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Faculty experience and engagement in a longitudinal integrated clerkship

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ABSTRACT

The authors sought to understand rewards and challenges of teaching third-year medical students in the University of Colorado School of Medicine (CUSOM) Denver Health Longitudinal Integrated Clerkship (DH-LIC) compared to teaching in rotation-based clerkships (RBCs). The authors considered implications for the recruitment and retention of faculty in clinical educational programs. Preceptors completed surveys at baseline and year-end. Of eligible faculty, 28 of 40 completed both baseline and year-end surveys. The majority (85.2%) of faculty were satisfied with the DH-LIC and 85.7% continued to teach in year-two of the program. Faculty reported increased satisfaction from teaching and improved teaching and mentoring skills. Faculty familiarity with DH-LIC students was significantly higher than with students previously taught ($p = .004$); 89.3% of faculty knew their DH-LIC student well enough to tailor instruction to individual learning needs. Teaching techniques utilized at baseline and end of year differed significantly; faculty reported asking questions to promote thinking, providing feedback to students, and providing students with practice in clinical reasoning more frequently in the DH-LIC. Innovative models of education such as LICs offer a strategy to recruit and retain excellent, invested faculty in outpatient settings.

Introduction

Currently, medical education leaders struggle to recruit and retain volunteer clinical faculty (Erikson et al. 2014). Today's clinical teachers face intense pressure to increase productivity and revenue, leaving less time for teaching (Cox & Irby 2006). Medical schools across the USA report difficulty with identifying and retaining ambulatory training sites (Erikson et al. 2014). While medical schools and hospital systems are invested in improving faculty satisfaction, engagement, and retention, resources to incentivize faculty are limited. While direct payment of preceptors for teaching of medical students is more common internationally, a minority of US medical schools rely on monetary compensation (Denton et al. 2015) and most turn to non-monetary benefits such as faculty titles, professional development, continuing medical education (CME) hours, and library access (Erikson et al. 2014). The Alliance for Clinical Education published a position statement addressing the "The Community Preceptor Crisis" which describes challenges medical schools face to find sufficient sites to train their students and to retain those faculty (Christner et al. 2016). Rarely mentioned is the idea that new models of education and teaching could serve to tip the balance in favor of intrinsic reward over the challenges faced by faculty related to reimbursement, productivity, and longer days.

Longitudinal integrated clerkships (LICs) may offer a sustainable strategy to recruit and retain excellent, invested clinical faculty to teach medical students in largely ambulatory settings (Strasser & Hirsh 2011). LICs are teaching models in which students participate in comprehensive care of patients over time, engage in continuity relationships with clinical faculty (otherwise known as preceptors in this article), and meet core clinical competencies across multiple disciplines simultaneously (Worley et al. 2006; CLIC 2011). LICs have been shown to enhance students' educational experiences and result in improved measures of patient-centeredness and empathy (Ogur et al. 2007; Hirsh et al. 2012; Gaufberg et al. 2014) with equal or better performance on standardized exams, clinical assessments, sub-internships, and national board examinations when compared to rotation-based clerkships (RBCs) (Walters et al. 2012; Teherani et al. 2013). While the structure of teaching relationships clearly influences the student experience and learning (Hauer, O'Brien et al. 2012), it likely also has an

Practice points

- Innovative models of education are needed to recruit and retain excellent, invested preceptors in ambulatory settings.
- In the DH-LIC, preceptors rated teaching and involvement in the program positively and were very likely to return to the program the following year.
- Preceptors in the DH-LIC reported high levels of familiarity with their students, reported more frequently asking questions to promote thinking, providing feedback to students, and providing students with practice in clinical reasoning at year-end versus baseline.
- LIC programs may be an attractive alternative for preceptors and provide medical schools with a sustainable model to maintain teachers in ambulatory settings who are invested in student development and effective teaching.

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impact on the teacher in terms of job satisfaction, personal reward, and approach to and quality of teaching.

