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Alliance, Trust, and Loss: Experiences of Patients Cared for by Students in a Longitudinal Integrated Clerkship

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Abstract

Purpose

The longitudinal integrated clerkship (LIC) model, which allows medical students to participate in comprehensive care of a panel of patients over time, is rapidly expanding due to recognized benefits to students and faculty. This study aimed to determine how LIC student contact affected patient experience and self-described health outcomes.

Method

This qualitative case study used semi-structured patient interviews to understand the impact of LIC learners at the University of Colorado School of Medicine on patients at Denver Health. Patients with at least three encounters with an LIC student and over age 18 were selected. Thirty patients were invited to participate in 2016–2017; 14 (47%) completed interviews before the thematic analysis reached saturation. Four researchers independently analyzed interview transcripts and reached consensus on emergent categories and themes.

Results

Six broad themes were identified: beginnings of a relationship, caring demonstrated by student, growing to trust student, reaching a therapeutic alliance, improvement of patient outcomes due to student involvement, and a sense of loss after students completed the LIC program.

Conclusions

Patients deeply valued the therapeutic alliances built with LIC students involved in their care over time. These alliances led to improved patient experience, mitigation of perceived health system failures, and subjective improvement in health outcomes. Patients described a sense of loss at the end of the LIC when students were no longer involved in their care. Curricula that support students building longitudinal therapeutic relationships with their patients are an opportunity to improve patient experience while promoting students' professional development.

Longitudinal integrated clerkships (LICs) are well documented as a curricular model that provides undergraduate medical students opportunity to engage in continuity relationships with clinical faculty and to meet core clinical competencies across multiple disciplines simultaneously.[1] LIC students develop a panel of patients with whom they maintain continuity through encounters across specialties and health care settings, which promotes student participation in the comprehensive care of patients over time. This structure fosters student ownership of the delivery and coordination of patient care, which allows trainees to actively learn about health care systems, disease processes, and the illness experience while cultivating durable patient-centered practices.[2–6] Additionally, the patient becomes a key driver of learning, which has been described as crucial for the development of a patient-centered medical education.[7] As LIC trainees are highly involved in patient care, the LIC approach may shift the role of students from learner–observers in clinical settings, to active participants in patient care and advocacy.[8–10]

The LIC model has seen rapid expansion due to the recognized benefits to learners and faculty.[10–14] However, little is known about the effect this model has on patient experience and outcomes. Substantial research has demonstrated that patients value longitudinal relationships with their physicians and other providers[15–19]; whether this extends to physicians in training has, to our knowledge, not been fully explored. Understanding how LIC students affect the patient experience is imperative to ensuring that medical educators and health systems meet their obligation to patients.[6,8,20,21] This study aimed to describe the impact of LIC students on patient experience through qualitative semi-structured interviews with patients cared for by LIC students.

Method

Context, participants, and setting

In 2014, the University of Colorado School of Medicine established an LIC at Denver Health (DH-LIC). Denver Health (DH) is made up of a 525-bed urban public safety-net hospital and nine integrated federally qualified health centers.[22] The DH-LIC program leadership selects eight student participants each year based on their demonstrated commitment to care for the urban underserved. DH-LIC students develop and follow a panel of at least 25 patients during their clerkship year including adult, pediatric, surgical, psychiatric, and obstetric patients. Students accumulate panel patients through primary care visits, emergency rooms encounters, and hospitalizations. Students are scheduled weekly or biweekly with each specialty preceptor. Faculty preceptors from all eight specialties represented in the DH-LIC (internal medicine, family medicine, pediatrics, obstetrics and gynecology, surgery and anesthesia, psychiatry, emergency medicine, and musculoskeletal medicine) work closely with their students to help identify patients who are suitable for longitudinal care as well as assist with facilitating follow-up by scheduling appointments when the student will be present and notifying students of upcoming referrals. Additionally, students track upcoming appointments and unscheduled encounters through the electronic medical record. Students have flexibility in their schedules to attend panel patient visits and are able to rearrange scheduled clinical time to accommodate follow-up with their patients if needed. Students often attend emergency room visits or inpatient rounding with their panel patients before or after scheduled clinical time. The DH-LIC program lasts the entirety of the core clerkship (third) year, encompassing all clerkship specialties excluding neurology. Students have the opportunity to continue work with DH-LIC preceptors and panel patients on an elective basis in their fourth year of medical school.

