Spring 2023

Strengthening New Hampshire's Primary Care Workforce Pipeline: Utilization of Alternative Scheduling Models

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Date of Submission: April 6, 2023

Abstract

BACKGROUND: Traditional clinical scheduling coupled with the current reimbursement system have created systematic barriers leading to decreased clinical education opportunities. Alternative scheduling models such as longitudinal integrated clerkships, one preceptor to two students and wave scheduling have the potential to eliminate these barriers and provide financial gains and increased access to care.

INTERVENTION: Interventions to meet this quality improvement project's objectives included (1) pre-intervention planning, (2) focus groups, (3) video presentations and (4) a pilot program of alternative scheduling models in clinical practice**.**

RESULTS: A pilot program utilizing the alternative scheduling models increased the relative value units (RVU) of each participant over the month timeline. In one month of the 2:1 model the preceptors RVU data increased from 69.7 to 99.11, a 29.94 RVU increase. Focus group data from participant A showed pre and post themes of innovation and improvement of the healthcare workforce post pilot. Participants B and C used the LIC model over the course of the month long pilot program. Participant B's starting RVU data was 225.06 after one month it increased to 306.68, resulting in an 81.62 RVU increase. Participant C's starting RVU data of 325.01 increase by 76.59 to a post pilot result of 401.6. Discussion with the participants post pilot had frequent mention of the words; positive, time management partnership, flexibility, access, and patient care. These key descriptors showed the primary authors themes in innovation and improvement of the healthcare workforce.

CONCLUSION: The findings from the pilot program have the potential to increase clinical placement opportunities for advanced practice students. Integration of alternative models in practice can address workforce development, access to healthcare, and decrease barriers to post-

secondary education and training. (Endowment for Health, 2021). Lastly, initial pilot data utilizing the alternative models with three participants over 4 weeks resulted in an increase in revenue of $6,000. These models hold a promise to strengthen the pipeline while addressing the organizational barriers in healthcare structure and reimbursement.

Keywords: Alternative Scheduling, RVU, Pipeline development

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Strengthening New Hampshire Primary Care Workforce Pipeline: Utilization of Alternative Scheduling Models

The healthcare system is at a critical crossroads. Increase demand with decrease supply of advanced healthcare providers has left both the national and local systems strained. Future trends estimate that by 2032 primary care will be short over 200,000 providers across the United States (Bing-You et al.2012). Traditionally, clinical education relies heavily on community preceptors to accept students from all advanced healthcare disciplines. However, the current national scheduling structure and reimbursement systems has provided barriers for the advancement of clinical training. This is increasingly challenging as enrollment in medical schools, nurse practitioner programs, and physician assistant programs across the country has steadily increased (Worley & Kitto, 2001).

Strategic planning to meet New Hampshire's healthcare workforce demand has been prioritized by the state's agencies and local nonprofits including the Endowment of Health a "state, private, nonprofit foundation dedicated to improving the health of New Hampshire's people, especially those who are vulnerable and underserved" (Endowment for Health, page 34, 2021). Through this organization the Forward Fund was created using "$1.9 million from the New Hampshire Medical Malpractice Joint Underwriting Association". This fund also finances workforce development including clinical placement opportunities, eliminating policy and practice barriers to licensure, and implementing a coordinated State Plan to expand and support the health care workforce (Endowment for Health, 2021). In the fall of 2020, a needs assessment was conducted in New Hampshire (NH) to address the concerns, barriers, and experiences of healthcare providers and organizations across the state. The results from this assessment helped identify barriers to and develop a healthcare workforce strategic plan for the state.

One of the barriers identified through the strategic plan was the "thin pipeline and barriers to post -secondary education and training" (Backus, page 8, n.d.). Traditional clinical scheduling coupled with the current reimbursement system create systematic barriers to increase clinical education opportunities. Alternative scheduling models such as longitudinal integrated clerkships (LIC), one preceptor to two students and wave scheduling have the potential to eliminate these barriers and provide financial gains and increased access to care (Hudson et al 2012; Bing-You et al.2012; Krehnbrink et al 2020; Melvin et al, 2020; Worley & Kitto, 2001). Initial pilot data utilizing the alternative models with three participants over 4 weeks resulted in an increase in revenue of $6,000. These models hold a promise to strengthen the pipeline while addressing the organizational barriers in healthcare structure and reimbursement.

Problem Description

Recruitment and retention of preceptors is imperative to the supply chain of the healthcare workforce. To meet the nation's increased demand for healthcare providers, an equal number of future physicians, nurse practitioners and physicians' assistants' students need to be trained and retained across the country. There is an increase in demand for healthcare providers related to an increase in our nation's elderly population. The U.S. Census Bureau determined the nation's 65-and-older population has grown rapidly since 2010, driven by the aging of Baby Boomers born between 1946 and 1964 (Profile of Older Americans | ACL Administration for Community Living, n.d.). Currently, sixteen percent of the population or 1 in 7 Americans is over the age of 65 (Profile of Older Americans | ACL Administration for Community Living, n.d.). This trend will continue to increase, with estimates showing by 2040 twenty-one percent of the population will be over 65 (Administration on Aging, 2021). The increase in the aging population creates a higher demand for healthcare providers including physicians, nurse

practitioners and physician assistants. Estimates show that by 2032 the United States healthcare workforce will be short 29,400 nurse practitioners and 122,000 physicians (Wiseman et al., 2013).

The deficit of primary care providers has led to opportunities for nurse practitioners and nurse practitioner students. These opportunities are increasing due to the insufficient number of physicians going into primary care to replace those retiring (Barnes et al., 2018). In 2008 seventeen percent of rural and fifteen percent of non-rural primary care providers were nurse practitioners (Barnes et al., 2018). However, in 2016 these numbers increased to twenty-five percent of providers in rural and twenty-three percent in non-rural practices, highlighting the timely response to rising demand for primary care services within the United States (Barnes et al., 2018). Studies have demonstrated the care nurse practitioners offer is similar to physicians with positive patient outcomes in lipid management, number of emergency department visits and hospitalizations, blood glucose and blood pressure control, and mortality (Stanik-Hutt et al., 2013). To build workforce capacity more multidisciplinary provider configurations will need to be developed.

Growing enrollment in advanced healthcare provider educational programs has been steadily increasing, however limited training sites have restricted admission to educational institutions. According to the Association of American Medical Colleges enrollments have grown by thirty-three percent since 2002 (Medical School Enrollments Grow, but Residency Slots Haven't Kept Pace, 2022). The American Association of Colleges of Nursing has also reported a steady growth of five percent of nurse practitioner programs over the past year (Student Enrollment Surged in U.S. Schools of Nursing in 2020 Despite Challenges Presented by the Pandemic, 2022). Demand is being felt in organizations and preceptors are fielding increased

requests for training from colleges and universities within and outside New Hampshire. High clinical load, limited availability, decreased clinical efficiency, and clinical productivity are well-documented barriers to precepting advanced healthcare providers (Latessa et al, 2008). In addition, some preceptors and organizations are not compensated to train students placing further financial barriers. According to the Joint Report of the 2013 Multi-Discipline Clerkship/Clinical Training Site Survey (2013) payment incentives for community-based sites were used "by seventy-one percent of D.O., twenty percent of P.A, fifteen percent of M.D., and four percent of N.P (nurse practitioners) respondents. Carelli et al. (2019) echoed these findings, the most shared challenges with placement were lack of financial incentives for precepting nurse practitioner students (Carelli et al., 2019). Fifty-five percent of nursing programs in the report cited a primary reason for preceptor refusal of a student was lack of incentive or financial compensation (Carelli et al., 2019). Furthermore, the online programs they surveyed had a higher probability of offering financial compensation to preceptors providing student preference for placement over local brick and mortar state and private institutions (Carelli et al., 2019). Reimbursement in the traditional precepting model is not meeting the needs of the stakeholders and further solutions to address productivity need to be explored to increase the efficiency of NH's healthcare workforce pipeline.