Published literature examining preceptor outcomes in the LIC model is largely qualitative. Preceptors report high satisfaction rates (Ogur et al. 2007) and a deep sense of reward in working longitudinally with students (Teherani et al. 2009). Preceptors benefit from engaging in learning, refining practice, and joining with an educational institution (Hudson et al. 2011). However, these benefits must be considered alongside the need for efficient and effective care in teaching venues with widely varying compensation schemes (Teherani et al. 2009). Little quantitative data are available assessing relative rewards and burdens for preceptors teaching in LICs compared to teaching in RBCs. Data examining retention of preceptors in educational programs carries importance given the resources required to recruit and develop new preceptors to teach in medical school programs.

We surveyed preceptors about their experiences and attitudes before and after the inaugural year of the University of Colorado's Denver Health LIC (DH-LIC). The CUSOM, like many US medical schools, does not pay preceptors to teach, thus making it critical to understand the non-monetary motivations for teaching. We aimed to understand how preceptors perceive the rewards and challenges of teaching third-year medical students in an LIC, how preceptors compare LIC teaching to prior experiences teaching in RBCs, and what implications LIC teaching has for the recruitment and retention of outpatient teaching preceptors. A new LIC curriculum provided an opportunity to survey the same individual preceptors before and shortly after the inaugural year of an LIC program in order to contrast their experiences teaching in RBCs compared to the LIC. This study sought to investigate the impact of the educational structure on preceptors in demanding clinical environments.

Methods

Study design

This is a descriptive cross-sectional survey study of preceptors' perceptions about teaching third-year medical students in the DH-LIC both at the beginning and end of the inaugural year of the DH-LIC. Based on earlier studies of LIC faculty teaching experiences (Elisabeth et al. 2009; Teherani et al. 2009; Nilsson et al. 2010; DaRosa et al. 2011; Hauer et al. 2011), we developed a 38-item survey (Appendix 1) to query preceptors about their experiences teaching medical students, motivation for and approaches to teaching, and perceptions of obstacles and challenges related to teaching. Response scales included Likert-type rating scales and open-ended comments. We administered the survey online to DH-LIC preceptors at baseline (reflecting prior experiences teaching in RBCs) and again at the end of the year (after teaching in the DH-LIC).

Study setting

The University of Colorado School of Medicine (CUSOM) established an LIC in 2014 at Denver Health (DH), an academic affiliate urban safety-net hospital where most faculty are involved in medical education in some capacity. DH is a 525-bed hospital with nine integrated community health centers serving a largely underserved patient population in the heart of downtown Denver. In this inaugural year, the program leadership selected eight student participants among 24 applicants based on their demonstrated commitment to care for the underserved. Academic performance was not a selection criterion; students were similar to their peers in respect to grades in the pre-clinical years (first year grades, $p = .413$, second year grades, $p = .444$) and USMLE Step 1 scores ($p = .881$). Students completed learning objectives in an integrated fashion over the course of the year working with preceptors in specialties representing the majority of required third-year clerkships. Program leaders selected faculty volunteers based on their commitment to the curriculum and track record for excellence in teaching as demonstrated in various undergraduate and graduate medical education roles. Preceptors received development and training in the LIC model and goals consisting of a 4 h mandatory orientation and an optional 4 h retreat mid-year.

Study participants

The analysis is limited to core preceptors with regular contact with an LIC student over the duration of the DH-LIC program. Forty preceptors met this criterion in six specialties: family medicine, internal medicine, pediatrics, psychiatry, obstetrics and gynecology, and emergency medicine. None of these preceptors had prior LIC teaching experience. We excluded from the analysis preceptors with infrequent (less than twice a month) or sporadic (not evenly spaced) contact with students, including anesthesiology, radiology, and hospital medicine faculty. This decision was based on feedback from students that less regular and predictable contact with non-core preceptors did not provide the same longitudinal teaching relationships central to the LIC model.

