MDHHS Office of Nursing Safety and Workforce Planning
Advanced Practice Partnership Demonstration

2020 Evaluation Report

By the
Michigan Public Health Institute

Project Period: 10/1/2019 to 9/30/2020

Program Description

Academic Practice Partnership Demonstration is a project implemented at multiple ambulatory care practice locations by Wayne State University with support from the Michigan Department of Health and Human Services, Office of Nursing Safety and Workforce Planning (MDHHS ONP), to develop a replicable, immersive, technologically supported clinical education experience for nurse practitioner (NP) students in three geographically distinct and complex practice-based environments in medically underserved or health professional shortage areas of Michigan. Exposure to these areas during clinical placement increases the likelihood nurses will work in those settings after graduation. It is hoped that use of this innovative technology in clinical placements in the chosen settings will demonstrate that it can overcome barriers related to geographic distance and faculty support.

Five NP students were recruited to participate across three primary care practice sites in Detroit, Houghton Lake and New Baltimore. Two faculty instructors from Wayne State University served as the preceptor and clinical instructor for clinical placement sites. A licensed, practicing nurse practitioner served as a preceptor as well. This project used distance robotic clinical evaluation methodology using Double Robotic and TytoCare products which allow geographically remote faculty to see and hear what students are experiencing. The use of Double Robotics robots and omni-directional microphones support efficient, tele-present oversight of the clinical placements. Technical support provisions are included for students, faculty and staff. Security is ensured via point-to-point connections using private networks. Two of the clinical placements were able to utilize the robotics technology. The third planned clinical placement did not receive the robotics technology due to circumstances related to the 2020 COVID-19 pandemic.

Evaluation Questions

The primary goal of the evaluation was to determine if using distance robotic technology (DRT) is an efficient and viable option for providing remote clinical education to NP students during their clinical placement rotations in geographic locations for which there is difficulty identifying or recruiting onsite faculty from local resources. To do this, the following questions were addressed.

1. How adequate was the training, planning and technical support for setting up the distance robotic technology clinical education experience?
2. Do NP students feel they received adequate support and guidance from their instructors while conducting their clinical placement rotations?
3. Do instructors feel as though they were able to provide the same level of support and guidance to students through distance robotic technology compared to in-person site visits?
4. How does distance robotic technology impact nurse preceptors and clinical staff?
5. What are the resource implications (financial, time and other) of implementing distance robotic technology?
6. What are the main factors that need to be considered when expanding or replicating distance robotic technology in other clinical sites?

Measurement & Data Sources

Data collection included interviews conducted by phone and a cost tracking form. The table below provides the key indicators that will be addressed for each of the evaluation questions along with the corresponding data source and question.

Evaluation Question	Indicators	Data Source
1. How adequate was the training, planning and technical support for setting up the distance robotic technology clinical education experience?	• Appropriateness of training • Comfort level with using the DRT • Adequacy of time for training • Availability of technical support associated with DRT	• Student Questionnaire • Instructor Questionnaire • Preceptor Questionnaire • Clinical Staff Questionnaire
2. Do NP students feel they received adequate support and guidance from their instructors while conducting their clinical placement rotations?	• Satisfaction with the level of support and guidance from instructor • Perception of adequate patient interaction with DRT • Ability to have clear and uninterrupted communication with instructor • Student interest in working in underserved, culturally diverse communities • Impact of DRT on the NP student deciding where to complete their clinical placement education	• Student Questionnaire
3. Do instructors feel as though they were able to provide the same level of support and guidance to students through distance robotic technology compared to in-person site visits?	• Perception of clinical placement staff partnership in planning clinical experience • Ability to communicate with NP student • Ability to provide appropriate educational information through DRT compared to in-person • Ability to evaluate student clinical skills • Ability to observe whether student met learning objectives • Ability to see and hear patient • Ability to see and hear relevant medical equipment and readings • Perception of student interest in working in underserved, culturally diverse communities	• Instructor Questionnaire

