Current Evidence in Virtual and In-Person Objective Structured Clinical Examinations in Nurse Practitioner Education: A Narrative Review

Dr. Jennifer-Lynn Fournier, Dr. Robyn Gorham, and Anthony Olowu

Abstract: Aim: To review the efficacy of virtual and in-person Objective Structured Clinical Examinations (OSCEs) in nurse practitioner (NP) education. Scope: OSCEs are often used to evaluate the clinical competencies of NP students. Meanwhile, the COVID-19 pandemic caused a shift towards virtual OSCEs, prompting this review of literature. The utility, benefits, and drawbacks of virtual versus in-person OSCEs will be explored. Methods: This meta-narrative review examines existing literature focused on both virtual and in-person OSCEs, as well as publications addressing both methods. Nine peer-reviewed articles published between 2014 and 2024 were gathered from three electronic databases. Articles were limited to those focusing on operationalization of OSCEs and student evaluation and learning. Findings: Five overarching themes emerged. These included: the value of OSCEs, benefits and challenges of virtual and in-person OSCEs, student performance and learning, student satisfaction, and feasibility. Conclusion: Both virtual and in-person OSCEs have valuable roles in NP education. An approach that incorporates both methods is

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recommended to optimize resources, student learning, and assessment outcomes. A mixed approach leverages the logistical advantages and cost-effectiveness of virtual assessments with the hands-on experience, standardization, and motor skills training associated with in-person OSCEs.

Keywords: Virtual OSCEs, in-person OSCEs, Nurse Practitioner Learning, Clinical Competency, narrative review.

Données actuelles sur les examens cliniques objectifs structurés en mode virtuel et en présentiel dans la formation des infirmiers praticiens : Une revue narrative

Résumé :. Objectif : Évaluer l'efficacité des examens cliniques objectifs structurés (*Objective Structured Clinical Examinations* – OSCE) en mode virtuel et en présentiel dans la formation des infirmiers praticiens (IP). Portée : Les OSCE sont couramment utilisés pour évaluer les compétences cliniques des étudiants en formation d'infirmier praticien. Cependant, la pandémie de COVID-19 a entraîné un passage vers des OSCE virtuels, ce qui a amené à réaliser cette revue de la littérature. L'utilité, les avantages et les inconvénients des OSCE virtuels par rapport aux OSCE en présentiel y sont analysés. Méthodes : Cette revue méta-narrative examine les publications existantes traitant des OSCE virtuels et en présentiel, ainsi que des études comparant les deux approches. Neuf articles évalués par des pairs, publiés entre 2014 et 2024, ont été sélectionnés à partir de trois bases de données électroniques. Seuls les articles traitant de l'opérationnalisation des OSCE, de l'évaluation des étudiants et de l'apprentissage ont été retenus. Résultats : Cinq thèmes principaux ont émergé : la valeur des OSCE, les avantages et défis des OSCE en mode virtuel et en présentiel, la performance et l'apprentissage des étudiants, la satisfaction des étudiants et la faisabilité des deux approches. Conclusion : Les OSCE virtuels et en présentiel jouent tous deux un rôle important dans la formation des IP. Une approche combinée est recommandée pour optimiser les ressources, l'apprentissage des étudiants et les résultats des évaluations. Cette approche mixte permet de tirer parti des avantages logistiques et de la rentabilité des évaluations virtuelles, tout en préservant l'expérience pratique, la standardisation et l'entraînement aux compétences motrices offerts par les OSCE en présentiel.

Mots-clés : OSCE virtuels, OSCE en présentiel, apprentissage des infirmiers praticiens, compétence clinique, revue narrative.

Introduction

Objective Structured Clinical Examinations (OSCEs) have become an indispensable component in the clinical education of licensed health professionals such as physicians, nurses, and nurse practitioners (NPs) due to their consistent and comprehensive method for assessing clinical competencies. OSCEs are designed to evaluate various skills necessary for effective clinical practice, including history-taking, physical examination, clinical reasoning, and patient communication. Each OSCE station is typically crafted to reflect real-world clinical scenarios, allowing students to demonstrate proficiency in a controlled and standardized environment. The traditional live, in-person OSCE format ensures that all students are assessed under near identical environmental and contextual conditions, which helps mitigate biases and allows for evaluation of cognitive and practical skills (Khan et al., 2013).

The COVID-19 pandemic dramatically accelerated the adoption of virtual OSCEs among clinical education programs. This change led to interest in the effectiveness and utility of virtual OSCEs, as well as in how virtual OSCEs compare to in-person OSCEs in terms of operationalization and NP student assessment and learning. This meta-narrative literature review will address the following research question: *What is the current evidence on the comparative benefits and challenges to using virtual versus in-person OSCEs in NP education programs?* The aim is to provide insights from students, educators and

researchers that will inform future decisions about the application of virtual versus in-person OSCE testing in NP education.

