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## ■ Original Article

# Preceptors' perceived barriers on physician assistant student use of point-of-care ultrasound on clinical rotations

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## ABSTRACT

**Background:** Inclusion of point-of-care ultrasound (POCUS) within medical education is increasing. A lack of clinical preceptors ready to teach POCUS to physician assistant (PA) students has been discovered. Understanding the barriers to student use of POCUS in clinical education will inform curricular planning.

**Methods:** Qualitative survey research was completed on 212 previously identified PA student preceptors. Descriptive statistics outlining frequencies of responses were completed.

**Results:** The most frequently identified barriers included lack of preceptor experience with POCUS (63.7%), lack of access to a device (47.6%), and lack of familiarity with POCUS (45.2%). Time and lack of experience with POCUS were more commonly identified by inpatient providers. Lack of clinical indications and device access were more frequent in outpatient preceptors.

**Discussion:** As programs incorporate POCUS, creating intentional opportunities for POCUS education on clinical rotations is needed. The differences in barriers based on practice type allow targeted intervention based on specific rotations.

**Keywords:** point-of-care ultrasound, physician assistant, barriers, clinical educators

## INTRODUCTION

Point-of-care ultrasound (POCUS) is an ultrasound examination performed at a patient's bedside by a clinician to rapidly integrate findings into the clinical decision making process [1]. POCUS has demonstrated benefits for evaluation of multiple organ systems and clinical conditions, and is being increasingly utilized in specific medical specialties [1]. Despite this, use of POCUS by practicing clinicians across varied practice areas remains low [2-7]. In a 2020 survey of practicing internists across North America, POCUS use was noted to be infrequent [2]. In a 2018 pilot

study of 52 practicing physician assistants (PAs), only 26.9% of respondents reported current use and another 7.7% reported prior use [4]. Within clinical practice, lack of training, access to POCUS devices, and issues over supervision, time, and quality assurance were commonly identified barriers to learning and incorporation of POCUS into practice [2-4, 8].

Commonly identified barriers to incorporation of POCUS into curriculum in medical schools and PA programs include the lack of additional time within the curriculum, and lack of financial support to administer the curriculum [9]. Among

PA programs, lack of access to a device, device cost, and lack of faculty to teach POCUS were noted as additional barriers [10]. Despite this, given the growing body of literature supporting POCUS, focused POCUS skills education within medical education curricula is increasing [1-4, 9-14]. Emergency medicine and critical care residencies and fellowships are required to provide POCUS education, and inclusion in curricula within internal medicine and family medicine residencies is often expected [1, 3, 13]. Additionally, sequential, longitudinal POCUS curricula are feasible in PA education [15].

Recently, a lack of clinical preceptors ready to teach POCUS to PA students on clinical rotations has been discovered through a 2020 survey of 124 nurse practitioners (NPs), PAs, and physicians serving as clinical preceptors for one Midwest PA program [6]. Most clinical preceptors in that study believed POCUS adds value to patient care (87.1%), should be taught in PA school (77.4%) and expressed interest in learning POCUS themselves (70.2%) [6]. However, consistent with studies looking at other clinician populations, few have received POCUS training (37.1%) or actively use POCUS in their practice (23.4%) [6]. Regarding continuation of POCUS training on clinical rotations 66.1% of preceptors stated they would allow PA students to practice their POCUS skills on clinical rotation. However, only 31% felt comfortable or very comfortable with this. Even fewer, 22.6%, felt comfortable or very comfortable integrating PA student findings on POCUS into their clinical decision making [6].

POCUS instruction across the curriculum including use on clinical rotations is necessary for PA learners' students to master this increasingly necessary skill. While perceived barriers to POCUS use have been explored in clinical practice and didactic education, barriers to the use of POCUS by PA students while on clinical rotations, from the perspective of clinical preceptors, has not been defined. A better understanding of these perceived barriers will allow for more appropriate curricular planning and interventions to ensure sufficient learning opportunities for PA students on clinical rotations. The purpose of this research project was to identify the most common barriers and the single most significant barrier to PA student use of POCUS on rotations.

