected retention rate and also improved job satisfaction among nurse practitioners. Interventions that improved knowledge among nurse practitioners were online learning or online learning paired with face-to-face sessions. The studies included in the review are detailed in the review of literature matrix (see Appendix A).

Based on the findings discussed, it could be said that an onboarding process if implemented in phases at different time intervals after hiring a new nurse practitioner could provide a positive role transition into the field of neurology and increase job satisfaction and retention rate. This supports the need for an orientation and onboarding program for the nurse practitioners that have been recently hired and will be hired in the future into the department of neurology. The idea is that the onboarding process would be implemented via an online portal that will have modules on important topics to be learned in neurology paired with face-to-face lecture series, along with mentorship. The evidence supports use of online learning materials in increasing knowledge base and skills of nurse practitioners. But based on the research findings, integrating face-to-face interactive sessions along with built in mentorship experience will further provide positive influence on the onboarding and orientation process.
CHAPTER 3: THEORETICAL FRAMEWORK

My DNP project involved developing an online portal consolidating educational materials to aid APPs in learning neurology. This online portal was used as part of the onboarding process for APPs that are newly hired to neurology. The portal was paired with a face-to-face lecture series, along with mentorship experience. Malcolm Knowles’ (1980) adult learning theory served as a guide in the development of the online learning portal to affect the change at the individual level. Kotter’s eight step model (1995) was used during the planning phase to guide the process of implementation at the organizational level.

Overview of Adult Learning Theory

Learning theories are useful in understanding how people gain knowledge and skills, as well as how emotions, attitudes, and behaviors are acquired and can be changed (Butts & Rich, 2018, p. 200). Adult learning theory is based on Knowles’ five assumptions of adult learners and four principles of andragogy (Taylor & Hamdy, 2013). It has been widely used in educating professionals in various fields including nursing. Figure 1 gives detailed information on the five assumptions and their definitions made by Malcolm Knowles for adult learners. Figure 2 provides a pictorial depiction of Knowles’ four principles of andragogy.
Figure 1: Knowles 5 assumptions of adult learners.


Figure 2: Knowles 4 principles of andragogy.

According to Knowles’ adult learning theory, adults learn based on the following assumptions: 1) an adult learner has an independent self-concept, 2) their accumulated experience reservoir becomes a resource for learning, 3) they have learning needs closely related to changing social roles, 4) they are interested in immediate application of the knowledge, and 5) they learn by internal rather than external factors. The four principles of andragogy imply: 1) that adults can direct their own learning and should be involved in planning and evaluation of learning experiences, 2) their past experience provides the basis for future learning, 3) subjects should be immediately relevant, and 4) learning should be problem-focused rather than content-centered (Merriam, 2001). These components of the Knowles’ adult learning theory were important in framing the online learning portal for neurology APPs.

Literature Review for the Application of Malcolm Knowles’ Adult Learning Theory

Additionally, through a literature review, I found that application of Malcolm Knowles’ adult learning theory has been successfully used as a basis for the development of learning materials in various health professions. Knowles’ adult learning theory played an influential role in the development of an online module, ONc-PoWER, designed for new nurse practitioners in the specialty of oncology. According to the adult learning theory principles, adults learn best when content can be made immediately relevant. Keeping this in mind, the content in the module was made more immediately relevant to the learner and thus more likely to be utilized and retained (Hoffmann, Klein, & Rosenzweig, 2017).

Adult learning theory has also proven successful in neurology residency programs. A study evaluated the efficacy and feasibility of an adult learning theory-based curricular program in neurology residency education. The results showed a robust and sustainable benefit for
residents in training without imposing a financial or logistical burden on programs (Shoirah, Ntranos, Brandstadter, Liu, Medina, Kwan, & Krieger, 2018)

Application of Malcolm Knowles’ Adult Learning Theory to the DNP project

Knowles’ five assumptions of adult learner guided the evolution of the online learning portal for APPs in neurology. The portal was set up to enable self-directed learning for APPs. Past experiences in the field of nursing or as a physician assistant in a different focus area were taken into consideration as the learning materials were developed. The learning modules were designed to be directly applicable to participants’ current role of becoming a successful neurology APP and could be immediately applied while seeing patients. Motivation to learn as an adult comes from internal factors, thus the modules were designed to be self-paced.

Kotter’s 8 Step Model for Leading Organizational Change

At the organizational level, Kotter’s 8-step change model (1995) was used to identify barriers that could impact the design, implementation, or effectiveness of my DNP project to promote quality, safety and improved health outcomes in the patients seen at the neurology clinic. Kotter’s model includes the following eight steps: 1) creating a sense of urgency for change, 2) forming a guiding change team, 3) creating a vision and plan, 4) communicating this vision and plan with stakeholders, 5) removing barriers to change, 6) providing short term wins, 7) sustaining the change, and 8) building on this change (Barrow & Toney-Butler, 2019).

Creating a sense of urgency can be achieved through motivating people by connecting at an emotional level around the ‘why’ is this change needed. APPs that do not have enough training or support as they take on a new role in neurology may not be satisfied and end up leaving. This has led to the formation of a guiding change team through my DNP project. I obtained buy in from the clinic director and the clinic manager for this project, who were the
champions for facilitating the change. Existing APPs provided feedback about what was important to include in the learning portal, which fulfills communication vision and plan with stakeholders.

As the process progressed, predicting and recognizing potential barriers was important. Deficient communications with the key stakeholders, teaching faculty physicians, was foreseen as a major barrier resulting derailment of my DNP project. To overcome this barrier, connecting with the key stakeholders’ periodically through casual conversations or through email was planned. Due to the restrictions brought on by the COVID-19 pandemic, email was chosen as a form of communication with the key stakeholders and teaching faculty physicians. Finally, the author tried to celebrate short wins by sending motivating messages through text messages to the participants.
CHAPTER 4: DNP PROJECT PLAN

Design

This DNP project was a quality improvement initiative that included the implementation and evaluation of an online learning portal paired with face-to-face teaching sessions, and a mentorship experience. Evidence supports the use of this intervention to improve job satisfaction, knowledge/preparation, and retention, thus, leading to improvements in patient care. The intervention was implemented by this author, as part of the onboarding experience for new APPs in the neurology outpatient clinic at UNC hospitals. Along with new APPs, the online learning portal was also developed to serve as a resource for existing APPs. The findings of this project will offer validation for the new onboarding process and its benefits.