Theoretical Framework

This work is based on Kirkpatrick and Kirkpatrick's four-level evaluation model for learning outcomes (Kirkpatrick & Kirkpatrick, 2006). This model was initially developed for evaluation of educational programs. The first section of the model is "reaction" and focuses on experiences and feedback. This aligns with our project as student and educator experiences with OSCE examinations and operationalization are key foci of published works on virtual and in-person OSCEs. The second section of the model focuses on learning and assessment of skill, aligning it with the primary purpose of OSCE examinations. Behaviour is the third component of the Kilpatrick model. This section focuses on how learned skills are transferred into application—a central purpose of OSCE evaluation in clinical programs. Finally, the model closes with evaluation of results. Given the focus of this review is a review of experiential, quantitative, and qualitative reports related to virtual and in-person OSCEs, this model proves to pull together key concepts related to our work.

Method

A meta-narrative literature review was conducted in the spring of 2024 (Sukhera, 2022). This approach is most useful for work focused on exploration of a broad research question that does not require synthesis of quantitative data

(Sukhera, 2022). Further, the meta-narrative review seeks to draw conclusions based on the contradictions and tensions within the literature focused on a topic. This method is well suited to a review related to in-person and virtual OSCEs, given students and educators present with strong positions on the suitability of each method for student evaluation. The method also allows investigators to explore areas that may not produce sufficient material with typical parameters used in methods such as systematic reviews, and to include commentary articles, case reports, and similar items (Sukhera, 2022). The method leans toward exploration of related concepts, while not requiring exhaustive inclusion of all available literature (Sukhera, 2022). We were unable to find any publications or reports associated with NP education and virtual and in-person OSCEs specifically. Meanwhile, the meta-narrative review facilitated exploration around this area of interest in order to become better informed and to determine existing gaps. The narrative reporting provided herein will chronicle the current state of knowledge around virtual and in-person OSCE examinations, so that this knowledge can be applied when making decisions around the use of these modalities in NP education. Meanwhile, the search process and target areas of interest will be presented to inform readers of the breadth and scope of this work (Sukhera, 2022).

Data Collection

A search was conducted across three electronic databases including PubMed, CINAHL, and Google Scholar. The search covered publications from

2014 to 2024 to capture recent changes in OSCE practices, particularly those influenced by technological innovations and the COVID-19 pandemic. Keywords used in the search were "virtual OSCE," "in-person OSCE," "nurse practitioner education," and "clinical competency". These terms ensured that the review encompassed both virtual and in-person methods of OSCE delivery within NP education.

The review included only peer-reviewed articles, theses, and conference papers that reported on operationalization, clinical competency, and student assessment and learning. This ensured the inclusion of studies likely to contain information needed to explore and address the research question. Studies that did not meet these criteria or focused on key concepts unrelated to our research question were excluded. Ultimately, nine articles were incorporated into the review. A summary of these articles is provided in Table 1.

Table 1: Summary of Articles

Author(s) & Year	Title	Objective	Modality	Findings/Limitations	Major Themes
Avraham, R., Cohen, T., Artzi-Medvedik, R., Hurvitz, N., & Cohen, O. (2023)	Effectiveness of a virtual program for OSCE preparation during COVID-19: A descriptive and repeated cross-sectional study among nursing students	Evaluate the effectiveness of a virtual OSCE preparation program during COVID-19 using a descriptive and repeated cross-sectional study among nursing students	Virtual	The virtual program was effective; limitations include the study's descriptive nature and potential selection bias	Value of OSCEs in nursing education Benefits and challenges to virtual and in-person OSCEs Student performance and learning Student satisfaction Feasibility
Boursicot, K., Kemp, S., Ong, T. H., Wijaya, L., Goh, S. H., Freeman, K., & Curran, I. (2020)	Conducting a high-stakes OSCE in a COVID-19 environment	Discuss methods and challenges of conducting high-stakes OSCEs during COVID-19	Both	Successfully conducted OSCEs despite challenges; limitations include adaptability to different contexts	Value of OSCEs in nursing education Benefits and challenges to virtual and in-person OSCEs Student performance and learning

