



The effects of the SNAPPS model on clinical learning experiences for Physician Assistant students

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Keywords

Clinical rotations;
clinical teaching strategies;
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SNAPPS.

Abstract

The current study was created to pilot an approach to clinical experiential learning for Physician Assistant (PA) students by teaching students the six-step clinical teaching model: (1) Summarize the case, (2) Narrow the differential diagnosis, (3) Analyze the differential diagnosis (what key patient findings support or lack support for each), (4) Probe the preceptor (ask for clarification of topics about which the learner feels unsure), (5) Plan management (with preceptor input) and (6) Select a care-related issue for self-directed learning; abbreviated to SNAPPS. SNAPPS is known to be learner-led and has been shown in research to be effective in increasing insights into clinical reasoning and encouraging timely feedback to medical students. The research question asked what effect SNAPPS training may have on PA student ratings of (1) learning climate, (2) control of session, (3) communication of goals, (4) promotion of understanding and retention, (5) evaluation, (6) feedback and (7) global assessment on a survey instrument following clinical learning experience. In a Solomon-four group design, PA students from an Atlanta-based PA program completed the validated PA Clinical Rotation Evaluation (PACRE) instrument before and/or after a SNAPPS training or case-based education module. An analysis of variance showed the effects of group designation on the domains of Control of Session ($F(3, 9) = 9.084, p = .004$), Communication ($F(3, 9) = 7.527, p = .008$) and Evaluation ($F(3, 9) = 5.626, p = .019$) was statistically significant for differences in PACRE scores. It was noted that the case-based groups scored clinical rotation higher on the instrument than the SNAPPS groups, highlighting the potential effect that SNAPPS groups may have reflected more critically on their learning experience.

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Introduction

Physician Assistants (PAs) are licensed clinicians who fulfill a role in healthcare by expanding access to care through patient-centered, team-based care and are able to practice in every specialty and setting within the United States (American Academy of Physician Assistants [AAPA], 2022). However, faced with clinical site and preceptor shortages in the United States (Erikson et al., n.d.; Kohlhepp, 2017), Physician Assistant (PA) students may be placed with clinical preceptors who lack competence in effective teaching strategies. Research about clinical teaching strategies has focused on training both the preceptor and the student to achieve evidence of effectiveness (Fagundes, et al., 2020; Jain, et al., 2019). However, one teaching model is documented to be learner-led and places the responsibility of the teaching encounter onto the learner (Pascoe et al., 2015). This shift may support adult learners' needs for autonomy and self-directedness (Bastable et al., 2020). Burgess et al. (2020, p. 2) noted strategies that increase learner engagement could create students who identify as proactive learners who "seek feedback and reflect on their own performance". Suppose the effectiveness of a learner-led clinical teaching model remains when training in the model is only given to students. In that case, this may create more consistent and effective learning opportunities in clinical experiences, more opportunities for students' insights into clinical decision-making processes and more effective feedback from preceptors without adding stress and training time to the clinical preceptor. If students can be equipped with effective student-led learning strategies during clinical rotations, this could decrease barriers for clinicians to embrace the role of clinical teacher and ultimately increase access to clinical experiential learning for PA students. The purpose of the study was to assess what effects teaching PA students a clinical model had on their perception of the clinical learning experience.

Literature review

The Association of American Medical Colleges (AAMC, 2020) released data projecting shortages of primary and specialty care physicians through 2033. This shortage has contributed to a very high expected growth rate of physician assistants (PA) (Bureau of Labor Statistics [BLS], 2021) and an increase in the number of physician assistant (PA) programs by 54% since 2010 (Accreditation Review Commission for the Education of Physician Assistants, Inc [ARC-PA], 2021). This growth has led to concerns about clinical preceptors and clinical site shortages (Kohlhepp, 2017). Clinical teaching sites serve an important experiential learning component for the education of physician assistants (and other clinicians); however, this rapid growth in need has led to a shortage of placements for students and trained preceptors to guide this learning (Roupp et al., 2019). Based on the 2013 Multi-Discipline Clerkship/Clinical Training Site Survey (Erikson et al., n.d.), 95% of PA program respondents indicated they were moderately or very concerned about the number of clinical sites available. Melvin et al. (2020, p. 14) noted "one core experience of health professions education is graduated responsibility in authentic clinical settings with patients... the increased volume of trainees... has not correlated with

a sufficient increase in numbers of clinical training sites." Clinical sites often share precepting duties using several site providers or attempt to place multiple students with one preceptor to meet placement needs (Theobald et al., 2019). These tactics may decrease the likelihood of learners receiving significant experiential learning exposures and effective feedback during the clinical rotation.