Participant sampling

We conducted semi-structured, in-depth interviews with patients who had significant interaction with DH-LIC students. Patients who had primarily received obstetrical care during contacts with the student (n = 21) were excluded in order to focus on patients with chronic illnesses requiring numerous interactions with the health system in different settings. Purposive sampling identified 100 patients who had three or more encounters with DH-LIC students according to routine student-maintained spreadsheets documenting all longitudinal patient encounters during the academic year 2016–2017. These patients also met inclusion criteria of age ≥ 18 years and contact not primarily for obstetric care (Figure 1). We excluded patients from this group if they primarily spoke a language other than English or Spanish, had a serious psychiatric co-morbidity that would prevent informed consent, or had transferred their care outside of the DH system. Twelve patients were also found to have died since the student was involved in their care. Of the remaining 62 patients, the sampling strategy prioritized patients with a greater number of contacts with their DH-LIC student to facilitate meaningful discussions during interviews; therefore 32 patients were not prioritized. We conducted interviews with the remaining available patients until saturation was reached.

Data collection

We developed an interview guide by reviewing highly cited studies assessing patients' attitudes toward traditional (non-LIC) medical students.[23,24] Specific questions were developed to evaluate components of the patient experience that were hypothesized to be affected by DH-LIC students. After piloting the questions, the final guide consisted of open-ended questions that explored the student–patient relationship, potential student roles, and the impact of students on patient care (see Supplemental Digital Appendix 1, available at http://links.lww.com/ACADMED/A688).

This research was approved as expedited human subjects research by the Colorado Multiple Institutional Research Board.

Study authors (R.J.F., J.E.A., J.G., K.K., A.M.) obtained informed consent and conducted semi-structured interviews in the patient's preferred language. These were recorded in private settings lasting approximately 45 minutes between October 2017 and December 2017. Interviews were de-identified and transcribed verbatim and entered into ATLAS.ti version 8.1.3 (ATLAS.ti GmbH, Berlin, Germany) for coding. All Spanish interviews were translated into English (GoTranscript, Edinburgh, United Kingdom). Participants also completed a short survey that included demographic information and the Centers for Disease Control's Health-Related Quality of Life survey.[25] We provided them with a $20 gift card and transportation reimbursement for participation.

Qualitative analysis

We coded and analyzed interview transcripts using an inductive analytic approach, and through an iterative process that occurred in three phases over a four-month period (December 2017–March 2018).[26,27] The first phase involved preliminary coding of the five transcripts read by four investigators (R.J.F., J.E.A., J.G., C.F.H.). This first review resulted in the development of the initial codebook. Codes were compared against specific text and the codes were applied to the transcripts to verify that the individual codes holistically aligned with the context of each interview. We resolved discrepancies in coded text through discussion until consensus was reached on a preliminary list of codes and emergent themes.

In the second phase, we applied preliminary codes to the remaining transcripts. All transcripts were analyzed by at least two researchers (among the author team). We independently reviewed assigned codes with associated text and then met to review each other's analyses. A second series of meetings was held to evaluate the transcript coding and to resolve discrepancies

between reviewers. We determined that thematic saturation was reached once additional interview data prompted no changes to the codebook and no new themes emerged.

The final phase of coding focused on confirming codes for conceptual coherence and textual documentation. At this stage, we refined codes into themes and a coherent conceptual framework. The conceptual framework was validated through discussion with faculty and students familiar with the DH-LIC program not involved in this research.

We obtained quality of life measures for the Colorado population for 2010 (most recent available data) from publicly available records and analyzed using one-sample t-tests.[28] This allowed comparison of the study population to the general population in terms of overall health status.

We conducted all statistical analyses using Stata SE statistical software, version 14.2 (StataCorp, College Station, Texas).

Results

Eight DH-LIC students logged 1,009 encounters with 407 patients in academic year 2016–2017. Of these, 100 met our initial inclusion criteria. Thirty-eight were excluded during this process, and 62 retained. Of these, 30 were prioritized and invited and 14 (47%) of these completed interviews. The remaining patients were unreachable, declined participation or did not remember their student. After completion of the first 14 interviews, saturation was reached, so inclusion of additional patients was not attempted. (Figure 1).

Among the 14 participants who completed an interview, the median age was 56, and 57% (n = 8) were female (Table 1). A majority (63%, n = 9) of respondents reported poor or fair health (Table 2). Participants reported that in the last 30 days they were physically and mentally unhealthy for a mean of 16.5 days and 11.9 days, respectively. These are significantly higher rates of reported poor or fair health than the general population. Participants also indicated

significantly more days on which they were physically or mentally unhealthy, compared to the health of the general population of Colorado.[29]

Qualitative analysis of transcripts identified a linear process over time by which DH-LIC students and their patients built longitudinal connections. The elements of this student–patient relationship were captured by six broad themes, each with subthemes. We agreed that the themes had a temporal relationship. A prototype was developed to help describe the developmental path that characterized the typical timeline of student–patient relationships in the DH-LIC and how these themes fit together (Figure 2):

- Beginnings of a relationship;
- Caring demonstrated by student;
- Growing to trust student;
- Reaching a therapeutic alliance with student;
- Improvement of patient outcomes due to student involvement; and
- A sense of loss after student progression beyond the DH-LIC program.