Author(s) & Year	Title	Objective	Modality	Findings/Limitations	Major Themes
Setyonugroho, W., Kennedy, K. M., & Kropmans, T. J. (2015)	Reliability and validity of OSCE checklists used to assess the communication skills of undergraduate medical students: A systematic review	Systematic review of OSCEs in undergraduate medical education	Both	OSCEs are valuable in medical education; limitations involve variability in implementation	Value of OSCEs in nursing education Student performance and learning
Saad, S. L., Richmond, C., Jones, K., Schlipalius, M., Rienits, H., & Malau-Aduli, B. S. (2022).	Virtual OSCE delivery and quality assurance during a pandemic: Implications for the future	Evaluation of a virtual OSCE as an assessment tool during COVID-19	Virtual	Virtual OSCEs are feasible; limitations include technical issues and lack of hands-on practice	Value of OSCEs in nursing education Benefits and challenges to virtual and in-person OSCEs Student satisfaction Feasibility
Luke, S., Petitt, E., Tombrella, J., & McGoff, E. (2021)	Virtual evaluation of clinical competence in nurse practitioner students	Evaluation of clinical competence of nurse practitioner students using virtual methods	Virtual	Virtual evaluation showed promising results; limitations include small sample size	Benefits and challenges to virtual and in-person OSCEs Student performance and learning

Author(s) & Year	Title	Objective	Modality	Findings/Limitations	Major Themes
Choi, A., Murtha, T. D., Morrison, L. J., & Talwalkar, J. S. (2024)	A comparison between in-person and virtual communication skills in OSCEs for medical students	Compare communication skills between in-person and virtual OSCEs for medical students	Both	Both in-person and virtual OSCEs were effective; limitations include potential bias in virtual assessments	Value of OSCEs in education Benefits and challenges to virtual and in-person OSCEs
Grover, S., Pandya, M., Ranasinghe, C., Ramji, S. P., Bola, H., & Raj, S. (2022)	Assessing the utility of virtual OSCE sessions as an educational tool: A national pilot study	National pilot study on the utility of virtual OSCE sessions as an educational tool	Virtual	Virtual OSCE sessions were useful; limitations include technological challenges	Value of OSCEs in nursing education Benefits and challenges to virtual and in-person OSCEs Student performance and learning
Mak, V., Krishnan, S., & Chuang, S. (2022)	Students' and examiners' experiences of their first virtual pharmacy OSCE in Australia during the COVID-19 pandemic	Experiences of students and examiners during the first virtual pharmacy OSCE in Australia during COVID-19	Virtual	Mixed experiences: limitations involve adaptation to virtual settings	Benefits and challenges to virtual and in-person OSCEs Student performance and learning Student satisfaction Feasibility

Author(s) & Year	Title	Objective	Modality	Findings/Limitations	Major Themes
Chang, O., Holbrook, A. M., Lohit, S., Deng, J., Xu, J., Lee, M., & Cheng, A. (2023)	Comparability of OSCEs and written tests for assessing medical school students' competencies: A scoping review	Scoping review on the comparability of OSCEs and written tests for assessing medical students' competencies	Both	OSCEs and written tests are comparable; limitations include variability in study designs	Value of OSCEs in nursing education Student performance and learning

Results

Each article was reviewed by three members. Important themes and focal areas of the articles were agreed upon through dialogue and review of the articles. Key areas that emerged from the data include:

- The value of OSCEs in nursing education

- Benefits and challenges of virtual and in-person OSCEs

- Student performance and learning

- Student satisfaction

- Feasibility

All of these concepts align with Kilpatrick's model (2006), encompassing reactions and experience of students and educators to OSCEs themselves as well as educators, experiences in operationalizing and budgeting for them, the quality of in-person and virtual OSCE assessment related to evaluating student

behaviour and suitability to clinical practice, and the ability of in-person and virtual OSCEs to facilitate learning and measure achievement.

Value of OSCEs in Clinical Education

The controlled and repeatable nature of OSCEs allows educators to assess a broad range of clinical skills directly applicable to real-world practice, ensuring that students are well-prepared for the demands of clinical environments (Avraham et al., 2023, Grover et al., 2022). They also serve a feedback opportunity that helps prepare students to manage common and rare clinical scenarios, while demonstrating a variety of soft skills required for professional competency (Chang et al., 2023). The use of predefined scenarios and standardized patients also facilitates the assessment of complex skills, such as problem-solving and decision-making, in a consistent and equitable manner (Boursicot et al., 2020, Saad et al., 2022) and facilitates both summative and formative assessment (Choi et al., 2024). These attributes of OSCEs reinforce their importance in supporting student learning and evaluation and make them a relevant tool for educators and regulators (Saad et al., 2022). Regulators and educational institutions may choose to use OSCEs to evaluate learning and skill among students close to graduation or as part of the evaluation of healthcare professionals, including NPs in the licensure process (Avraham et al., 2023; Boursicot et al., 2020; Setyonugroho et al., 2015; Luke et al., 2021).