Evaluation Question	Indicators	Data Source
4. How does distance robotic technology impact nurse preceptors and clinical staff?	• Perception of clinical placement staff partnership in planning clinical experience • Ability to communicate with instructor • Perception of adequate patient interaction with DRT • Perception of NP student's ability to learn through DRT • Perception of instructor support and guidance given to the student • Perception of student interest in working in underserved, culturally diverse communities • Impact of DRT on clinic productivity • Operational changes to accommodate DRT • Knowledge, attitudes and interest in continuing to precept students using DRT • Benefits of academic practice partnership	• Preceptor Questionnaire • Clinical Staff Questionnaire
5. What are the resource implications (financial and other) of implementing distance robotic technology?	• Cost of the robotic device • Cost of maintenance repairs • Time associated with maintenance • Cost of wireless service • Costs associated with training, if any • Other costs associated with DRT • Time associated with training • Costs associated with travel to site (mileage, per diem, hotel) • Time associated with travel • Number of visits completed	• Instructor Questionnaire • Cost tracking form
6. What are the main factors that need to be considered when expanding or replicating distance robotic technology in other clinical sites?	• Set-up • Impact on productivity • Patient's level of comfort/acceptance with DRT • Physical environment • Wireless service • Reliability of DRT (What happens when it breaks?) • Cost and type of backup plan in place when technology falters • Ability to expand clinical placement locations/geography	• Preceptor Questionnaire • NP Student Questionnaire • Clinic Staff Questionnaire

Data Collection and Analysis Methods

Telephone Interviews

Data for this project was obtained through telephone interviews. Interview participants included the NP students, clinical instructor, preceptors and other clinical support staff[1]. The planned interview questions appear in Appendices 1-4. Interviews were recorded, transcribed and de-identified. Interview transcripts were reviewed and coded by trained team members to answer the evaluation questions.

Cost-tracking Form

Faculty costs were collected from NP clinical instructors using the distance robotic technology. At the end of each semester, clinical instructors recorded the total number of site visits, the number of hours worked, how many students were observed, and time and mileage spent traveling (if applicable) in a cost tracking form provided by the MPHI team. Additionally, the total cost of the technology and faculty time spent in training to use the technology was collected from faculty using the distance robotic technology.

Analyses examined differences in cost for the distance robotic site visits compared to in-person site visits. A copy of the cost-tracking form is included in Appendix 5.

Sample

A total of ten individuals familiar with the DRT were interviewed. These included:

- Five NP students;
- Two preceptors;
- Two clinical instructors; and
- One medical assistant.

Both the urban and rural clinical placement sites supported with DRT were located in United States Department of Health Resources and Services Administration (HRSA), designated health professional shortage areas.

Results

Qualitative information from the interviews provided insight into how DRT was used to assess clinical placements. Findings from the interviews are reported for each of the six evaluation questions below.

How adequate was the training, planning and technical support for setting up the distance robotic technology clinical education experience?

There was no formal training provided for integrating the DRT. Students who were involved in distance robotic clinical placements were provided a brief 15-minute orientation to how the robotic technology would be used within their clinical placement and how to introduce the technology in patient visits.

[1] Student participation is subject to approval by faculty instructors.

Additionally, they were instructed in implementing the surveys to evaluate the use of the technology with patients. Preceptors were provided no training to use the DRT as they did not operate the technology. Clinical instructors were given an informal training but recommended that a troubleshooting manual would have been helpful if any technical challenges arose with using the robotic technology. Despite the brevity of the informal training, clinical instructors and students felt the amount of time to introduce them to using the DRT was adequate and a manual was created to help address simple issues with the technology. Clinical staff, instructors and preceptors were all comfortable with using the technology during patient visits with these provided resources.

An information technology (IT) team was available at the university for technical assistance if any challenges arose as well as additional IT support from the developers of the robotic technology. IT support at the university was typically adequate to resolve any technical issues; however, when one of the robots malfunctioned, the robot needed to be sent back to the manufacture for repair. Additionally, only a small number of IT staff at the university was knowledgeable about the use of the DRT and respondents felt that additional cross training would have been useful when usual staff are unavailable.

Do NP students feel they received adequate support and guidance from their instructors while conducting their clinical placement rotations?