Data analysis

This analysis included only longitudinal preceptors in largely ambulatory settings who completed both the baseline and end-of-year surveys. For these matched preceptors, we generated summary statistics as well as frequencies and paired *t*-tests for 27 core items. We also generated frequencies for a separate set of items asked only on the end-of-year survey. We excluded preceptors without RBC teaching experience from analysis of select questions specifically asking about teaching in RBCs compared to the DH-LIC. Analyses were conducted using SPSS version 23.0.0.0 (IBM, Armonk, NY).

Results

Characteristics of preceptors

Of 40 DH-LIC preceptors invited to complete the baseline and end-of-year surveys, 28 (70.0%) completed both surveys (referred to as "matched") and are the focus of this analysis (Table 1). Response rates by specialty ranged from 50 to 100%. Most ($n = 17$, 60.7%) of the matched respondents had worked at DH for five or fewer years. Many

Table 1. Characteristics of 28 matched preceptors, Denver Health Longitudinal Integrated Clerkship (DH-LIC), 2014.

Specialty taught	Percent of matched respondents (*N*)
Urgent/emergency care	21.4 (6)
Family medicine	25.0 (7)
Internal medicine, ambulatory	28.6 (8)
Obstetrics and gynecology	7.1 (2)
Pediatrics	14.3 (4)
Psychiatry	3.6 (1)
Gender	
Female	67.9 (19)
Male	32.14 (9)
Years working at Denver Health	
1–5 years	60.7 (17)
6–10 years	28.6 (8)
>10 years	10.7 (3)
Previous teaching experience in rotation-based clerkships (RBCs)[a]:	
No students	7.1 (2)
Limited students (1–3)	35.7 (10)
Extensive (>3 students)	57.2 (16)

DH-LIC: Denver Health Longitudinal Integrated Clerkship; *N*: number
[a]In the original survey, "traditional block rotation," was used instead of "rotation-based clerkship."

Table 2. Preceptor reasons for teaching medical students, Denver Health LIC, 2014[a] ($N = 28$).

Rank	Reasons for teaching	Mean (SD) (scale 1–4)
1	Give back to profession by preparing the next generation of physicians	3.39 (0.74)
2	Gain personal satisfaction working with medical students	3.21 (0.79)
3	Enjoy sharing my expertise	3.14 (0.65)
4	Enjoy seeing students develop	3.14 (0.70)
5	Provides variety in my clinical work	3.00 (0.82)
6	Keeps me on my toes	2.71 (0.81)
7	Promotes self-reflection	2.68 (0.90)
8	Recruit students to my specialty	1.93 (0.77)
9	Academic promotion requires teaching	1.93 (0.90)
10	Department or division chair requires teaching	1.25 (0.52)

LIC: longitudinal integrated clerkship; *N*: number; SD: standard deviation
[a]Item stem: how important are the following reasons for your decision to teach medical students? Four-point scale: 1 = not at all important, 4 = the reason I teach.

($n = 12$, 42.8%) had limited experience teaching third-year medical students in RBCs previously. Overall, two-thirds ($n = 19$, 67.9%) of these preceptors were female. We compared characteristics between the matched preceptors and those who completed only one of the two surveys ($n = 12$) and found no statistically significant differences in baseline characteristics of gender ($p = .479$) or specialty ($p = .238$).

At the end of the inaugural year of the DH-LIC, matched preceptors rated the importance of various reasons in their decision to teach medical students. This allowed comparison of the importance of motivations inherent to teaching (e.g. enjoy sharing experience, seeing student develop) to external motivations for teaching (e.g. required by department chair, promotion requirements) among matched respondents. At the end of the year, the most important reasons cited for teaching were intrinsic: giving back to the profession by preparing the next generation of physicians and gaining personal satisfaction working with medical students (Table 2).

