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DEVELOPMENTS

Chief Residents as Educators: An Effective Method of Resident Development

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***Background*: The importance of teaching residents how to instruct medical students is recognized, but time and logistics challenge the implementation of teaching skills programs. No study has described a dissemination model with chief residents as trainers and managers of a teaching skills program. *Description*: All chief residents in three departments ($n = 16$), participated in an 8-hr train-the-trainer teaching skills program and then trained 178 residents through seven 1-hr sessions. Outcome was measured through student surveys using a validated instrument with seven teaching domains and overall assessment of teaching effectiveness. *Evaluation*: Survey results revealed a significant improvement in the vast majority of teaching domains 9 months after implementation of the program in all three departments. Student perceptions of overall teaching effectiveness improved in two departments and trended upwards in the third. *Conclusion*: A resident teaching skills program utilizing chief residents as trainers resulted in improved 3rd-year medical student ratings of resident teaching.**

A large proportion of medical student teaching in the clinical years is performed by residents.[1,2] The Liaison Committee on Medical Education mandates that residents who teach students must "be prepared for their role in teaching and evaluation."[3] Nevertheless, only 55% of residency directors "offer residents formal instruction in teaching skills" with a mean of 11.5 instructional hr in those programs over the residency. Furthermore, the majority of residency directors (75%) and Graduate Medical Education leaders (87%) recognize that their residents "would benefit from even more instruction."[4]

Providing residents with a sufficient depth of teaching skills training is a recurrent challenge to medical schools and residencies. Obstacles in administering resident teaching skills programs include complexity of resident schedules, work hour limitations, and resident rotations at multiple clinical sites. Faculty time constraints often limit the availability of faculty to implement and teach these courses. Chief residents understand the administrative challenges of teaching residents new skills and the challenges residents face in teaching. They are in a unique position to serve as teaching skills trainers and teacher role models for their residents. Chief residents provide near-peer training and can increase resident motivation to teach. However, only one study described a chief resident managed teaching skills program. In that study, one chief resident presented workshops to 26 residents, measured self-rating of teaching effectiveness postworkshop and noted that teaching skills as measured by video analysis declined over an average 6-month period.[5,6] Despite the potential benefits, to date no article describes a dissemination model utilizing multiple chief residents in various specialties as teachers and managers of resident teaching skills programs.

New Jersey Medical School is a large, urban, state-funded university-based residency program with 478 residents potentially involved with student teaching. These residents rotate through multiple sites including a university hospital, a Veterans Affairs hospital, and several suburban community hospitals. The mandate to train a large number of residents and the belief that chief residents could serve as effective teachers, administrators, and role models was the impetus for the creation of the Chief Residents as Educators program. In June 2005, a centrally administered longitudinal teaching skills program utilizing chief residents as trainers was instituted at New Jersey Medical School.

The program outcome was measured by surveying 3rd-year medical student perceptions of resident teaching effectiveness.

METHOD

In January 2005, interviews with program directors revealed the lack of programs in the area of residents as medical student educators. The departments of Obstetrics and Gynecology (Ob/Gyn), Internal Medicine, and Pediatrics volunteered to participate in a centrally administered teaching skills program. To develop an even wider degree of support for the Chief Resident as Educators program, meetings were held with the involved

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departments, the institution wide committee on Graduate Medical Education, and the residents themselves.

Chief residents in the departments of Ob/Gyn, Internal Medicine, and Pediatrics participated in an 8-hr train-the-trainer program in the beginning of the academic year. Each chief resident also received a Chief Resident as Educator teaching skills syllabus to follow during their training sessions with their residents. The train-the-trainer program and syllabus were developed after review of the resident teaching skills literature and published curricula.[7–11] Components of the program included "Why Residents Can Be Excellent Teachers," "One Minute Preceptor," "How Do We Learn Best?" "Five-Minute Teaching Strategies," "How to Give Effective Feedback That Makes a Difference," "Orienting Your Students to Goals and Expectations, and "What's in a Great Question?"