Students were overall satisfied with the support and guidance received from their instructor, describing the feedback they received as good or excellent. Because of technical issues, students at one of the clinical placement locations participating with the DRT received both in-person and distance site visits from their clinical instructor. They felt the guidance and feedback from instructors were similar regardless of the type of observational visit they received. One challenge with the DRT visit that a student mentioned was that the instructor's ability to observe can be impeded if the student or patient blocks the view of the camera. This problem is alleviated if there is enough room in the exam room to maneuver the robot for a better perspective. Additionally, preceptors expressed that having the robotic technology to complete visits decreased disruption in the clinic by the clinical placements, because there was one less external person to accommodate in the clinic.

Most interviewees agreed that the robotic technology affected patient interactions very little. Some reported that it was more beneficial to complete site visits using the technology because having one less person in the exam room put both the patient and the student practitioner more at ease. Students noted that sometimes technical issues affected the patient visit but still felt the overall visit was not affected by the DRT. Preceptors noticed that patient visits with the DRT took more time due to students having to explain the use of DRT and gain consent for its use during the examination.

Nearly all students felt their clinical placements prepared them well for working in underserved communities. They appreciated the range of chronic and acute issues they were able to see within both rural and urban settings. They felt that the use of DRT allowed for increased access to these placements because clinical instructors were able to easily observe and evaluate their clinical skills without needing to travel to those locations. Clinical instructors and preceptors also saw an increased interest in working in rural settings in their students. They noted that students are often surprised by the range of issues that rural clinical settings treat and manage.

Participants also expressed that having additional students in a single clinical placement sometimes reduced the number of patients they were able to see and prohibited them from experiencing the typical pace of patient visits in a primary care setting. Students at rural placements appreciated being able to care for a greater number of patients because they were one of few students at a clinical placement. One of the potential benefits noted by many students of using DRT is that it facilitated access to additional clinical placement sites; thereby, reducing competition to provide care during patient visits.

Do instructors feel as though they were able to provide the same level of support and guidance to students through distance robotic technology compared to in-person site visits?

Clinical instructors noted only a few challenges with communicating with students using the DRT. Instructors noted that, when the technology was positioned appropriately, they were able to clearly observe their students interacting with patients and able to see the techniques students were using to assess patients. However, there were some challenges with decreased visual quality relating to connectivity issues; but overall, staff and students felt the use of DRT to complete site visits went well when the wireless connectivity was strong. Interviewees noted that a drawback to the DRT supported visit was that vital measurements such as heart or lung sounds are not audible to the instructors. A few times when the technology malfunctioned, instructors completed visits in person.

One interviewee noted that using the DRT could help instructors to complete more visits for a student experiencing challenges in their clinical placement to observe any patterns in the student's practice, rather than being limited to only a few site visits to evaluate student skills. Additionally, another instructor noted that a benefit of observing students through the DRT was the ability to observe students and patients interacting more naturally, unaffected by the physical presence of another person. Students agreed that they were able to focus more on the patient interaction when the instructor was observing through DRT rather than in-person, as they were able to forget that the DRT was in the room with them.

How does distance robotic technology impact nurse preceptors and clinical staff?

Clinical and Patient Impact

- Preceptors and clinic staff reported that the DRT had no impact on clinic productivity and clinic staff were better able to maintain their routines without an external person to accommodate.
- They also felt that the DRT did not affect how they interacted with patients and believed most patients to be receptive to and intrigued by use of the technology.
- However, one interviewee noted that patient visits using the DRT took a longer time to complete because providers had to explain the use of the DRT and gain consent from patients to be observed by the clinical instructor.

Interactions with University

- Preceptors were able to clearly communicate with instructors as needed and appreciated the ability to have face-to-face conversations using DRT, as opposed to mostly email communications.

- Clinical staff and preceptors felt that clinical instructors were able to observe students' clinical skills and provide feedback with the DRT without being intrusive during the patient visit.
- Preceptors working with the university were appreciative of the open communication from instructors and highly proficient students they had in their clinics.
- Furthermore, clinic staff expressed appreciation not only for the ability to utilize this up-to-date technology from students but also learn what the most up-to-date best practices in the field are from students.
- Preceptors reported they would be very willing to participate as a clinical placement site both with the university and with continuing to use DRT.

What are the resource implications (financial, time and other) of implementing distance robotic technology?

