The Patient Centered Medical Home as Curricular Model: Perceived Impact of the "Education-Centered Medical Home"

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BACKGROUND: The patient-centered medical home (PCMH) model aims to provide patient-centered care, lower costs, and improve health outcomes. Medical students have not been meaningfully integrated in this model.
AIM: To test the feasibility of a longitudinal clerkship based on PCMH principles and anchored by PCMH educational objectives.
SETTING: Two community-based family medicine clinics, one academic internal medicine clinic, and one pediatric clinic affiliated with an urban medical school.
PARTICIPANTS: 56 medical student volunteers.
PROGRAM DESCRIPTION: We embedded student teams in existing faculty practices and recruited a high-risk patient panel for each team. Clinical education occurred through a traditional clinic preceptor model and was augmented by 3rd and 4th year students directly observing 1st and 2nd year students. Didactic content included monthly Grand Rounds conferences.
PROGRAM EVALUATION: Students attended 699 clinics, recruited 273 continuity patients, and participated in 9 Grand Rounds conferences. Student confidence with PCMH principles increased and attitudes regarding continuity were highly positive. "Continuity," "early clinical exposure," and "peer teaching" were the most powerful themes expressed by students. Faculty response to the pilot was highly positive.
DISCUSSION: An Education-Centered Medical Home (ECMH) is feasible and is highly rated by students and faculty. Expansion of this model is underway.

KEY WORDS: patient-centered medical home; medical education; longitudinal integrated clerkship; early clinical experience; curriculum design; continuity in education.
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The Patient-Centered Medical Home (PCMH) is "a model of practice in which a team of health professionals, coordinated by a personal physician, works collaboratively to provide high levels of care, access and communication, care coordination and integration, and quality and safety."[1] The PCMH model has growing momentum, and many stakeholders feel it should be the foundation of a new US healthcare delivery system.[1–3] Evidence is mounting that the PCMH model can deliver on the "Triple Aim" of patient-centered care, lower costs, and improved health outcomes.[4]

In 2010, the Carnegie Foundation issued a call for substantive medical education reform.[5] Leading primary care professional organizations also issued a joint statement calling for medical schools to educate students using the PCMH as a curricular model.[6] Current US medical students have limited exposure to and knowledge of the PCMH concept[7] though some family medicine clerkship sites have begun to use a PCMH model.[8]

A longitudinal PCMH-based clerkship structure provides continuity with patients, peers, and preceptors.[9,10] This continuity yields more accurate and meaningful evaluations of student core competency development.[10,11] Patient continuity enables student-patient relationships to develop, fostering professional growth[12] and providing a meaningful way for students to understand the social determinants of disease, comprehend problems of care fragmentation,[13,14] and appreciate the importance of the Wagner Chronic Care Model.[8,15] Finally, the longitudinal care model enables students to track real-time quality metrics with the opportunity to identify targets and methods for patient care improvement.[16]

Our goal was to develop a curriculum for medical students that integrated the PCMH principles of: (1) continuity with a personal physician, (2) team-based care, (3) care coordination and integration, (4) quality and safety, and (5) enhanced access.[1] Inspired by the PCMH model, we

developed an Education-Centered Medical Home (ECMH) clerkship designed for medical students at all levels. The aim of this study was to assess the feasibility and perceptions of an ECMH clerkship on students and preceptors.

SETTING AND PARTICIPANTS

This study took place at Northwestern University Feinberg School of Medicine, an urban medical school in Chicago, IL, from June 2011 to April 2012. During the pre-implementation phase (June to August 2011), an ECMH director (DE) and coordinator (BJ) were chosen and 10 % FTE salary support was obtained for each. The ECMH director selected four clinical sites based on their diversity and willingness to participate. ECMH student goals and objectives, evaluation forms, and didactic curricula were also developed. This study was approved by the Northwestern University Institutional Review Board.

Invitations to participate in the ECMH clerkship were sent to all students (n=680) by email followed by large group information sessions. One hundred twelve students volunteered to participate, and 56 students (14 first year, 13 second year, 15 third year, and 14 fourth year) were randomly selected and enrolled. All students provided informed consent before participating.

We established ECMHs at four diverse clinic sites, each with a single faculty preceptor: two federally qualified health center family practice clinics (PCC Community Wellness Center-Austin, PCC-A) and PCC Community Wellness Center-South, PCC-S), one academic general internal medicine clinic (Northwestern Memorial Faculty Foundation, NMFF), and one academic pediatric pulmonary clinic (Children's Memorial Hospital, CMH).