Available knowledge

Community based preceptors provide most of the clinical training for NH's advanced practice healthcare students. Community-based preceptors traditionally serve as volunteer, non-salaried faculty, with academic institutions relying on intrinsic rewards to sustain this model (Graziano et al., 2018). However, this is not enough as preceptors operate on a pressured schedule that is built around optimizing productivity. The Resource Based Relative Value or

RVU's model is increasingly used to determine salaries of providers and incentivize increased access. The RVU was developed to account for all clinical services dispensed by providers and provide greater consistency when comparing services (Luong et al., 2018). At the time it was developed, the RVU was a better alternative than rates based on local community standards. To address the financial concerns of preceptors and administrators related to accepting students from an academic institution education needs to be provided on alternative scheduling that does not impact productivity, to increase recruitment and retention of preceptors to incentivize clinical sites.

Literature has shown many preceptors are frustrated related to meeting the expectations of the patients scheduled while providing a student the time and opportunities to practice clinical skills (Brooks & Niederhauser, 2010). Appointment times in clinics are not organized to teach but to enhance efficiency and workflow. New Hampshire's Strategic Plan to increase the healthcare workforce identified this as a barrier, and in response is encouraging employers to reduce the productivity requirements of those serving as preceptors to increase student recruitment (Endowment for Health, 2022). Students in the traditional precepting and scheduling model must work within the time constraints of the appointment blocks for patients and must interview, exam, present, and received feedback from the preceptor all within the time allotted for the encounter. In contrast, alternative scheduling, outside the traditional block scheduling, has been shown to maximize efficiency without sacrificing the quality of education or patient care.

LIC, an alternative to traditional block scheduling, have been shown to increase preceptor satisfaction and productivity (Bing-You et al., 2014). Students are placed in one location for 12 months. Worley and Kitto (2001) found that even after 5 months of having the same student in rural general practices there was a positive effect on provider productivity. Jack Verby, director

of Minnesota's Rural Physician Association suggested that having a third-year medical student in a LIC scheduling model was worth an additional $40,000-70,000 in annual billings compared to when no student was present (Bing-You et al, 2014). Sixty-six percent of preceptors in LIC's reported longitudinal placement as financially neutral or favorable (Hudson et al, 2012). Additionally, several studies showed a fiscal impact can be seen in as little as 2-3 months (Hudson et al 2012; Bing-You et al.2012; Krehnbrink et al 2020 ;Worley & Kitto, 2001).

Traditionally, preceptors are matched one to one. However, alternative scheduling with one preceptor to two students has been shown to be beneficial to providers regarding productivity. Hays et al. (2019) and Melvin et al. (2020) found pairing a senior and junior advanced healthcare provider student together with one preceptor not only increased student placement opportunities, but it also transformed the workplace into a teaching environment. This model can take several forms to meet the needs of the preceptor, student, and practice (Appendix A).

Institutions have also utilized the development of student schedules or wave scheduling. This is when patients are booked in parallel with one patient scheduled for the learner while at the same time another patient is scheduled for the preceptor to see on their own (Ferenchick et al., 2002). The amount of time allotted is dependent on the skill level of the learner and the amount of time the preceptor needs to feel confident that he or she can maintain patient rapport and still provide optimal care (Oberhelman et al., 2020). This model, in addition to having a neutral to positive impact financially, also had the added benefits of decreased wait times and improved patient satisfaction (Regan-Smith et al, 2002; Ferenchick et al.,2002). While the literature supports alternative models and their impact on the financial productivity these models are minimally used in clinical practice or seen as a solution to increase the workforce pipeline.

Rationale

Prior to the pandemic NH was second among the nation hardest hit by labor shortage (WORKFORCE LETTER | The Dupont Group, n.d.). The abrupt nature of the pandemic halted the growth of our economy and shifted the workforce. Many chose to leave the healthcare due to multiple factors and barriers including loss of child and eldercare services, burnout and for fear of illness (Economic Analysis Report | Economic & Labor Market Information Bureau (ELMI) | NH Employment Security, n.d.). During this time NH's labor force declined from 768,900 in March 2020 to 735,030 in April 2020 (Economic Analysis Report | Economic & Labor Market Information Bureau (ELMI) | NH Employment Security, n.d.). Contributing factors for the decline in available workforce was the limited growth in the age groups of 14-24 and 24-34 (Economic Analysis Report | Economic & Labor Market Information Bureau (ELMI) | NH Employment Security, n.d.). This fact is concerning as NH's workforce is aging. Currently, NH is the oldest (by age) state in the nation and estimates show that by 2030, almost one-third of Granite Staters will be over the age of 65 (New Hampshire Health Care Workforce Coalition, n.d.). New Hampshire Health Care Workforce Coalition estimates that in the next ten years more job openings will be due to replacements and not reflective of the growth of an industry (New Hampshire Health Care Workforce Coalition, n.d.).

In addition to the labor shortage, NH has an aging healthcare provider pool. Currently, ¼ of the state's primary care providers licensed, are over the age of 60 (Endowment for Health, 2021). By 2030, almost one-third of Granite Staters will be over the age of 65, and a large part of this population will require additional health care services (Endowment for Health, 2021). The NH workforce shortage of clinicians and direct care providers limits Granite Staters' access to services, causing a rationing of needed care and added health care costs systemwide (Endowment

for Health, 2022). This adds to an increased urgency to develop innovative strategies to build the workforce pipeline. In response, Governor Sununu's Next Generation Workforce Initiative has directed the state's universities to increase enrollment to train and graduate more healthcare professionals. The Joint Report of the 2013 Multi-Discipline Clerkship/Clinical Training Site Survey (2013) found that despite observed growth in schools/programs and enrollment over the last decade, universities indicated the number of available clinical sites and competition for sites have an impact on enrollment capacity in their programs. The arrival of the COVID-19 pandemic hit the healthcare workforce and halted many institutions from taking students as providers were shifted to higher needs areas. The increased need for providers as well as preceptors increased the urgency to develop innovative models to train and increase the healthcare workforce pool.

Considering the increased demand, barriers like the impact of productivity remain a strong obstacle to recruitment of preceptors and training sites. Productivity remained a high concern in addition to time restrictions, limited space, and onboarding time (Cobb et al., 2013). Productivity is of a high concern as many providers' performance and thus salary is impacted if specific metrics are not met. Initially, RVU's were developed to "determine reimbursement for health care based on time spent with the patient and skills required to complete the interaction, while addressing any disparities of reimbursement based on geography or insurance" (Shepphard & Duncan, 2020, page number?). Even though the RVU was not initially developed to evaluate providers it is increasingly being used in clinical practice to evaluate productivity (Shepphard & Duncan, 2020). The issue with RVU's is that it does not capture the non-billable aspects that advanced healthcare providers perform such as education and emotional support (Shepphard & Duncan, 2020). These non-billable interventions can be rich learning opportunities for advanced healthcare students while providing preceptors increased flexibility and productivity. Both

nationally and locally long-term workforce development planning must include an expansion of educational and training opportunities in NH as practitioners tend to remain in the state in which they complete training (Backus, n.d.)

Specific Aims

The specific aims of this workforce initiative were to:

1. Develop a training video along with Southern New Hampshire Area Health Education Center (SNHAHEC) on the benefits of alternative models to increase productivity using advanced healthcare students.

2. Host a focus group via zoom where videos of alternative precepting models were showed along with a discussion inviting providers and administrators to participate in the training and interact with colleagues on the implementation of alternative models in practice.

3. Evaluate the impact of alternative precepting models on provider and organization through tracking of relative value units.

4. A 20% increase in preceptors stating they will use alternative precepting models in practice post training.

Methods

Context

Healthcare workforce initiatives have become increasingly more important at the national and local level. Recently more attention has been placed on clinical education and the barriers that are currently in place to meeting the healthcare system's needs. Locally these barriers were addressed through a needs assessment in 2020. This assessment was conducted in

NH to address not only the barriers but concerns and experiences of healthcare providers and organizations across the state. The results from this assessment develop an actionable healthcare workforce strategic plan for the state. Within the strategic plan for improvement of the workforce pipeline, 7 objectives were identified to move the plan forward. The proposed training addressed pipeline objective 3, "increase existing workforce satisfaction and retention by reducing work burden where possible." Second it addressed objective 6 to "create accessible and supportive training models for students in health care professions (Backus, page 17, n.d.).