Avraham et al. (2023) and Setyonugroho et al., (2015) highlighted OSCEs' effectiveness in measuring critical clinical skills and ensuring students are

prepared for real-world scenarios. Avraham et al. (2023) compared virtual and in-person OSCEs, noting that while virtual OSCEs offer flexibility and accessibility, they may lack the hands-on experience essential for teaching and review of some skills. Meanwhile, in-person OSCEs provide a more immersive and realistic assessment environment but are more labour and resource intensive to operationalize.

The Shift to Virtual OSCEs

The COVID-19 pandemic dramatically accelerated the adoption of virtual OSCEs. Restrictions on in-person gatherings necessitated a shift to virtual formats to maintain educational continuity and safety (Avraham et al., 2023). Virtual OSCEs, which utilize digital platforms to simulate clinical interactions, present unique opportunities and challenges. They offer flexibility, reduce logistical burdens, and increase accessibility for students who may be geographically dispersed (Avraham et al., 2023). Meanwhile, the transition to virtual OSCE assessments has also raised questions about the modality's ability to accurately replicate the hands-on experience (Saad et al., 2022) and direct patient interaction preferred at some points in the training of healthcare professionals (Boursicot et al., 2020).

Benefits and Challenges of Virtual and In-Person OSCEs

The literature underscores the robustness of traditional, in-person OSCEs in providing reliable and valid clinical performance assessments. A key strength

of these OSCEs is their ability to measure performance consistently across different students and settings due to their structured nature and standardized assessment criteria (Harden, 2016). The use of predefined scenarios and standardized patients for in-person OSCEs also facilitates the assessment of complex skills, such as physical examination, problem-solving and decision-making, in a consistent and equitable manner (Boursicot et al., 2020). This makes OSCEs a key component of clinical education, and formative and summative evaluation, and a critical benchmark for ensuring the quality and readiness of future healthcare professionals (Choi et al., 2024).

Meanwhile, studies have indicated that virtual OSCEs can uphold the rigorous standards required for assessing clinical competencies, while also offering significant benefits in terms of flexibility and accessibility (Mak et al., 2022; Saad et al., 2022; Choi et al., 2024). Saad et al. (2022) and Mak et al. (2022) reported that virtual OSCEs enable students from diverse geographic locations to participate without the logistical challenges of travel, which can be particularly beneficial in widening access to education and reducing associated costs. Additionally, virtual OSCEs provide a flexible schedule, allowing examinations to be conducted at various times to accommodate different time zones and individual student needs. A mixed methods study by Mak et al. (2022) found that students felt less anxious during virtual OSCEs. Studies by Avraham et al. (2023), Grover et al. (2022), Luke et al. (2021), and Saad et al. (2022) found that virtual OSCEs effectively evaluate knowledge and decision-making abilities, although they can be limited in their ability to facilitate real-time, hands-on

training. Meanwhile, respondents to Mak et al. (2022) indicated there were less non-verbal cues among standardized patients and OSCE candidates in virtual OSCEs. Boursicot et al. (2020) and Chang et al. (2023) emphasized that in-person OSCEs provide a more immersive and comprehensive assessment environment. These studies highlight the importance of selecting the appropriate OSCE method for the evaluation or learning task at hand. Where the physical examination techniques, the execution of medical procedures and evaluation of procedural skills are being evaluated, in-person OSCEs could be more effective. In-person OSCEs also support hands-on teaching and skill refinement as required during the process. Virtual OSCEs provide a cost-effective approach that could facilitate more frequent OSCE sessions, particularly for scenarios and practice areas that do not require demonstration of hands-on skills such as communication, mental health, and history-taking (Avraham et al., 2023; Grover et al., 2022; Luke et al., 2021; Saad et al., 2022). In addition, where students are in geographically diverse locations, virtual OSCEs allow for cost-effective evaluation without the expense or time commitment of travel (Saad et al., 2022; Mak et al., 2022). Virtual OSCEs may also be used for periodic assessments of student performance where this aspect of clinical learning would not be assessed by faculty otherwise.

