Effectiveness of a SNAPPs in psychiatric residents assessed using objective structured teaching encounters: a case-control study

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ABSTRACT

BACKGROUND: Residents play the role of teachers in almost one-quarter of their activities in residency programs. OBJECTIVE: To evaluate whether a 45-minute class using summarize, narrow, analyze, probe, plan, and select (SNAPPS) could improve psychiatry residents’ case discussion skills in diverse practical learning settings. DESIGN AND SETTING: This case-control, randomized, blinded study was conducted in a psychiatry hospital at Fortaleza-Ceará. METHODS: Using “resident as teacher” (RaT), objective structured teaching encounters (OSTEs), and SNAPPS, we conducted a study with 26 psychiatry residents. We analyzed video footage of psychiatric cases in three settings: outpatient, nursing, and emergency. An intervention was held two months later with the residents, who were then assigned to two groups: group A (lecture on SNAPPS) and group B (lecture on a topics in psychiatry). Shortly after the lectures, they were video recorded while discussing the same cases. Three blinded examiners analyzed the videos using an instrument based on the Stanford Faculty Development Program (SFDP-26). RESULTS: We found high internal consistency among external examiners and an interaction effect, group effect, and moment effect (P < 0.05). The residents who received the SNAPPS lecture scored significantly higher than their counterparts who received a traditional case presentation. CONCLUSION: This study indicates the efficacy of SNAPPS over traditional case presentation in all three settings as assessed by OSTEs and supports its implementation to improve the teaching of clinical reasoning.

INTRODUCTION

Residents play the dual role of learners and teachers for up to one-quarter of their time in residency programs. Nevertheless, formal training in teaching-learning techniques developed for residents, or at least specific recommendations and regulations for those activities are scant. In addition, teaching skills are difficult to correlate directly with clinical diagnostic and recognized competences. Thus, residents are likely to adopt ineffective teaching strategies.

In the United States, more than 50% of residency programs have already implemented “Resident as Teacher” (RaT) training. More recently, a study of program directors in the United States showed that RaT has been implemented in 80% of residency programs, representing a 26.34-point increase from 2001 to 2016. Often, residency programs use a variety of methodologies to teach RaT techniques, including workshops, lectures, seminars, and teaching retreats. These programs have been shown to improve residents’ teaching skills and satisfaction with programs, promoting positive changes in their attitudes toward teaching. A systematic review conducted in 2008 analyzed 13 studies carried out with residents of programs in different fields, demonstrating an improvement in residents’ teaching skills in the most diverse techniques employed. More recently, a review of RaT in general surgery found that changes in attitude toward teaching was the most frequent outcome of assessment, and a resident-as-teacher consensus guideline has been developed to provide a road map for program directors and institutions and to enhance the culture of teaching and learning.

After the implementation of an RaT curriculum, it might be beneficial to use objective structured teaching encounters (OSTEs) in conjunction with these pedagogical strategies to allow the standardized assessment of skills over time. OSTEs have proven to be an effective method to assess both residents and medical students, and have been used to assess and improve the teaching performance of faculty members.
There are benefits of RaT programs for different participants: Residents, by acquiring practical knowledge and skills, are more likely to engage in teaching and learning activities. The students will be able to perceive the educational potential in their institution. The institution may build multi-level capacities in education, alleviating the increasing demands on senior faculty members.2

Although it is not included in the three most popular RaT models (namely, the One-Minute Preceptor, the clinical teaching program of the Stanford Faculty Development Center, and Irby’s domains), role-modeling is the most frequently identified method for residents engaged in teaching.11

An example of a good technique used in medical education for clinical case presentation is the summarize, narrow, analyze, probe, plan, and select (SNAPPS) technique.12 Initially proposed by Wolpaw,13 this technique is based on constructive learning wherein students as active participants are able to develop new knowledge and teachers are partners in the learning process.14 The use of this technique in the teaching-learning process might help students effectively and efficiently verbalize higher-level thinking skills and improve their technical skills.12 In addition, SNAPPS can improve clinical reasoning in the diagnosis and treatment of common diseases14 and has the theoretical advantage of placing greater emphasis on self-directed learning.15 There have been no previous studies using modified models of SNAPPS for teaching preceptors.