Average time spent completing a single visit for all students at the respective clinical placement sites participating with DRT was computed using cost tracking data completed by the clinical instructors and the nursing program's financial department as well as anecdotal information obtained from participant interviews. For the DRT clinical site 1, instructors spent nearly twice the amount of time completing an in-person site visit for all students at the clinical site as compared to completing a site visit using the DRT. Most of that time was spent waiting for patients to be seen. For the DRT clinical site 2, instructors spent nearly five times as long to complete a single in person visit for their students as compared to completing a site visit using the DRT. Most of the time spent for completing an in-person visit was due to travel time and waiting for patients to be seen (see Table 1).

Table 1. Comparison of average time spent completing in-person versus distance site visit

Time Spent (Hours)	In-Person Visit	Distance Visit
DRT Clinical Site 1		
Planning and coordinating site visit	2	2
Time spent waiting due to no patient	1.5	0.33
Evaluating student patient interactions for all students	2	0.75
Travel	0.2	0
Estimated total time spent completing site visit for all students	**5.7 hours**	**3.1 hours**
DRT Clinical Site 2		
Planning and coordinating site visit	1	1

Time Spent (Hours)	In-Person Visit	Distance Visit
Time spent waiting due to no patient	2	0.16
Evaluating student patient interaction for all students	0.5	0.50
Travel	5	0
Estimated total time spent completing site visit for all students	**8.5 hours**	**1.66 hours**

According to the U.S. Bureau of Labor Statistics, the average salary of a postsecondary nursing instructor in Michigan in May 2019 was $81,510[2]. Using this average salary, the average hourly wage for nursing instructors is about $39.19 an hour. This hourly wage was used to approximate the wages associated with completing an in-person site visit at each of the clinical sites participating with DRT. For the DRT clinical site 1, costs to cover an in-person site visit cost twice as much as a distance visit. For the second placements, costs for an in-person site visit are nearly 10 times more costly than a distance a visit (see Table 2).

Table 2. Projected travel costs to complete in-person clinical placement site visits

	In-Person Visit	Distance Visit
DRT Clinical Site 1		
Mileage	$0.62	N/A
Overnight per diem	N/A	N/A
Wages to complete site visit*	$223.38	$121.49
TOTAL COSTS	**$224.00**	**$121.49**
DRT Clinical Site 2		
Mileage	$194.48	N/A
Overnight per diem	$75.00	N/A
Wages to complete site visit*	$332.86	$65.06
TOTAL COSTS	**$602.34**	**$65.06**

[2] Occupational Employment and Wages, May 2019 25-1072 Nursing Instructors and Teachers, Postsecondary. (2020, July 06). Retrieved September 08, 2020, from https://www.bls.gov/oes/current/oes251072.htm

*Average hourly wage multiplied by average time to complete in-person site visit.

Clinical instructors complete at least two site visits per semester at each of the clinical placement sites. Using the information in the tables above, the total costs for completing all site visits within an academic year was estimated for each clinical placement site for both in-person costs and distance costs for instructor time only. Completing distance visits for these two clinical placement sites saves about $3,838.74 in instructor wage costs a year (see Table 3). Additionally, the time saved for completing visits using the DRT for both sites is approximately 57 hours netting approximately an additional $2,219.72 in productive work time for instructors.

Clinical instructors found that using the DRT to conduct site visits saved a substantial amount of time and allowed them to work on other tasks while waiting for patient visits. Clinical instructors reported that the time to conduct in-person site visits often varied widely because of how busy the clinic was or whether patients showed up on time. There were instances when site visits had to be rescheduled altogether because of no-shows at the clinic. Often during in-person visits, instructors were unable to work on other tasks while waiting for patients to arrive. With the availability of the DRT, clinical instructors were able to more easily fit site visits around their schedules and more effectively use their time for evaluating student-patient interactions. For clinical instructors who are teaching, working their own clinic hours and participating in other research projects, the time saved using the DRT was invaluable.

Table 3. Estimated total wage costs to complete in-person versus distance site visits in an academic year

	In-Person Visit x 6	**Distance Visit x 6**
DRT Clinical Site 1	$1,344.00	$728.94
DRT Clinical Site 2	$3,614.04	$390.36
TOTAL Wage Costs	**$4,958.04**	**$1,119.30**

The total upfront costs for use of the DRT at the two clinical placement sites in which the technology was used totaled approximately $9,273.69. This included purchase of an extended warranty covering the cost of the maintenance in the event the technology malfunctioned. When technological issues arise, instructors must schedule alternative, in-person, site visits which incur additional wage and travel costs.