Student Performance and Learning

Virtual and in-person OSCEs provide opportunities for assessment of clinical competencies, highlighting their ability to measure critical skills essential

for clinical practice. A survey-based evaluation by Choi et al. (2024) found that virtual OSCEs were effective for formative and summative evaluation of common clinical assessment and communication skills for medical students and were met with good levels of student satisfaction. They concluded there was no difference in educational value among virtual and in-person OSCEs when assessing complex scenarios involving patient communication, cognitive and analytical skills, and the application of theoretical knowledge to clinical problems. Avraham et al. (2023) and Saad et al. (2022) note that virtual OSCEs, despite their limited hands-on training capacity, can adequately evaluate knowledge and decision-making abilities in a controlled remote setting and facilitate instructor or evaluator feedback. Additionally, digital tools like interactive case simulations enhance the learning experience and provide detailed insights into student performance (Avraham et al., 2023; Saad et al., 2022). Virtual OSCEs can incorporate innovative tools like interactive case simulations and real-time feedback, enhancing the learning experience and providing detailed insights into student performance. The virtual method has also been appreciated by students for its ability to simulate video-medicine, which is more frequently used since the onset of the COVID pandemic (Mak et al., 2022; Luke et al., 2021).

In-person OSCEs provide an immersive and comprehensive assessment environment for evaluating practical and procedural skills. Boursicot et al. (2020) and Chang et al. (2023) note that in-person OSCEs are appreciated by students for their ability to simulate face-to-face interaction with standardized patients which supports students in practising and refining communication skills,

empathy, and bedside manner. Meanwhile, communication skill evaluation is also highlighted as a key strength of virtual OSCEs (Choi et al., 2024). Studies by Setyonugroho et al. (2015) and Grover et al. (2022) emphasize that despite higher logistical demands and costs, the ability of in-person OSCEs to provide a realistic clinical environment and hands-on experience makes them invaluable in clinical education (Boursicot et al., 2020). This is particularly relevant for tasks requiring manual dexterity and physical evaluation, which are challenging to replicate virtually.

Student Satisfaction

Research shows that student satisfaction with OSCEs varies significantly depending on the modality, with surveys and focus groups providing substantial evidence (Saad et al., 2022). Virtual OSCEs receive positive feedback due to their flexibility, accessibility, and cost-effectiveness (Luke et al. 2021). NP students and faculty agreed that virtual OSCEs were preferred and were planning to continue with this method going forward (Luke et al., 2021). Students appreciate being able to participate from various locations without travel and the need for out-of-town accommodations, thus reducing associated costs and logistical challenges (Saad et al., 2022). This accessibility is a key contributor to student preference for virtual OSCEs (Saad et al., 2022).

Meanwhile, some students prefer in-person OSCEs. Boursicot et al. (2020) attribute this preference primarily to an appreciation for real-time interaction with standardized patients and the immediate feedback provided by examiners.

While virtual OSCEs, particularly when conducted synchronously, can also offer real-time feedback, some students may feel that the physical presence of examiners and patients adds a layer of authenticity and engagement that is difficult to replicate in a virtual environment. This preference highlights the nuanced nature of the debate surrounding virtual versus in-person OSCEs, suggesting that while virtual formats offer flexibility and accessibility, they may not fully replace the experiential benefits of in-person assessments.

Feasibility

Virtual OSCEs offer significant logistical benefits, particularly regarding scalability and accessibility, which are increasingly crucial in globalized education and during unforeseen challenges like the COVID-19 pandemic (Avraham et al., 2023; Saad et al., 2022). Virtual OSCEs eliminate the need for physical presence, accommodating students from diverse geographic locations without travel or physical space limitations. This is especially advantageous for institutions with large cohorts of international students, ensuring equitable access to assessments regardless of location. The logistical simplicity of setting up virtual OSCEs allows institutions to scale their assessment processes more efficiently, significantly reducing costs associated with logistics, such as venue hire and staff travel (Avraham et al., 2023). This flexibility facilitates broader participation and allows for administering assessments in a manner less disruptive to students' schedules, promoting a more flexible learning environment. The accessibility and utility of

the virtual approach may also lead to more frequent offerings of OSCEs to facilitate learning and evaluate student outcomes.

Discussion

As clinical education evolves, the comparison between virtual and in-person OSCEs has gained relevance, particularly in response to technological advancements and challenges such as the COVID-19 pandemic (Boursicot et al., 2020; Saad et al., 2022). Both modalities present distinct advantages and challenges, which must be considered to optimize their use in clinical education.

In-person OSCEs provide an environment where controlled, hands-on patient interaction allows for a more authentic assessment of clinical competencies (Setyonugroho et al., 2015). The immediate instructor feedback in this setting supports student learning outcomes, particularly for motor skills training or correction requiring direct demonstration (Luke et al., 2021). While virtual OSCEs have been perceived as less effective in facilitating physical examination skills involving movement and body mechanics, some instructors do deliver this type of teaching during virtual sessions held in real time. Immediate feedback can also be provided using this method (Choi et al., 2024).