Experiential clinical learning and feedback are key components in the development of clinical decision-making by future PAs and, under the guidance of clinical preceptors, are primarily developed through exposure to patients' problems at clinical sites. McNeil and Konicki (2021, p. 105) stated, "it is a misconception that just by virtue of their clinical experience [clinicians] will be successful as preceptors". The ongoing need for authentic experiential learning for students has increased the likelihood of preceptors being recruited and chosen based on "specialty, availability and willingness as opposed to their competence in the teaching role" (McNeil & Konicki, 2021, p.105, emphasis added). McNeil and Konicki reported the topics preceptors felt the most in need of training included improving students' clinical decision-making and giving feedback. Shaughness et al. (2017) noted that effective feedback is structured and about what works well and where improvements can be made. The feedback should be timely and allow the learner to apply the feedback to the clinical setting immediately. Effective feedback can improve clinical decision-making skills and provide a "more enriching clinical learning experience" (Shaughness, et al., 2017, p. 175).

The SNAPPS model is an acronym for a six-step oral presentation format. It stands for (1) Summarize the case, (2) Narrow the differential diagnosis, (3) Analyze the differential diagnosis (what key patient findings support or lack support for each), (4) Probe the preceptor (ask for clarification of topics about which the learner feels unsure), (5) Plan management (with preceptor input) and (6) Select a care-related issue for self-directed learning (Pascoe et al., 2015). Research has shown the effectiveness of using teaching techniques, such as the SNAPPS model, to increase insights and timely feedback for clinical decision-making ability when used by preceptors and students trained in these strategies (Pascoe et al., 2015).

The SNAPPS model is noted to be learner-directed and shifts the responsibility of the teaching encounter from the preceptor to the learner (Pascoe et al., 2015). The SNAPPS strategy is often taught to both preceptors and students, with the preceptor taking an active role mainly in steps four and five. In randomized controlled studies of the use of SNAPPS, it was noted that students took on a more active role during case presentations; expressed significantly more questions and uncertainties; took the initiative to present and justify their clinical decisions for diagnosis, differential diagnosis, and management plan; had expanded differentials; and were clearer about their diagnostic hypotheses (Fagundes et al., 2020; Jain et al., 2019). The drawback of this method is that implementation, as supported by research, requires training of both the preceptor and the student (Fagundes et al., 2020; Jain et al., 2019; Pascoe et al., 2015). However, given the strains on placement of students into clinical sites, programs may not be in a position to require preceptors

to incorporate additional training in order to become more effective clinical educators (Gatewood & DeGagne, 2019).

Research question

The study addressed the following research question: What was the effect of SNAPPS training on Physician Assistant (PA) student perceptions of the clinical learning experience, including (1) learning climate, (2) control of session, (3) communication of goals, (4) promotion of understanding and retention, (5) evaluation, (6) feedback and (7) global assessment?

Methodology

Study design

The design of this study is based on the Solomon four-group design, which Braver and Braver (1988) noted to have strong internal validity and that can assess for pretest sensitization. In this design, 14 participants were randomly assigned to one of four groups (see Table 1). Participants in Groups 1 and 3 completed the clinical rotation evaluation survey instrument prior to the educational session ("pretest" condition). The survey was based on the most recently completed clinical rotation. The two intervention groups (Groups 1 and 2) received educational training in the SNAPPS model. In contrast, Groups 3 and 4, acting as controls, received a case-based learning activity similar to prior didactic year sessions. A "post-test" clinical evaluation survey was administered at the completion of the four-week clinical rotation that immediately followed the educational sessions (Rotation 2).

Table 1: Proposed study design, based on Solomon four-group design.

Groups	Clinical Rotation (4 weeks)	Pre-Intervention Clinical Rotation Evaluation Survey*	Educational Session Content	Clinical Rotation (4 weeks)	Post-Intervention Clinical Rotation Evaluation Survey*
1**	X	X	SNAPPS Model**	X	X
2**	X		SNAPPS Model**	X	X
3	X	X	Case-based Learning	X	X
4	X		Case-based Learning	X	X

Note: *Survey is based on the most recently completed clinical rotation. ** Intervention groups.

Factors that have been found to affect survey completion include mode of administration, questionnaire design, incentives, and follow-up contacts (Klabunde, et al., 2013). To maximize the response rate, students were introduced to the general purpose of the research: to understand how learning strategies can influence the clinical learning experiences of physician assistant students during clinical rotations. This may appeal to the student participants' altruistic motivations of increasing learning for students who follow in their paths. Also, only the researcher will have access to identified data (not clinical faculty or preceptors), ensuring that confidentiality can be promised which may promote open and honest participation. The instrument is

short (15 items) and was administered electronically. The surveys and educational modules were provided through a link to the participant's school-associated email address, and three to four emailed reminders were sent to participants.