High rates of preceptor satisfaction and retention

At the end of the year, preceptors expressed satisfaction teaching in the DH-LIC. Many (57.1%, $n = 16$ of 28) matched respondents agreed that teaching in the DH-LIC increased their overall job satisfaction. For those with RBC experience, 93.8% ($n = 15$ of 16) agreed that their personal satisfaction and reward from teaching was greater in the DH-LIC compared with RBCs; 6.3% ($n = 1$ of 16) stated no difference in satisfaction when comparing experiences teaching in the two curricular models. None of the matched respondents reported less satisfaction teaching in the DH-LIC compared to RBCs.

Overall, 85.2% ($n = 23$ out of 27) of matched respondents reported satisfaction with the DH-LIC program overall. Of 40 total longitudinal preceptors (including preceptors who completed both surveys as well as those who did not), 85.7% ($n = 34$) returned as preceptors for the second year of the curriculum.

Minimal impact on productivity

DH-LIC preceptors rated the importance of various challenges in teaching medical students at baseline and after teaching in the DH-LIC (Table 3). In both the baseline and year-end surveys, the greatest barrier cited by matched respondents was having a high clinical load (71.4%, $n = 20$, of respondents felt this was a major challenge or reason not to teach at baseline while 59.2%, $n = 16$, felt this way at the end of year). We did not find variability in this result between specialties.

Matched respondents with prior experience teaching in RBCs were asked at the end of the year to rate teaching as a barrier to clinical efficiency in the DH-LIC compared to RBCs. Preceptors were divided, with 43.8% ($n = 7$ of 16) responding "less" or "somewhat less" with DH-LIC students, 18.8% ($n = 3$) responding no difference, and 37.6% ($n = 6$) responding "more" or "somewhat more" with DH-LIC students. This result did not vary between specialties. Preceptors compared their perception of clinical productivity while teaching a DH-LIC student in the first half and second half of the year. Preceptors perceived less student impact on productivity during the second half of the year than the first half (Table 4).

Improved teaching methods and mentoring relationships with students

At year-end, almost three-quarters (74.1%, $n = 20$ of 28) of matched respondents agreed that precepting a student in the DH-LIC improved their teaching skills. When asked to estimate how often they used various methods at baseline, preceptors reported using various techniques at least 75% of the time when instructing medical students (Table 5). At the end of the year, preceptors reported more frequent use of providing students practice in clinical reasoning (60.7%, $n = 17$), providing feedback to students (53.6%, $n = 15$) and asking questions to promote thinking (50.0%, $n = 14$). When comparing the mean ratings for each of these scales, the differences were statistically significant.

For matched respondents with experience teaching in RBCs, 100% ($n = 16$ of 16) felt that their ability to provide meaningful and constructive feedback to a student was greater in the DH-LIC. Regardless of prior RBC teaching experience, matched preceptors reported improvements in their knowledge of the students' abilities and interests. Half

Table 3. Preceptor perceptions of barriers to teaching medical students, Denver Health LIC, 2014[a] ($N = 27$)[b].

	Percent (*N*) end of LIC		Mean (SD) (scale 1–4)		
Barriers to teaching medical students	Not a burden or somewhat of a burden	Major burden or reason not to teach	Baseline	End of LIC	*p* Value
High clinical load	40.7 (11)	59.2 (16)	2.78 (0.70)	2.67 (0.73)	.48
Decreased efficiency with clinical practice	63.0 (17)	37.0 (10)	2.56 (0.64)	2.41 (0.57)	.26
Unable to trust student skills	100.0 (27)	0.0	1.41 (0.50)	1.15 (0.36)	.02
Concern cannot meet teaching requirements of course	92.6 (25)	7.4 (2)	1.56 (0.51)	1.44 (0.64)	.45
No dedicated or protected teaching time	63.0 (17)	37.0 (10)	2.26 (0.90)	2.37 (0.84)	.56
Too many students	92.6 (25)	7.4 (2)	1.59 (0.75)	1.48 (0.64)	.50
Teaching not valued by peers or organization	92.6 (25)	7.4 (2)	1.41 (0.64)	1.44 (0.75)	.71
Problematic students	96.3 (26)	3.7 (1)	1.41 (0.57)	1.11 (0.42)	.003

LIC; longitudinal integrated clerkship; *N*: number; SD: standard deviation

[a]Item stem: rate how much of a burden the following demands/challenges are when considering opportunities to teach students in the LIC. Four-point scale: 1 = Not a burden, 2 = Somewhat of a burden, 3 = Major burden, and 4 = Reason not to teach.