Balancing logistical efficiency and the depth of skill acquisition underscores the need for a nuanced approach to integrating both virtual and in-person OSCEs in educational curricula (Choi et al., 2024). Virtual OSCEs offer notable logistical benefits, particularly in reducing travel and accommodation costs (Saad et al., 2022; Mak et al., 2022). Their remote accessibility allows for

broader participation, accommodating students from diverse locations (Grover et al., 2022). This is especially beneficial during global crises (COVID-19) or for programs with large, geographically diverse cohorts. Additionally, the virtual format expands participation, making the process more inclusive and alleviating the anxiety of traveling to unfamiliar locations (Mak et al., 2022). While some virtual OSCEs are asynchronous, allowing students to complete assessments at their own pace, synchronous virtual OSCEs enable real-time engagement, closely mirroring the immediate feedback and interaction found in in-person assessments (Choi et al., 2024; Avraham et al., 2023). The primary challenge noted remains the limited capacity for hands-on teaching of motor skills essential for physical exam techniques, as virtual platforms cannot fully replicate the tactile experience (Saad et al., 2022; Luke et al., 2021).

Despite these challenges, virtual OSCEs can maintain high assessment standards through modern technology and proctoring methods (Grover et al., 2022). Therefore, a hybrid approach that leverages the strengths of both formats may offer the most comprehensive solution for nursing education (Grover et al., 2022). Where possible, virtual methods can be used for evaluation of ongoing learning, including physical examination, with the understanding that hands-on motor skills may warrant some in-person learning. In-person methods, with their associated expense and inconvenience may be reserved for complex scenarios involving hands-on care and physical exam, complex procedures, the need for monitors and other technologies, and instances where strict standardization is desirable (final program exams, regulator licensure OSCEs).

Virtual OSCEs may be used in remaining areas and can be used more frequently to solidify and evaluate learning.

With advancements in technology and proctoring, virtual OSCEs can uphold similar standards, though they may still not fully replicate the benefits of hands-on instruction (Mak et al., 2022). The shift towards virtual formats may necessitate further exploration into simulation-based assessments, where students can practise and demonstrate motor skills in a more controlled yet flexible virtual environment (Luke et al., 2021). This approach could potentially bridge the gap between the flexibility of virtual OSCEs and the hands-on advantages of in-person assessments.

Limitations of This Review

This review focuses on the logistical advantages and educational challenges of virtual and in-person OSCEs for the purpose of NP education. However, it is limited by the scope of existing research, which may not fully capture the diversity of student experiences specific to the NP student population. The rapid adoption of virtual OSCEs during the pandemic also means that many practices are still evolving, and long-term data on their effectiveness is limited. Given the novelty of virtual OSCEs, and the associated instructor and student learning curves, changes in experiences and preferences can be expected going forward. In addition, new knowledge related to our research question and focused on NP students can be anticipated.

Recommendations

Given the distinct advantages and limitations of both virtual and in-person OSCEs, the following recommendations are proposed:

Further Research

Future studies should explore the competencies best assessed through each OSCE modality. Comparative research is needed to evaluate the effectiveness of virtual versus in-person OSCEs in developing skills such as motor proficiency and clinical reasoning among NP students. This research will be critical in guiding the strategic use of each modality in different educational contexts. The utility of virtual versus in-person OSCEs should also be evaluated for suitability for supporting learning versus NP testing and credentialing.

Operational Guidelines

Educational institutions should establish evidence-based best practices to determine when to employ virtual versus in-person OSCEs. These guidelines should consider the nature of the skills being assessed, the resources available, and the diverse needs of the student population. For example, virtual OSCEs could be utilized for ongoing assessments and check-ins. In contrast, in-person OSCEs might be reserved for high-stakes evaluations requiring hands-on practice and immediate feedback.

Educator Training and Resources

Investment in educator training and resources is essential to support effective delivery of virtual and in-person OSCEs. Educators should be supported in transitioning to virtual platforms, with access to tools that facilitate real-time feedback and interaction. Additionally, institutions must ensure that the technological and infrastructural requirements of these modalities are met, allowing for a seamless integration into the curriculum and enhanced instructor uptake.

Curriculum Integration

Using OSCEs as a continuous assessment tool rather than a one-time examination may offer benefits for student learning and skill development in clinical education. Periodic assessment with OSCEs may allow for regular feedback, which is crucial for fostering a deeper understanding of clinical skills and knowledge (Harden, 2016). Unlike traditional summative assessments, which typically occur at the end of a learning period, periodic assessments provide ongoing opportunities for students to reflect on their performance and identify areas for improvement. This iterative process could help reinforce learning, ensuring that students acquire and master skills over time. Regular exposure to various clinical scenarios through repeated OSCEs can enhance students' ability to apply theoretical knowledge to practical situations, leading to better preparedness for real-world clinical practice. Additionally, periodic assessment with OSCEs can allow educators to track their students' progress more

effectively, identifying learning gaps early and providing targeted support to address specific weaknesses.