Chief residents were taught how to facilitate 1-hr sessions. The supporting syllabus contained a timed outline of each session and a detailed description of each session's learning activities such as role-play, brainstorming, reflection, and small-group discussion. The syllabus provided resources including clinical cases, additional background information, and a CD-ROM with Microsoft PowerPoint slides for certain sessions. The chief residents, all of whom were either PGY-4 or PGY-5 residents, were taught facilitation skills and were given practice opportunities during the training sessions.

Following the training, the chief residents led seven 1-hr sessions with their respective residents over 6 months. The same monthly schedule was followed by each specialty in each clinical site to ensure similar educational experience by residents regardless of resident rotation schedule. The lead author (EM) served as a resource to the chief residents by answering questions, sending reminders on the timetable for sessions, observing several chief resident sessions, and giving feedback.

Measurement Instrument and Sample

Students evaluated residents who had at least 5 hr of direct contact time with them. To reduce response burden, students evaluated two or three randomly selected residents who met the time criteria. Chief resident trainers were not evaluated by students. The study was approved by the New Jersey Medical School Institutional Review Board.

A 25-item validated survey instrument based on the seven-domain Stanford Faculty Development Program (SFDP) framework, developed by Dr. Debra Litzelman, was used with permission by the author.[12] The survey uses a 5-point Likert scale, ranging 1 (*strongly disagree*) to 5 (*strongly agree*), to report on components of learning climate, control of teaching session, communicating goals, promoting understanding and retention, evaluation, feedback, and promoting self-directed learning. Independent of the SFDP, students also rated residents' overall teaching effectiveness using an identical 5-point Likert scale.

Surveys were distributed at the completion of each clerkship in May or June 2005, prior to the onset of the resident teaching skills instruction (baseline group), then 6 months and 9 months after the institution of the longitudinal resident training program. Student respondents were instructed to give no personal identifiers of themselves or the residents they were evaluating. Surveys were distributed and collected in a large group setting. Data from the SFDP were collapsed into the seven teaching domains identified in the SFDP tool (learning climate, control of session, goals, promoting understanding and retention, evaluation, feedback, promoting self-directed learning) and totals compared in each department at baseline, 6 months, and 9 months using analysis of variance (ANOVA). ANOVAs were also performed across the three departments at each time point. Post hoc pairwise contrast comparisons using the least significant difference method were performed when the ANOVA was significant. Effect size (d) was measured for each pair of ratings. Analysis of covariance (ANCOVA) was performed to control for baseline differences by department. Statistical significance was defined as $p < .05$.

RESULTS

Sixteen chief residents were trained as resident educators. Subsequently, the chief residents trained 20 Ob/Gyn residents, 50 Pediatrics residents, 100 Medicine residents, and 8 Medicine-Pediatric residents. The number of surveys completed by students at baseline, 6 months, and 9 months were as follows: Ob/Gyn = 48, 67, 54; Pediatrics = 41, 43, 53; and Medicine = 92, 79, 115. Proportionately more surveys were collected following the Medicine 12-week rotation at each time interval than following the Ob/Gyn or Pediatrics 8-week rotations reflecting the larger number of students in the Medicine rotation at that time. The student survey response rate was more than 80%.

SFDP Domains

Figure 1 presents the SFDP domain scores at baseline for the three departments. In each domain, Medicine had significantly higher scores at baseline than Ob/Gyn. Medicine had higher baseline scores compared to Pediatrics in all domains except goals and feedback.

Figure 2 represents changes from baseline in the seven teaching domains for each of the three departments. Statistically significant improvements were noted from baseline to 6 months and baseline to 9 months in all domains among Ob/Gyn residents. There was no significant difference between 6-month and 9-month measurements in Ob/Gyn in any domain. Pediatric residents had statistically significant improvements in all domains from baseline to 6 months. There was no significant change from 6- to 9-month data in Pediatrics except in the domain of goals, which reverted back to the baseline level. The medicine residents had no significant change in all domains from baseline to 6 months except for a decrease in learning climate. There were significant improvements from baseline to 9 months in all domains except learning climate and evaluation. Significant improvements from 6 months to 9 months were noted in all domains.