Beginnings of a relationship

Patients described variable first interactions with their DH-LIC student. Some patients were confused about the student's role:

> I didn't know anything about her so when she first came on I was kind of leery, like, "Who is this? Why is she here? Why is she hearing all my personal business?" It was confusing because I didn't know anything about her. (Participant 1)

Conversely, others had thorough introductions that set the stage for their ensuing relationship:

> [The preceptor] had mentioned that he was a student, he was going to be working with us, and asked if that was okay, and all of that. (Participant 10)

Caring demonstrated by student

In interactions following the introduction, patients described ways that they felt cared for by their DH-LIC student, or how their student's actions made them feel special. This bond was created by the students' actions, physical presence, demonstration of extra concern, and consideration for the patient's social context.

The presence of the DH-LIC student at significant or unexpected moments was identified by many patients as an important component of this sense of caring. Patients described being surprised by how often their student would appear; others described how much it meant to have the student present at pivotal moments in their care:

> He snuck in to see me at the ER. That made me feel like I mattered to him…. He didn't have to be there. He was supposed to be somewhere else, but he was there for me. (Participant 13)

> Every time I had a doctor's appointment, she checked up on me. She made sure that she'd stick her head in the door and say, "I just came to check on you." And that made me feel good. (Participant 4)

Patients described sensing they received an extra level of concern from their students, including through spending additional time with them or learning about their condition. They described students as responsive to needs and requests that had often been unmet by other providers:

> I had a little more time to really communicate what was going on. And when it was just [the preceptor], we were very straight to the point.… I got the impression that [the student] was ready to take the time to listen. (Participant 10)

> She has seen me in the waiting room and came sat by me and asked me how I was doing and everything, and I start telling her everything that was going on. (Participant 1)

One element of feeling cared for was how DH-LIC students considered social context in patient care:

> I think even from the first experience, he was pretty good about knowing the troubles I was experiencing as a parent….When we needed to make appointments, it was like, "Do you think you'll have someone to care for your son during this time?" (Participant 10)
>
> I told them that I didn't have any transportation, that no one could come for me ... there wasn't any transportation going that way, they gave me a pass for the bus ... they did help me very much. (Participant 2)

Growing to trust student

Over time, patients began to develop trust in their student. Many patients explicitly stated that trust was not instantaneous; it had to be gradually earned. This growth of trust was supported by students taking on an impressive array of roles beyond that of the learner. Patients described students in the critical roles of educator, navigator, and facilitator of communication between care providers:

> She drew a heart and was showing me how much valves, the valves I had left or the arteries because I had stenosis, a lot of things. She explained about the high blood pressure, what it would do to smoking because I was a smoker, how that would affect my heart and just everything. (Participant 4)

In another example, a visually impaired patient described how his student served as a navigator by assisting with reminding him of appointments:

> [The student] sent me a copy to my house so that I could have a written document to give to my girls to tell them, "Here, put this on the calendar. I'm supposed to be here."… She

called me up and arranged that doctor appointment, and that doesn't happen very often neither. (Participant 7)

One particularly notable role that cultivated trust was how DH-LIC students facilitated patient–provider communication. They helped translate complicated medical information into understandable terms and helped care teams recognize each patient's unique situation:

> When she would come in, she'd explain to me about what the medicine was doing for me and why I needed it, why it would take care of me throughout my body … she knew a lot about my health issues and all this bigger words that they use. So, she'd explain afterwards in my language because you don't understand doctors. (Participant 4)
>
> I also told [the student] what was going on and how my hand had swollen up, everything that was going on with it.… She got talking with [my doctor]. We all got to talk together, and it went better. (Participant 1)

As students took on these varied roles, patients described being impressed by students' mastery of various skills beyond that expected of a student, which further fostered trust. These competencies included communication skills, emotional intelligence, and affective skills, along with medical and systems knowledge and technical skills:

> His ability to comfort me, and the idea of taking the medication to actually settle things down, really impacted me.… I don't even know if he knows that he made me comfortable enough to change my mind on something like that. (Participant 10)
>
> I mean she's sharp as a tack. She knows a little bit of everything when I would ask her different questions. (Participant 8)

Patients frequently described what they perceived as health system failures due to fragmentation of care, feeling judged or dismissed by providers, or receiving low quality care. Patients

perceived their DH-LIC students as playing an important role in mitigating the negative impact of these system shortcomings:

> Most of the time, these doctors, they don't care about you. You just get in the hospital, they'd kick you out sick and everything else, but [the student] was one there that was so supportive to me. (Participant 11)
>
> Having somebody to talk to rather than a machine is always better. [The student] responded very quickly.… Sometimes when I deal with people on the phone, they tell me "We have up to a three-day waiting period" … but I can't work like that. (Participant 7)

Reaching a therapeutic alliance with student

Over time, elements of caring and trust led patients and DH-LIC students to form a therapeutic alliance, where the student had a far greater impact on patient care and experience than would typically be expected of a student. This alliance had several foundational components. Patients described how students accompanied them through their illness experience, alleviating a sense being lost or alone in a vast health care system:

> When I was going to the vascular surgeon, Dr. [student] showed up. I was still scared and didn't really know what was going on.… That somebody—he cared enough to be there. I didn't expect him. I didn't expect anybody except the vascular surgeon to be there. Just having him there was a comfort to me. (Participant 13)
>
> It was like, "We can do this together. We'll make sure that you feel comfortable to talk to someone, and if this isn't working, please let me know." (Participant 10)

Patients also cited examples of their students serving as strong advocates for them, particularly when patients felt dismissed by other providers:

> It just felt like I had someone else that was there, that understood that there were some issues going on, that could speak for me, and also tell them what's going on with me.

> When I was by myself, I just felt like they kind of always thinking I was complaining. (Participant 1)

This close bond allowed patients to disclose sensitive information and express vulnerability. Many patients specifically described disclosing information to the student they had previously withheld from other providers:

> He said whatever they can help me with this, all they're here to do is help me. He understood my drug use and the way I wasn't taking my pills. He understood all that. (Participant 11)
>
> I got to the point where I wasn't afraid to tell her anything. (Participant 8)

A direct result of this bond was patients feeling empowered to make decisions for themselves, often as a result of the student promoting skills, behaviors, and/or knowledge that contributed to self-agency:

> I wasn't really concerned, but after talking to her and how open she was, I took her a little bit more seriously, yes, I went back. Then I started getting pills and I kept going back, and I can feel the difference. (Participant 8)

Evidence of the therapeutic alliance was found in the patient's deep sense of confidence in the student's abilities:

> I think [the student] was excellent, mainly because even though he was a student, he had an air about him that he really knew what he was doing…. It was a comfortable thing because you think, "He might be a student, but he knows." (Participant 11)

Patients felt an alliance with their student built on a foundation of genuine caring and endearment and described examples of feeling like their relationship meant more to them than would be typical of a doctor–patient relationship:

> I just wish there was more people like her. She was a wonderful person. We have a good relationship. I mean I never had anybody like her. She loved my kids when I was in the hospital.… She cared about [my family's] needs too, not just mine. (Participant 4)
>
> [The preceptor and student] came to my home. I felt like they came … more in friendship, caring. In a caring way because it wasn't something they had to do … it meant a lot. He was a comfort to me. Through the whole thing, he made me feel like, "It's OK. You can cry, you can talk. Don't be afraid." (Participant 13)

Patients used a number of unique analogies to describe the quality of attachment with their student:

> I mean I'm just so proud of her, as a patient here at Denver Health, that she got to be a student and she tried every step of the way. She did her job wonderful and I would give her an A+. (Participant 4)
>
> The next time I went back … I painted a picture for [the student] and took it. It is because I was so impressed. Just a way to say thank you. (Participant 8)
>
> It was like the sunshine would pop out of the window when she came in through the door because she was just so understanding and caring. (Participant 4)

Improvement of patient outcomes due to student involvement

Patients directly linked the therapeutic alliance developed with their students to improved outcomes in their health. These were either global descriptions of improved health, or specific ways their care benefited from their student's involvement:

> Yes, I'm very thankful for her because, like I said, she gave me good advice. It is thanks to her that I take my medication like I'm supposed to. (Participant 6)
>
> Her presence, being there, it was a wonderful thing because it did have the impact in my whole situation about my medicines, about … everything. (Participant 4)

Sense of loss after student progression

Some participants described a sense of loss after students completed the DH-LIC. These feelings encompassed a broad spectrum. Some participants described simply feeling sad that their student was no longer a part of their care:

> When she left, I was upset because she left and I couldn't see her no more ... she I guess was moving to another hospital or her training was over. (Participant 4)
>
> It would be very nice if she [the preceptor] could do something for me to continue with [the student]. (Participant 2)

Other patients described this loss as negatively affecting their care, with one respondent indicating he had dropped out of primary care after his student graduated. Other participants felt hurt by their LIC student's transition:

> Without her, it was very emotional. Not having her around and not knowing that she wasn't going to be here anymore was very hurtful and painful on my part because I know what she did for me and just making me happy and joyful. (Participant 4)

Other patients described feeling abandoned after their student completed the DH-LIC program:

> She was there and then gone. I didn't see her no more. I thought it was better, I felt like it was better for me to have someone…. Then when she left I was just like okay well, there's another person gone and came and gone again. (Participant 1)

Despite these feelings of loss, patients' overall satisfaction with DH-LIC student involvement in their care was high: all patients stated they were more satisfied in their health care as a result of student involvement, and 86% (12/14) stated they would want a similar arrangement with a DH-LIC student again in the future. Those who said they would prefer not to have another DH-LIC student cited the difficulty and loss after the student left their care or entering hospice care as reasons.

Discussion

This study explored the transitions that occurred for patients cared for over a longitudinal period of time by DH-LIC students. Our findings demonstrate how DH-LIC students cultivated powerful therapeutic alliances with their patients that led to subjective improvements in health outcomes. Patients also describe the profound sense of loss they felt when their student completed the DH-LIC program. Patient-centered behavior and attitudes are fostered among medical students by longitudinal relationships with patients[30]; our findings would support the concept that the relationship is symbiotic and results in benefits for patients at the same time as learning is improved for students.[2,21,31]

Therapeutic alliance

An important finding is how DH-LIC students were perceived by patients as a critical member of their care team. Our findings align well with work by Poncelet and colleagues, who report that patients valued the continuity afforded by an LIC student and described a more patient-centered experience with the health system.[32] Beyond valuing continuity, our findings advance the potential roles of LIC students to encompass advocacy, patient empowerment, alleviation of feelings of judgment and other failings of a health care system, and the cultivation of a therapeutic alliance leading to improvements in health behavior and outcomes.

Patients made clear that it was the longitudinal contact with their student over time that made those alliances possible. Their LIC student became a recurring presence in their care, and a key team member who knew the patient's medical history better than anyone, acted upon psychosocial determinants and barriers to health, and was able to facilitate communication between health care providers. These factors were fundamental in building rapport and further reflect the rationale for forming LICs. Our findings reinforce the necessity of longitudinal

relationships between learners, patients, and faculty for patient-centered medical education where the patient drives clinical education.[7]

These findings support existing work that challenges the traditional view that medical students are passive observers and potential drains on time and resources.[2,3,33,34] Our participants described how DH-LIC students brought considerable value to the patient experience and helped ameliorate the effects of health system failures on their care. As health care systems are examined for ways to improve patient experience and health outcomes, the impact of an LIC structure that allows a student to develop and act as a patient educator, navigator, advocate, and ally who helps patients circumvent system shortcomings should not be overlooked. LIC programs are designed to immerse students in workplace learning, provide outstanding mentorship and role-modeling from preceptors, and provide ample time to reflect about challenges and rewards of patient care as they form professional identity.[7,35–37] These elements are critically synergistic to forming the type of clinician who can act as an advocate for their patients even at this early stage of training. LICs and other curricular innovations may improve the synergy between medical schools and health care systems, thus providing benefits to patients, trainees, and systems.[6,21,38]

Morbidity of patient population

One important observation is the burden of disease in the study population. Of the 100 patients who met initial inclusion criteria, 12 were found to have died, and of the 14 patients who were interviewed, four died shortly after the interview. Participants reported markedly worse health-related quality of life across all measured metrics than the general Colorado population.

This discrepancy is partially explained by the patient population DH serves. DH-LIC students also frequently develop relationships with patients who are nearing the end of life. These patients have frequent interactions with the health system, allowing ample opportunity for students to

develop relationships while providing much-needed continuity for the patient and the providers involved in their care. We found that DH-LIC students provided important emotional support and health care system navigation at this vulnerable phase of life to a marginalized patient population, further demonstrating the unique value that medical students may bring to clinical care mirroring what has been described between physicians and older patients.[17]

Navigating loss in the patient–student relationship

Medical educators must attend to the profound sense of loss and bewilderment patients described when the DH-LIC students were no longer a consistent presence in their health care. One patient in particular described a deep and enduring sense of abandonment that led her to not want to work with a DH-LIC student in the future. As the socio-economically disadvantaged patients served by DH are at high risk for past trauma related to loss, it is plausible that this sense of abandonment may have been amplified in this study population. However, these findings highlight the importance of carefully navigating the act of closure at the end of the clerkship experience. Anecdotally, students also struggled with closure with patients and the worry that comes with no longer overseeing their care. This may represent an emotional risk for LIC students that medical schools have an ethical imperative to address. In the DH-LIC program, near the end of the clerkship year, students engage in a reflective writing assignment and group discussion about the termination of care relationships with patients, including strategies for self-care at this transition time. Providing student and faculty support and education around this transition is a critical curricular element that has received little attention in the literature.