Population of interest

The population of interest for this pilot study was students in the clinical year of a physician assistant (PA) program located in Atlanta, Georgia. The Institutional Review Board (IRB) gave this research exempt status, and an informed consent form was approved for use. Students who had successfully completed their didactic education and had advanced in the program into clinical education were invited to participate in the study. During a pre-clinical orientation program, the students were introduced to the research, and the purpose of the study and the consent form were reviewed. The program had a cohort size of about 31 students who would be entering clinical rotations, and 14 consented to be a part of the study.

Instruments and psychometrics

The PA Clinical Rotation Evaluation (PACRE) instrument (Meverden et al., 2018) was developed based on the Stanford Faculty Development Program (SFDP) for Clinical Teaching categories, which include (1) learning climate, (2) control of session, (3) communication of goals, (4) promotion of understanding and retention, (5) evaluation, (6) feedback and (7) promotion of self-directed learning (Meverden, et al., 2018). The items are responded to on a five-point Likert scale of (1) strongly disagree to (5) strongly agree and included items such as The preceptor created an environment that was conducive to learning (learning climate), I received feedback on my performance (feedback), and I was evaluated on what I learned (evaluation). Each of the categories included two items that were evaluated on the survey by clinical learners. Additional demographics were collected with the survey, including age, gender and rotation specialty. After iterative revisions, the draft survey was pilot-tested with PA students and colleagues before being used on a larger scale (Meverden, et al., 2018). Meverden, et al. (2018) showed the instrument to have excellent internal consistency (Cronbach alpha = 0.95). Meverden et al. reported PACRE scores to be associated with gender and rotation specialty, as well as the perception of preparedness and value of the rotation.

The PACRE instrument was developed and validated with clinical PA students, which aligns with the population of interest and the research question for the proposed study. There are no anticipated changes to the instrument besides adding some demographic questions. Permission to use the instrument was obtained from the developer of the PACRE.

Analysis and discussion

Results

Consent for participation in this research was collected from participants prior to the random assignment of each

student to one of the four study groups. 15 out of 31 eligible students in the cohort consented to participate (45%), and the response rate for the first and second surveys was 93%; 14 out of 15 and 87%; 13 out of 15). Data were verified to be complete, and entries with errors or missing data were eliminated. A software program (SPSS) was used to analyze the collected data.

The general characteristics of the participants collected in the post-intervention survey included a mean age in years of 27.31 (SD= 2.6), with 100% identified as women. This is similar to PA programs nationwide where the mean student age is 25.2 (SD = 2.7), and female students make up 72.2% of students (Physician Assistant Education Association, 2020). It is notable that the PA program from which the participants were sampled is located in a Historically Black College and University (HBCU). While participants of this study were not asked about race, the cohort that was sampled has the following metrics: 83% African American, 7% Hispanic, 7% Asian, which does not reflect national program means at 3.9% African American, 7.6% Hispanic and 9.9% Asian student populations (Physician Assistant Education Association, 2020). Participants participated in the following rotation types when completing the post-intervention survey: internal medicine (4), family medicine (3), pediatrics (2), emergency medicine (1), behavioral medicine (1), obstetrics and gynecology (1) and surgery (1).

The mean value and standard deviation from the post-intervention score for each domain was calculated (Table 2). The groups that had the SNAPPS intervention (Groups 1 and 2) scored the rotation experience lower across all the domains when compared to case-based groups (Groups 3 and 4). Group 3 had no variance in domain scores, except global assessment of learning, with both participants responding with strongly agree (5) across all domains.

Table 2: Post-intervention survey scores by groups and by domain.

	Group 1 (Pre- intervention and SNAPPS) (n=4)	Group 2 (SNAPPS) (n=3)	Group 3 (Pre- intervention survey and Case-based) (n=2)	Group 4 (Case-based) (n=4)	p
PACRE Scores ¹					
Learning Climate	3.750(.9574)	3.833(.7638)	5.00(.000)	4.875(.2500)	.085
Control of Session	4.000(.000)	3.833(.2887)	5.00(.000)	4.750(.5000)	.004*
Communication	3.125(.7500)	4.500(.5000)	5.00(.000)	4.750(.5000)	.008*
Promotion of Understanding	3.750(.5000)	4.000(.000)	5.00(.000)	4.375(.9465)	.180
Evaluation	3.375(.4787)	4.33(.5774)	5.00(.000)	4.500(.5774)	.019*
Feedback	3.250(.8660)	4.167(.7638)	5.00(.000)	4.375(.7500)	.099
Global Assessment	3.00(.4082)	3.50(1.3229)	4.50(.7071)	4.250(.8660)	.181

