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Patient-Centered Medical Homes and Physician Assistant Education: Preparing the PA Student for the Practice of the Future

Gerald Kayingo, PhD, MMSc, PA-C; Vasco Deon Kidd, DHSc, MPH, PA-C; Mary L. Warner, MMSc, PA-C

Purpose: The patient-centered medical home (PCMH) holds promise for improving primary health care delivery, but little is known about its impact on medical education. The purpose of this study was to examine the extent to which physician assistant (PA) students are exposed to elements of the PCMH during the didactic and clinical phases of their education. **Methods:** A survey was distributed to clinical coordinators at all accredited PA programs in the United States that met the study inclusion criteria. The survey inquired about curricula central to practice in the PCMH: team-based care, electronic medical record utilization, and principles of care coordination. **Results:** Of the 211 clinical coordinators that were surveyed, we received responses from 87 (41%), of which 94% stated that they teach principles of interprofessional team-based practice during the didactic phase. Sixty percent or more teach concepts related to physician-directed teams, quality improvement, care coordination, and electronic medical records. Only 25% of respondents provide instruction in payment structures that reward care coordination and high quality care, and 22% stated that their students do not have exposure to the PCMH. Most importantly, less than 25% of respondents utilize designated PCMH clinical sites, and those that do have been doing so for less than two years. **Conclusion:** Many PA programs teach some of the core concepts of PCMH during the didactic phase, but exposure to PCMH during clinical clerkships remains limited. Concerted effort is needed to better prepare PA students to function in these emerging team-based practices.

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INTRODUCTION

The patient-centered medical home (PCMH) is a health care model in which a team of health professionals works collaboratively to provide high levels of care, access, and communication; care coordination and integration; as well as quality and safety, on an ongoing basis.¹⁻³ The PCMH model holds promise for improving both patient and staff experiences.^{4,5} There is also evidence that implementation of the PCMH may improve preventive services and may be associated with reduced emergency department visits and hospital admissions for older patients.^{5,6} Various health care organizations are recommending that the PCMH should be the foundation of a new health care delivery system in the United States.⁷ The core features of the PCMH are described by the Agency for Healthcare Research and Quality (AHRQ) and are summarized in Table 1.¹

While there is increasing evidence supporting the positive effects of the PCMH on patients, health care

providers, and care-related processes, there has been little examination of its incorporation in teaching settings. For the PCMH model to succeed and be sustainable, health care students should be exposed to team-based care, electronic medical records, care coordination, quality, and safety early in their training. A cross-sectional study conducted by Saultz and colleagues in 2008 to determine the extent to which third-year medical students are exposed to elements of the PCMH during a required ambulatory clerkship revealed up to a tenfold variation from school to school.⁸ In 2010, the Association of Departments of Family Medicine distributed a survey to chairs of departments inquiring about the ways medical students and residents are exposed to the curricula central to the PCMH.⁹ The majority of respondents indicated that they were teaching some aspects of the PCMH, but it is unclear whether the information being presented is of sufficient breadth and depth to prepare students for clinical practice in the

Table 1. Core Features of the Patient-Centered Medical Home

Ongoing relationship with a personal physician	Each patient has an ongoing relationship with a primary care provider who provides first contact and continuous and comprehensive care.
Physician-directed medical practice teams	The personal physician leads a team of individuals at the practice level who collectively take responsibility for ongoing patient care.
Whole person orientation	Care for all stages of life: acute care, chronic care, preventative services, and end-of-life care. The personal physician is responsible for providing all of the patient's health care needs or for arranging care with other qualified professionals.
Care is coordinated and/or integrated	Care is coordinated and integrated across all elements of the complex health care system and the patient's community.
Enhanced access to care and information	Enhanced access to care is available through open scheduling, expanded hours, and other innovative options for communication between patients and their personal physician and/or care team.
Health information technology	Provide technology infrastructure for information management and exchange.
Improved quality and safety	Physician-patient partnerships in care, evidence-based medicine, quality improvement, patient participation in care, practice participation in voluntary recognition process.
Payment reform/ appropriate payment structures	Payment appropriately recognizes the added value provided to patients who have a patient-centered medical home. Alignment of financial incentives to support coordination of care, alternative scheduling arrangements, use of new technologies, and improved quality of care.

Source: Adapted from the *Joint Principles of the Patient-Centered Medical Home*, Patient-Centered Primary Care Collaborative

PCMH. Similarly, an Association of American Medical Colleges study revealed that by 2012, the majority of academic centers and clinical practices delivered at least some aspects of team-based care. These health care teams were comprised of physicians and other health care providers.¹⁰