The implementation and dissemination of the strategic plan takes a collective buy in from healthcare organizations, providers, and educators. Currently there is poor alignment of the existing education/training programs with workforce shortages. Employers as well as educational institutions lack the capacity to ensure an adequate pipeline of workers for their organizations. The current shortage of providers limits the perception of training students to increase the pipeline. This often is short sighted and causes competition from organizations in sharing best practices for integrating clinical education.

To develop and address the needs you need a champion to start the process. The mission of Southern NH Area Health Education Center (AHEC) is to "develop, promote, and coordinate community and academic multi-disciplinary partnerships for health professions education. We focus on under-served communities and provide education for students, practicing health professionals, and members of southern New Hampshire communities". Along with the Endowment for Health, SNHAHEC is invested in addressing and creating interventions for the strategic plan.

Interventions

Interventions to meet this quality improvement project's objectives included (1) pre-intervention planning (2) focus group and (3) video presentation (figure 1).

Figure 1: Project Interventions

Pre- Intervention

Pre-intervention planning is critical in the development of a quality improvement project. A production company was contacted with a quote to meet the funding standards set by SNHAHEC. Once the production company agreed upon the price, the team leader worked with the production company to develop a schedule, taping, and narration script. Prior to the start of filming alternative models were identified through the literature and the author identified local

providers who utilized these models. Once those providers were identified and agreed to be part of the training video, interview questions for the production were formatted using the behavioral based interview format STAR, specific situation, task, action, and result of the situation (Appendix B). This method is best deployed when trying to capture behavior and make connections in application to other clinicians and organizations. The interviewees received the questions prior to the videotaping to allow time to consider their responses. Interview questions aimed to evaluate the financial implications as well as benefits to utilizing the alternative models. Pre- intervention survey for focus group members, post intervention surveys and list of focus group questions were all developed during the pre- intervention period (Appendix C).

There is considerable knowledge in the literature of how people process visual and verbal information and how it provides a solid foundation for learning procedural or contextual information. Engagement in a focus group is a multifaceted learning opportunity and includes behavioral and cognitive and affective dimensions (Onwuegbuzie et al, 2009). Both modalities were utilized as a framework.

Focus Group

This initiative required a collaborative approach from SNHAHEC, the academic faculty mentor and project leader. Upon approval of this proposal, potential preceptors and advanced health educators were recruited using contact information from the SNHAHEC central clinical placement database. This database helps connect available clinical education opportunities with available preceptors and organizations. Outreach for training and follow-up was directed toward current primary care advanced healthcare providers, current and potential preceptors, and administrative and support staff.

Social scientists and qualitative researchers routinely use focus groups to simultaneously collect substantial amounts of data from a small group. According to Onwuegbuzie et al. (2009) well-constructed focus groups should create an environment where participants are comfortable sharing diverse thoughts, opinions, and beliefs. Due to participants' availability and the scheduling of this virtual training, a recruitment goal was set at twenty percent higher than the expected goal (Onwuegbuzie et al., 2009). If the requitement goal is not obtained, the literature supports the effectiveness of focus groups that has twelve or less members (Onwuegbuzie et al, 2009). This is especially true when participants have specialized knowledge and/or experience related to the quality improvement topic (Onwuegbuzie et al, 2009).

To ensure efficiency, the focus group had a moderator team. This comprised of a primary moderator and assistant moderator. The primary moderator's role was to guide participants in discussion, prompting members to engage and to ensure all participants' input was collected (Onwuegbuzie et al, 2009). The moderator used live polling during the didactic portion of the training to capture initial knowledge and engage further conversation. Prompts for the focus group were developed prior for consistency of themes (Appendix B). The assistant moderator facilitated recording the session, admitting participants into the virtual training, taking notes, and overseeing the live polling in the session.

Video

The use of video training productions has increased over the past decade due to the popularity of streaming services, YouTube, and educational platforms. Videos can come in a variety of genres and be used for diverse instructional purposes in various instructional settings. Effective training media is usually rooted in the Cognitive Theory of Multimedia Learning (CTM). CTM is defined as:

> "Three cognitive science principles of learning: the human information processing system includes dual channels for visual/pictorial and auditory/verbal processing (i.e., dual-channels assumption); each channel has limited capacity for processing (i.e., limited capacity assumption); and active learning carrying out a coordinated set of cognitive processes during learning (i.e., active processing assumption)." (Mayer, 2005, p 31)

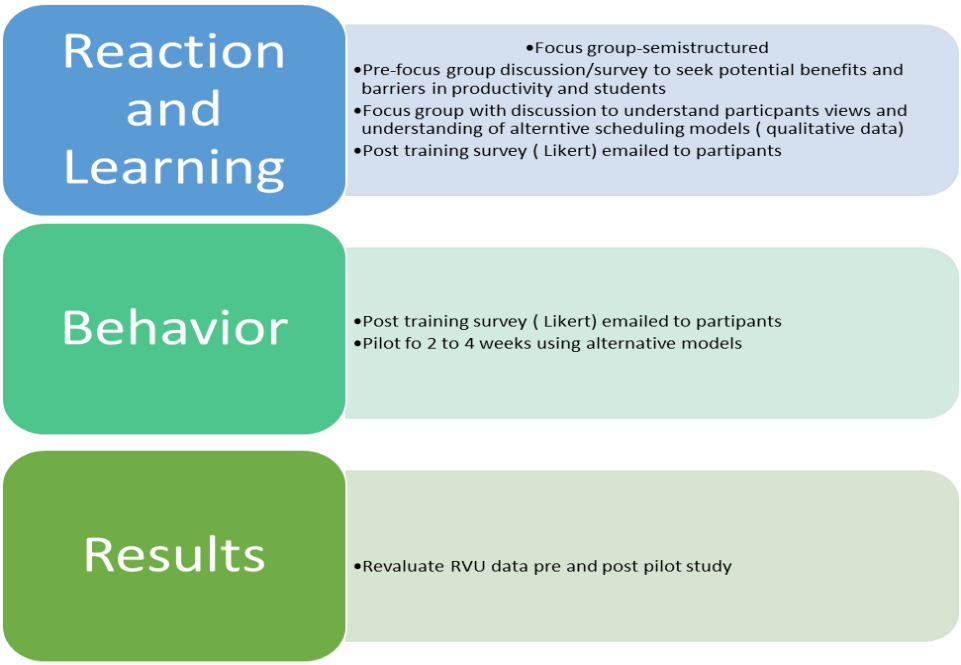
To elicit personal and cultural perceptions and provide a rich learning experience the CTM theory was incorporated into the developed training material. The International Journal of Analytical and Experimental Modal Analysis article "Role of Multimedia on Motivation and Knowledge Retention" stated that the combination of visual and audio cues provides a deeper understanding to the content and a higher ability to apply this in real world situations (2020).

The training was developed utilizing CTM to meet the project's objectives. Focus included supply and demand for the state's healthcare workforce and how alternative models of scheduling can replenish the pipeline while potentially improving preceptors' productivity and access. To ensure the focus group participants received adequate educational exposure to each model the training covered three models: LIC, one preceptor to two students, interprofessional and wave scheduling. Didactic content for the video included current preceptors who utilized the scheduling models in their practice. Strategies on implementation in practice, scheduling models and fiscal impact were addressed. Panel discussion (during the focus group) was facilitated by a moderator following the didactic presentation and included preceptors who utilize the alternative models to answer follow up questions from attendees.