OBJECTIVE
This paper aims to evaluate whether a 45-minute class using the SNAPPS technique can improve psychiatry residents’ case discussion skills in diverse practical learning settings.

METHODS
This study was conducted in a psychiatric hospital in the city of Fortaleza, Ceará, Brazil, from March 2017 to December 2018. The study included all 27 residents of the psychiatry training program and 15 interns (i.e., medical students from the last two of the six years of medical school in Brazil).

Before data collection, approval from the Research Ethics Board was obtained on 09/01/2017 (No. 2.255.068), and all the participants provided written informed consent.

The study proceeded as follows: Three psychiatric cases were simulated in three different settings: an outpatient clinic, a ward, and the emergency department. The researcher video recorded the 27 residents in the three settings. First, each resident was told to simulate a clinical case supervision with an intern. All the interns received basic instruction lasting around 20 minutes on how to discuss the clinical cases previously prepared by the researchers. They had access to the details of each case on a sheet to better guide the residents as the discussion deepened. Second, they were asked to discuss the cases for up to six minutes. Finally, the cases were provided to the interns to be used when they play the learner-actor role.

Two months after the first phase of the study (pre-intervention), the residents were invited to attend a didactic activity. The residents were randomly assigned to two groups of 11 residents, with each group including equal numbers of first-year (R1), second-year (R2), and third-year residents (R3) (Figure 1). The intervention group (group A) attended a 45-minute lecture on the teaching technique using SNAPPS. Videos of simulated cases were shown, and the residents were taught how to give effective feedback. Contrariwise, the control group (group B) attended a 45-minute lecture on a general topic in the field of psychiatry. Note that unlike the traditional method, only teachers (in this case, the residents) were taught this technique. The interns did not attend the class.

After the lectures, the groups of residents were taken to different places in the hospital and did not meet each other. Thereafter, the residents had another six minutes of discussion in the same three simulated cases and were video recorded again (Figure 1). All the pre- and post-intervention videos were coded, grouped, and recorded. Only 1 out of 144 video files was found to be corrupted

Figure 1. Study design.
and, therefore, could not be evaluated. The videos were analyzed by three blinded assessors who did not have access to the decoding of the study phases. These invited assessors are clinician-educators in another medical school with extensive teaching experience.

After the intervention day, group B residents were invited to attend the 45-minute lecture on the SNAPPS teaching technique. Only one resident did not attend the lecture, for personal reasons.

Each video was assessed three times—outpatient, emergency, and ward—by the three blinded assessors using the Stanford Faculty Development Program (SFDP)-26 tool (validated in Brazil by Fakhouri Filho SA).16

A sociodemographic questionnaire was used to collect and assess the residents’ gender, year of residency, previous teaching experience, medical school methodology (traditional or active learning), perceived importance of the resident's teaching role, and the approximate amount of time spent teaching during the residency program.

The following analyses were performed: 1) Cronbach’s alpha was calculated between the results gathered from the assessors in each stage (pre- and post-intervention); 2) the generalized estimating equation (GEE) approach with gamma distribution and unstructured correlation structure was used to compare the scores in the outpatient, ward, and emergency settings; 3) a chi-squared test or Fisher's exact test (F) was used, as appropriate, for the comparison of demographic characteristics between the two groups of residents. Finally, the Mann–Whitney U test was used for the comparison of variables when there were two groups and the Kruskal–Wallis test where there were more than two. All the tests were performed with a significance level of 5%.

RESULTS

Internal consistency between external examiners was high in all three settings (outpatient, ward, and emergency), with values of Cronbach’s alpha above 0.70. The values obtained in the pre-intervention and post-intervention settings were 0.850 and 0.910 (outpatient), 0.691 and 0.934 (emergency), and 0.701 and 0.885 (nursing), respectively.