Table 4. Distance Robotics Technology total costs

Item	Cost
Robots x2	$8,315.69
iPads x2	$958.00
Training costs	$92.40
TOTAL	**$9,273.69**

What are the main factors that need to be considered when expanding or replicating distance robotic technology in other clinical sites?

One of the main factors noted by most participants using the DRT was the need for a strong wireless connection to support clear visual quality while operating the technology. Additionally, participants noted the need to connect to the same network as the instructor's computer to avoid issues with connecting calls. Finally, technological malfunctions can be an issue. During the demonstration effort, one of the robots malfunctioned and had to be sent back to the manufacturer for repair. Fortunately, the instructor was located close to the site, and she was able to complete an in-person visit. However, for placements that are farther away, more planning and travel would have been necessary to support in-person observation, which could present substantial challenges when a robot malfunctions.

Most interviewees agreed that the technology helped ease the physical constraints of clinic spaces by having one less external person to maneuver around, particularly in small examination rooms. Students and clinical instructors found that nearly all patients who consented to having a visit that included the DRT expressed comfort with its use and noted that patients were also less nervous with the DRT than with having the clinical instructor in the room. Interviewees agreed that the technology provides more time and availability for clinical instructors to complete more visits and visits in geographically distant placements. However, there were some concerns regarding the feasibility of completing visits in those geographically distant placements should the technology break down and need repair.

Summary

The use of DRT in conducting site visits for NP students completing their clinical placements provided noteworthy benefits for all participants. For clinic staff, patients and students, the use of DRT was less intrusive to routine clinic operations and visits along with feeling more at ease without another person in the room.

Rather than evaluate cost effectiveness for this new placement, the resources for implementing the DRT were recorded to understand financial, time and other resource implications. For clinical instructors,

time saved from not having to travel and wait for patients to arrive allowed for more flexibility in scheduling site visits around their other work responsibilities, which increased their productivity and ultimately leads to cost savings over time.

Both clinical instructors and students were satisfied with the ability to conduct site visits with the technology. Clinical instructors and students felt they were able to give and receive satisfactory guidance and support for meeting clinical placement requirements when conducting a distance site visit. The use of DRT allowed students to practice in geographically distant and rural settings, which the students and clinical instructors described as an enlightening experience. Students also felt this placement adequately prepared them for working with underserved communities.

Challenges with using the technology reported by interviewees were easily managed and resolved. These included making sure the technology was fully charged, connecting to the same network with a strong connection, and positioning the DRT appropriately for an unobstructed view of the examination. When one of the DRT units malfunctioned, the university was able to send it back to the manufacturer in a timely manner and have it repaired under the warranty. Fortunately, the technology was used at a clinical placement that was located near the university and clinical instructors were able to complete visits in-person while the technology was getting repaired. For placements that are farther away, additional planning and logistics would be needed to complete the site visits. Another drawback of using DRT to complete site visits is that clinical instructors are not able to hear heart and lung sounds and other vital measurements. Despite these challenges, all participants agreed that the use of DRT to complete site visits was a satisfactory alternative to in-person site visits and provided substantial benefits.

Appendix 1. Student Interview Questions

1. What planning with your preceptor and clinical instructor took place before beginning the distance robotic clinical education experience?

    a. Did you have any challenges during the planning/training process?

    b. How long did the planning and training process take?

    c. How appropriate was the training for using the distance robotic technology?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    Please explain your rating.

2. How would you describe the level of support you received from the instructor during your clinical education experience?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    a. Please explain your rating.

3. Do you feel you received the same level of support and education from your instructor as students who had in-person, on-site visits? Please explain.

4. How much did the distance robotic technology affect how you interacted with patients?

    ○ Not at all ○ A little ○ Moderately ○ A lot ○ A great deal

    a. Please explain your rating.

5. What aspects of this clinical placement were most beneficial to your learning experience?

6. What could be done in the future to increase the educational benefit of this type of clinical placement for future students?

7. What challenges did you experience with the distance robotic clinical education program?

    a. How did you overcome them?

b. Were there any technological challenges that occurred e.g. if the robot breaks?

c. How did it affect your learning experience or supervision?