Methods

This project was implemented at an outpatient neurology clinic associated with a large hospital organization. Newly hired APPs at this clinic were recruited to participate in this project. A meeting was held to introduce participants to the intervention components and to answer any questions. The introduction script used during this meeting is provided in Appendix B. With a motive of improving onboarding experience for new APPs, an online educational portal paired with face-to-face teaching sessions, and mentorship experience were used as interventions. The online portal housing learning modules on different topics in neurology was developed using MS SharePoint over a three-month period. A meeting with the participants was scheduled to introduce the interventions along with important dates. A resource document with all the needed information was provided to the APPs. A separate meeting with mentors was held to ensure the
understanding and expectation of their role. Prior to giving access to the online portal, live lectures and meeting with their mentors, participants were asked to fill out a pre-implementation questionnaire using Qualtrics software. These surveys were anonymous. Participants had nine weeks to use the learning portal, attend the live lectures, and meet with their mentors. The same questionnaire with some additional questions for process evaluation, was administered at the end of this nine-week period. Job satisfaction, knowledge/preparation, and retention were measured as primary outcomes. Through the interventions, we expected to see improvement in these primary outcomes. Although we speculated improvement in retention rate among APPs through our interventions, measuring it did not provide meaningful data as a nine-week period is not enough time to detect change. Similarly, it was expected that an increase in knowledge and satisfaction of APPs will result in better patient outcomes, but given the short time frame, detecting a change in patient outcomes before and after implementation of our interventions was not feasible. Therefore, retention rate and patient outcomes are factors that will be examined at a later date (after completion of this DNP project).

**Setting, Population, and Resources**

Over the past few years, the presence of APPs in the UNC Hospital’s neurology outpatient clinic has increased. There is a plan for opening more APP positions over the next few years. Currently, there is no formal onboarding process that is specific to these APPs in neurology. In the past, APPs either have transitioned from another specialty or have been a recent graduate. Thus, role transition is usually very challenging and providing support is essential. Recently, there was one new APP that was hired and finished the credentialing process at the end of January 2020. Another APP had completed almost a year with the department and one APP has finished six months post hiring. These three APPs are part of the general neurology
All three APPs, who are in different stages of their training, constituted our sample for this project. But the population of interest for this project are all the APPs in the neurology role. Attending physicians in outpatient and inpatient neurology served as a great resource in providing materials in their specialty for the online portal. Two outpatient physicians also participated in the mentorship program for the APPs. Face-to-face teaching sessions taught by faculty physicians were already scheduled as part of resident physician training program. These started in June and continued for nine weeks. These sessions were made available online through WebEx, due to the COVID-19 pandemic.

**Intervention**

The intervention consisted of three components, an online learning platform on MS SharePoint, live online lecture sessions, and mentorship experience.

**Online Learning Platform**

A secured online platform called MS SharePoint, was used to create a site housing neurology education materials. Materials were organized in the order that has been most effective in learning neurology. Neurology residents start their didactics with neurological exam, neuroanatomy and neuroimaging. Then some of the most common topics are discussed such as stroke, seizures and headaches. This has been the best practice for learning neurology for years (Safdieh, 2019), and has been effective in author’s experience of learning neurology as an APP. Thus, the resources on the website were modeled keeping this order in mind. On the homepage of the website there was also a learning schedule posted to be used as a guide for the first eight weeks. The order of effective learning starting from the basics and then moving in sub-specialty topics, also reflected on this schedule. Examples of the topics are, neurological exam, neuroimaging, headache, stroke, epilepsy, movement disorders, neuromuscular disorders,
multiple sclerosis, and dementia. Each of these topics have a folder under which learning materials are available in the form of PowerPoint presentations, research articles, e-books, videos, etc.

Development of the online learning portal was on the basis of the four principles of andragogy. According to Knowles: “Adult students must participate in setting the training program, not to conform them to it” (Aliakbari, Parvin, Heidari, & Haghani, 2015), thus the APPs hired recently were largely involved in expressing what materials they feel are highly relevant to be included on the learning portal. They also played a role in ranking what materials are of most immediate relevance as a new APP in neurology.

**Face-To-Face Lectures**

Face-to-face teaching sessions are part of boot camp educational lectures delivered by faculty physicians in the department meant for resident physician training. These lectures took place at noon two days a week and at eight in morning one day a week for nine-weeks. APPs received a schedule of the topics covered. They were given prior access to live video conference through WebEx, given the limitations generated by the COVID-19 pandemic. These lectures were scheduled at a time when patients were not scheduled, to facilitate participation.

**Mentorship**

A mentor was assigned and introduced to each participant at the beginning of the nine-weeks. These mentors assigned were their supervising physicians that they have already known and are well versed in their respective practice areas, thus selectively matched dyads. At the beginning of the nine-week period, the author had a virtual meeting with the mentors to discuss the guidelines for successful mentorship. Establishing a clear purpose and goals, frequent communication between mentors and mentees, facilitating socialization and networking
opportunities while maintaining positive and comfortable environment for the mentees was the main theme of mentorship (Nowell et al., 2017). A mentor resource document shared during this meeting is in Appendix C, which also contains the form used as a guide during mentorship meetings. Mentors served as a resource to expand learning, in addition to the online portal. During the mentor-mentee meeting a patient case was discussed to promote case-based learning. A study found that the case-based learning was a successful method in education of advanced practice nurses (Huckstadt & Hayes, 2005).

Mentors played an important role in providing support to the APPs as they learn and take on this new role. They were available to answer logistical questions, as they learn the culture. The mentee and the mentor could have met as many times as needed over the nine-weeks but were expected to meet at least once every two-weeks, thus four times.

**Ethics and Human Subjects Permissions**

The protocol for this quality improvement project was submitted to the Institutional Review Board (IRB) at the University of North Carolina at Chapel Hill for review. Given that this is not a research project, the IRB made a determination of non-human subjects research for the project and did not require oversight from the IRB. The surveys administered to the APPs were kept confidential and anonymous using Qualtrics software in efforts to promote honest evaluation. Keeping the responses confidential and anonymous was intended to prevent any risks in their current job, preventing a negative effect on work relationships.

**Procedures for Project Implementation**

On June 26, 2020, the site was live for use by APPs. Face-to-face teaching sessions started on July 2 and continued through September 1, 2020. Mentors were assigned to each of the APPs by June 26, 2020. The participants were given the pretest questionnaire on June 19, 2020,
one week prior to accessing the online portal, face-to-face lectures, and meeting with the mentor.

Over the next nine weeks, July 2 – September 1, 2020, APPs had the portal to use per their discretion, attend the face-to-face lectures, and experience mentorship. At the end of the nine weeks, participants filled out the same questionnaire used before implementation with added questions pertaining to process evaluation measures which was due September 4, 2020.

**Key Stakeholders**

Utilizing Kotter’s 8 step model, it is essential to form a change team. The author served as a champion at the implementation site to facilitate organizational and participant buy in. There was a bi-weekly communication with the supervising physician within general neurology subdivision who is a key stakeholder. A second champion was the clinic manager who aimed to remove any barriers during the implementation phase. Additionally, she also made sure that the clinic schedule for these APPs was blocked during the face-to-face lectures. Bi-weekly check-ins with individual participants were conducted to provide short term wins and keeping the team engaged.

**Data Collection Instruments**

**Job Satisfaction and Role Transition**

APP satisfaction was measured using an abbreviated version of Misener Nurse Practitioner Job Satisfaction Scale (MNPJSS). This is a 44-item scale that allows NPs to rate their level of satisfaction using a 6-point Likert scale. Out of these 44 items, 11 items were deemed applicable to assess job satisfaction for this project. A total sum score was calculated across these 11-items to provide a job satisfaction score. The total from pre-implementation was compared to the post-implementation survey. An additional four questions were developed by the author to measure job satisfaction specific to the site onboarding process –education/training,
resources, and support. These four questions measured perceived confidence and adequacy of education resources and support as they take on a new role as neurology APP. It is particularly important to assess APP perception as this could be used as a guide to enhance the onboarding experience. The survey is available for preview in Appendix D.