## METHODS AND MATERIALS

An exploratory quantitative survey research design was employed. Survey questions were developed by PA program faculty at an academic medical center in the Midwest. Respondents reflected a diverse breadth of

disciplines across the medical system's associated health system.

Prior research was completed on two hundred twelve previously identified NPs, physicians, and PAs serving as PA student preceptors via an email survey in 2020. Further statistical analysis was completed to address additional research questions. Descriptive statistics outlining frequencies of responses were completed. Demographic data was collected, including years of practice (less than 10 years or 10 years or greater), location (the main academic medical center or other clinical sites), practice type (inpatient, outpatient, or mixed practice), and specialty (primary care, surgical practice, or medical specialty, including emergency medicine).

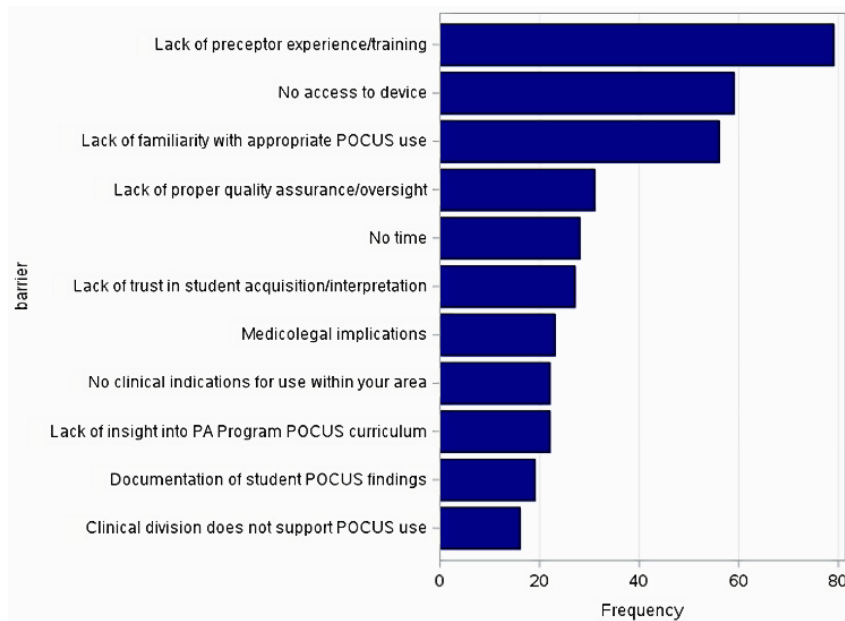
## RESULTS

The survey response rate was 58.5% (124 of 212). Most respondents were female (62.9%), with males accounting for a substantial minority (34.7%), while a small percentage preferred not to specify (2.4%). Most respondents were PAs (61.3%), with NPs (22.6%) and physicians (16.1%) making up the remainder. Regarding experience, respondents were evenly split between those who had been in practice for fewer than 10 years (48.4%) and those who had been in practice for 10 years or greater (50%). Most respondents (52.4%) worked predominantly in an inpatient setting, while 25.8% worked predominantly outpatient, and the remaining 21.4% worked in a mixed practice setting. Regarding experience, respondents were evenly split between those working at the main academic medical center (47.6%) and those working in community and critical access sites (52.4%).