Study of Interventions

One of the most critical components of implementing a training program is to accurately assess the training program's impact. The Kirkpatrick Model, an internationally recognized tool for evaluating and analyzing the results of educational, training and learning programs (Heydari, 2019) was used during this training. The Kirkpatrick Model consists of four levels of evaluation: reaction, learning, behavior, and results (figure 2). This model is simplistic and covers a limited number of variables and a set evaluation criterion (Heydari, 2019). In addition, there is no need to collect the basic data and learners' previous performance on the topic prior to implementation. This tool was selected as it provides a systematic approach to intervention and provides information about the activities, characteristics, and outcomes of a program (Torres et al., 2005)

Figure 2: Kirkpatrick Model



This quality improvement project partnered with SNHAHEC to address one of the four strategic action agenda items of the healthcare workforce strategic plan. This intervention was developed based on prior needs assessment and recommendations in collaboration with SNHAHEC. Upon faculty approval of this proposal, virtual training with the focus group was

scheduled. The focus group and viewing of the training video targeted providers and administrators to elicit barriers to precepting, knowledge of alternative scheduling models and productivity incentives. Continuing education credit was offered to participants completing the training. The didactic portion of the training provided an overview of alternative scheduling models currently integrated into practice. It also provided rationale for alternative scheduling models for workforce development and impacts on productivity. Post viewing discussion was facilitated to understand participants' views and their understanding of the alternative models. Post training feedback was collected through the framework of the Kirkpatrick Model and sent to the participants via email. Lastly, participants were invited to participate in a pilot program utilizing alternative scheduling models in practice.

The delivery of the intervention elicited variable forms of data including audio, video, notes taken during the live session and live polling results. At the intervention's completion, the primary and assistant moderator reviewed the recordings and transcribed an abridge transcript. This form of transcribed data analysis focuses on the quality improvement question and only transcribe the portions needed for better understanding of the phenomenon of interest (Onwuegbuzie et al, 2009). Recording consent from the participants was conducted before the training began using an electronic form. The participant could either consent to stay in the session or decline. The recording was reviewed and used primarily to verify quotations that reinforced the identified measures of this quality improvement project.

Implementation duration for the pilot program was requested for a minimum of two weeks with a maximum of four weeks. This was to ensure enough time was captured to influence the productivity output. Before implementation, baseline productivity for the participants was

collected on their baseline scheduling models. Pre and post pilot RVU was collected to establish whether the observed outcomes were due to the intervention (table 1)(Appendix D).

Table 1: Pre and Post Pilot RVU Data

Provider	Starting RVU	Ending RVU	Precepting Model
A.	69.17	99.11	2 Students 1 Preceptor
B.	225.06	306.68	Longitudinal Integrated Clerkship
C.	325.01	401.6	Longitudinal Integrated Clerkship

Data was de-identified to conceal the providers and participating clinics. Brief semi-structured pre- and post-focus groups were conducted to evaluate and seek potential flaws and barriers, along with intervention successes (table 2) (Appendix E).

Table 2: Pre and Post Pilot Data

Providers	**Pre-intervention focus group themes**	**Starting RVU**	**Post-intervention focus group themes**	**Ending RVU**	**+/- Pre and Post Intervention**
A	1. Innovation 2. Challenges 3. Productivity	69.17	1. Improvement of Healthcare Workforce 2. Innovation	99.11	***+ 29.94 Resulting in increased billing of $970.31***
B	1. Productivity 2. Innovation	225.06	1. Innovation 2. Improvement of Healthcare workforce	306.68	***+81.62 Resulting in increased billing of $2,645.18***
C	1. Productivity 2. Innovation	325.01	1. Improvement of Healthcare Workforce	401.6	***+76.59 Resulting in increased billing of $2,482.16***

Measures

A mixed method approach was utilized with both qualitative and quantitative data. Quantitative data was important to collect as it measured the content (Albright & Jones, 2022). The measures will follow the Kirkpatrick Model in collection of reaction, learning, behavior, and results of the intervention.

In the first stage of this model the participants' reaction were measured for knowledge of alternative scheduling models, primary care workforce strategy, precepting barriers, and RVU knowledge. The utilization of the Kirkpatrick Model was selected to ensure the contextual elements that contributed to the success, failure, efficiency, and cost were captured (Heydari et al., 2019). Through the focus group discussion prior knowledge of the intervention was collected. After completion of the focus group, participants were sent an electronic survey to evaluate post focus group reaction to the evidence and rationale for alternative scheduling models, workforce strategy, integration into practice, and RVU knowledge. The first level was measured with a researcher-developed questionnaire that had three categories including: training content assessment, instructor assessment and course support assessment that were scored on a 5-point Likert scale from strongly disagree to strongly agree (Heydari et al., 2019). This was distributed after completion of the focus group via email to those that attended (Appendix F).

The second level of the Kirkpatrick model aim is learning by the participants during the didactic. Semi structured moderated questions before and then after the intervention included questions around the themes of workforce barriers, strategic workforce planning, and types of scheduling. In addition, participants were asked prior to the intervention if they are a current preceptor, received an RVU incentive from their organization and if they currently used an alternative model. This was formatted in yes and no questions and was captured via anonymous

live polling during the focus group. The pre and post intervention was completed within the training to ensure the data was captured by all active participants.

The third level of the Kirkpatrick model in evaluation of the educational intervention was behavior. (Heydari et al., 2019). This portion completed post intervention to assess if participants were planning on implementation of the alternative models into practice. Questions had a response to planning on implementing alternative scheduling, would you like to implement alternative scheduling, do not want to implement, and would like to but with modifications. The author acknowledges that for true behavior change this should be evaluated over a longer time. Given the time limitations the questions were directed towards attitude and future behavior changes.

The fourth level in this model is the results of intervention or educational training. The aim of this level was to see if there was an increase in interest and or implementation of alternative scheduling models. Participants were then asked if they would like to participate in a pilot of one of the highlighted models. Pre and post RVU data was collected from those that participated in the pilot.

Return on investment was utilized to determine the intervention's effectiveness. Traditionally, ROI is a metric used in the planning stage to determine the proper allocation of resources, and communicate results to stakeholders (Alli et al., 2016). In relation to this quality improvement project, it estimates the non-monetary values associated with intervention and behavior change (Alli et al., 2016). The calculation for ROI is:

$$\text{ROI} = \frac{\text{current value of investment} - \text{cost of the investment}}{\text{cost of investment}} \times 100$$

To calculate the current value of investment the pilot participants RVU post pilot was utilized. This was then multiplied by the current Medicare rate of $32.4085 per RVU which resulted in $6,097.65 The cost of the video production or cost of investment was $9,538.00. The

$$\text{ROI} = \frac{6{,}097 \times 9{,}538}{9{,}538} \times 100 = -36.07$$

It is important to note that the ROI was only calculated for the 3 pilot participants and not the entire focus group. Funding for the intervention was through grant money so no actual investment from SNHAHEC budget was made. Non-profits like SNHAHEC often struggle using the traditional ROI metric as the goals and outcomes do not easily translate. Since the training will continue and be made public even after this project is completed, it is hard to capture the interventions true worth unless tracked over a longer period.

In addition, cost per behavior influenced was also used to measure the behavior change. This was calculated by dividing the total money spent by the number of people influenced to adopt the behavior. This result demonstrated the cost when the desired behavior change takes place (Ali et al., 2016).

Cost Per Behavior =

$$\frac{9{,}538}{33} = \$279.93$$

Just like ROI, this is also difficult to capture as the calculation is only based on the limited duration and attendance of the one focus group. Tracking utilization of the intervention with proper follow up would allow for a more accurate calculation in both ROI and cost per behavior.

Analysis

Data analysis is a crucial step in the quality improvement process. As previously mentioned, a mixed method approach was utilized. The use of quantitative and qualitative data provided a deeper understanding of the influence of the intervention (Albright & Jones, 2022). Descriptive statistics were used to analyze the training data and pilot study, as the timeline is not long enough for inferential statistics. This pilot study is the first part in a potential longer-term project that will most likely use predictive statistics.