**Knowledge**

In order to measure knowledge post intervention implementation, EMERSE (Electronic Medical Record Search Engine) was used. EMERSE is a database of patient charts linked to the electronic medical record. Differential diagnosis and its synonyms were searched as non-discrete variable in EMERSE. In order to pull up charts associated with participants, their names were also entered in the search engine. This was done for each participant with date range set as 1-month period prior to implementation and the 1-month period after implementation. Additionally, this author prepared five questions that were included in the pre and post-implementation survey to measure knowledge. These questions targeted perceived confidence of APPs in the basic neurology concepts. Accumulation of APP perceived confidence is particularly important to monitor to detect if there was a change through implementation of interventions (see Appendix D).

**Retention Rate**

We monitored retention of participants over the nine-week project period; however, assessing retention rate may not be meaningful given the small number of participants and short time period. Our clinic will continue to monitor retention in the future as more individuals complete the intervention.
**Participation in Intervention Components**

Participation in intervention components was assessed through questions on the post-implementation survey. There were two questions designed to assess the use of the online learning portal. One question measured attendance at the face-to-face lectures and one question examined how many times the participant met with their mentor (see Appendix E).

**Satisfaction with Intervention Components**

The post-implementation survey also included questions developed by this author to assess satisfaction with the intervention components. Six questions evaluated satisfaction with the learning portal. There were two questions about the face-to-face lectures and one question about the mentorship experience. At the end of this survey, an open-ended question was included for any additional comments (see Appendix E).
CHAPTER 5: DATA ANALYSIS

The data analysis includes the statistics – mean scores compared before and after for the data collected through the MNPJSS. Comparing the data from pre to post-implementation for each APP allowed us to establish a link to look at individual-level change. Differential diagnoses were used as a non-discrete variable by searching patient notes through EPIC software. The number of differential diagnoses that the APP documented were measured pre- and post-implementation. With a small sample of 3, we were able explore and report data at the individual level. Increase in the number of differential diagnoses documented post implementation was used as an indicator of increased knowledge. Descriptive statistics such as mean scores and percentages were used to describe the findings from the questions that assessed perceived confidence related to job satisfaction, role transition, knowledge, and process evaluation measures. Higher scores indicate better outcomes.

Outcomes and Interpretation

Job Satisfaction and Role Transition

The mean score on the data collected through the 11-item abbreviated MNPJSS was 2.37 on pre-implementation survey and 2.12 on post-implementation survey. On the scale used, 1 denoted to be very satisfied and 6 denoted very dissatisfied. Thus, decrease in the mean scores on post-implementation survey, indicated an increase in overall job-satisfaction and support through the interventions. When looking at the items individually there was a positive change in the perception of support for continuing education, expanding skill level within scope of practice, opportunity to expand scope of practice, time to seek advanced education, and opportunity to
develop and implement ideas, post-intervention. 33% of the participants reported to be minimally satisfied post-intervention about the interaction with other APPs, including faculty. Furthermore, the response to the question that asked about the consideration given to their opinion and suggestions for change in the work setting remained unchanged post-intervention, only 33% reported being satisfied overall. Table 1 provides the mean scores on the abbreviated MNPJSS as seen on pre-implementation compared to post-implementation survey. Additionally, the four questions developed by this author, demonstrated improvement in participants’ overall perceived confidence and adequacy of education resources and support. There was also an increase in confidence in job satisfaction specific to the site onboarding process –education/training, resources, and support. Table 2 provides with the data on change in mean scores on individual questions on post-implementation compared to pre-implementation survey. Questions 6-9 focused on measuring site specific job satisfaction. In the scale used for these questions, 1 denotes strongly disagree and 6 denoted strongly agree. Additionally, on pre-implementation survey, only 33% of the participants perceived that they received adequate education and training and have adequate support in the new role, compared to 100% on post-implementation survey. There was an increase in confidence in 33% of the participants on being clearly aware about whom they approach for clinical and administrative support on post-implementation survey. Similarly, 33% felt like they had enough resources for reference as a new APP in neurology before the intervention compared to 100% post-implementation. Based on these findings and considering the mean scores (Table 2) increased from 4.22 to 4.89, it is apparent that the interventions were successful in positively influencing perceived confidence in job satisfaction and support during role transition.
### Table 1: Mean scores on pre-implementation compared to post-implementation survey on abbreviated Misener Nurse Practitioner Job Satisfaction Scale (MNPJSS)

<table>
<thead>
<tr>
<th>No.</th>
<th>Abbreviated MNPJSS</th>
<th>Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-Implementation / Post-Implementation</td>
</tr>
<tr>
<td>1.</td>
<td>Support for continuing education (time and money)</td>
<td>2.33 / 2.00</td>
</tr>
<tr>
<td>2.</td>
<td>Opportunity for professional growth</td>
<td>2.50 / 2.33</td>
</tr>
<tr>
<td>3.</td>
<td>Opportunity to expand your scope of practice</td>
<td>2.00 / 2.00</td>
</tr>
<tr>
<td>4.</td>
<td>Interaction with other APPs including faculty</td>
<td>2.00 / 2.00</td>
</tr>
<tr>
<td>5.</td>
<td>Expanding skill level/procedures within your scope of practice</td>
<td>2.17 / 1.67</td>
</tr>
<tr>
<td>6.</td>
<td>Ability to deliver quality care</td>
<td>1.83 / 1.67</td>
</tr>
<tr>
<td>7.</td>
<td>Opportunities to expand your scope of practice and time to seek advanced education.</td>
<td>2.17 / 1.67</td>
</tr>
<tr>
<td>8.</td>
<td>Evaluation process and policy</td>
<td>2.33 / 2.33</td>
</tr>
<tr>
<td>9.</td>
<td>Sense of value for what you do</td>
<td>2.50 / 2.33</td>
</tr>
<tr>
<td>10.</td>
<td>Opportunity to develop and implement ideas</td>
<td>2.50 / 2.00</td>
</tr>
<tr>
<td>11.</td>
<td>Consideration given to your opinion and suggestions for change in the work setting or office practice</td>
<td>3.67 / 3.33</td>
</tr>
</tbody>
</table>

**Average Mean Scores**

<table>
<thead>
<tr>
<th>Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.37 / 2.12</td>
</tr>
</tbody>
</table>