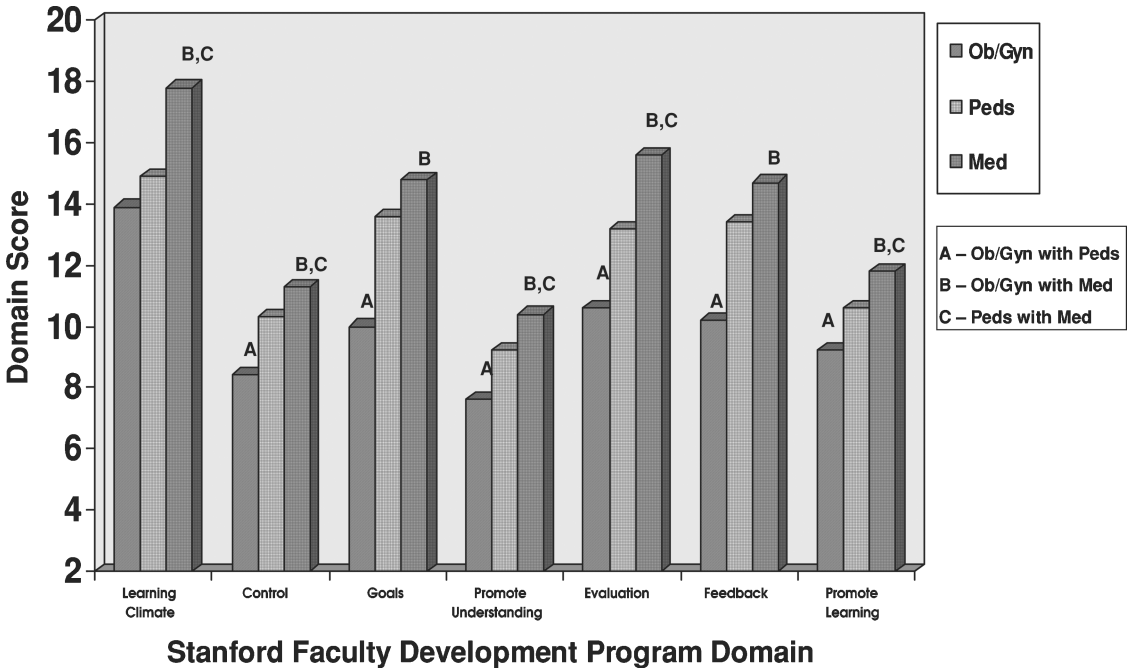

FIG. 1. Comparison of the Stanford Faculty Development Program domain scores at baseline for Ob/Gyn, Pediatrics, and Medicine. Significance defined at $p < .05$.

Results for the ANCOVA determinations revealed that time points remained a significant factor when controlling for baseline departmental effects.

Tables 1 to 3 contain the collapsed SFDP domain student ratings reported as mean values and standard deviations for each department over time. The effect size of each pair of ratings is