The focus group content was analyzed though a constant comparison analysis approach to group data themes from the participants and placed with a corresponding code for each set. These themes were charted to understand variation among the data (Table 3)

Table 3: Focus Group Constant Comparison Analysis

Descriptor (code)	Category	Themes
RVU Payment	Reimbursement	Productivity
Time Space Comfort Education	Barriers	Challenges
Positive Time Management Partnership Flexibility	Strengths	Innovation
Access	Patient Care	Improvement of the Healthcare Workforce

Ethical Considerations

This quality improvement initiative was evaluated to determine the Institutional Review Board (IRB) approval was not necessary. The author/team leader does not have any potentially

relevant conflicts of interest, and the author/team leader is not employed by the agency where the project was implemented.

Results

Modifications to Interventions

The original intervention plan for this quality improvement project included scheduling individual focus groups with practices. Given the time limitations one larger focus group was held to capture a more diverse audience. The intention of the focus group was also to facilitate more meaningful learning and discussion.

Pre-Intervention data

Recruitment for the focus group centered on outreach to providers, educators, administration, and faculty. Initial registration for the focus group had 56 participants from 14 states. Fifty-seven percent of the registered worked and lived in New England with the remaining 43% located in states outside the area. Sixty-seven percent identified as Nurse Practitioners, 22.22% registered nurses, 9.26% were administration and 1.85% were Physician Assistants. For those registered, 28.3% stated their organization did use RVU data when reviewing provider performance with 71% saying this was not a factor in evaluation of performance. Those that did report RVU data was a factor in evaluation, 77% did not receive financial compensation if they met or surpassed their RVU goal. During the registration process 75% of the participants were not familiar with alternative scheduling models including longitudinal clerkship, two students one preceptor and wave scheduling.

Intervention

The focus group and viewing of the training video targeted providers and administrators to elicit barriers to precepting, knowledge of alternative models and productivity incentives. On the day of the focus group 55% of those registered attended. Most attendees (70%) identified as Nurse Practitioners, followed by College and University faculty (20%) and administration (10%). Analysis of the transcript identified four themes including improvement of the healthcare workforce, innovation, challenges, and productivity (Table 3).

Improvement of the Healthcare Workforce

On review of the data, there was a strong connection with the importance of precepting and its impact on the local workforce. All the participants (100%) agreed precepting was an integral part of the primary care workforce. This was further supported with 65% of participants stating they or the organization they work for precepts students with 35% taking a student once a year and 35% taking a student twice a year.

Increase access to care was seen as a positive with the themes presented. Regarding access to patient care one participated stated “we struggle, one with finances and two with access. So, I think this could increase access and some of our revenue, which would help us. Some of the incentives we would like to see happen”. This was echoed by another participant who ran a fellowship program and stated, “this is doable and would alleviate the preceptor and even provide more opportunities for patients to be seen”.

Precepting was also seen as a recruitment tool and pipeline for the organizations that have advanced practice students. One administration participant commented “personally, I really like

to hire students that have done that (LIC), have been precepted at our organization rather than new graduates from someplace else, or sometimes even a student with experience from another".

However, workforce is not just an issue with advanced practice providers, it affects all healthcare staff. Clinical support staff supply was a contributing factor in the discussion of workforce development and precepting. During the focus group, this was mentioned three times about adopting alternative models in their respective practices. A lack of support staff was also identified in the strategic plan as a barrier to organizations having advanced practice students.

Providers also identified that having students within the organizations provided support and created a culture of learning. A provider who precepted in private practice and was often alone in the office commented that having students "kept her from being lonely and felt like I had support".

Innovation

To tackle the supply chain for the primary care workforce innovative scheduling models were introduced during the focus group. The participants were asked if they or their practice currently utilizes any one model. Of those that participated 16.67% stated they have a model that they use, with the remaining 83.3% either unsure or have not identified a preceptor model. Post training video, participants were asked if they could implement an alternative scheduling model in their current organization (table 4).

Eighty percent of the participants felt that after training was completed, they could implement one of the scheduling models in the presented format or with modifications. Analysis of the transcription highlighted several sub themes including time management, partnership, and flexibility. The LIC was associated with more frequent positive associations. One participant

Table 4: Implementation of an Alternative Scheduling Model in Current Practice

Possible Response	Percentage of Attendees
No- as presented this could not be implemented in my practice/organization	5%
Unsure	15%
Yes- as presented this could be implemented in my practice or organization	50%
Yes- with modifications this could be implemented in my practice or organization	20%
Yes, as faculty I could see this implemented in clinical practices	10%
Total	100%

commented "longitudinal rotations do allow to maximize efficiency as the student and preceptor do not need to orient someone over and over. If the student has their own schedule, this may increase their responsibility on lab follow up, something that is often lacking with new graduates". Partnership between students, preceptor and facility were identified as strong rationale for selection of the alternative models. Participants stated, "I like the idea of one student at the same facility for all clinicals and that the students mentor each other". Preceptors also stated that the alternative models provided an opportunity to build longer professional relationships with students and universities. Creating a culture of learning with student integration was cited as a positive of all three models.

Challenges

While most of the focus groups feedback regarding the models trended more positively, challenges were also presented. As previously mentioned, support staff availability was seen as a potential barrier to utilizing alternative models. Since organizations are currently facing support staff shortages, concern around additional support staff needed to support workflow for a student schedule was identified as a challenge to implementation. This was also discussed in relation to actual physical space available at many organizations. Two participants commented

space would be a challenge to integrate these models into their practice organization. In addition, academic calendars also pose a challenge for one focus group member. This was further clarified that the organization might have to frequently change the template making it harder for schedulers to book months out. Appointment times of 15 minutes also was discussed as a challenge to having students. One participant felt that it was not "realistic to percept 2 students with my current schedule of 15-minute appointments".

Productivity

The intervention highlighted models that can increase RVU output for preceptors. While this was the initial focus of the training, it was not the focus of the participants. None of the focus group participants mentioned this as a strength or challenge to the alternative models. Only one provider responded that "the productivity part is debatable. In private practice I spend an average of $1,500-2,000 per student to onboard. We give them laptops and VOIP lines to use (for HIPAA reasons), they cannot use their own laptops. Sometimes, they have to onboard with our various service vendors. If some reason, they drop out (which has happened to a few colleagues), the practice is stuck with that bill".

Post-Intervention

Evaluation of the training was sent out post intervention and used a 5-point Likert scale to evaluate training moderators, material, and content. One hundred percent of those participants responded to the post- intervention survey (tables 5, 6, & 7).

Table 5: Presentation of Training Material

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
Moderators						
Elizabeth Harrison, MSN, APRN	0.00%	0.00%	5.56%	16.67%	77.78%	100%
Paula Smith, MBA, EdD	0.00%	0.00%	5.88%	17.65%	76.47%%	100%

Table 6: Did the Training Meet the Objectives

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Describe the opportunities and barriers related to precepting	0.00%	0.00%	5.56%	27.78%	66.67%
Explore different models of precepting	0.00%	0.00%	5.88%	11.76%	82.35%
Discuss how you might integrate a model of precepting into your practice	0.00%	0.00%	5.88%	23.53%	70.59%

Participants felt the training video was the most helpful portion of the webinar followed by discussion with preceptors and faculty about the new methods of precepting. Post-intervention participants were asked to identify 2 changes they made based on the learning session. Respondents stated they shared the video with co-workers, had discussed with administration taking two students, and changing their schedule when having students to either wave or interdisciplinary. Lastly, participants were asked if they wanted to join a pilot tracking alternative schedule model integration and pre and post RVU data. Five of the providers responded they were interested in joining the pilot.