[b]Data was missing on this item for 1 of the 28 preceptors. Analyses based on the 27 who provide data at baseline and at the end of the LIC.

Table 4. Preceptor perceptions of the impact of teaching in the LIC on clinical productivity, Denver Health LIC, 2014.

	Percent (*N*)		
Question stem ($N = 16$)	Less or somewhat less	No difference	More or somewhat more
Compared to past experiences teaching third-year medical students in rotation-based clerkships, indicate the impact of the LIC on teaching as a barrier to your clinical efficiency[b]	43.8 (7)	18.8 (3)	37.6 (6)
Question stem ($N = 28$)	Strongly disagree or disagree	Neutral	Agree or strongly agree
As a result of teaching an LIC student, my efficiency in clinic/productivity in the First half of the year (July–November) decreased[c]	14.3 (4)	28.6 (8)	57.1 (16)
As a result of teaching an LIC student, my efficiency in clinic/productivity in the Second half of the year (December–March) decreased	32.1 (9)	32.1% (9)	35.7 (10)

LIC: longitudinal integrated clerkship; *N*: number

[a]In the original survey, "traditional block rotation," was used instead of "rotation-based clerkship."

[b]16 of 28 matched respondents were eligible to complete because they had prior RBC experience. Five-point scale: 1 = Less, 2 = Somewhat less, 3 = No difference, 4 = More, and 5 = Somewhat more.

[c]Item stem: indicate your level of agreement with the following statements. Five-point scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly agree.

Table 5. Frequency and mean rating of teaching techniques utilized, Denver Health LIC, 2014[a] ($N = 28$).

	Percent (*N*)				
	Baseline	End of LIC	Mean (SD) (scale 1–5)		
	% Using technique at least 75% of the time	% Using technique at least 75% of the time	Baseline	End of LIC	*p* Value
Techniques used less frequently in the LIC compared to prior teaching roles					
Assign readings or topics for investigation	67.9 (19)	25.0 (7)	3.93 (0.94)	2.64 (1.28)	<.001
Review basic science related to clinical decisions	67.9 (19)	28.6 (8)	3.86 (0.80)	2.96 (1.14)	<.001
Have students observe you with patients	75.0 (21)	35.7 (10)	4.00 (0.90)	3.18 (1.12)	.005
Observe students with patients	60.7 (17)	25.0 (7)	3.68 (1.06)	3.00 (1.02)	.004
Techniques used more frequently in the LIC compared to prior teaching roles					
Ask questions to promote thinking	35.7 (10)	50.0 (14)	3.11 (1.03)	3.61 (0.88)	.02
Provide feedback to students	14.3 (4)	53.6 (15)	2.46 (0.84)	3.64 (0.87)	<.001
Provide students practice in clinical reasoning	21.4 (6)	60.7 (17)	2.68 (1.19)	3.89 (0.92)	<.001
Techniques with no change					
Teach procedural skills	14.3 (4)	21.4 (6)	2.61 (1.03)	2.50 (1.11)	.59

LIC: longitudinal integrated clerkship; *N*: number; SD: standard deviation

[a]Item stem: indicate the frequency with which you currently use each of the following commonly used activities when you teach medical students. Five-point scale: 1 = Never use, 2 = Use 25% of time, 3 = Use 50% of time, 4 = Use 75% of time, and 5 = Always use.