Enhancing Technological Support

To address the challenges of virtual OSCEs, it is critical to invest in robust technological infrastructure that can support the complex requirements of online clinical assessments. This includes ensuring high-speed internet access, reliable software platforms, and the availability of necessary hardware such as webcams, microphones, and secure network connections. The reliability of digital platforms is paramount; any technical failures or interruptions can compromise the integrity of the assessment and potentially disadvantage students. This can sometimes be an issue in more rural locations.

Platforms used for virtual OSCEs must be able to handle real-time video streaming, allow for seamless interaction between students and evaluators, and provide secure environments for sensitive information. Some organizations use private, online meeting systems like Zoom(™) for this purpose. Meeting software is simple, cost-effective and sufficient for testing skills such as history-taking, diagnostic reasoning, and very basic physical examination that does not require specialized equipment like monitors or imaging. Going forward, more integrated platforms could be developed to enhance the experience and evaluation capacity of virtual OSCEs to incorporate artificial-intelligence-driven patient responses and clinical features, and manikins. Adequate training for students and faculty is essential to maximize the uptake and effectiveness of virtual OSCEs.

Students must be familiarized with the digital tools they will use, including navigating the virtual environment, interacting with simulated patients, and submitting their work for evaluation. Training sessions should also cover troubleshooting common technical issues so students can manage any challenges during the assessment. Faculty training should focus on effectively using technology to conduct assessments, provide feedback, and ensure that the evaluations are as rigorous and fair as in-person OSCEs. Faculty should also be trained in new pedagogical approaches to virtual assessments, such as engaging with students and assessing their performance through a screen. This comprehensive training approach helps build confidence in the technology, reduces anxiety related to technical failures, and fosters an environment where virtual OSCEs can be conducted smoothly and efficiently. By investing in technology and training, educational institutions can enhance the dependability and credibility of virtual OSCEs, ensuring they remain a viable and effective alternative to traditional in-person assessments.

Conclusion

This narrative review provides valuable information about virtual and in-person OSCEs that highlights their potential within NP education. The findings indicate that while both modalities effectively assess clinical competencies, each offers distinct advantages that can enhance educational outcomes when strategically implemented. Given the complementary strengths of both modalities, we recommend that NP education programs adopt a hybrid

approach, integrating both virtual and in-person OSCEs. This approach would maximize the educational benefits of each modality, creating a more holistic and flexible teaching and assessment framework that can adapt to the diverse needs and circumstances of NP students. By leveraging the logistical flexibility of virtual assessments alongside the hands-on richness of in-person examinations, academic institutions can enhance the quality of clinical training and better prepare NP students to meet the complex demands of clinical practice.

This review has highlighted a significant gap in the literature regarding applying these OSCE modalities specifically within NP education. To address this, we strongly recommend conducting further research to establish best practices for implementing hybrid OSCE models across organizations and curricula. Such studies are essential for developing evidence-based guidelines that can be standardized across educational institutions, ensuring consistency and quality in NP education. Additionally, these discussions are of interest to regulators who play a critical role in shaping educational standards and ensuring the competency of future healthcare professionals. By focusing on these areas, the nursing education community can contribute to the ongoing evolution of NP student clinical assessments, ultimately improving patient care and healthcare delivery.

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References

Avraham, R., Cohen, T., Artzi-Medvedik, R., Hurvitz, N., & Cohen, O. (2023). Effectiveness of a virtual program for OSCE preparation during COVID-19: A descriptive and repeated cross-sectional study among nursing students. *BMC Nursing, 22*(1), 235. https://doi.org/10.1186/s12912-023-01396-5

Boursicot, K., Kemp, S., Ong, T. H., Wijaya, L., Goh, S. H., Freeman, K., & Curran, I. (2020). Conducting a high-stakes OSCE in a COVID-19 environment. *MedEdPublish, 9*, 54. https://doi.org/10.15694/mep.2020.000054.1

Chang, O., Holbrook, A. M., Lohit, S., Deng, J., Xu, J., Lee, M., & Cheng, A. (2023). Comparability of Objective Structured Clinical Examinations (OSCEs) and written tests for assessing medical school students' competencies: A scoping review. *Evaluation & the Health Professions, 46*(3), 213–224. https://doi.org/10.1177/01632787231165797