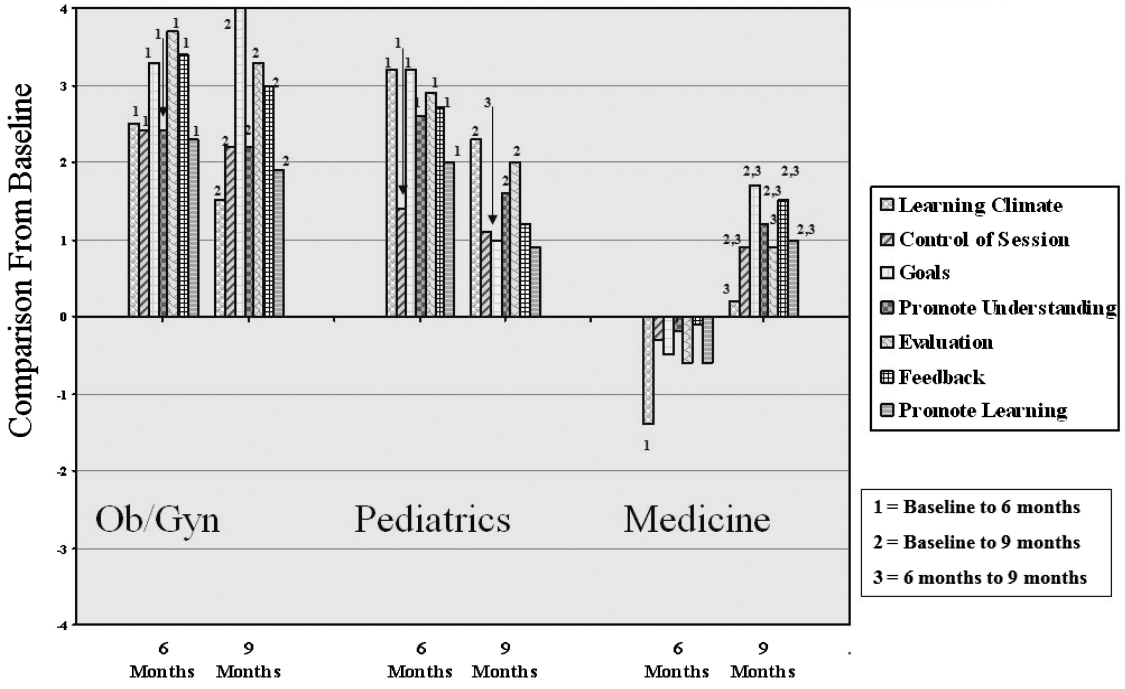

FIG. 2. Representation of the changes from baseline in the seven domains for Ob/Gyn, Pediatrics, and Medicine at 6 months and 9 months. Significant changes ($p < .05$) from baseline to 6 months, baseline to 9 months, and 6 months to 9 months are noted.

TABLE 1
Composite student ratings of residents in Ob/Gyn department over time

Domain	Baseline		6 months		9 months		Effect Size (d) Pairwise Comparisons		
	M	*SD*	*M*	*SD*	*M*	*SD*	Baseline: 6 Months	Baseline: 9 Months	6 Months–9 Months
Learning Climate	13.93	3.44	16.37	3.61	15.39	3.42	0.69***	0.43*	0.28
Control of Session	8.42	2.16	10.82	2.54	10.63	2.83	1.02***	0.89***	0.18
Communication of Goals	9.98	3.18	13.30	4.12	14.05	4.58	0.91***	1.05***	0.17
Promoting Understanding and Retention	7.56	2.83	10.03	3.03	9.85	2.84	0.84***	0.81***	0.06
Evaluation	10.56	3.32	14.27	3.84	13.86	3.79	1.04***	0.93***	0.11
Feedback	10.19	3.51	13.63	3.87	13.22	4.51	0.93***	0.76***	0.09
Promoting Self-directed Learning	9.21	2.75	11.49	2.72	11.08	2.66	0.83***	0.69***	0.15
Overall Teaching Effectiveness	2.96	1.25	3.72	1.15	3.62	1.01	0.69***	0.33**	0.09

Note. Ratings are based on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The 25-item survey was collapsed into learning domains as follows: Learning climate, 4 questions; control of session, 3 questions; communication of goals, 4 questions; promoting understanding and retention, 3 questions; evaluation, 4 questions; feedback, 4 questions; promoting self-directed learning, 3 questions. Overall teaching effectiveness was a separate, additional question.
* $p < .05$. ** $p < .01$. *** $p < .001$.

included. The effect size, or standardized mean difference, is measured by dividing the difference between the two means by the pooled standard deviation.[13] Ob/Gyn had large effect sizes in all baseline versus 6-month domains and in all baseline versus 9-month domains except learning climate, where there was a medium effect. Medium to large effect sizes were noted in all domains of Pediatrics baseline versus 6 months and in several domains of Pediatrics baseline versus 9 months. Medicine had medium effect sizes comparing baseline to 9 months in all categories except learning climate and evaluation.

Overall Teaching Effectiveness

Student rating of overall teaching skills effectiveness improved significantly in Ob/Gyn and Medicine but not in Pediatrics. Within Ob/Gyn, there were differences noted between baseline and 6 months (2.96 and 3.72, $p < .01$, $d = 0.69$) and baseline and 9 months (2.96 and 3.62, $p < .01$, $d = 0.33$), but not between 6 and 9 months. Within Medicine, there were no significant differences between baseline and 6 months, but there were significant differences between 6 and 9 months (3.75 and 4.26, $p < .01$, $d = 0.45$) and between baseline and 9 months (3.93

TABLE 2
Composite student ratings of residents in pediatrics department over time