An interaction (P < 0.001) in the three settings was observed when comparing the overall score between Group A and Group B. In the outpatient setting, the overall scores ranged from 2.30 ± 0.77 to 6.00 ± 6.76 in Group A and 2.85 ± 0.82 to 2.85 ± 0.78 in Group B. In the emergency setting, they ranged from 2.18 ± 0.82 to 5.06 ± 1.14 in Group A and 2.45 ± 0.85 to 2.36 ± 0.57 in Group B. In the ward setting, the scores ranged from 2.12 ± 0.82 to 5.45 ± 0.67 in Group A and 1.79 ± 0.82 to 2.40 ± 0.81 in Group B.

The analysis of each item separately revealed that some items differed significantly in the outpatient setting (Table 1).

The items that differed significantly in the emergency setting are given in Table 2.

The items that differed significantly in the ward setting are given in Table 3.

Comparison of the associations between sociodemographic variables (gender, year of residency, previous teaching experience, time spent teaching, teaching role perceived importance, and medical training methodology) between the two groups—intervention (A) and control (B)—revealed no statistically significant differences (P > 0.05). Most participants (81.8%) were female.

Of the 432 recorded videos, only 1 file was corrupted (Group B in the post-intervention phase in the nursing setting). This loss was discrete and highlighted the statistical data of our study.

DISCUSSION

In a training program of only 45 minutes, followed by practice, SNAPPS served to consistently improve residents teaching skills. Many studies have also specifically tested and proven the effectiveness of this method in RaT programs.12,17–22 Despite their small samples, the results of other studies in psychiatry match the findings of this study, as they demonstrated significant improvements in skills and attitudes.23–25

### Table 1. Mean scores in each item in the outpatient setting

<table>
<thead>
<tr>
<th>Teaching environment</th>
<th>Group A pre</th>
<th>Group A post</th>
<th>Group B pre</th>
<th>Group B post</th>
<th>Interaction effect</th>
<th>Moment effect</th>
<th>Group effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wakened students’ interest in the topic.</td>
<td>1.24 ± 0.70</td>
<td>4.06 ± 0.71</td>
<td>1.58 ± 0.53</td>
<td>2.18 ± 1.46</td>
<td>P = 0.005</td>
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</tr>
<tr>
<td>Encouraged students to actively participate in the discussion.</td>
<td>1.61 ± 1.11</td>
<td>4.85 ± 0.17</td>
<td>2.03 ± 1.52</td>
<td>2.45 ± 1.51</td>
<td>P = 0.008</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Promotion of understanding and retention</th>
<th>Group A pre</th>
<th>Group A post</th>
<th>Group B pre</th>
<th>Group B post</th>
<th>Interaction effect</th>
<th>Moment effect</th>
<th>Group effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessed students’ level of previous knowledge.</td>
<td>1.21 ± 0.48</td>
<td>3.91 ± 0.91</td>
<td>1.45 ± 1.01</td>
<td>2.18 ± 1.44</td>
<td>P = 0.012</td>
<td>----</td>
<td>----</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Promotion of self-directed learning</th>
<th>Group A pre</th>
<th>Group A post</th>
<th>Group B pre</th>
<th>Group B post</th>
<th>Interaction effect</th>
<th>Moment effect</th>
<th>Group effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explicitly encouraged further study.</td>
<td>1.00 ± 0.00</td>
<td>4.24 ± 0.56</td>
<td>1.21 ± 0.60</td>
<td>1.21 ± 0.40</td>
<td>P &lt; 0.001</td>
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</tr>
<tr>
<td>Politely encouraged students to read while not in the institution.</td>
<td>1.00 ± 0.00</td>
<td>4.42 ± 0.52</td>
<td>1.12 ± 0.31</td>
<td>1.21 ± 0.40</td>
<td>P &lt; 0.001</td>
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<td>----</td>
</tr>
<tr>
<td>Made sure the students understood what was being taught.</td>
<td>1.12 ± 0.31</td>
<td>1.82 ± 0.87</td>
<td>1.03 ± 0.10</td>
<td>1.09 ± 0.30</td>
<td>P = 0.018</td>
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</table>
RaT is an easy-to-implement and inexpensive model. Furthermore, unlike traditional methods, our study modified the technique by teaching the preceptors, i.e., the residents. To the best of our knowledge, there are no similar published studies. This is the first study to use a modified model of SNAPPSS.