Choi, A., Murtha, T. D., Morrison, L. J., & Talwalkar, J. S. (2024). A comparison between in-person and virtual communication skills OSCE for medical students. *Journal of Medical Education and Curricular Development, 11*, 23821205241241375. https://doi.org/10.1177/23821205241241375

Greenhalgh, S., Thorne, K., & Malterud, K. (2018). Time to challenge the spurious hierarchy of systematic over narrative reviews? *European Journal of Clinical Investigation, 48*(6), Article e12931, https://doi.org/10.1111/eci.12931

Grover, S., Pandya, M., Ranasinghe, C., Ramji, S. P., Bola, H., & Raj, S. (2022). Assessing the utility of virtual OSCE sessions as an educational tool: A national pilot study. *BMC Medical Education, 22*(1), 178. https://doi.org/10.1186/s12909-022-03248-3

Harden, R. M. (2016). Revisiting 'Assessment of clinical competence using an objective structured clinical examination (OSCE)'. *Medical Education, 50*(4), 376–379. https://doi.org/10.1111/medu.12801

Khan, K. Z., Ramachandran, S., Gaunt, K., & Pushkar, P. (2013). The Objective Structured Clinical Examination (OSCE): AMEE Guide No. 81. Part I: An historical and theoretical perspective. *Medical Teacher, 35*(9), e1437–e1446. https://doi.org/10.3109/0142159x.2013.818634

Kirkpatrick, D. L., & Kirkpatrick, J. D. (2006). *Evaluating training programs: The four levels* (3rd ed.). Berrett-Koehler Publishers.

Luke, S., Petitt, E., Tombrella, J., & McGoff, E. (2021). Virtual evaluation of clinical competence in nurse practitioner students. *Medical Science Educator, 31*(4), 1267–1271. https://doi.org/10.1007/s40670-021-01312-z

Mak, V., Krishnan, S., & Chuang, S. (2022). Students' and examiners' experiences of their first virtual pharmacy Objective Structured Clinical Examination (OSCE) in Australia during the COVID-19 pandemic. *Healthcare (Basel), 10*(2), 328. https://doi.org/10.3390/healthcare10020328

Saad, S. L., Richmond, C., Jones, K., Schlipalius, M., Rienits, H., & Malau-Aduli, B. S. (2022). Virtual OSCE delivery and quality assurance during a pandemic: Implications for the future. *Frontiers in Medicine, 9*, 844884. https://doi.org/10.3389/fmed.2022.844884

Schuwirth, L. W. T., & Van der Vleuten, C. P. M. (2011). Programmatic assessment: From assessment of learning to assessment for learning. *Medical Teacher, 33*(6), 478–485. https://doi.org/10.3109/0142159X.2011.565828

Setyonugroho, W., Kennedy, K. M., & Kropmans, T. J. (2015). Reliability and validity of OSCE checklists used to assess the communication skills of undergraduate medical students: A systematic review. *Patient Education and Counseling*, *98*(6), 701–709. https://doi.org/10.1016/j.pec.2015.06.004

Sukhera, J. (2022). Narrative reviews: Flexible, rigorous, and practical. *Journal of Graduate Medical Education, 14*(4), 414–417. https://doi.org/10.4300/JGME-D-22-00480.1

Turnbull, D., Chugh, R., & Luck, J. (2021). The use of case study design in learning management system research: A label of convenience? *International Journal of Qualitative Methods, 20*, 1–11, http://dx.doi.org/10.1177/16094069211004148

Authors

Dr. **Jennifer-Lynn Fournier** is an Associate Professor in the School of Nursing at Laurentian University in Sudbury, Ontario. She teaches in the Nurse Practitioner program as well as other programs preparing learners for practice and leadership in the Health Disciplines. She has expertise in employment and education and has published a variety of studies focused on regional, national and international Nurse Practitioner populations. She lives in northern Ontario, Canada.

Dr. **Robyn Gorham** is an Associate Professor in the School of Nursing at Laurentian University in Sudbury, Ontario. She is a Primary Healthcare Nurse Practitioner and teaches in the Nurse Practitioner program as well as the Advanced Practice Nursing graduate program. Given her longstanding history in Nurse Practitioner education, Dr. Gorham publishes in the areas of education, practice, and role development.

Anthony Olowu, RN, MScN is a graduate of the Advanced Practice Nursing program at Laurentian University in Sudbury, Ontario. He practices nursing in northern Ontario, Canada where he serves as a clinical lead in long-term care. Anthony continues to pursue knowledge and growth in the areas of clinical practice and leadership.