*Note: 1 = Very Satisfied, 6 = Very Dissatisfied*

### Table 2: Site specific questions developed by the author

<table>
<thead>
<tr>
<th>No.</th>
<th>Site Specific Questions</th>
<th>Mean Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre-Implementation / Post-Implementation</td>
</tr>
<tr>
<td>1.</td>
<td>I feel confident that I can collect a proper, in-depth history of neurological problems</td>
<td>4.67 / 5.00</td>
</tr>
<tr>
<td>2.</td>
<td>I feel that I can perform an accurate neurological exam</td>
<td>4.33 / 5.00</td>
</tr>
<tr>
<td>No.</td>
<td>Site Specific Questions</td>
<td>Mean Scores</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pre-Implementation</td>
</tr>
<tr>
<td>3.</td>
<td>I feel that I can localize the findings of a normal neurological exam</td>
<td>4.00</td>
</tr>
<tr>
<td>4.</td>
<td>I understand how to look at brain imaging for basic findings i.e; stroke, bleed, mass, atrophy and white matter disease</td>
<td>3.33</td>
</tr>
<tr>
<td>5.</td>
<td>I feel like I have a basic grasp of all the common neurological problems</td>
<td>3.67</td>
</tr>
<tr>
<td>6.</td>
<td>I feel that I have received adequate education and training to take on this new role as an APP in neurology</td>
<td>4.33</td>
</tr>
<tr>
<td>7.</td>
<td>I feel that I have adequate support to take on this new role as an APP in neurology</td>
<td>4.33</td>
</tr>
<tr>
<td>8.</td>
<td>I am clearly aware about whom to approach if I need assistance in carrying out my responsibilities in this new role</td>
<td>5</td>
</tr>
<tr>
<td>9.</td>
<td>I feel like I have enough resources for reference as a new APP in neurology</td>
<td>4.33</td>
</tr>
<tr>
<td></td>
<td><strong>Average Mean Scores</strong></td>
<td><strong>4.22</strong></td>
</tr>
</tbody>
</table>

Note: 1 = Strongly Disagree, 6 = Strongly Agree; Question 1-5: assess knowledge and Questions 6-9: assess job satisfaction

Knowledge

Overall, the five questions developed by the author demonstrated success in the adequacy of the intervention components. Please refer to Table 2, questions 1-5 for the data on these questions that were meant to assess knowledge. These questions were designed to detect change in participant confidence in knowledge of basic neurology concepts and their ability to apply these concepts in practice. On the pre-implementation survey, 33% of the participants did not feel completely confident in their ability to perform an in-depth history and accurate neurological exam compared to 100% confidence on the post-implementation survey. On measuring APP confidence in their ability to localize the findings through evaluation and having a basic grasp of
common neurological problems, only 33% felt confident on pre-implementation survey compared to 66% on post-implementation. Additionally, one out of three participants perceived to have no confidence at all in having basic grasp of common neurological problems before implementation, but all three participants felt an increase in their confidence post-implementation. There was increase in confidence in the ability to interpret brain imaging from 33% to 66% post-implementation. Based on the above findings, there was an increase in confidence in participants’ ability to perform a neurological history and exam, localize findings, and interpret brain imaging through the components of the interventions.

The plan of using EMERSE to detect change in knowledge using differential diagnosis as a non-discrete variable did not succeed. The search was conducted using multiple keywords, but no charts were found for any of the participants in the date range of 1-month prior and 1-month after implementation. Leaving the date range open was also tried in hopes to identify any charts documented by the participants, however, no charts were found using the search function in various ways. This finding is incorrect as participant APPs have seen patients within the date range used for EMERSE and documentation of differential diagnosis was part of their note template.

Retention Rate

All three participants continued their role as a neurology APP at the end of nine-week implementation period; however, given the limited number of participants and short time frame this may not be meaningful. Retention rate will continue to be monitored over time and compared with pre-implementation retention rates to monitor the intervention’s impact on this outcome.
**Participation in Intervention Components**

The online portal had an eight-week schedule posted on the homepage that the APP could use as a guide for their self-directed learning. Sixty-six percent reported completing 1-2 weeks of materials compared to 33% who reported completing 4-6 weeks of materials. Additionally, 33% reported spending less than ten minutes per week using the portal, 33% reported spending 10-20 minutes, and 33% reported spending 31-40 minutes. There were 21 live lecture sessions assigned that were most applicable for the APPs to attend out of 32. One participant reported attending 11-15 live lectures and two reported attending 5 – 10 live lectures. Participants were expected to meet with their mentor a total of four times during nine-week period. Sixty-six percent of the participants reported meeting with their mentor four times compared to 33% who met with their mentor just once. These findings are also represented in Table 3. Considering the above data, participation in the live lectures and the proposed use of online portal was lower than expected. A majority of the participants did however meet with their mentor four times to practice case-based learning.

**Table 3: Post-Implementation Survey: Assessing Participation**

<table>
<thead>
<tr>
<th>No.</th>
<th>Participation</th>
<th>1 – 2</th>
<th>4 – 6</th>
<th>7 – 8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How many modules (weeks 1 - 8) from the homepage did you complete on the online learning portal?</td>
<td>66%</td>
<td>33%</td>
<td>0%</td>
</tr>
<tr>
<td>2.</td>
<td>What was the average amount of time you spent each week completing the modules?</td>
<td>≤ 10 mins</td>
<td>10-20 mins</td>
<td>31-40 mins</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33%</td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
<td>0%</td>
</tr>
<tr>
<td>4.</td>
<td>How many times did you meet with your mentor?</td>
<td>1</td>
<td>4</td>
<td>≥5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>33%</td>
<td>66%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Satisfaction with Intervention Components

There were six questions on the post-implementation survey that were designed to measure satisfaction with the online portal on MS SharePoint. The mean scores on all the questions was 4.33 out of 5 with standard deviation of 0.47. Higher scores meant higher satisfaction. This indicates that all participants perceived that the topics were: well organized, materials provided were adequate for learning, there was diversity in the materials provided and resources were suitable for reference. Participants also agreed that using the learning portal has increased their knowledge in neurology. Participants did not have an issue accessing the portal from work or home. Table 4 provides participant responses in percentages to the six questions assessing satisfaction pertaining to the online learning platform.

There were two questions on the post-implementation survey to assess participant satisfaction with the live lectures. Table 5 presents the responses of the participants on these two questions. There was a difference in the degree in all the participants’ perception on the appropriateness of the lecture materials for their knowledge. 33% reported to be neutral, 33% agreed and 33% strongly agreed with the appropriateness of lecture materials for their understanding. The mean score for this question was 4 out of 5 with standard deviation of 0.67. However, all participants agreed that live lectures were successful in increasing their understanding of the topics with a mean score of 4.33 out of 5 with standard deviation of 0.47.