of preceptors at the end of LIC ($n = 14$ of 28) reported knowing their student well enough to tailor instruction and provide mentorship or advising, compared with 25% at baseline. In parallel, preceptors reporting "limited" or "general knowledge" of their student's skills fell, 39.3% ($n = 11$ of 28) at baseline compared with 10.7% ($n = 3$ of 28) at the end of the LIC (Table 6). Rates of familiarity with and mentorship of their DH-LIC student were significantly higher than with students they had taught in pre-LIC settings (mean 3.39 (0.68) vs. 2.82 (0.85), $p = .004$). Concerns about being unable to trust student skills or about having problematic students became significantly less important in the LIC when compared to pre-LIC teaching settings (mean 1.41 (0.50) vs. 1.15 (0.36), $p = .02$ and 1.41 (0.57) vs. 1.11 (0.42), $p = .003$, respectively).

Discussion

This hypothesis-generating study evaluated preceptors' perceptions of teaching in a newly implemented LIC, and in comparison to prior teaching in RBCs. DH-LIC preceptors who responded to both baseline and end-of-year surveys were highly satisfied in terms of overall job satisfaction and in comparison to teaching in RBCs. A large majority of preceptors (85.7%) returned to the DH-LIC program in year two. Reasons for high satisfaction and return to the

Table 6. Preceptor perceptions of medical students skills, abilities, and interests, Denver Health LIC, 2014 ($N = 28$).

	Percent (*N*)		Mean (SD) (scale 1–4)		
In general, how well do you know the medical students you teach?	Baseline	End of LIC	Baseline	End of LIC	*p* Value
Limited knowledge	3.6 (1)	0.0 (0)	2.82 (0.85)	3.39 (0.68)	.004
General Knowledge	35.7 (10)	10.7 (3)			
Enough to Tailor	35.7 (10)	39.3 (11)			
Enough to Tailor and Mentor	25.0 (7)	50.0 (14)			

LIC: longitudinal integrated clerkship; *N*: number; SD: standard deviation

[a]Item stem: in general how well do you know the medical student/LIC students you teach/taught? Four-point scale: 1 = I have a limited knowledge of a student's skills, 2 = I have a general knowledge of a student's skills, 3 = I know them well enough to tailor instruction, and 4 = I know them well enough to tailor instruction and provide mentorship.

program were multiple and include improved teaching and mentoring skills, close relationships with students, and minimal barriers relative to rewards. Though numbers of preceptors included in the analysis are small, examining preceptor perceptions before and after one year of teaching in the DH-LIC provided a unique moment in time to compare experiences of these same individuals in RBCs and the DH-LIC. This matched design allowed for individual preceptors to serve as their own controls.

In the current environment of medical education, clinical faculty face increasing pressure to maximize clinical productivity leaving less time for teaching (Cox & Irby 2006). As a result, medical schools face intense pressure to retain preceptors, especially in ambulatory sites (Erikson et al. 2014). A paucity of literature exists examining retention of preceptors over time and describing the differences in preceptor experience as they teach in various curricular models. While most literature on LIC programs has focused on benefits for students, our study demonstrates the advantages for preceptors and the potential for this model to increase faculty retention especially in outpatient settings.

Rewards for preceptors in the DH-LIC were numerous. In the LIC environment, respondents reported improved teaching skills, improved ability to provide meaningful and constructive feedback to students, closer relationships with students, and increased utilization of more advanced teaching skills, including providing students practice with clinical reasoning, providing feedback, and asking questions to promote thinking. Earlier literature reports that teaching students as effectively as possible is one of the strongest motivators for senior clinicians (Dahlstrom et al. 2005). We hypothesize that the LIC model's "educational continuity" (Hirsh et al. 2007) creates close, longitudinal faculty–student relationships that foster beneficial teaching techniques (Hauer, Hirsh et al. 2012; Hauer, O'Brien et al. 2012; O'Brien et al. 2012). We also hypothesize that these relationships strengthen teachers' perceptions of the personal benefits of teaching (Balmer et al. 2016). Although these remain areas of future study, in the DH-LIC, respondents were satisfied, perceived themselves to be more effective teachers, and utilized advanced teaching methods.