Table 7: Extent Participants Agreed with the Following Statements

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The objectives were relevant to the activity goals/purpose	0.00%	0.00%	5.56%	22.22%	72.22%
The teaching strategies and resources were effective	0.00%	0.00%	5.56%	22.22%	72.22%
The information presented in this training is important	0.00%	0.00%	5.56%	22.22%	88.89%
My knowledge has increased on the topic(s) presented	0.00%	0.00%	5.56%	33.33%	61.11%
The time frame was appropriate for the activity/topic	0.00%	0.00%	5.56%	22.22%	72.22%
The facilitator demonstrated a good understanding of the material	0.00%	0.00%	5.56%	11.11%	83.33%
The style, pace, content, delivery methods and materials used were appropriate	0.00%	0.00%	5.56%	5.56%	88.89%

Pilot

Three participants out of the five who stated they were interested participated in the pilot study. Two participants utilized the LIC model and one with the 2:1 model. Data was collected over a month period. The previous months RVU data was utilized as the baseline RVU data point. After one-month RVU data was collected from the participants (table 8).

Table 8: Pre and Post Pilot RVU Data

Providers	Starting RVU	Ending RVU	Precepting Model
A	69.17	99.11	2 Students 1 Preceptor
B	225.06	306.68	Longitudinal Integrated Clerkship
C	325.01	401.6	Longitudinal Integrated Clerkship

The participant who used the 2 students one preceptor model (Provider A) only worked one day a week. In one month, the preceptor A's RVU data increased from 69.7 to 99.11, resulting in a

29.94 RVU increase. Participant B and C used the LIC model over the course of the month pilot program. Participant B's starting RVU data was 225.06 after one month it increased to 306.68, resulting in an 81.62 RVU increase. Participant C's starting RVU data started at 325.01 with post pilot result of 401.6 a 76.59 increase. Discussion with the participants post pilot had frequent mention of the words; positive, time management partnership, flexibility, access, and patient care. These key descriptors showed the primary authors themes in innovation and improvement of the healthcare workforce.

Discussion

Summary

Creating strategies to address the primary care workforce pipeline was a driving factor in the creation of this quality improvement project. To meet the healthcare needs locally all stakeholders' interests needed to be heard and addressed. In response to the barriers found in New Hampshire's strategic plan for healthcare workforce development this quality improvement project aimed to identify solutions. The initial aim was to develop a training video for providers, preceptors, administration, and faculty on the benefits of alternative models to increase productivity. The focus group which included the training video was in response to organizational frustration in meeting the needs of patients while balancing the clinical education of advanced practice students. In addition, the training addressed the financial implications of clinical education and the perception of decreased productivity. Quantitative and qualitative data from this quality improvement project showed that participants results from the focus group did not see productivity as a barrier to clinical education. Environmental and administrative factors were identified as having stronger influences. Eighty percent of the participants reported they could implement one of the models into practice as presented or with modifications. Qualitative

analysis of the focus group discussion showed that participants had more positive benefits to using the model than barriers. This is important to note as the project's initial rationale was rooted in decreasing barriers identified from the strategic plan. Data from the focus group identified strengths of the models in eliminating some of the barriers to training and creating accessible and supportive training models for students in health care professions (Backus, page 17, n.d.).

Pilot quantitative data regardless of model showed a positive increase in RVU data for the preceptors over the course of the month. In a short period of time providers were able to either increase access to visits and or see more complex patients. This provided the organizations they work for increased revenue.

The identified benefits of this quality improvement project included increased knowledge and dissemination of alternative scheduling models, implementation of alternative models into practice and increased RVU for providers. The training video and webinar were made available at no cost to the participants due to funding from Southern New Hampshire Health Education Center. In addition, the training video was made public to be used by other organizations to further provide information on the alternative models and impact on RVU's.

Interpretation

Measuring impact of an intervention is a complex process. In a time, limited pilot program associations between the intervention and the outcomes are the focus rather than observing projected longer-term potential gains. Also, the outcomes can be influenced more intensely by both internal and external factors. This is especially true in quality improvement

projects with healthcare as factors such as reimbursement, healthcare access, provider, and support staff availability, and even weather can impact results.

The results of the pilot program while small, represent findings from prior studies (Bing-You et al., 2011, Hays et al.,2019, Hudson et al., 2012, Melvin et al., 2020, Krehnbrink et al., 2020, & Worley & Kitto, 2001). Prior studies identified the perception of clinical organizations, administration, and providers that precepting negatively impacted productivity and thus revenue; this pilot showed an increase in revenue while utilizing the alternative models. In addition, the focus group did not identify productivity as a barrier to clinical placement or preceptor satisfaction. And in fact, space and onboarding was identified as more of a barrier to limitation of alternative models.

The LIC alternative model was utilized by two of the pilot participants. Worley and Kitto (2001) found that even after 5 months of a LIC there was a positive effect on provider productivity. Increase in RVU data was also identified in studies from Hay et al (2019) and Melvin et al. (2020) using alternative models of two to one. This projects pilot showed that even after one month, participants showed an increase in RVU data. Hays et al. (2019) and Melvin et al. (2020) found that the alternative models increased student placement opportunities and transformation of the workplace into a teaching environment. This improvement project also identified similar descriptors in analysis of post pilot participants focus group.

The direct involvement of the preceptors in using the alternative models allowed us to address the perceived barrier of productivity through tracking RVU data. Two of the participants were employed by organizations that provide RVU incentive bonus monthly. Because of the participation one of the preceptors was eligible for personal bonuses after one month of participation. This is important for two reasons: one on the administrative level that reinforces

clinical education has the potential to increase revenue and two, preceptors have the potential to get paid for clinical education through existing reimbursement structures.

Limitations

The primary limiting factor for this quality improvement project was time. To see real change and impact of the intervention it would have been beneficial to see trends of RVU data, continuity, and sustainability. The time frame was also limited in recruitment of pilot participants for several reasons. Participants and organization had to be already comfortable with precepting in the traditional manner and have a system in place for coordinating clinical education. Given the limited time for the intervention, the amount of onboarding and training participation in this intervention was prohibitive. In addition, this model had to have to buy in from individual preceptors as well as their organization. A preceptor could have been willing, but the organization had the final say in the incorporation of the model. Also, at the time of recruitment of pilot participants the training video was not available to share, so possible pilot participants were unable to share knowledge related to alternative scheduling models included the video information with administration. The time of year could have also impacted positive trends of the RVU data as this was conducted over the winter when primary care offices have typically higher volume. A longer pilot program would provide a better insight into the impact of the intervention.

The size of the pilot was a limiting factor to the generalizability of the work. To ensure this quality improvement project could be broadly implemented a larger pilot participant pool would have to be recruited across multiple organizations, specialties, and locations. Furthermore, while the training was aimed at preceptors, many the participants in the focus group were faculty at advanced practice programs. This limited the number of possible participants who were

currently in practice and precepting. Lastly, it is important to note not all healthcare offices track RVU data limiting the number of possible participants in the pilot.

Due to the timeline and scope of the project, the project was led by a sole investigator. The possibility of investigator bias was considered and addressed throughout the quality improvement process. In consultation with the faculty and practice mentors the potential for bias was addressed in implementation and analysis of the data.

Conclusion

Addressing and development of impactful strategies to improve the healthcare workforce pipeline are essential nationally and locally. Nationally, the increase in demand for healthcare providers coupled with increase in enrollment in advanced practice programs has created limitations in training. These limitations are further compounded by perceptions that clinical education impacts organizations potential for revenue. When creating innovation to leverage the current reimbursement system, traditional models have to be challenged to create change potential. The alternative models presented and utilized in the pilot program challenged these conventional perceptions.

The findings from the pilot program have the potential to increase clinical placement opportunities for advanced practice students. Locally, this is important as New Hampshire's available healthcare workforce pool has decreased, while healthcare needs of the state has increased. Integration of alternative models in practice have the potential to address workforce development, access to healthcare and the added health care cost to the states system (Endowment for Health, 2021). Lastly, initial pilot data utilizing the alternative models with three participants over 4 weeks resulted in an increase in revenue of $6,000. These models hold a

promise to strengthen the pipeline while addressing the organizational barriers in healthcare structure and reimbursement.

While LIC and 2 to 1 preceptor models were utilized in the pilot, the findings suggest that other alternative models also have the potential to increase RVU at the individual and organizational levels. This adds the sustainability of the work and that it can be used in different organizational structures and states. Further work is needed to create a sustainable healthcare workforce pipeline. Larger pilot programs across different context have the potential to advocate for the impact of alternative scheduling models in access, education and provider, patient and organizational satisfaction.