¹Values are Mean (SD) *Statistically significant; p<0.05

An analysis of variance showed the effects of group designation on the domains of Control of Session ($F(3, 9) = 9.084, p = .004$), Communication ($F(3, 9) = 7.527, p = .008$) and Evaluation ($F(3, 9) = 5.626, p = .019$) that were statistically significant for differences in PACRE scores. Post hoc analysis was completed using Games-Howell (Games et al., 1979) due to unequal variances noted on Levene's test (Levene, 1960) and indicated that the control of session ratings was significantly higher for the group with case-based education and pretest survey ($M=5.000, SD = .000$) as compared to SNAPPS intervention without pretest survey ($M=3.833, SD = .2887, p = .049$). Games-Howell post hoc analysis also showed ratings for the case-based education with pretest survey group to be significantly higher in both communication and evaluation compared to the SNAPPS intervention with pretest survey group (communication: $M=5.000, SD = .000; M=3.125, SD = .75000, p = .045$; evaluation: $M=5.000, SD = .000; M=3.3750, SD = .4787, p = .020$).

Discussion

The case-based education group (with pretest condition) had statistically significantly higher ratings in the domains of control of session, communication and evaluation than the SNAPPS intervention groups. Control of session score was based on ratings of participants on statements regarding balancing time between patient care and teaching and using time effectively. Communication scores were based on agreement with statements regarding how clear the rotation goals were and if the goals were appropriate for educational needs. The evaluation scores were based on rating statements about performance evaluation by the preceptor (Meverden et al., 2018). The SNAPPS model is known for giving the student a greater role in leading the educational process and creating more engagement in the learning activity by the student (Fagundes et al., 2020; Jain et al., 2019). The SNAPPS group participants may have ranked their preceptors lower in these specific domains of control of session, communication of goals and evaluation, and in general across all the domains because they had more insights into how to be engaged in the learning experience. Burgess et al. (2020) noted that the self-directed learner would seek feedback and reflect more on their performance. Potentially the SNAPPS participants were more self-directed and engaged in more reflection, and were more critical in their reflection on the clinical learning experience. It is interesting to note that one case-based group gave a rating of strong agreement (score of 5) across all the domains, which brings into question how sincerely these participants were reflecting on the learning experience.

This study wanted to examine the potential effects of teaching student participants the SNAPPS model on their perceptions of the clinical learning experience, with the expectation that the SNAPPS model may offer a more learner-driven learning experience and create more self-directed learning in the clinical setting. Overall, it does appear the SNAPPS groups did have a different perception of the clinical learning experience from the case-based groups. However, what remains unclear is if a potentially more critical perception of the learning experience may have been associated with the greater achievement of learning outcomes due to SNAPPS.

Conclusions and recommendations

Limitations of this study were the small sample size, lack of generalizability, and not controlling for factors such as rotation setting or perceptions of preparedness for the rotation. The small sample was taken from a program in an HBCU with a student profile that may vary dramatically from other PA programs, which limits the generalizability of the findings and may raise questions about the influence of student and preceptor race on perceptions of learning in the clinical setting that was beyond the scope of this study. Meverden et al. (2018), in their validation of the PACRE instrument, noted correlations between rotation settings, with general practice rotations having the highest scores and surgical rotations having the lowest. A significant relationship between PACRE scores and participant responses to two questions about preparation for the rotation and preparation for being a PA was also noted in the analysis of the PACRE instrument (Meverden, et al., 2018). Data analysis that includes factoring in data about rotational settings and perception of students' preparation for the rotation may provide clearer insights into the effects of the SNAPPS model while controlling for other external factors that can impact the PACRE score.

Adding an objective learning assessment score (i.e., end-of-rotation examination score) or preceptor evaluations to the PACRE instrument scores may offer more insights into the potential learning benefits of the SNAPPS model without relying on students to evaluate teaching. Student evaluation of teaching (SET) is well-known to be influenced by implicit and explicit biases and poor insights by students on what is most effective for teaching and learning, which may have impacted the data collected in this study.

This study, though limited, showed that students' perceptions of the clinical learning experience did change in response to exposure to the SNAPPS model. It remains unclear if this perception is related to greater achievement of learning outcomes in clinical decision-making and a more reflective, self-directed learning approach. Further research should explore if the SNAPPS model would influence objective measures of learning in the clinical setting or if the student-led use of the model offered preceptors more insights for more effective student feedback and evaluation in the clinical setting.

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