Limitations

Forty-seven percent of invited participants completed interviews. It is possible that individuals more critical of students declined invitations to participate in interviews, biasing our results to a more positive portrayal of the DH-LIC. However, our rate of interview completion compares

favorably to similar studies.[32] While the high morbidity of our patient population may limit the external validity of our findings, there is considerable similarity between our findings and those reported among healthier populations.[32] Results were analyzed by authors who have experience with the LIC model we studied, potentially biasing interpretation. Approximately six months had passed between the last interaction participants had with students and when the interviews were conducted, which may have led to some failure of recall and may have contributed to the number of patients who were not able to remember their student. Given the small number of patients included in this study at a single institution and the fact that students were chosen for the DH-LIC based on their commitment to care for this patient population, it is unknown if the demonstrated benefits would persist with different students and patients. Future research may pursue questions comparing patient experience among different types of patients and different types of students, including a comparison of conventional rotation-based and LIC students, and in other health care settings.

Conclusion

This study demonstrates strong therapeutic alliances between DH-LIC students and their patients, leading to improved patient experience, mitigation of perceived health care system failures and social determinants of health, and subjective improvement in health care outcomes. These findings demand a critical reflection on the active role of medical students in patient care. By investing in curricula that support students in building longitudinal therapeutic relationships with their patients, medical schools have the potential to dramatically improve patient experience and outcomes while sustaining a curricular model that allows students to thrive in their professional development and developing a strong sense of patient-centeredness.

References

1. The Consortium of Longitudinal Integrated Clerkships (CLIC). CLIC Overview. 2018. http://www.clicmeded.com/. Accessed May 10, 2019.
2. Ogur B, Hirsh D. Learning through longitudinal patient care: Narratives from the Harvard Medical School-Cambridge Integrated Clerkship. Acad Med. 2009;84:844–850.
3. Walters L, Greenhill J, Richards J, et al. Outcomes of longitudinal integrated clinical placements for students, clinicians and society. Med Educ. 2012;46:1028–1041.
4. Hudson JN, Poncelet AN, Weston KM, Bushnell JA, Farmer AE. Longitudinal integrated clerkships. Med Teach. 2017;39:7–13.
5. Konkin DJ, Suddards C. Students' experiences of role, relationships and learning in two clerkship models. Med Educ. 2017;51:490–497.
6. Poncelet A, Hudson J. Student continuity with patients: A system delivery innovation to benefit patient care and learning (continuity patient benefit). Healthcare. 2015;3:607–618.
7. Bleakley A, Bligh J. Students learning from patients: Let's get real in medical education. Adv Health Sci Educ. 2008;13:89–107.
8. Hirsh DA, Ogur B, Thibault GE, Cox M. "Continuity" as an organizing principle for clinical education reform. N Engl J Med. 2007;356:858–866.
9. Irby DM, Cooke M, O'Brien BC. Calls for reform of medical education by the Carnegie Foundation for the Advancement of Teaching: 1910 and 2010. Acad Med. 2010;85:220–227.
10. Norris TE, Schaad DC, DeWitt D, Ogur B, Hunt DD. Longitudinal integrated clerkships for medical students: An innovation adopted by medical schools in Australia, Canada, South Africa, and the United States. Acad Med. 2009;84:902–907.

11. Teherani A, O'Brien BC, Masters DE, Poncelet AN, Robertson PA, Hauer KE. Burden, responsibility, and reward: Preceptor experiences with the continuity of teaching in a longitudinal integrated clerkship. Acad Med. 2009;84(10 Suppl):S50–S53.

12. Snow SC, Gong J, Adams JE. Faculty experience and engagement in a longitudinal integrated clerkship. Med Teach. 2017;39:527–534.

13. Strasser R, Hirsh D. Longitudinal integrated clerkships: Transforming medical education worldwide? Med Educ. 2011;45:436–437.

14. Mazotti L, Adams J, Peyser B, Chretien K, Duffy B, Hirsh DA. Diffusion of innovation and longitudinal integrated clerkships: Results of the clerkship directors in internal medicine annual survey. Med Teach. 2018. [publish ahead of print.] DOI: 10.1080/0142159X.2018.1472369.

15. Fan VS, Burman M, McDonell MB, Fihn SD. Continuity of care and other determinants of patient satisfaction with primary care. J Gen Intern Med. 2005;20:226–233.