The intervention lasted approximately 45 minutes, which is similar to that in the original SNAPPSS study by Wolpaw and other studies,\(^1^,2^,3^,4^,5^,6^\) which prevented the activity from becoming tiresome, thereby reducing participant withdrawal rates as video recordings took place in different shifts. No particular mode or duration of RaT programs can be considered better than others. The programs may include simple lectures, teaching retreats lasting several days, didactic classes, and even online modules.\(^3^,4^\)

Similar to the study by Connor, the SNAPPSS technique was also evaluated shortly after the lecture.\(^2^\) As in other studies,\(^2^,6^\) the residents were independently assessed by three blinded assessors. Reliability was guaranteed by the standardization of the assessment, which allowed the external examiners to assess the residents with high internal consistency.

The SNAPPSS technique had a positive impact on the residents. It improved their skills in managing a case discussion session with interns. The individual items specifically related to awakening the interest of interns in the topic, encouraging their active participation, and assessing their level of previous knowledge were found to be significantly different between Group A and Group B. These items refer to primordial skills taught in the SNAPPSS lecture that were properly learned and put into practice by the residents.

Items such as listening carefully to the students (interns), showing respect, not ridiculing them, and answering their questions clearly and politely did not present any interaction effects in any of the three settings. Those attitudes are probably already part of the residents’ behavior in psychiatry and may have been acquired throughout life or properly modeled during undergraduate studies.

The sociodemographic variables did not differ significantly between Group A and Group B. Third-year residents have similar teaching skills as first-year residents. Our findings suggest that, without proper training, the residents did not necessarily improve their teaching skills regardless of their year of residency. They need specific training to acquire such skills. Similar results were reported by Sawanyawisuth et al.,\(^18^\) in which the differences found in the SNAPPSS group resulted due to maturation over time, as fifth-year students performed better than sixth-year students on basic attributes, having more diagnoses in their differential, more justified diagnoses, and initiating more diagnosis.\(^18^\)

When asked about the amount of time spent teaching in medical residency, most residents (25 out of 27) reported spending 25% of their time teaching interns or fellow residents. Isenberg-Grzeda et al.\(^27^\) found that 86% of respondents reported that teaching is a common activity during a typical week. In another study, 50% of the residents reported teaching daily, 40% reported teaching only a few times a week, and 10% reported teaching a few times a month.\(^28^\)

With regard to the importance of residents as teachers, only 1 of the 27 participants did not find this role important. While it was not possible to attest this statistically, it is clear that the subject is of great importance to residents and to interns, who usually

### Table 2. Mean scores in each item in the emergency setting

<table>
<thead>
<tr>
<th>Item</th>
<th>Group A pre</th>
<th>Group A post</th>
<th>Group B pre</th>
<th>Group B post</th>
<th>Interaction effect</th>
<th>Moment effect</th>
<th>Group effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion of understanding and retention</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Assessed students’ level of previous knowledge</td>
<td>1.85 ± 1.49</td>
<td>4.21 ± 0.75</td>
<td>1.70 ± 1.39</td>
<td>1.76 ± 0.84</td>
<td>P = 0.029</td>
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<tr>
<td>Management of the session</td>
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<tr>
<td>Efficiently used the time for teaching</td>
<td>2.42 ± 1.40</td>
<td>4.06 ± 0.59</td>
<td>2.21 ± 1.20</td>
<td>2.06 ± 0.84</td>
<td>P = 0.024</td>
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</tbody>
</table>