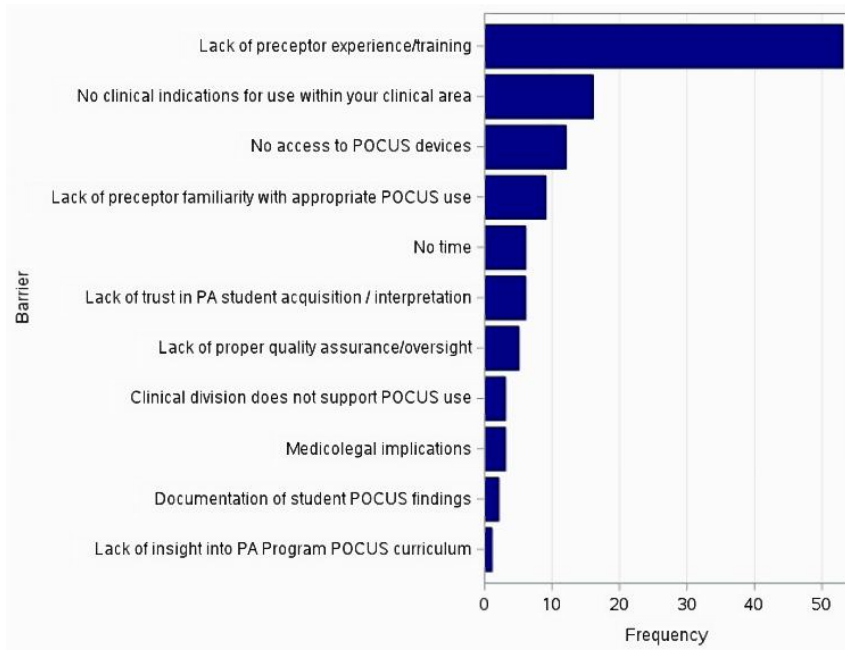
Clinical preceptors were asked to identify perceived barriers to PA student use of POCUS on clinical rotations (**Figure 1**). The most frequently identified barriers included lack of preceptor experience/training in POCUS (63.7%), lack of access to a POCUS device (47.6%), and lack of familiarity and indications for POCUS (45.2%).

Clinical preceptors were also asked to identify the single most significant barrier to PA student use of POCUS while on clinical rotation (**Figure 2**). Lack of preceptor experience and training was the most significant barrier identified by 42.7% of preceptors. With less frequent responses, lack of clinical indication (12.9%) and lack of access to POCUS devices (9.7%) were the next most significant barriers.

Prior research completed on this same preceptor population demonstrated significant differences in prior training in POCUS, desire to learn POCUS, and readiness to teach



**Figure 1.** Frequency of barriers impacting PA student use of POCUS identified by participants who could check more than one response (reprinted with permission from Mayo Foundation for Medical Education and Research)

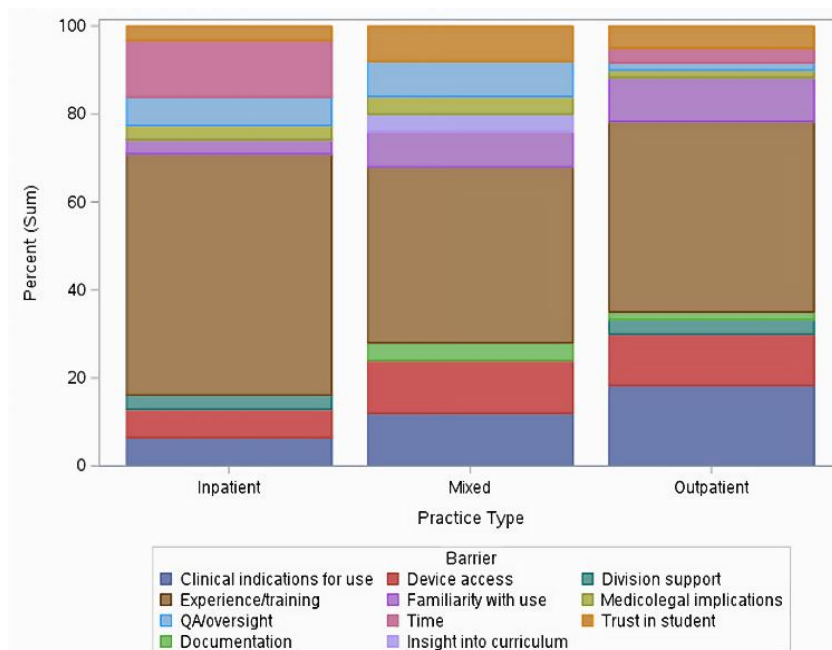


**Figure 2.** Frequency of the most significant barrier for PA student use of POCUS identified by participants (reprinted with permission from Mayo Foundation for Medical Education and Research)

POCUS on clinical rotations between inpatient, mixed, and outpatient providers [6]. Differences in barriers between these groups were evaluated (**Figure 3**). Given the sample size and number of barriers identified, inferential statistical analysis to determine statistically significant differences was not possible, however, notable trends were seen. Time and lack of preceptor training and experience with POCUS were more commonly identified barriers by inpatient providers compared to mixed or outpatient providers. Lack of clinical indications, device access, and lack of familiarity were more common within the outpatient preceptor population.