Domain	Baseline		6 months		9 months		Effect Size (d) Pairwise Comparisons		
	M	*SD*	*M*	*SD*	*M*	*SD*	Baseline: 6 Months	Baseline: 9 Months	6 Months–9 Months
Learning Climate	14.92	5.03	18.07	2.83	17.24	4.07	0.80***	0.51**	0.24
Control of Session	10.31	3.25	11.71	2.81	11.41	2.84	0.46*	0.36	0.11
Communication of Goals	13.56	4.69	16.83	3.63	14.57	4.32	0.79***	0.22	0.57***
Promoting Understanding and Retention	9.23	3.30	11.85	2.88	10.77	3.31	0.85***	0.47*	0.35
Evaluation	13.23	4.67	16.07	3.90	15.21	4.70	0.66**	0.42*	0.20
Feedback	13.43	4.56	16.07	3.81	14.57	4.68	0.63**	0.25	0.35
Promoting Self-directed Learning	10.59	3.60	12.60	3.22	11.66	3.44	0.59**	0.30	0.28
Overall Teaching Effectiveness	3.46	1.39	4.30	1.04	3.89	1.20	0.69**	0.33	0.37

Note. Ratings are based on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The 25-item survey was collapsed into learning domains as follows: Learning climate, 4 questions; control of session, 3 questions; communication of goals, 4 questions; promoting understanding and retention, 3 questions; evaluation, 4 questions; feedback, 4 questions; promoting self-directed learning, 3 questions. Overall teaching effectiveness was a separate, additional question.
* $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 3
Composite student ratings of residents in medicine department over time

Domain	Baseline		6 months		9 months		Effect Size (d) Pairwise Comparisons		
	M	*SD*	*M*	*SD*	*M*	*SD*	Baseline: 6 Months	Baseline: 9 Months	6 Months–9 Months
Learning Climate	17.81	2.87	16.39	4.20	18.03	2.88	0.49**	0.08	0.57**
Control of Session	11.31	2.30	10.97	2.92	12.26	2.35	0.13	0.41**	0.50***
Communication of Goals	14.83	3.91	14.29	4.62	16.49	3.47	0.13	0.45**	0.54***
Promoting Understanding and Retention	10.36	2.86	10.56	3.74	11.66	2.91	0.06	0.45**	0.33*
Evaluation	15.61	3.94	14.95	4.88	16.56	3.67	0.15	0.25	0.38**
Feedback	14.76	3.94	14.69	4.35	16.30	3.61	0.02	0.41**	0.41**
Promoting Self-Directed Learning	11.79	3.02	11.19	3.64	12.84	2.52	0.18	0.38**	0.54***
Overall Teaching Effectiveness	3.93	1.14	3.75	1.28	4.26	1.00	0.15	0.31*	0.45**

Note. Ratings are based on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The 25-item survey was collapsed into learning domains as follows: Learning climate, 4 questions; control of session, 3 questions; communication of goals, 4 questions; promoting understanding and retention, 3 questions; evaluation, 4 questions; feedback, 4 questions; promoting self-directed learning, 3 questions. Overall teaching effectiveness was a separate, additional question.

* $p < .05$. ** $p < .01$. *** $p < .001$.

and 4.26, $p < .05$, $d = 0.31$). Within Pediatrics, there were significant differences from baseline to 6 months (3.46 and 4.30, $p = .01$, $d = 0.69$) with a trend back to baseline at 9 months.

DISCUSSION

This study demonstrates that a resident teaching skills program utilizing chief residents as trainers is an effective method to improve resident teaching skills. This is the first study using a dissemination model with chief residents as teaching skills trainers. All three subspecialties showed significant improvement by 9 months in many, if not all, of the domains. A specific strength of this study was the use of student rating of teaching effectiveness as the outcome measure of success of the resident teaching skill program.

The pattern of improvement on the SFDP domains varied by department. Ob/Gyn demonstrated improvement by 6 months in all domains, and maintained that improvement at 9 months. Medicine had significantly higher scores at baseline in almost all domains compared to Ob/Gyn and Pediatrics. Medicine ratings remained stable in most domains by 6 months and improved significantly in all but learning climate and evaluation by 9 months. Medicine's high baseline scores may have increased the difficulty in demonstrating an improvement at 6 months, but as the program spread through the department, the robustness of the program eventually overcame this effect by 9 months. Pediatrics improved in most domains by 6 months and maintained that level at 9 months.