As an earlier study has described, clinical load is the top reason deterring clinicians from teaching (Elisabeth et al. 2009). This finding was not specific to LIC models. Teherani et al. (2009) reported that most LIC preceptors devoted more time and effort to teaching LIC students than rotation-based students and often modified their clinics to accommodate LIC teaching. In the DH-LIC program, preceptors did not have flexibility to alter schedules and yet the DH-LIC preceptor satisfaction was high. DH-LIC preceptors reported that having a high clinical load made teaching more difficult; however, respondents did not report that teaching was more of a barrier to clinical efficiency in the DH-LIC than RBCs. Consistent with a previous study of LIC teaching experiences (Teherani et al. 2009), teaching in the DH-LIC had less of a perceived negative impact on productivity in the second half of the year as students became more integrated into clinics. This finding may be due in part to the building of a longitudinal trusting relationship between preceptor and student (Hirsh et al. 2014), allowing students to contribute more meaningfully to clinical care and is a key recommendation in addressing the community preceptor crisis (Christner et al. 2016).

This study adds to existing LIC literature by describing the experience of preceptors in the inaugural year of an LIC based at a public medical school with limited monetary resources for preceptor incentives. The CUSOM is a largely state-funded academic institution with 66% of students classified as "in-state." The school does not provide monetary incentives for teaching and therefore must develop innovative strategies to recruit and retain excellent outpatient faculty; the DH-LIC did both. In these ways, the CUSOM may be similar to large state-funded academic institutions considering the development of LIC programs.

Our study suggests an important hypothesis for more rigorous analysis; that is, the rewards of high quality teaching with no change in burdens may improve preceptor job satisfaction, and with that retention in clinical teaching. Next steps include tracking maintenance of these rates over time, comparing rates of preceptor retention in various teaching settings, and exploring how the LIC environment affects the preceptor experience in more depth.

Because we chose to compare preceptor perceptions of past teaching with their perceptions after one year of teaching in an LIC, our sample size is small. Despite this limitation, the analysis of data reached statistical significance in several domains. There is a possibility of recall bias when preceptors compared their immediate experiences and impressions of the LIC with more remote experiences teaching in RBCs. There is also the potential for bias related to the fact that some preceptors had years of experience teaching in RBCs vs. a single pilot year teaching in a new LIC curriculum. We excluded preceptors from our core analysis who did not complete the surveys or only completed one of the two. While the excluded preceptors did not differ in baseline characteristics from the preceptors who responded to both surveys, we cannot be certain that there are no other important differences between these two groups.

Because the LIC program selected preceptors with a historical commitment to and talent for teaching, this group of individuals may have been more engaged and motivated

at baseline and, as a result, our conclusions may not apply to preceptors who are less intrinsically motivated to teach. Furthermore, because preceptors volunteered to teach in the LIC program, preceptors may have pre-conceived positive bias toward the program. Conversely, as the survey asked preceptors to ponder burden related to teaching, this may introduce leading bias toward the negative. However, the faculty's resounding positive responses about the program occurred despite this survey bias toward the negative, potentially strengthening the overall impact of our findings. Finally, even though the application process did not select students into the program based on their academic profile, a selection bias or volunteer bias may exist. It is also possible that the nature of students choosing LICs and RBCs may have influenced individual preceptor responses and been a reflection of the experience teaching that student regardless of setting.

Conclusions

Though the study is small, we believe this preliminary report puts forward intriguing hypotheses about the ability of an LIC to support and sustain preceptors in demanding clinical environments. DH-LIC preceptors invested time and energy in the program, and the program rewarded them with close relationships with students, improved skills in terms of teaching and mentoring, and increased job satisfaction. With no additional monetary or other incentives, preceptors rated LIC teaching and involvement in the program highly. There is an ongoing crisis in recruiting and retaining community-based preceptors for medical student education across specialties (Christner et al. 2016). LIC programs may be an attractive alternative for clinical faculty and provide medical schools with a sustainable model to maintain teachers in outpatient settings who are invested in student development and effective teaching.