For the two questions that assessed participant satisfaction with mentorship (Table 6), all participants unanimously agreed that their mentors were interested in seeing them succeed and also felt that case based learning was helpful. The mean scores for both questions was 4 out 5 with standard deviation of zero.
**Table 4: Post-Implementation Survey: Assessing Learning Portal**

<table>
<thead>
<tr>
<th>No.</th>
<th>Learning Portal</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I think the topics were well organized in the learning portal</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
<tr>
<td>2.</td>
<td>I feel that the materials provided for each topic were adequate for my understanding</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
<tr>
<td>3.</td>
<td>I feel that there was a diversity of materials provided for each topic</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
<tr>
<td>4.</td>
<td>I feel that I have resources that I can refer back to quickly through the learning portal</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
<tr>
<td>5.</td>
<td>I believe that using this learning portal has increased my knowledge in neurology</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
<tr>
<td>6.</td>
<td>Were you able to access the portal without issues at home and at work?</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
</tbody>
</table>

**Table 5: Post-Implementation Survey: Assessing Live Lectures**

<table>
<thead>
<tr>
<th>No.</th>
<th>Face-to-Face (live) Lectures</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I feel like the lecture materials were appropriate for my knowledge</td>
<td></td>
<td></td>
<td></td>
<td>33%</td>
<td>33%</td>
</tr>
<tr>
<td>2.</td>
<td>The lectures increased my understanding of the topic</td>
<td></td>
<td></td>
<td></td>
<td>66%</td>
<td>33%</td>
</tr>
</tbody>
</table>
Table 6: Post-Implementation Survey: Assessing Mentorship Experience

<table>
<thead>
<tr>
<th>No.</th>
<th>Mentorship</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Did you think your mentor was interested to see you succeed in your new role?</td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Was case based learning helpful?</td>
<td></td>
<td></td>
<td></td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 6: DISCUSSION

Considering the findings from the review of literature, it was proposed that a formal onboarding process will improve role transition among nurse practitioners. Learning with a combination of online and face-to-face lectures is shown in prior research to have the most impact on knowledge, and when mentorship experience is part of onboarding, this positively affected job satisfaction among nurse practitioners. Based on our evaluation results, it could be said that this quality improvement project was successful in positively influencing the primary outcomes as expected. On the questions from the abbreviated MNPJSS, it was noted that all three participants felt differently about the interaction with other APPs, including faculty. Thirty-three percent of the participants remained minimally satisfied post-intervention, this indicates that there may be a need of opportunities where new APPs can interact with other APPs and faculty within the department. This will play a role in positively influencing role transitions for new APPs. Additionally, only 33% reported to be satisfied about the consideration given to their opinion and suggestions for change in the work setting, which means 66% were not satisfied. This may mean that APPs lack having a platform to express their opinions or suggestions. Including APPs into department meetings regularly can offer this platform to remain updated in changes and to raise their concerns. According to the questions measuring job satisfaction and role transition, it became apparent that there were gaps in these areas that were fulfilled with the implementation of interventions. Participants reported improvement in job satisfaction and their confidence in the available resources and support, which positively influenced their role transition. Mentorship was also successful in positively impacting APP job satisfaction post-
implementation. This enhanced perception will have an effect on retention as the APPs feel supported in their new role. There was also an increase in the confidence level pertaining to their knowledge in neurology, post-implementation. This increase in confidence is expected to positively reflect on patient outcomes, although not measured through this study.

Even though participation in the intervention components was lower than expected, participants showed improvement in knowledge, confidence in the available support for role transition, and job satisfaction. Mentorship had the highest participation among the interventions, which could mean that mentorship plays the most important role in influencing the primary outcomes. Another consideration for the future may be pairing new APP with a senior APP in the department to nurture learning without power dynamics at play. Also, just having the resources organized on an easily accessible online platform, rather than using them, may be enough to affect the participant’s confidence in the resources available for successful role transition. Each participant had a different degree of confidence in the appropriateness of the content of the live lectures based on their existing knowledge. This could suggest that each APP comes with the pre-existing knowledge in neurology which would be different from other APPs, as supported by Knowles’ adult learning theory. To address this difference, mentorship experience can also be used in the future to coach APPs on an individual basis on the concepts that need additional support.

The onboarding process is intended for a newly hired APP during their orientation period. All three participants had already completed their orientation period, and were practicing as a neurology APP for varying months. Two out of three participants were managing care for a full schedule of patients. This immensely reduced their availability to go through the materials on the online portal or attend lectures. Even though, participants’ schedule was blocked for them to
attend live lectures, two of three participants reported their visits running over into the blocked time, making them unable to attend the full lecture. Additionally, due the COVID-19 pandemic, one out of three participants were deployed to help in another clinic based on need. This negatively impacted our ability to control this participant’s schedules to attend live lectures or meet with the mentor. Thus, participation in these interventions needs time commitment. APPs in their formal orientation period will have dedicated time to learn neurology along with a small number of patients to manage, hence, these limitations will not be applicable for new APPs in their orientation period. Full participation in all intervention components will be expected of all new APPs. However, one concern is that when the newly hired APPs are required to participate in all of the intervention components, they may feel like they are not in charge of their own learning and this may cause dissatisfaction. This will also go against the Knowles’ adult learning theory that postulates that adults are self-directed learners. Instead, providing new hires with the minimal participation expected for all three components and allowing an area for varied level of engagement depending on their need, can be an ideal option.

In summary, participants perceived the interventions fulfilled the aim of providing the optimal level of confidence in enhancing job satisfaction, role transition and knowledge. This was seen through a decrease in the mean scores on the abbreviated MNPJSS. An increase in the mean scores was also seen on site specific questions measuring knowledge and job satisfaction.

**Limitations: Strengths and Weaknesses**

The abbreviated nature of this project could be considered as a limitation as there were only nine weeks allotted for APPs to use the online learning resource. As per the conversation with the vice chair of education and the director of the neurology residency program at UNC neurology, she has noted that it has taken residents approximately six – nine months to gain a
basic understanding of neurology. Another limitation of the study would be failing to consider the amount of baseline knowledge on neurology the participants came in with. This would be an important consideration as this may have an effect on the knowledge scores. Steps could be taken to assess the baseline knowledge in the participants during the follow up study.

Despite the short implementation period, we have learned that the interventions have been beneficial even after using it for nine weeks. This quality improvement project can be considered as a pilot project for evaluating an onboarding program consisting of the three interventions. By design, a pilot study is an initial step in exploring a novel intervention or an innovative application of an intervention. Pilot results can inform about the feasibility of these interventions and identify modification needed in the design of a larger hypothesis testing study (Leon, Davis, & Kraemer, 2011). Thus, based on the responses provided by APPs after nine weeks of implementation phase, changes will be made to make the learning materials more valuable. Receiving feedback after nine weeks of usage could also be seen as a strength as it would provide data for further development. The process evaluation measures also help assess how well the interventions were implemented and offers future guidance. Having a small sample of only three APPs is a weakness as the data is very limited to perform meaningful inferential statistics. But as the department grows with more APPs, a program evaluation could be planned at a later date with more APPs. Using Qualtrics for the administration of pre- and post-implementation survey was favorable due to the software’s ability to provide data analysis and reports that were effortless to interpret.

**Barriers to Implementation**

It is important to consider obstacles or barriers to overcome with the implementation of any practice change initiative. Some barriers were anticipated, and some were not. Participant
engagement was one of the potential barriers that was hypothesized, given the time commitment needed from the participants when they are no longer in the orientation period. Bi-weekly check-ins with the participants was thought to be successful in motivating them to schedule a meeting with their mentors but participation in live lectures and online modules remained low.