### Table 3. Mean scores in each item in the ward setting

<table>
<thead>
<tr>
<th>Item</th>
<th>Group A pre</th>
<th>Group A post</th>
<th>Group B pre</th>
<th>Group B post</th>
<th>Interaction effect</th>
<th>Moment effect</th>
<th>Group effect</th>
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</thead>
<tbody>
<tr>
<td>Teaching environment</td>
<td></td>
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<tr>
<td>Awakened students’ interest in the topic</td>
<td>1.73 ± 1.27</td>
<td>4.06 ± 0.96</td>
<td>1.70 ± 1.15</td>
<td>2.00 ± 1.20</td>
<td>P = 0.046</td>
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<tr>
<td>Encouraged students to actively participate in the discussion</td>
<td>1.94 ± 1.36</td>
<td>4.48 ± 0.77</td>
<td>1.76 ± 1.15</td>
<td>1.90 ± 1.66</td>
<td>P = 0.048</td>
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<tr>
<td>Promotion of self-directed learning</td>
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<tr>
<td>Explicitly encouraged further study.</td>
<td>1.33 ± 0.77</td>
<td>4.33 ± 0.80</td>
<td>1.30 ± 1.01</td>
<td>1.70 ± 1.16</td>
<td>P = 0.009</td>
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<tr>
<td>Politely encouraged students to read while not in the institution</td>
<td>1.33 ± 0.77</td>
<td>4.33 ± 0.80</td>
<td>1.30 ± 1.01</td>
<td>1.70 ± 1.16</td>
<td>P = 0.009</td>
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<tr>
<td>Motivated students to study own their own.</td>
<td>1.21 ± 0.48</td>
<td>3.88 ± 1.10</td>
<td>1.30 ± 1.01</td>
<td>1.50 ± 0.97</td>
<td>P = 0.002</td>
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<tr>
<td>Communicating goals</td>
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<tr>
<td>Presented the expected level of competence.</td>
<td>1.21 ± 0.40</td>
<td>2.97 ± 0.96</td>
<td>1.09 ± 0.30</td>
<td>1.27 ± 0.49</td>
<td>P &lt; 0.001</td>
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Chart 1. Medical education evolution

A global review identified the following three phases in the evolution of medical education:

1. A formative phase characterized by didactic teaching, phenomenological and memory learning, and a focus on the scientific basis for medicine during the first 70 years of the 20th century;
2. A performative phase characterized by problem-based instructional innovations focused on concepts in biology as applied to medicine, data retrieval, and integration of knowledge during the latter decades of the 20th century;
3. A transformative phase starting in the 21st century to improve the performance of health systems by adapting core professional competencies to specific contexts while drawing on global knowledge.

Adapted from Frenk et al.30
Despite being targeted only at residents who performed teaching functions, the lecture on the SNAPPSS technique has proven effective and can be useful in medical teaching for the improvement of skill acquisition. As in peer learning, where the use of two-way processes and reciprocal learning activities is important, SNAPPSS involves the sharing of knowledge, ideas, and experience among participants for mutual learning in undergraduate medical schools. This type of activity can have an impact on medical practice in Brazil and other countries, where studies on RaT and OSTE are still emerging. If implemented systematically as part of an RaT program, the residency will benefit from an approach that can improve the teaching of clinical reasoning. Further studies using SNAPPSS and other case presentation techniques are needed to consolidate such active teaching methodologies. Pedagogical surveys to identify residents’ opinions about the method are also important.

REFERENCES


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Authors' contributions: Feijó LP: conceptualization (lead), investigation (lead), project administration (lead), and writing — original draft (lead); Pereira GA: formal analysis (equal), investigation (equal), methodology (equal), and resources (equal); Ruffini WM: formal analysis (equal), investigation (equal), methodology (equal), and project administration (equal); Valente FS: formal analysis (equal), investigation (equal), methodology (equal), and resources (equal); dos Santos RA: formal analysis (equal), methodology (equal), resources (equal), and writing — review & editing (equal); Fakhouri Filho AS: conceptualization (equal), formal analysis (equal), methodology (equal), and supervision (equal); Nunes M do PT: project administration (equal), supervision (lead), visualization (lead), and writing — review and editing (equal); and Augusto KL: formal analysis (lead), project administration (equal), supervision (equal), and writing — review and editing (lead). All authors actively contributed to the discussion of the study results and reviewed and approved the final version of the manuscript to be published.

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