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Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

Glossary

Longitudinal Integrated Clerkship (LIC): clinical clerkship in which medical students participate in the comprehensive care of patients over time, have continuing learning relationships with these patient's clinicians and meet, through these experiences, the majority of the year's core clinical competencies across multiple disciplines simultaneously. (CLIC: Consortium of Longitudinal Integrated Clerkships [internet]. Cited September 2011. Available from: http://wwwclicmededcom/)

Notes on contributors

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Appendix 1: Survey items administered to faculty

A total of 27 common items asked at Baseline and End of Year Survey

Items 1–10: How important are the following reasons for your decision to teach medical students? (four-point scale: 1 = Not at all, 2 = Somewhat, 3 = Important, and 4 = Reason I teach)

- Department or division chair requires teaching
- Academic promotion requires teaching
- Keeps me on my toes
- Enjoy sharing my expertise
- Provides variety in my clinical work
- Give back to profession by preparing the next generation of physicians
- Promotes self-reflection
- Recruit students to my specialty
- Enjoy seeing students' develop
- Gain personal satisfaction working with medical students

Item 11: In general how well do you know the medical students you teach?

- I have a limited knowledge of a student's skill
- I have a general knowledge of a student's skills.
- I know then well enough to tailor instruction.
- I know them well enough to tailor instruction and provide mentorship.

Item 12–19: Indicate the FREQUENCY with which you used the following techniques when you taught medical students in the LIC (five-point scale: 1 = Never use, 2 = Use 25% of the time, 3 = Use 50% of the time, 4 = Use 75% of the time, and 5 = Always use)

- Observe students with patients
- Provide feedback to students
- Ask questions to promote thinking
- Have students observe you with patients
- Assign readings or topics for investigation
- Review basic science related to clinical decisions
- Provide students practice in clinical reasoning
- Teach procedural skills

Item 20–27: Rate how much a burden the following demands/challenges are when considering opportunities to teach students in the LIC (four-point scale: 1 = Not a burden, 2 = Somewhat a burden, 3 = Major burden, and 4 = Reason not to teach)

- High clinical load
- Decreased efficiency in clinical practice
- Unable to trust student skills
- Concern can't meet teaching requirements of course (e.g. observation, student assessment)
- No dedicated or protected time to teach
- Too many students (medical, nursing, PAs)
- Teaching not valued by peers or organization
- Problematic students

Eleven items asked only on the End of Year Survey (EoY)

EoY item 1–3: Compared to past experiences teaching third-year medical students in traditional block rotations, indicate the impact of the LIC on: (five-point scale: 1 = Less, 2 = Between Less and No impact, 3 = No impact, 4 = Between No impact and More, and 5 = More)

- Your level of personal satisfaction and reward from teaching
- Teaching as a barrier to your clinical efficiency
- Your ability to provide meaningful and constructive feedback to a student

EoY item 4–8: Indicate your level of agreement with the following statements (five-point scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree)

- As a result of teaching in the LIC, my overall job satisfaction has increased.
- Based on my experience with LIC students, I believe students are satisfied with the LIC program.
- As a result of teaching an LIC student, my base of medical knowledge has increased.
- Precepting an LIC student has helped me improve my teaching skills.
- Overall I am satisfied with the LIC program.

EoY 9–10: Indicate your level of agreement with the following statements (five-point scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree)

- As a result of teaching an LIC student, my efficiency in clinic/productivity in the First half of the year (July–November) decreased.
- As a result of teaching an LIC student, my efficiency in clinic/productivity in the Second half of the year (December–March) decreased.

EoY 11: I am planning to precept a new student in the second year of the LIC at Denver Health (scale: Yes, No)