From September 2011 to April 2012, one 4-h afternoon clinic session was changed to the ECMH model at each site. Students were divided by class, asked about preferences for travel and specialty, and assigned to one of the four locations. The PCC and NMFF clinics operated weekly; each was assigned 16 students. The CMH clinic operated biweekly with eight students assigned. Each faculty preceptor was provided 10 % FTE salary support to recognize the expected decrease in clinical productivity during ECMH sessions and effort required to recruit patients, organize educational activities, and mentor and evaluate students. Existing clinic staff members, nurses, and administrators participated; no additional staff members were hired.

PROGRAM DESCRIPTION

The ECMH curriculum was developed using three educational objectives: first, to enable students to participate in a longitudinal clerkship maximizing continuity experiences with patients, preceptors, and peers.[10,12,15] Second, to demonstrate patient-centered care principles of the PCMH model including: (1) providing coordinated, effective care for medically and socially complex patients; (2) educating patients on self-care; and (3) improving quality of clinical care.[6,8] The third objective was to incorporate students into the delivery of PCMH-model care as health coaches and coordinators.[16,17]

Preceptors recruited "high-risk" patients from their existing panels, defined as any who required three to four office visits per year and/or had two or more emergency room visits or hospital admissions during the past year. Students were encouraged to enroll patients they encountered in other clerkships if the patients lacked an existing primary care provider. Patients who agreed to participate had routine appointments rescheduled to ECMH clinic days. ECMH patients could also schedule appointments with their physician for urgent issues.

Students were expected to attend the ECMH clinic every other week on average. Students self-coordinated schedules to minimize conflicts with other courses and clerkships. After an initial ramp-up period for clinic orientation and patient recruitment, each site scheduled approximately three patients per hour or nine patients per ECMH session. Sessions began and ended with a team huddle to discuss patient care issues and educational goals. During clinic, students worked in pairs consisting of a first or second year student and a third or fourth year student. Three student pairs (two for CMH) engaged in patient encounters with faculty preceptor oversight. The remaining one or two students acted as the team educator and outreach manager for the patient panel. Team educators solicited clinical questions arising during clinic and prepared real-time, evidence-based responses. Outreach managers alerted other students to quality metric deficiencies and called patients who were overdue for appointments or who needed follow-up on outstanding tests.

Once a patient established care within the ECMH, third and fourth year students were expected to contact their patients by telephone periodically to help them navigate appointments, coordinate with specialists, assess clinical progress, or follow-up on outstanding issues. Students were expected to document all telephone encounters in the medical record and were instructed to discuss immediately any new medical developments with their preceptor. Students were not allowed to make management or clinical decisions without discussion and approval. If an ECMH patient was admitted to, saw a specialist at, or underwent a procedure at a hospital where students had access, they were encouraged to participate in caring for the patient and communicate with the managing physician.

All students attended monthly ECMH Grand Rounds conferences focused on PCMH principles.[1–3,6,8] Topics for Grand Rounds discussions included continuity of care with

a personal physician, care coordination, healthcare quality and safety, access to care, and medical economics.

PROGRAM EVALUATION

All 56 students consented to participate in the study and completed the entire protocol. Across four sites, the students attended 699 clinics (mean 12.9 per student, *SD*= 2.8) and provided care to 273 continuity patients (mean 5 per student, *SD*=2.1) in addition to a variable number of acute care patient visits. At the NMFF and PCC-A sites, 146 continuity patients were seen an average of 2.6 times each during the pilot (range 1–11 visits).

Student self-confidence regarding the attainment of ECMH educational objectives was assessed at baseline and at 28 weeks. The survey was prepared by study authors based on those previously published[7,17] and reviewed by a group of general medical faculty educators for clarity and content. Data were collected via online survey and analyzed using the Wilcoxon signed rank test. Forty-nine of 56 students (88 %) completed both surveys. Self-confidence regarding all six objectives, including teaching self-care, continuity of care, and managing care for "high-risk" patients, rose significantly during the study period (Table 1). Students also completed a survey regarding their satisfaction with the ECMH curriculum, demonstrating that they enjoyed the clerkship and the experience of achieving continuity of care with patients (Table 2).

Students completed monthly free text responses regarding their experiences. Several themes emerged, including the value of early clinical experiences, peer teaching, continuity of care, and care coordination (Appendix 1 available online).

All preceptors responded to a post-ECMH survey. Preceptors estimated they spent an average of 4.7 h per week in addition to ECMH clinic time, approximated as 60 % communicating with students regarding clinical issues, 20 % preparing teaching materials, 15 % evaluating students, and 5 % attending ECMH Grand Rounds. Using a Likert-type scale in which 1 = strongly disagree, 3 = neutral, and 5 = strongly agree, all preceptors strongly agreed that students were achieving continuity with patients and enjoyed participating in the ECMH pilot. Three of four preceptors agreed they were able to balance the ECMH workload with their usual professional responsibilities, while one preceptor was neutral. All preceptors and 39 of 42 non-graduating students desired to continue their ECMH clinics in the 2012–2013 academic year.