8. Has this experience increased your interest in working in this [rural, underserved, culturally diverse] setting?

    a. How well do you think this experience prepared you as future practitioner working in this setting?

9. Is DRT a worthwhile option for students wishing to complete their rotation in [rural, underserved, culturally diverse areas? Why or why not?

10. How do you think this clinical placement could be improved for future students?

11. Would you recommend using distance robotic technology as a part of the clinical education experience for other NP students? Why or why not?

Appendix 2. Clinical Instructor Questions

1. In what ways did you prepare students and preceptors with the distance robotic technology for the clinical education experience?

    a. Did you have any challenges during the planning/training process?

    b. How long did the planning and training process take?

    c. How appropriate was the training for using the distance robotic technology?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    Please explain your rating.

2. What technical assistance and support was made available to you for using the distance robotic technology?

    a. How useful was the support during the clinical experience?

3. How involved were clinic staff and administration in planning the student clinical experience?

4. How would you describe your ability to evaluate and communicate with NP students during their clinical education experience?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    a. Please explain your rating.

    b. How many more or fewer visits were you able to complete with using the technology versus doing an in-person visit?

    c. How effective was the distance robotic technology for evaluating the students' clinical skills and learning objectives?

5. How clearly were you able to see and hear the patient examination including the vital measurements?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    a. Please explain your rating.

6. Do you feel you were able to provide the same level of support and guidance to students using DRT as you do when conducting in-person site visits?
    a. What were the limitations, if any?

7. Do you think this experience will increase students' interest in working in this [rural, underserved, culturally diverse] setting in the future?
    a. How well do you think this experience prepares students in working in this setting as a professional?

8. What aspects of this clinical placement were most beneficial for students?
    a. Were there any benefits for clinical staff? Please explain.

9. What could be done in the future to increase the educational benefit of this type of clinical placement for both students and clinical staff?

10. What challenges did you experience with the distance robotic clinical education program?
    a. How did you overcome them?
    b. Were there any technological challenges that occurred e.g. if the robot breaks?
    c. What other arrangements did you make in the event that the technology was not available?
    d. How did that affect your supervision with the student or the learning experience?

11. For those who may want to replicate this type of distance robotic technology, what lessons learned over the past year could you share regarding planning, training, and integrating distance robotic technology in a clinical location?
    a. What factors (e.g. geography, IT support, workforce) need to be considered for supporting a clinical location to participate as a distance robotic technology placement?

12. Would you recommend using distance robotic technology for other clinical sites precepting NP students? Why or why not?

Appendix 3. Preceptor Interview Questions

1. What set-up, planning, or training did you have for using the distance robotic technology?
    a. Did you have any challenges during the set-up/planning/training process?
    b. How long did the set-up, planning, and training process take?
    c. How appropriate was the training for using the distance robotic technology?

        ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

        Please explain your rating.

2. How involved were you and other clinic staff and administration in planning the student clinical experience?
    a. In what ways did you contribute to the development of the clinical experience?

3. How would you describe your communication with the clinical instructor during the experience?

        ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    a. Please explain your rating.
    b. How does it compare to communicating with the clinical instructor in-person?

4. How much did the distance robotic technology affect how you and the student interacted with patients?

        ○ Not at all ○ A little ○ Moderately ○ A lot ○ A great deal

    a. Please explain your rating.

5. How much did the distance robotic technology affect the student's ability to meet learning objectives?

        ○ Not at all ○ A little ○ Moderately ○ A lot ○ A great deal

    a. Please explain your rating.

6. From your perspective, how would you describe the level of instructor support and guidance the student received during the clinical education experience?

   ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

7. Do you believe students received the same level of support and guidance as students who received in-person site visits from their instructors? Why or why not?

   a. What were the limitations, if any?

8. Do you think this experience will increase students' interest in working in this [rural, underserved, culturally diverse] setting in the future?

   a. How well do you think this experience prepares students in working in this setting as professionals?

9. How useful do you think the distance robotic technology is for recruiting students to your facility/area?

10. How did your productivity differ on the days nursing students' clinical site visits were completed compared to days in which the distance robotic technology was not present?