16. Saultz JW, Lochner J. Interpersonal continuity of care and care outcomes: A critical review. Ann Fam Med. 2005;3:159–166.

17. Mold JW, Fryer GE, Roberts AM. When do older patients change primary care physicians? J Am Board Fam Pract. 2004;17:453–460.

18. O'Malley AS, Mandelblatt J, Gold K, Cagney KA, Kerner J. Continuity of care and the use of breast and cervical cancer screening services in a multiethnic community. Arch Intern Med. 1997;157:1462–1470.

19. Beattie P, Dowda M, Turner C, Michener L, Nelson R. Longitudinal continuity of care is associated with high patient satisfaction with physical therapy. Phys Ther. 2005;85:1046–1052.

20. Hirsh D, Worley P. Better learning, better doctors, better community: How transforming clinical education can help repair society. Med Educ. 2013;47:942–949.

21. Worley P, Prideaux D, Strasser R, Magarey A, March R. Empirical evidence for symbiotic medical education: A comparative analysis of community and tertiary-based programmes. Med Educ. 2006;40:109–116.

22. Gabow P, Eisert S, Wright R. Denver Health: A model for the integration of a public hospital and community health centers. Ann Intern Med. 2003;138:143–149.

23. Gress TW, Flynn JA, Rubin HR, et al. Effect of student involvement on patient perceptions of ambulatory care visits: A randomized controlled trial. J Gen Intern Med. 2002;17:420–427.

24. Vaughn JL, Rickborn LR, Davis JA. Patients' attitudes toward medical student participation across specialties: A systematic review. Teach Learn Med. 2015;27:245–253.

25. Centers for Disease Control and Prevention. Measuring Health Days. Population Assessment of Health-Related Quality of Life. November 2000. https://www.cdc.gov/hrqol/pdfs/mhd.pdf. Accessed May 12, 2019.

26. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. Am J Eval. 2006;27:237–246.

27. Hanson JL, Balmer DF, Giardino AP. Qualitative research methods for medical educators. Acad Pediatr. 2011;11:375–386.

28. Centers for Disease Control and Prevention. Health-Related Quality of Life (HRQOL) Database. https://www.cdc.gov/hrqol/hrqol14_measure.htm. Accessed May 23, 2019.

29. County Health Rankings & Roadmap. 2018. http://www.countyhealthrankings.org/sites/default/files/state/downloads/CHR2019_CO.pdf. Accessed May 23, 2019.

30. Hirsh D, Gaufberg E, Ogur B, et al. Educational outcomes of the Harvard Medical School-Cambridge integrated clerkship: Away forward for medical education. Acad Med. 2012;87:643–650.

31. Bligh J, Prideaux D, Parsell G. PRISMS: New educational strategies for medical education. Med Educ. 2001;35:520–521.

32. Poncelet AN, Wamsley M, Hauer KE, Lai C, Becker T, O'Brien B. Patient views of continuity relationships with medical students. Med Teach. 2013;35:465–471.

33. Hauer KE, Hirsh D, Ma I, et al. The role of role: Learning in longitudinal integrated and traditional block clerkships. Med Educ. 2012;46:698–710.

34. O'Brien BC, Poncelet AN, Hansen L, et al. Students' workplace learning in two clerkship models: A multi-site observational study. Med Educ. 2012;46:613–624.

35. Billett S. Learning through health care work: Premises, contributions and practices. Med Educ. 2016;50:124–131.

36. Wald HS, Davis SW, Reis SP, Monroe AD, Borkan JM. Reflecting on reflections: Enhancement of medical education curriculum with structured field notes and guided feedback. Acad Med. 2009;84:830–837.

37. Warmington S, McColl G. Medical student stories of participation in patient care-related activities: The construction of relational identity. Adv Health Sci Educ Theory Pract. 2017;22:147–163.

38. Gonzalo JD, Dekhtyar M, Hawkins RE, Wolpaw DR. How can medical students add value? Identifying roles, barriers, and strategies to advance the value of undergraduate medical education to patient care and the health system. Acad Med. 2017;92:1294–1301.

Figure Legends

Figure 1

Flowchart of patient enrollment at Denver Health logged by students, including patients with 3 or more contacts with students during the clerkship year. From a study of patient experience, longitudinal care relationships, and health outcomes, University of Colorado School of Medicine, 2016–2017.

Figure 2

Prototype of the linear timeline of the development of relationships as described by patients cared for by Denver Health Longitudinal Integrated Clerkship students and interviewed about their experience working with students. From a study of patient experience, longitudinal care relationships, and health outcomes, University of Colorado School of Medicine, 2016–2017.