Table 1. Northwestern University Feinberg School of Medicine Students' Mean Rating of Their Confidence in the Attainment of ECMH Learning Objectives (*n*=49)

PCMH/ECMH learning objectives	Pre-program confidence rating, mean (SD)*	Post-program confidence rating, mean (SD)*	*p*-value
Achieve continuity of care	3.3 (0.7)	4.2 (0.5)	<0.001
Manage a patient panel	2.9 (0.8)	3.7 (0.6)	<0.001
Provide care for "high-risk" patients	2.8 (1.1)	3.8 (0.8)	<0.001
Educate patients on self-care	3.2 (0.8)	4.1 (0.7)	<0.001
Track and coordinate care	2.8 (0.9)	3.7 (0.8)	<0.001
Measure health outcomes; improve performance	2.8 (1.0)	3.6 (0.7)	<0.001

**Likert rating scale of confidence: 1 = very poor, 2 = poor, 3 = neutral, 4 = good, 5 = very good*

DISCUSSION

The ECMH is a longitudinal clerkship that enables students at multiple educational levels to work as a cohesive team, manage a complex patient panel, explore the core principles of the PCMH, serve as patient educators, and form meaningful relationships with peers, preceptors, and patients. As shown in this study, this model can be implemented in a variety of settings. Both students and faculty found the clerkship rewarding and valued the continuity relationships they developed, while student confidence in the attainment of PCMH principles of care improved.

A variety of teaching institutions have implemented longitudinal, integrated clerkships, with most occurring in the third year.[18–24] Other institutions have integrated PCMH concepts and teaching into the third year family medicine clerkship.[9,25] Our ECMH curricular innovation is the first longitudinal clerkship based on PCMH principles to involve students from all levels of training working as a team with the ultimate goal of following long-term patient outcomes. This differs from the traditional ambulatory clerkship apprentice model because ECMH students achieve continuity, serve as patient advocates, and act as peer and patient educators.

Table 2. Northwestern University Feinberg School of Medicine Students' Perceptions of ECMH Continuity Experience (*n*=49)

PCMH/ECMH continuity objective	Post-program rating, mean (SD)*
I look forward to going to my ECMH clinic	4.5 (0.8)
I feel ownership for my ECMH patients	4.1 (1.0)
I am achieving continuity with my ECMH patients	4.2 (0.9)
I am enjoying having continuity with my ECMH patients	4.6 (0.9)
Continuity has affected my perspective on patient care	4.4 (0.9)
I am able to balance my classwork with my ECMH responsibilities	4.1 (1.0)

**Likert rating scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree*

Student free text responses uncovered other unique aspects of the ECMH clerkship (Appendix 1 available online). For pre-clinical students, early clinical experiences drove inquiry-based learning and reinforced basic science principles. Upper-level students were able to focus on care coordination, quality of care, and other patient panel management skills that were previously not taught in a practical setting. They also created continuity of peer teaching through mentorship of pre-clinical colleagues. Whether these positive experiences impact specialty choice among ECMH participants is an important question for further study.

Based on our positive pilot experience and with broad support from hospital and medical school departments, we plan to incrementally expand the ECMH to include all students. Nine additional ECMH clinics started the pre-implementation phase in August 2012 with compensation similar to that provided in the pilot for a total of 13 in the 2012–2013 academic year. We selected the weekly model used at the PCC sites and NMFF as the template for all sites, as the eight-student bi-weekly model at CMH resulted in fewer clinic visits and continuity patients per student.

To measure the quality of care provided to ECMH patients, we identified 29 PCMH quality indicators based on those suggested by the Commonwealth Fund (Appendix 2 available online).[26] We plan to track these indicators at each ECMH site, create de-identified "quality report cards" to review at Grand Rounds, and use these indicators to drive quality improvement efforts.

Although our pilot was successfully implemented, this study has limitations. First, students were selected from a single institution based on interest, creating the potential for volunteer bias. Increased confidence during the year may be explained by an independent "maturation effect" or simply participating in an outpatient clinic experience. Comparisons between ECMH students and students enrolled in traditional preceptorships are underway. Second, student and faculty satisfaction may be explained by the extra attention given to participants because this was a new program. Third, we acknowledge that the ECMH requires significant financial resources and a substantial number of preceptors to incorporate all students at an institution, similar to other longitudinal clerkships.[27] Expansion of the ECMH has been facilitated by positive reviews of the pilot from students and preceptors.

In summary, we believe the ECMH has enriched medical student education at our institution. Vertical integration of students and horizontal integration of medical school competencies were achieved in a clinic that provides an authentic continuity experience. Through the prospective collection of patient health outcome data, we hope that the ECMH will also improve patient care quality and outcomes for high-risk patient populations.

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