Overall teaching effectiveness improved at 9 months in Ob/Gyn and Medicine. Pediatrics improved at 6 months, then trended back to baseline. In general there was a high degree of concordance between improvement in the SFDP teaching domains and the measurement of overall teaching effectiveness.

Student ratings of resident teaching effectiveness was utilized as the outcome variable using a validated survey instrument. This survey instrument was chosen after review of the literature.[12,14–17] Other potential methods of measuring outcomes were less appealing for the purposes of this study. Self-rating by residents of teaching improvement is the typical outcome measure and is an inadequate surrogate for direct feedback from the student, the intended learner. Objective Structured Teaching Examinations have been shown to be reliable[18–20] but are expensive and difficult to administer to a large number of residents. Improved student learning might be considered as an outcomes measure, but comparisons of student course grades or United States Medical Licensing Examination test score data are subject to multiple, potentially confounding factors.

A longitudinal program was chosen because it obviated the need to release residents from clinical duties for long periods and because it would serve as an ongoing reminder of the importance of teaching. Both 1-day workshops and longitudinal programs have been evaluated in the literature.[21] A longitudinal 13-hr, 6-month curriculum described by Morrison et al. resulted in improved teaching skills as judged by medical student raters in an Objective Structured Teaching Examination.[22,23]

The present program allowed dissemination of teaching skills training to a large group of residents rotating at multiple training sites. The dissemination model is an effective approach in train-the-trainer teaching skills programs for faculty,[24] but this is the first study utilizing the model solely with chief residents as teaching skills trainers. In this study, 16 chief residents trained 178 residents. Coverage of key concepts was ensured, as the program was centrally based with a uniform syllabus and monthly schedule. Some flexibility in scheduling and curricular emphasis tailored to departmental needs was achieved through chief resident input. The program was instituted with minimal

budgetary impact because it utilized chief residents as trainers. The centrally based trainer (EM) served as a resource person to the chief residents and kept the timing of training sessions on track with reminders to the chief residents.

Multiple factors contributed to the success of the program. Building support among stakeholders—in particular, department chairs and residency directors—prior to the institution of the program was critical to program implementation and chief resident buy-in. The use of chief residents as the educator of residents provided the following potential advantages when compared to the standard method of faculty-driven resident teaching development programs: Residents perceive chief resident as role models, chief residents can impact on dozens of residents, and chief residents have the opportunity to provide ongoing reinforcement of the teaching effectiveness programs on a daily basis.

The timing of the study was inadvertently designed in such a manner as to mask the potential impact of the Chief Residents as Educators program. Baseline data from students were obtained at the end of the academic year, a time when resident teaching skills are most honed. On the other hand, postintervention teaching skills were measured earlier in the next academic year. Furthermore, the baseline residents evaluated included residents soon to become chiefs, but the postintervention evaluations did not. Consequently, the reported positive findings of enhanced resident teaching effectiveness from baseline attest to the robustness of the Chief Residents as Educators program, as it was able to overcome the potential confound of time.

There are several limitations to the present study. Inherent in the 3rd-year schedule, blocks of students perform specific clerkships at distinct times. Therefore, 3rd-year students completing the surveys were different groups. Demographics were not studied, but it is unlikely that significant differences occurred between groups, as students' rotations are selected randomly through lottery. Finally, a component of the enhanced student ratings may be secondary to the Hawthorne effect. In essence, it is feasible that the improved efficacy of resident education was secondary to the increased focus on resident teaching, as opposed to the impact of the chief resident teaching sessions.

The present study demonstrates that a program utilizing chief residents as teaching skills trainers of residents is both feasible and effective. Furthermore, the efficacy of the chief resident as teacher program was demonstrated across multiple departments. The use of student feedback as the outcome measure maintains focus on the primary outcome of resident education development programs, namely, the quality of student education provided. Replication of the present study utilizing larger numbers of students at multiple institutions is needed prior to widespread implementation of the chief resident as educator model.

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