Another barrier that was not predicted was a concern for keeping the learning materials on the learning website protected. Learning materials provided by faculty are considered to be their intellectual property and cannot be distributed without their permission. It was important to address this obstacle immediately as this would deter the faculty from providing the learning materials. In order to overcome this barrier, the author collaborated with the university scholarly communications officer who provided guidance in this matter. All PowerPoint presentations were converted to PDF with an added copyright symbol. A copyright disclaimer was also added on the homepage of the portal. Most importantly, the portal was created on a secured, two-step password protected domain on the health system server. Each user also needed a granted permission to be able to access the portal. The access was only available for the department of neurology.

Using EMERSE to search differential diagnosis as a non-discrete variable among participants, to measure a change in the number of differential diagnosis was part of the proposal. This would have been used to determine change in knowledge post implementation. However, another barrier emerged during data analysis. Use of EMERSE did not provide with data we were expecting for the purposes of this project.

Sustainability

The intervention components were devised keeping sustainability in mind. The online portal was meant for self-directed learning which can be accessed from home and work. This
broadens the time available for learning and providing flexibility. This live resource can be easily updated and can also be used by nurses, medical assistants, and students in the department to learn the subject matter. The design of such an online learning resource has increased potential of use for our department as it continues to grow. Each subdivision within the neurology department can play a role in ascertaining that the materials on the learning portal are adequate for an APP in their division. Due to the COVID-19 pandemic, the live lectures were made available through online WebEx meetings. This further adds to the sustainability of this component, as now participants can access them without the limitation of travelling to the location of the lecture. Mentorship meetings took place in a combination of in-person and/or over the phone; this flexibility will further ensure participation in the future. All these factors will positively affect dissemination of the onboarding program in the future. In fact, the APP center of the hospital system has decided to use the MS SharePoint platform from this project, to organize the orientation materials for all the new incoming APPs. This allows for dissemination of the key intervention at a much larger scale.

**Implications for Practice**

Our main aim in this project was to address the lack of an organized onboarding protocol for APPs in the neurology department. Through this quality improvement initiative, we have developed an onboarding process to fill this gap. The interventions that were part of this project are supported by evidence in the literature and have been successful in attaining positive outcomes. However, a program evaluation with longer time and with more participants can be done in the future as the APP presence continues to grow in the department.

The onboarding process, as detailed in this document, can be followed by other neurology departments that are part of an academic institution. Components of the intervention
such as an online learning portal and mentorship can also be used by private neurology practices as well. Overall, we believe this quality improvement project is timely, considering the impact of the shortage of neurologist services in near future. Proper training and support for APPs will be essential as they continue to be integrated in specialty practice in increasing numbers. This onboarding process can be generalized to many other specialty practices in light of observed favorable outcomes in APP proficiency and satisfaction.
APPENDIX A: REVIEW OF LITERATURE MATRIX

**Title:** Quality Improvement Project to Enhance Onboarding of New Advanced Practice Providers (APPs) at a University based Outpatient Neurology Clinic

**Purpose Statement:** The purpose of this quality improvement project is to improve job satisfaction, knowledge/preparation, retention and patient care through an onboarding process for advanced practice providers in our neurology department by implementing an online learning portal paired with a face-to-face lecture series, along with mentorship experience. This learning portal will serve as an organized platform to house learning resources in neurology.
1. For evidence that describes and supports the clinical or systems problem

<table>
<thead>
<tr>
<th>Citation</th>
<th>Purpose Aims Objectives</th>
<th>Study Design/Method</th>
<th>Study Sample/Setting</th>
<th>Major Variables (outcome variables)</th>
<th>Measurement of variables</th>
<th>Analysis</th>
<th>Results / Findings</th>
<th>Quality of the Evidence</th>
</tr>
</thead>
</table>
| Barnes, 2015 | Examines relationship between NP role transition, prior RN experience and a formal orientation | Cross sectional study       | Convenience sample of 352 participants at a national NP conference. | Dependent variable: NP role transition  
Independent variable: Formal orientation | 16-item, 5-point Likert Scale Nurse Practitioner Role Transition Scale (NPRTS): measured perceptions of own NP role transition experience  
The reliability and validity of this scale was established in 182 practicing NP’s across various settings. Internal consistency reliability for t 16 item NPRTS was .87  
Single question added: “Did you receive a formal orientation in your FIRST NP position?” | independent t test: compare the mean scores on the NPRTS for formal orientation  
multiple regression analysis: for relationship between formal orientation and NP to role transition | formal orientation positively correlated with NP role transition \( r = .29, P < .001 \)  
Formal orientation had higher scores on the NPRTS \( (M = 53.1, SD = 9.4 \text{ vs } M = 46.9, SD = 10.0) \). This was significant \( t(350) = 5.62, P < .001 \) | Level of evidence: VI  
(Melnyk & Fineout-Overholt’s, 2011)  
Strengths: applies to NP role transition into a different specialty. Decent sample size. Provides empirical data to support formal orientation programs for NPs  
Weaknesses: Cross sectional study using self-reported data, may not be a representative of actual pool of NPs, since the participants were NPs that attended the conference |
<table>
<thead>
<tr>
<th>Citation</th>
<th>Purpose Aims</th>
<th>Study Design/Method</th>
<th>Study Sample/Setting</th>
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<th>Analysis</th>
<th>Results / Findings</th>
<th>Quality of the Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Langley, 2018</td>
<td>To develop a comprehensive orientation and onboarding plan for Neurocritical care Advanced Practice Providers</td>
<td>Guideline for program evaluation for APP onboarding program focuses on 5 specific areas: candidate selection, proctor assignment, 3-phased orientation process, remediation, and mentorship</td>
<td>Advanced Practice Providers hired to work in one hospital Neurocritical care unit</td>
<td>Retention rate of APPs post implementation of orientation/onboarding plan</td>
<td>self-expression or peer evaluation for the reason for leaving employment</td>
<td>No analysis mentioned but provided descriptive data on retention</td>
<td>Post implementation: 83% retention rate Compared to 50% pre-implementation</td>
<td>Level of evidence: VII (Melynk &amp; Fineout Overholt, 2011)</td>
</tr>
<tr>
<td>Strengths: gives specific direction on the program developed. Gives data on retention rate Weaknesses: does not mention any formal measure of evaluation of program. Does not give anecdotal data on the self-expression and peer evaluation given by APPs that left employment Applicability/feasibility to your population/setting: provides perception of important areas to focus on for orientation plan. Having a formal orientation plan increased retention rate, this could be applied to my setting</td>
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<tr>
<td>Asber, 2019</td>
<td>To examine the effect of new nurse residency programs (NRPs) on retention of new nurse graduates</td>
<td>Integrative Literature review</td>
<td>Sample: 16 articles Mostly all articles are of level V evidence</td>
<td>1-year retention rate for who participated in Nurse Residency program</td>
<td>Not mentioned</td>
<td>The results are reported descriptively on retention rate as the outcome</td>
<td>1-year retention rates of 90% to 100% compared to national average of 70% to 82.5%</td>
<td>Level of evidence: V (Melynk &amp; Fineout Overholt, 2011)</td>
</tr>
<tr>
<td>Strengths: literature review with strong inclusion criteria Weakness: Only looked at 1-year retention, not beyond. Data only in hospital settings. Applicability: There were higher 1-year retention rate if new nurse participated in an formal orientation program</td>
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<tr>
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</table>
| Horner, 2017    | If mentoring influences new nurse practitioner job satisfaction and retention          | Non-Experimental mixed methods study      | N = .37              | Job satisfaction                    | 44 item Misener Nurse Practitioner Job Satisfaction Scale (MNPJSS). Scale scored a Cronbach’s α reliability measure of .96 | A one-way analysis of variance with .05 level of significance for cross tabulations was used | MNPJSS scores range 141 to 246, with a mean of 195.26 (SD = 28.29)  
  p < .05 for job satisfaction corresponding to “minimally satisfied”  
  All of participants reported that the mentor experience/relationship positively influenced job satisfaction | Level of evidence: IV  
  (Melynk & Fineout Overholt, 2011)  
  Strengths: establishes a relationship between mentorship and nurse practitioner job satisfaction  
  Weaknesses: small, convenience sample located in an urban Midwest health care organization  
  Applicability: Having a mentor for a new nurse practitioner may increase job satisfaction and therefore retention |
| Robesano, 2019  | easing novice APRNs’ progression to independent practice through transitional support | Quasi-experimental (pilot study)         | 92% (n =12) for the 30-day survey, 70% (n =7) for the 180-day survey, and 100% (n =6) for the 1-year survey | Independent variable: Phased onboarding activities  
  Dependent variable: professional satisfaction, and provider retention | Questions are based on a Likert scale, with optional comment boxes. This was administered at 30 day, 180 day and 1 year post hire | The results were reported descriptively | Themes found; achievement in a stellar recruitment process, fostering a team environment, colleague support, and job satisfaction | Level of evidence: IV  
  (Melynk & Fineout Overholt, 2011)  
  Strengths: evaluates the effectiveness of a phased onboarding process for new nurse practitioners  
  Weaknesses: data is from a pilot study with very small sample from a single healthcare organization. Data is not available post system wide roll out  
  Applicability: This provides evidence that phased orientation and onboarding is effective |
Legend: NPRTS: Nurse Practitioner Role Transition Scale, NP: Nurse Practitioner, RN: Registered Nurse, APPs: Advanced Practice Providers, NRPs: Nurse Residency Programs, MNPJSS: Misener Nurse Practitioner Job Satisfaction Scale, APRN: Nurse Practitioners