Table 1

Characteristics of 14 Patients Cared for by Denver Health Longitudinal Integrated Clerkship Students, From a Study of Patient Experience, Longitudinal Care Relationships, and Health Outcomes, University of Colorado School of Medicine, 2016–2017

Patient characteristic	Value
Age, median (IQR)	56 (43–61)
Gender, no. (%)	
Female	8 (57)
Male	6 (43)
Highest education level, no. (%)	
Grade school	5 (36)
High school	7 (50)
College	2 (14)
Graduate school	0 (0)

Abbreviation: IQR indicates interquartile range.

Table 2

Health-Related Quality of Life of 14 Patients Cared for by Denver Health Longitudinal Integrated Clerkship Students Compared With General Colorado Population, From a Study of Patient Experience, Longitudinal Care Relationships, and Health Outcomes, University of Colorado School of Medicine, 2016–2017

	No. (95% CI)		
Measure	Study population	Colorado population[29]	*P* value
% Fair or poor self-rated health	64.3 (39.2, 89.4)	12.4 (11.2, 13.7)	<.0001
No. mean physically unhealthy days	16.5 (9.3, 23.7)	3.3 (3.0, 3.6)	.0016
No. mean mentally unhealthy days	11.9 (4.8, 19.1)	3.5 (3.2, 3.8)	.0239
No. mean days of activity limitation	11.9 (4.8, 18.9)	1.9 (1.7, 2.1)	.0094

Abbreviation: CI indicates confidence interval.

Figure 1

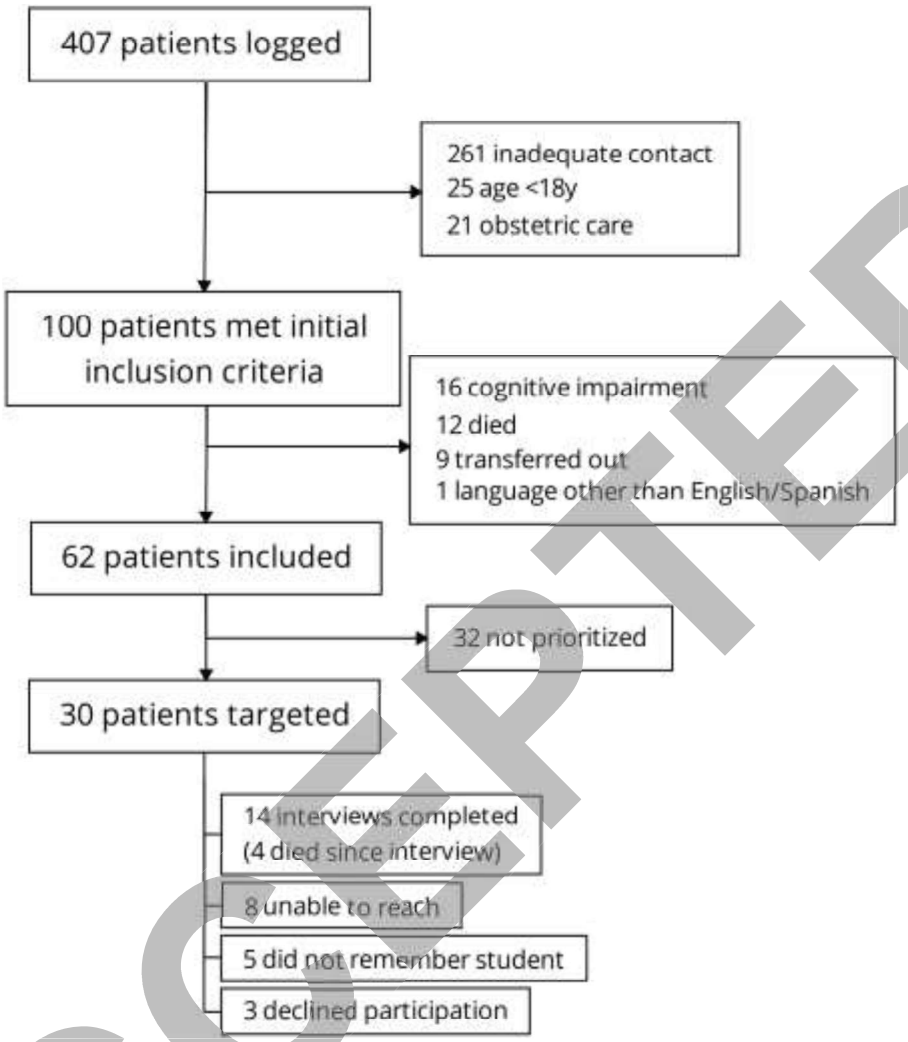

Figure 2