Since the inception of the profession in the 1960s, physician assistant (PA) practice has been patient-focused and team-based, and thus perfectly suited to the PCMH model. Unlike other health professions that put a lot of emphasis on clinical and basic science research, independent practice, or lead-

ership roles, PAs are trained in a collaborative model to work alongside supervising physicians, and their education largely centers on clinical medicine. Both the American College of Physicians and the American Academy of Family Physicians have stated that PAs should be recognized as primary care providers in the PCMH and have recognized that many PCMH practices are already utilizing PAs.¹¹ However, to date, there has been little investigation into the impact of the PCMH on PA education and the extent to which programs are teaching the concepts of the PCMH and preparing PAs to function

in these new health care delivery models. The Standards of the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA) indicate that PA programs are expected to provide instruction in interprofessional teams (B1-08), health care delivery systems (B2-11), and quality improvement (B2-13).¹² In addition, leading medical professional bodies have issued joint statements calling for health professional schools to educate students on the new models of health care and to use the PCMH as a curricular model.¹³ Recently, the Society of Teachers of Family Medicine (STFM) and the Physician Assistant Education Association (PAEA) released a joint statement calling for the training and deployment of integrated teams of health professionals who provide and coordinate care within a patient-centered model.¹⁴ Given the advent of health care reform, understanding the impact of the PCMH on medical education has become a national priority. The purpose of this study is to characterize the extent to which PA students are exposed to the core elements of this new delivery model during their training.

METHODS

A 12-question survey was developed and beta tested by four PA programs in the winter of 2012 (Table 2). After receiving approval from the Yale School of Medicine Human Investigations Committee, the survey was distributed electronically to 211 clinical coordinators using Survey Monkey. We obtained email addresses, with permission, from the PAEA database for all clinical coordinators at the 131 programs that had been accredited for at least two years. These criteria yielded addresses for 211 clinical coordinators; some programs have more than one person designated as the clinical coordinator. The study focused on clinical coordinators because these faculty members were considered most likely to be familiar

Table 2: Physician Assistant Education and Patient-Centered Medical Homes Survey

Section 1. General Information

1. In which state is your PA program located? _____
2. Type of institution: ☐ Private ☐ Public
3. Type of sponsoring institution:
☐ Academic health center ☐ University ☐ 4-year college
☐ Community college ☐ Hospital ☐ Military ☐ Other
4. Administrative housing: ☐ School of medicine ☐ School of allied health/health professions ☐ Other
5. Credential awarded: ☐ Master's ☐ Baccalaureate ☐ Certificate ☐ Associate

Section 2. Didactic Experience with Patient-Centered Medical Homes (PCMH)

6. How are your students oriented to the concept of patient-centered medical homes?
Check all that apply ☐ Through seminar sessions ☐ Through on-line activities
☐ Through guest speakers ☐ Through reading assignments
☐ Not at all
7. Does your program teach students any of the following concepts?
Check all that apply ☐ Physician-directed medical teams that care for patients in an ongoing way
☐ Principles of quality improvement ☐ Interprofessional practice
☐ Care coordination and integration ☐ Electronic medical records
☐ Payment structures that reward care coordination and high quality medical care
☐ I do not know
8. Do your students participate in quality improvement projects as part of their formal training?
Check all that apply ☐ Yes, all students ☐ Yes, some of the students
☐ None of them participate in quality improvement projects
☐ I do not know

Section 3. Clinical Experience with Patient-Centered Medical Homes (PCMH)

9. Do your students complete rotations in practices that model patient-centered medical homes?
☐ Yes, all students ☐ Yes, some of the students
☐ None of them rotate through patient-centered medical homes
☐ I do not know
10. Approximately, what is the percentage of your primary care sites that utilize a patient-centered medical home model?
☐ 100% ☐ 75% ☐ 50% ☐ 25% ☐ <25%
☐ I do not know
11. For how many years have your students been rotating in patient-centered medical homes during their clinical training?
☐ >5 years ☐ 3-5 years ☐ 1-2 years ☐ <1 year
☐ I do not know
12. Do your students complete rotations in federally qualified community health centers?
☐ Through didactic lectures ☐ Yes, all of them
☐ Yes, some of them ☐ None of them
☐ I do not know

Name of your PA program (optional)

with both the clinical and didactic phases of PA programs. It was also assumed that surveying clinical coordinators was more likely to yield a higher response rate than program directors, who are subjected to many national surveys. Furthermore, we surveyed program faculty and not students because our primary interest was in curricular content and modifications designed to expose students to practice in the PCMH. Finally, the study focused on the PCMH and not the other elements of the Affordable Care Act such as accountable care organizations and health insurance exchanges, which were relatively new and had not been implemented by the time we distributed the survey.

Provisionally accredited programs in existence for less than 2 years were excluded from the research. The investigators were blinded to the identity of the programs and the respondents. A study coordinator, who was not part of the research team, sent a reminder email to nonresponders at 3 weeks and at 2 months after the survey was initially distributed. In addition, a consultant not involved as a researcher reviewed the email addresses of the respondents and cross-referenced the name of the program with the PAEA geographic region to ensure that responses were obtained from all geographical areas.