11. Were there any unexpected benefits to you and your staff with participating as a clinical placement? If yes, please describe.

    a. Were there any benefits to having a university partnership as a result of the placement?

12. What challenges did you experience with the distance robotic clinical education program?

    a. How did you overcome them?

    b. Were there any technological challenges that occurred e.g. if the robot breaks?

    c. What other arrangements were made in the event that the technology was not available?

    d. How did that affect supervision with the student or learning experience?

13. Overall, how would you rate this clinical placement experience?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    a. Have you precepted NP students before? If so, how does this experience compare to your previous experiences?

14. How likely would you continue precepting students using the distance robotic technology?

○ Extremely unlikely ○ Somewhat unlikely ○ Neutral ○ Somewhat Likely ○ Extremely likely

    a. Please explain your rating.

15. For those who may want to replicate this type of distance robotic technology, what lessons learned over the past year could you share regarding planning, training, and integrating distance robotic technology in a clinical location?

    a. What factors (e.g. geography, IT support, workforce) need to be considered for supporting a clinical location to participate as a distance robotic technology placement?

16. Would you recommend using distance robotic technology for other clinical sites precepting NP students? Why or why not?

Appendix 4. Clinic Staff Interview Questions

1. Did you complete any set-up, planning, or training for using the distance robotic technology? (If no, skip to d)

    a. Did you have any challenges during the set-up/planning/training process?

    b. How long did the set-up, planning, and training process take?

    c. How appropriate was the training for using the distance robotic technology?

    ○ Very Poor ○ Poor ○ Fair ○ Good ○ Excellent

    Please explain your rating.

    ○ If no, would you recommend training for clinic staff to use and set up the distance robotic technology?

2. In what ways did you need to prepare to have students with the distance robotic technology in the clinic e.g. in terms of physical environment, technology storage, etc.?

3. How much did the distance robotic technology affect how you and the student and preceptor interacted with patients?

    ○ Not at all ○ A little ○ Moderately ○ A lot ○ A great deal

    a. Please explain your rating.

4. How much did the distance robotic technology affect the student's ability to meet learning objectives?

    ○ Not at all ○ A little ○ Moderately ○ A lot ○ A great deal

    a. Please explain your rating.

5. How did your productivity differ on the days nursing students' clinical site visits were completed compared to days in which the distance robotic technology was not present?

6. Were there any unexpected benefits to you and your staff with participating as a clinical placement? If yes, please describe.
    a. Were there any benefits to having a university partnership as a result of the placement?

7. What challenges did you experience with the distance robotic clinical education program?
    a. How did you overcome them?
    b. Were there any technological challenges that occurred e.g. if the robot breaks?
    c. What other arrangements were made in the event that the technology was not available?

8. For those who may want to replicate this type of distance robotic technology, what lessons learned over the past year could you share regarding planning, training, and integrating distance robotic technology in a clinical location?
    a. What factors (e.g. geography, IT support, workforce) need to be considered for supporting a clinical location to participate as a distance robotic technology placement?

9. Would you recommend using distance robotic technology for other clinical sites precepting NP students? Why or why not?

Appendix 5. Cost Tracking Forms

Site Visit Costs			
Instructions: if you only did a distance visit, please still fill-in estimated time and costs for travel if you were to do the visit in-person. Please add note on which type of visit you actually performed.			
Clinical Placement Location			
	In-person visit	**Distance Visit**	**Notes**
# of Site Visits completed			
# of students observed			
# of student-patient interactions observed (for each student)			
Time spent completing site visits for this location			
# of hours planned for site visit			
# of hours spent evaluating student patient interactions			
# of hours traveled			
# of productive hours outside of student observations (i.e. email, grading, etc.)			
Costs of in-person visits for this location			
# of miles traveled			
Did this require an overnight visit?		NA	
[If Yes] Total per diem for overnight (include meals, hotels, etc.)		NA	

Technology Costs			
	Quantity	**Cost**	**Notes**
# of robots			
# of TytoCare devices			
Wireless service to use technology for the academic year			
Training to use technology			
# of individuals trained			
# of trainings provided			
Cost of training (e.g. trainer, materials, etc.)			
Maintenance Costs			
Maintenance of robot			
Costs associated with altering placement due to unavailable technology			