## DISCUSSION

The lack of additional time within the curriculum, lack of financial support to administer the curriculum, lack of access to a device, device cost, and lack of faculty to teach POCUS have been identified as barriers to incorporation of POCUS into medical education and PA program curriculum [9, 10]. Importantly, while perceptions of PA student preceptors on POCUS are favorable, use and readiness to teach POCUS on clinical rotations are limited [6]. However, reasons for preceptor's lack of readiness to teach POCUS have not been explored, as barriers to PA student use of POCUS on clinical rotations have not been previously defined.



**Figure 3.** Frequency of the most significant barrier for PA student use of POCUS identified by participants by practice type, inpatient versus mixed practice versus outpatient (reprinted with permission from Mayo Foundation for Medical Education and Research)

The most frequent barriers preceptors identified to PA student use of POCUS include lack of preceptor experience and training with POCUS, lack of access to a POCUS device, and lack of familiarity of and indications for POCUS. For a large percentage of clinical preceptors, lack of preceptor experience and training with POCUS was the single most significant barrier. Trends towards differences based on preceptor practice type have not been reported previously. These perceived barriers are like those barriers identified by clinicians limiting their own use of POCUS [2-4, 8]. One conclusion to this data is that preceptors don't feel comfortable when students' experiences with a topic exceed their own, and thus, student use of POCUS is tied to a preceptors knowledge about POCUS. In prior research, PA program directors identified several barriers to implementing a POCUS curriculum, including lack of skilled didactic faculty, lack of time, and lack of access to devices [10]. However, a lack of clinical preceptors with the experience required for training PA students in POCUS, and the associated barriers for this, were not identified. While this study is specific to PA students, similar patterns might be found for medical students and residents, however, further research is required.

These new findings add additional context to the previously identified gap in clinical preceptors' perceptions and readiness to teach [6]. As PA programs incorporate POCUS into curricula, creating intentional opportunities for POCUS education on clinical rotations is needed. The differences in barriers based on practice type allow targeted intervention based on specific rotations. At this institution, emphasis of

POCUS practice on specific rotations, such as emergency medicine, that include preceptors with POCUS experience is occurring. Attempts to identify and recruit preceptors specifically with POCUS experiences are ongoing. Additionally, advocacy to help remove barriers, such as providing resources for education, primarily for inpatient providers, and device access, primarily for outpatient providers, are occurring.

## CONCLUSION

The new findings described in this study further inform appropriate curricular planning for PA programs attempting to incorporate POCUS into their curriculum. Given the novelty of this skillset, programs will benefit from a deeper understanding of barriers, with notable differences to practice types, to help ensure adequate student learning. Programs looking to incorporate POCUS into their curriculum, should identify clinical educators with this skill set, and foster the development of this skillset in others.

Despite the good response rate, this study is limited by a small sample size. All preceptors worked at the same institution, all within the geographical location of the upper Midwest. These factors might limit generalizability; however, the study population spans different professions, specialties, practice types, experience, and clinical sites (critical access, community hospitals/clinics, and academic medical centers). We believe this represents the most robust understanding of the barriers impacting student use of POCUS on clinical rotations. Response bias and lack of validation of survey tool are additional limitations to study.

Future research to see if interventions targeted at reducing these barriers for preceptors result in improved student opportunity for clinical POCUS education. Additional research at multiple institutions and with a larger preceptor population is required to see if these results are generalizable.

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**Declaration of interest:** Authors declare no competing interest.

**Data sharing statement:** Data supporting the findings and conclusions are available upon request from the corresponding author.

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