2. For evidence on how to improve or solve the problem

<table>
<thead>
<tr>
<th>Citation</th>
<th>Purpose Aims Objectives</th>
<th>Study Design/Method</th>
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<th>Major Variables (outcome variables)</th>
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<th>Results/Findings</th>
<th>Quality of the Evidence</th>
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<tr>
<td>Lawn, 2017</td>
<td>The purpose of the study was to examine e-learning provided to existing health professionals for their continuing professional development</td>
<td>Integrative review of literature</td>
<td>10 peer reviewed articles</td>
<td>Independent variable: Effective e-learning approaches&lt;br&gt;Dependent variable: Self management support (SMS)</td>
<td>Papers included: 2006 – 2016</td>
<td>Content analysis using JBI QARI critical appraisal checklist for interpretive and critical research &lt;br&gt;Combination of e-learning and face-to-face learning is suggested to support SMS skills development for health professionals</td>
<td>Level of evidence: V &lt;br&gt;(Melynk &amp; Fineout Overholt, 2011) &lt;br&gt;Strengths: literature review with strong content analysis &lt;br&gt;Weaksness: The results are very general, analyzed on many different themes. It is hard to consolidate findings &lt;br&gt;Applicability: the findings suggest that there is not much data on what is the best way to provide e-learning but combining face-to-face with e-learning is helpful</td>
<td></td>
</tr>
<tr>
<td>Hackstadt A, Hayes K, 2005</td>
<td>Purpose was to examine effectiveness of interactive online learning modules for APNs and their perception of online learning</td>
<td>Quasi-experimental group, pre and post test</td>
<td>Purposive sampling of 73 APNs</td>
<td>Pre and post test knowledge scores</td>
<td>t sample t-test</td>
<td>Significant increase in mean knowledge scores in both modules: back pain, ( t = -10.83, p &lt; 0.0001 ), dermatology, ( t = -7.42, p &lt; 0.0001 ) &lt;br&gt;Per evaluation: learners reported not missing face-to-face class</td>
<td>Level of evidence: IV &lt;br&gt;(Melynk &amp; Fineout Overholt, 2011) &lt;br&gt;Strengths: higher level of evidence, the same sample used for pre and post knowledge scores, sample was varied across the knowledge base as included nurses and advance practice providers with ranging experience as well</td>
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<tr>
<td>Citation</td>
<td>Purpose Aims</td>
<td>Study Design/Method</td>
<td>Study Sample/Setting</td>
<td>Major Variables (outcome variables)</td>
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<tr>
<td>Hoffman, 2018</td>
<td>Evaluate effectiveness of Oncology Nurse Practitioner Web Education Resource (ONc-PoWER) in response to inadequate or non-standardized orientation</td>
<td>Quasi-experimental, pre and post assessment</td>
<td>79 dyads (i.e., a new ONP and his or her mentor) from 27 states within US</td>
<td>Independent variable: a web-enhanced educational tool, funded through the National Cancer Institute</td>
<td>pre- and post-knowledge and confidence scale via 10 multiple-choice item questions to the ONPs and mentors were asked to respond “yes” or “no” to 30 questions involving clinical activities that evaluated the ability of their respective ONPs to perform the core clinical tasks presented through modules</td>
<td>Descriptive statistics and a paired sample T-test were used for analysis</td>
<td>statistical significance (p = .000) between pre- and post-program self-assessment of cancer care knowledge and confidence in delivering cancer care among ONPs</td>
<td>Strengths: evaluates the online module created to train ONPs Weaknesses: the survey used to assess pre- and post-knowledge was not a standardized tool. Reliability of the survey was not described Applicability: This is similar to my problem of inadequate orientation for new nurse practitioners in neurology</td>
</tr>
</tbody>
</table>

Legend: SMS: self-management support, APNs: Advanced practice nurses, APPs: Advanced practice providers, ONc-PoWER: Oncology Nurse Practitioner Web Education Resource, ONPs: Oncology Nurse Practitioners
APPENDIX B: INTRODUCTION SCRIPT

I invite you to partake in an opportunity to experience and evaluate a nine-week APP onboarding program. This is a quality improvement project aimed to improve APP onboarding. The program comprises of three parts – online learning platform, mentorship experience and face-to-face lectures. The online learning platform will be organized by topics in neurology. This platform will be available for use for nine-weeks. A mentor will be assigned during these nine-week period to provide support and guide your learning process. You can meet with them as many times you decide together but are expected to meet at least four times. Additionally, there are face-to-face lectures as part of the resident boot-camp that you are invited to attend. These lectures are given by our faculty attending physicians. You can attend the lectures using an online WebEx links that will be emailed to you. A schedule of topics will be provided to you. Before participating in this program, I would like you to fill out a brief survey through qualtrics. You will receive an email for this survey. I wanted you to know that all surveys will be kept anonymous. At the end of the two months you will be asked to fill out a survey again. I can answer any questions you may have at this time.
APPENDIX C: MENTORSHIP RESOURCE