Funding

Funding for the training video was made possible by the Advanced Nursing Education and Workforce Initiative and Health Resources and Services Administration (HRSA) of the United States Department of Health and Human Services (HHS). This was part of an award totaling $2.8 million dollars for healthcare workforce initiatives.

References

Albright, K., & Jones, C. D. (2022). Methodological progress note: The case for mixed methods in quality improvement and research projects. *Journal of Hospital Medicine*, *17*(6), 468–471. https://doi.org/10.1002/jhm.12806

Ali, A. D., Warner, L. A., & Khachatryan, H. (2016). *Estimating Return on Investment (ROI) for a Behavior Change: An Evaluation Tool for Extension Programs*. 4.

Backus, E. (n.d.). *Health Care Workforce Development Strategic Plan*. 26.

Barnes, H., Richards, M. R., McHugh, M. D., & Martsolf, G. (2018). Rural And Nonrural Primary Care Physician Practices Increasingly Rely on Nurse Practitioners. *Health Affairs*, *37*(6), 908–914. https://doi.org/10.1377/hlthaff.2017.1158

Bing-You, R. G., Trowbridge, R. L., Kruithoff, C., & Daggett, J. L. (2014). Unfreezing the Flexnerian Model: Introducing longitudinal integrated clerkships in rural communities. *Rural and Remote Health*, *14*(3), 2944.

Brooks, M. V., & Niederhauser, V. P. (2010). Preceptor expectations and issues with nurse practitioner clinical rotations. *Journal of the American Academy of Nurse Practitioners*, *22*(11), 573–579. https://doi.org/10.1111/j.1745-7599.2010.00560.x

Carelli, K. V., Gatiba, P. N., & Thompson, L. S. (2019). Tax incentives for preceptors of nurse practitioner students in Massachusetts: A potential solution. *Journal of the American Association of Nurse Practitioners*, *31*(8), 462–467. https://doi.org/10.1097/JXX.0000000000000257

Economic Analysis Report | Economic & Labor Market Information Bureau (ELMI) | NH Employment Security. (n.d.). Retrieved September 5, 2022, from https://www.nhes.nh.gov/elmi/products/ear.htm

Endowment for Health (2022, March) G*iving Care: A Strategic Plan to Expand and Support New Hampshire's Health Care Workforce* https://endowment-ssets.nyc3.digitaloceanspaces.com/images/Executive-Summary-Giving-Care-March-2022.pdf

Endowment for Health(2021, May) *Tomorrow's Healthcare Workforce: Strengthening NH's Clinical Placement Opportunities* https://endowment-assets.nyc3.digitaloceanspaces.com/images/Clinical-Placements-Report-Digital-Final.pdf

Ferenchick, G. S., Chamberlain, J., & Alguire, P. (2002). Community-based teaching: Defining the added value for students and preceptors. *The American Journal of Medicine*, *112*(6), 512–517. https://doi.org/10.1016/s0002-9343(02)01093-8

Graziano, S. C., McKenzie, M. L., Abbott, J. F., Buery-Joyner, S. D., Craig, L. B., Dalrymple, J. L., Forstein, D. A., Hampton, B. S., Page-Ramsey, S. M., Pradhan, A., Wolf, A., & Hopkins, L. (2018). Barriers and Strategies to Engaging Our Community-Based Preceptors. *Teaching and Learning in Medicine*, *30*(4), 444–450. https://doi.org/10.1080/10401334.2018.1444994

Hays, R. B., McKinley, R. K., & Sen Gupta, T. K. (2019). Twelve tips for expanding undergraduate clinical teaching capacity. *Medical Teacher*, *41*(3), 271–274. https://doi.org/10.1080/0142159X.2018.1429587

Heydari, M. R., Taghva, F., Amini, M., & Delavari, S. (2019). Using Kirkpatrick's model to measure the effect of a new teaching and learning methods workshop for health care staff. *BMC Research Notes*, *12*(1), 388. https://doi.org/10.1186/s13104-019-4421-y

Hudson, J. N., Weston, K., & Farmer, L. (2012, April 17). *Medical students on long-term regional and rural placements: What is the financial cost to supervisors?* https://doi.org/10.22605/RRH1951

Krehnbrink, M., Patel, K., Byerley, J., Tarantino, H., Peyser, B., Payne, L., Foley, K., & Latessa, R. (2020). Physician Preceptor Satisfaction and Productivity Across Curricula: A Comparison Between Longitudinal Integrated Clerkships and Traditional Block Rotations. *Teaching and Learning in Medicine*, *32*(2), 176–183. https://doi.org/10.1080/10401334.2019.1687304

Kuppuraj, V. (2020). *Role of Multimedia on Motivation and Knowledge Retention*. *volume XII*.

Latessa, R., Beaty, N., Colvin, G., Landis, S., & Janes, C. (2008). Family Medicine Community Preceptors: Different From Other Physician Specialties? *Family Medicine*, *40*(2), 6.

Luong, P., Bojansky, A. M., & Kalra, A. (2018). Academic Physician Compensation in the United States: Should providers' work at academic medical Centres be judged by just one metric, the relative value unit (RVU)? *European Heart Journal*, *39*(40), 3633–3634. https://doi.org/10.1093/eurheartj/ehy640

Mayer, R. E. (2005). Cognitive Theory of Multimedia Learning. In R. Mayer (Ed.), *The Cambridge Handbook of Multimedia Learning* (pp. 31–48). Cambridge University Press. https://doi.org/10.1017/CBO9780511816819.004

Medical school enrollments grow, but residency slots haven't kept pace. (2022). AAMC. Retrieved August 5, 2022, from https://www.aamc.org/news-insights/medical-school-enrollments-grow-residency-slots-haven-t-kept-pace

Melvin, J. K., Story Byerley, J., Steiner, M. J., Steiner, B., & Dallaghan, G. L. B. (2020). Balancing clinical capacity with learner numbers. *Clinical Teacher*, *17*(1), 13–21. https://doi.org/10.1111/tct.13103

Oberhelman, S., Boswell, C., Jensen, T., Swartz, D., Bruhl, E., O'Brien, M., & Angstman, K. (2020). Student experiences and satisfaction with a novel clerkship patient scheduling. *Medical Education Online*, *25*(1), 1742963. https://doi.org/10.1080/10872981.2020.1742963

Onwuegbuzie, A. J., Dickinson, W. B., Leech, N. L., & Zoran, A. G. (2009). A Qualitative Framework for Collecting and Analyzing Data in Focus Group Research. *International Journal of Qualitative Methods*, *8*(3), 1–21. https://doi.org/10.1177/160940690900800301

Profile of Older Americans | ACL Administration for Community Living. (n.d.). Retrieved August 12, 2022, from https://acl.gov/aging-and-disability-in-america/data-and-research/profile-older-americans

Recruiting and Maintaining U.S. Clinical Training Sites Joint Report of the 2013 Multi-Discipline Clerkship/Clinical Training Site Survey. (n.d.). AAMC. Retrieved August 2, 2022, from https://www.aamc.org/data-reports/students-residents/data/recruiting-and-maintaining-us-clinical-training-sites-joint-report-2013-multi-discipline-clerkship

Regan-Smith, M., Young, W. W., & Keller, A. M. (2002). An Efficient and Effective Teaching Model for Ambulatory Education. *Academic Medicine*, *77*(7), 593–599. https://journals.lww.com/academicmedicine/pages/articleviewer.aspx?year=2002&issue=07000&article=00003&type=Fulltext&casa_token=66jwdcRNTGIAAAAA:OPoTxfs9na

iYgxVPdMRDFlMo8Z5nMARWFJb_EXP3jyWBHGEJ_KT45AMjwGE5EwC7nKIdcUP79nAnragWSAR68Mpl

Run Chart Tool | IHI - Institute for Healthcare Improvement. (n.d.). Retrieved September 23, 2022, from https://www.ihi.org:443/resources/Pages/Tools/RunChart.aspx

Sheppard, K. G., & Duncan, C. G. (2020). Relative value units in health care: Friend, foe, or necessary evil? *Journal of the American Association of Nurse Practitioners*, *32*(9), 626–629. https://doi.org/10.1097/JXX.0000000000000515

Stanik-Hutt, J., Newhouse, R. P., White, K. M., Johantgen, M., Bass, E. B., Zangaro, G., Wilson, R., Fountain, L., Steinwachs, D. M., Heindel, L., & Weiner, J. P. (2013). The Quality and Effectiveness of Care Provided by Nurse Practitioners. *The Journal for Nurse Practitioners*, *9*(8), 492-500.e13. https://doi.org/10.1016/j.nurpra.2013.07.004

Student Enrollment Surged in U.S. Schools of Nursing in 2020 Despite Challenges Presented by the Pandemic. (n.d.). Https://Www.Aacnnursing.Org/News-Information/Press-Releases/View/ArticleId/24802/2020-Survey-Data-Student-Enrollment. Retrieved August 5, 2022, from https://www.aacnnursing.org/News-Information/Press-Releases/View/ArticleId/24802/2020-survey-data-student-enrollment

Torres, R. T., Preskill, H., & Piontek, M. E. (2005). Evaluation strategies for communicating and reporting: Enhancing learning in organizations. Sage.

Wiseman, R. F. (2013). Survey of advanced practice student clinical preceptors. *The Journal of Nursing Education*, *52*(5), 253–258. https://doi.org/10.3928/01484834-20130319-03

WORKFORCE LETTER | The Dupont Group. (n.d.). Retrieved August 2, 2022, from https://dupontgroup.com/covid-19-resources/workforce-letter/

Worley, P., & Kitto, P. (2001, March 2). *Hypothetical model of the financial impact of student attachments on rural general practices*. https://doi.org/10.22605/RRH83

Appendices

Appendix A

Alternative Schedule Model Using Two Students: Version 1

Appointment Times	Student 1	Student 2	Preceptor
08:00-08:30	Patient 1	Feedback/Teaching	Feedback/Teaching
08:30-09:00		Patient 2	Wrap up Patient 1
9:00-09:30	Patient 3		Wrap up patient 2
09:30-10:00		Patient 4	Wrap up Patient 3
10:00-10:30	Patient 5		Wrap up Patient 4
10:30-11:00		Patient 6	Wrap up Patient 5
11:00-11:30	Patient 7		Wrap up Patient 6
11:30-12:00	Documentation	Patient 8 with preceptor	Patient 8 with student 2

Alternative Schedule Model Using Two Students: Version 2

Appointment Times	Student 1	Student 2	Preceptor
08:00-08:30	Patient 1 together		Patient 2
08:30-09:00			Wrap up Patient 1
9:00-09:30	Patient 3 together		Patient 4
09:30-10:00			Wrap up Patient 3
10:00-10:30	Patient 5		Patient 6
10:30-11:00			Wrap up Patient 5
11:00-11:30	Patient 7		Patient 8
11:30-12:00	Documentation		Wrap up Patient 7

Alternative Schedule Model Using Two Students: Version3

Appointment Times	Student 1	Student 2	Preceptor
08:00-08:30	Patient 1	Patient 2	Patient 3
08:30-09:00			Wrap up Patient 1 and 2
9:00-09:30	Patient 4	Patient 5	Patient 6
09:30-10:00			Wrap up Patient 4 and 5
10:00-10:30	Patient 7	Patient 8	Patient 9
10:30-11:00			Wrap up patient 7 and 8
11:00-11:30	Patient 10	Patient 11	Patient 12
11:30-12:00			Wrap up Patient 10 and 11

Wave Scheduling

Appointment Times	Student Schedule	Preceptor
8:00-8:20	Patient 1	Patient 2
8:20-8:40	Student and preceptor see patient #1	
8:40-9:00	Patient 3	Patient 4
9:00-9:20	Student and preceptor see patient #3	
9:20-9:40	Patient 5	Patient 6
9:40-10:00	Student and preceptor see patient #5	
10:00-10:20	Patient 7	Patient 8
10:20-10:40	Student and preceptor see patient #7	
10:40-11:00	Documentation	Patient 9
11:00-11;20	Documentation	Patient 10
11:20-11:40	Patient 11	
11:40-12:00	Student and preceptor see patient #11	

All three schedules are based on 30-minute block scheduling. Versions 1 and 2 are best utilized with a novice student and last rotation student. Version two can also be used for an interdisciplinary model. This provides more time for feedback and preceptor involvement. In Version 1 this allows students to see patients in consecutive fashion. Version 3 can be used with last rotation students and a seasoned preceptor to increase RVU's.

Appendix B

Semi Structured Focus Group Prompts

1. Do you feel taking students helps your states' healthcare workforce?
   What do you feel the impact is on the state's healthcare workforce when you precept a student?
2. Please tell me about your preceptor experiences. Type of students your precept, how often you precept students….
3. Have you identified a preceptor model that you or your practice uses?
   Tell me about the model you use in your clinic when precepting students? How was this developed or chosen?
4. Are you familiar with alternative scheduling models using advanced healthcare providers?
5. Does your practice have productivity or RVU goals for each provider?
   How is provider productivity evaluated in your clinical setting?

5a. Is there financial compensation (ie bonus) if you meet or surpass the goal?

5b. Is the risk of decreased productivity a factor when you are considering precepting a student?

6. After being introduced to the alternative precepting models, do you feel these could be utilized in your clinical practice, clinical site?

6a. If you think you can utilize this in your practice, can you provide the reasons?

6b. If you do not think that you could utilize this in your practice, can you provide the reasons?

7. What positives can you identify using these models?

7b. What barriers can you identify using these models?

8. Would you like to share any other thoughts on the models?

10 Would you be interested in participating in a pilot to use one of the demonstrated models?

Appendix C

Interview Prompts

1. How do you feel taking students helps the states healthcare workforce?
2. How often do you have students? Why do you choose to take students as frequently as you do?
3. What model do you use to precept (interdisciplinary collaboration, wave scheduling, two students, long term placement, etc.)

3a. What was the evolution or reason for selecting this

3b. How has the model you currently use evolved?

4. Have you always used this method, if not what made you change?
   If so, why did you start using this method?

5 What have been some surprising benefits to using this method?

6. What are some barriers to this method?

7. How has precepting made you a better provider?

8. Can you walk us through a day with your students?
   Is your pace slower, the same or faster when you are precepting a student? Multiple students?

8a. Is your pace slower, the same or faster when you are precepting a student? Multiple students?

8b. How do the students influence the care your patients receive?

9. How have you developed “buy in” from your office on your precepting model? On precepting students?

10 Many perspective preceptors cite impact on productivity as a barrier to taking a student. What is your personal experience regarding the effect of precepting on your productivity?

Appendix D

Pre and Post Pilot RVU Data

Clinic	Providers	Starting RVU	Ending RVU	Precepting Model
A	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
B	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
C	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
D	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.

Appendix E

Pre and post pilot data

Clinic	Pre-intervention focus group themes	Starting RVU	Post- intervention focus group themes	Ending RVU
A	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
B	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
C	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.
D	1. 2. 3.	1. 2. 3.	1. 2. 3.	1. 2. 3.

Appendix F

First Level Assessment Post Focus group

	Strongly Disagree	**Somewhat Disagree**	**Neither Agree or Disagree**	**Somewhat Agree**	**Strongly Agree**
Training Content					
The program objectives were clearly defined.					
The training was relevant to my own needs and/or the needs of the organization.					
This course enhanced my knowledge of the subject matter.					
The material was the right level of complexity for my background.					
Facilitator					
The program objectives were covered by the moderator.					
The facilitator demonstrated a good understanding of the material.					
The facilitator shared his/her experience					
Course Support					
The duration of the session was appropriate for the content					