The benefits of mentorship

<table>
<thead>
<tr>
<th>Mentee</th>
<th>Mentor</th>
<th>Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilitation of role transition</td>
<td>Professional and personal development</td>
<td>Integrated staff members</td>
</tr>
<tr>
<td>Personal and professional growth and development</td>
<td>Pride in watching others develop</td>
<td></td>
</tr>
<tr>
<td>Political and strategic power development</td>
<td>Sharing of experience and knowledge</td>
<td></td>
</tr>
<tr>
<td>Empowerment</td>
<td>Positively challenged and stimulated, encouraging reflective practice</td>
<td>Empowered, motivated, autonomous skilled work force</td>
</tr>
<tr>
<td>Increased job satisfaction and commitment to stay</td>
<td>Increased job satisfaction</td>
<td>Satisfied workforce Retention of staff</td>
</tr>
<tr>
<td>Improved knowledge base, with bridging of the practice-theory gap</td>
<td>Reciprocal learning, keeping practice up to date</td>
<td></td>
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<tr>
<td>Enhanced competence</td>
<td>Improved staff efficacy</td>
<td></td>
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<tr>
<td>Greater productivity</td>
<td></td>
<td></td>
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<tr>
<td>Career development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased self esteem</td>
<td>Increased self esteem</td>
<td>More confident workforce</td>
</tr>
<tr>
<td>Enhanced socialisation into new organisation and organisational insight</td>
<td></td>
<td>Socialisation of individuals able to contribute to the organisation earlier and subscribe to, and promote, organisation goals</td>
</tr>
</tbody>
</table>

Rosser et al., 2004

Mentorship Objectives:

❖ **Clear mentorship purpose and goals:** Mentor and mentee are encouraged to work together to articulate the purpose of the mentorship and set mentorship goals (Nowell et al., 2017). The quality improvement form below can be helpful for this purpose.

❖ **Frequent communication between mentors and mentees:** The mentor and mentee dyad are encouraged to communicate frequently, with ongoing feedback and evaluation. This has shown to help build strong mentorship relationship that fosters a comfortable environment for the mentees to ask questions, develop a sense of teamwork and provides more opportunities for learning. *The mentee and the mentor can meet as many times as*
needed over the nine-weeks but are expected to meet at least every two-weeks, thus four times. A quality improvement form provided by North Carolina Board of nursing will be used during these meetings as a guide (Nowell et al., 2017).

- **Facilitating socialization and networking opportunities**: provides a medium for integration into the culture, unwritten social norms and expectations. This also offers mentee an opportunity to greatly expand their network through working with other scholars and mentors. Attending program meetings, national conferences should be encouraged (Nowell et al., 2017).
QUALITY IMPROVEMENT PROCESS – DOCUMENTATION FOR MEETINGS SHALL INCLUDE:

1. CLINICAL ISSUES DISCUSSED (practice relevant clinical issues):

2. PROGRESS TOWARD IMPROVING OUTCOMES:

3. RECOMMENDATIONS (IF ANY) FOR CHANGES IN TREATMENT PLAN:

SIGNATURE(s) OF THOSE ATTENDED AND DATES:

__________________________________  ______________

__________________________________  ______________
APPENDIX D: SURVEY: PRE-IMPLEMENTATION

How satisfied are you in your current job as a nurse practitioner/physician assistant with respect to the following factors?

V.S. = Very Satisfied M.D. = Minimally Dissatisfied
S. = Satisfied D. = Dissatisfied
M.S. = Minimally Satisfied V.D. = Very Dissatisfied

<table>
<thead>
<tr>
<th>Factor</th>
<th>V.D</th>
<th>D.</th>
<th>M.D.</th>
<th>M.S.</th>
<th>S.</th>
<th>V.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Support for continuing education (time and money)</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. Opportunity for professional growth</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. Opportunity to expand your scope of practice</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Interaction with other APPs including faculty</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Expanding skill level/procedures within your scope of practice</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>6. Ability to deliver quality care</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7. Opportunities to expand your scope of practice and time to seek advanced education.</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. Evaluation process and policy</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9. Sense of value for what you do</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10. Opportunity to develop and implement ideas</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>11. Consideration given to your opinion and suggestions for change in the work setting or office practice</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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</table>
Please indicate the degree to which you agree with each statement:

1. I feel confident that I can collect a proper, in-depth history of neurological problems
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

2. I feel that I can perform an accurate neurological exam
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

3. I feel that I can localize the findings of a normal neurological exam
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

4. I understand how to look at brain imaging for basic findings i.e; stroke, bleed, mass, atrophy and white matter disease
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

5. I feel like I have a basic grasp of all the common neurological problems
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

6. I feel that I have received adequate education and training to take on this new role as an APP in neurology
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

7. I feel that I have adequate support to take on this new role as an APP in neurology
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

8. I am clearly aware about whom to approach if I need assistance in carrying out my responsibilities in this new role
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree

9. I feel like I have enough resources for reference as a new APP in neurology
   1 = Strongly Agree  2 = Agree  3 = Somewhat Agree  4 = Somewhat Disagree  5 = Disagree  6 = Strongly Disagree
APPENDIX E: SURVEY: POST-IMPLEMENTATION

Process Evaluation Measures

1. How many modules (weeks 1 - 8) from the homepage did you complete on the online learning portal?
   a. 1 - 2
   b. 2 - 4
   c. 4 - 6
   d. 6 – 8

2. What was the average amount of time you spent each week completing the modules?
   a. Less than 10 minutes
   b. 10-20 minutes
   c. 21-30 minutes
   d. 31-40 minutes
   e. Greater than 40 minutes

3. How many face-to-face live lectures did you attend?
   a. 5-10
   b. 11-15
   c. 16-20
   d. 21-25
   e. Greater than 25

4. How many times did you meet with your mentor?
   a. 1
   b. 2
   c. 3
   d. 4
Learning Portal
1. I think the topics were well organized in the learning portal
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

2. I feel that the materials provided for each topic were adequate for my understanding
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

3. I feel that there was a diversity of materials provided for each topic
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

4. I feel that I have resources that I can refer back to quickly through the learning portal
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

5. I believe that using this learning portal has increased my knowledge in neurology
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

6. Were you able to access the portal without issues at home and at work?
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

Face-to-Face lectures
1. I feel like the lecture materials were appropriate for my knowledge
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

2. The lectures increased my understanding of the topic
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree
Mentorship

1. Did you think your mentor was interested to see you succeed in your new role?
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

2. Was case based learning helpful?
   1= Strongly Disagree 2= Disagree 3= Neutral 4= Agree 5= Strongly Agree

Please use the space below for additional comments about online learning portal, face-to-face lectures and mentorship:

____________________________________________________________________________
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