As shown in Table 3, the survey had three lines of inquiry: (1) program demographics, (2) exposure to the PCMH during the didactic phase, and (3) exposure to the PCMH during the clinical phase. To assess exposure to the PCMH core elements during the didactic phase, the survey inquired about elements of the curriculum related to the practice of the PCMH such as team-based care, electronic medical records, and principles of care coordination. It was noted from the literature that PCMH definitions and elements vary widely.⁵ The topics of instruction chosen for the survey have been delineated as the hallmarks of the PCMH.^{1,3}

Table 3. Study Variables

Program demographics	State
	Type of supporting institution
	Administrative housing of program
	Academic credential awarded
Didactic exposure to PCMH concepts	Topics of instruction
	Instructional methods
Clinical exposure to PCMH	Rotations in PCMH
	Percentage of primary care sites that offer PCMH
	Rotation in federally qualified community health centers

Table 4. Geographical Distribution of Survey Participants

Consortium	Eligible Programs		Respondent Programs	
	Number	Percent	Number	Percent
Southeast	29	22%	18	27%
Northeast	27	21%	11	16%
Midwest	25	19%	9	13%
West	17	13%	12	18%
East	22	17%	12	18%
Heartland	11	8%	5	8%
Total	131	100%	67	100%

Descriptive statistics were used to characterize the results. Categorical variables are presented as percentages. A chi-square test was used to examine whether the geographical distribution of the sample differs significantly from that of the whole eligible population. The statistical software SAS 9.2 was employed to do the chi-square test. The 95% confidence intervals for proportions were first calculated using the normal approximation to the binomial distribution method and confirmed using the Wilson score interval without continuity correction.

RESULTS

Of the 131 PA programs that met the inclusion criteria, responses were obtained from 67 (51%) programs. A total of 87 (41%) clinical coordinators responded to the survey, of which 69.2%

($n = 60$) represented private institutions and 30.8% ($n = 26$) represented public institutions. The majority of respondents (64%) were housed in a university, while the rest were split between 4-year colleges (17%) and academic medical centers (15%). Very few respondents were housed in community colleges, hospitals, or military programs. About 25% of respondents were associated with a school of medicine, while 72% reported being in a school of allied health or health sciences. The vast majority of respondents (93%) reported that their programs confer a master's degree, while 3.4% ($n = 3$) confer a bachelor's degree and 3.4% ($n = 3$) grant a certificate.

As shown in Table 4, responses were obtained from all geographical areas and consortiums for the national PA educators' community. When a chi-square test was used to examine whether the geo-

graphical distribution of the sample differed significantly from the whole eligible population, we found no statistically significant difference ($P = 0.176$) in the percentage of programs that responded by region compared with those programs that were eligible to participate in the study. This finding suggests that our sample was representative of the eligible PA programs in the United States based on geographical location.

Didactic Exposure

Clinical coordinators were asked which of the listed PCMH concepts were taught during the didactic phase of the program (Figure 1). Almost all (93.3%) respondents to this question reported teaching the concepts of interprofessional practice. Further, more than 60% reported that they also teach concepts related to physician-directed teams, principles of quality improvement, care coordination and integration, and electronic health records. In contrast, only 25% of respondents reported that their programs teach about payment structures that reward care coordination and performance. With regard to participation in quality improvement (QI) projects, the majority of respondents (38%) stated that their students do not participate in QI projects, 26.7% stated that some of the students participate, 14.7% reported that all students participate, and 20% answered that they did not know if their students participated in a QI project.

Regarding how the students are oriented to the concepts of the PCMH, the most common instructional method was traditional lecturing (68%) followed by guest lecturing (38%). Nearly 25% of the respondents said that they have not oriented their students to the concept of the PCMH (Figure 2).

Clinical Exposure

With regard to PA clinical training, clinical coordinators were asked if their students complete rotations in practices

Figure 1. Concepts of PCMH Taught during the Didactic Phase (N = 75) **Figure 2. Instructional Methods Used to Expose PA Students to the Concepts of PCMH during the Didactic Phase (N = 76)**

that model the PCMH; only 8% responded that all students rotate through a PCMH (Figure 3). In contrast, 52% reported that only some of the students rotate in this environment, and 20% reported that none of the students rotate in a PCMH. Lastly, 20% responded that they do not know if their students rotate in a PCMH.

When asked about the percentage of their primary care sites that were using the PCMH model, 40% of

respondents answered "I do not know," 30% reported that less than 25% used the PCMH model, and 21% indicated that at least 25% of their sites were in the PCMH (Figure 4). Fewer than 10% of clinical coordinators responded that more than 50% of their primary care sites used the PCMH model, and none reported that 100% of their primary care sites did.

To gain further insight into the extent of exposure to the PCMH, pro-

grams were asked how long they have used PCMH sites. Twelve percent of respondents reported having used this type of site for more than 5 years, 10% for between 3 and 5 years, and 23% for between 1 and 2 years. The largest percentage (41%) reported that they did not know how long the program had been using PCMH sites.

Regarding students who rotated in a federally qualified community health center, only 6% of respondents reported having all students rotate through one of these sites, while most respondents (55%) reported that some of their students do. Four respondents reported either that students do not rotate through this environment or that they did not know. More than a third of survey participants skipped this question.

DISCUSSION

The PCMH model has been rapidly adopted across the country in recent years. In July 2014, there are 7,782 sites recognized as medical homes by the National Committee for Quality Assurance (<http://www.ncqa.org>), up from an estimated 1,500 sites in December 2010. Despite this rapid adoption of the PCMH model, little is known about its impact on medical education. Studies examining the experiences of students who rotate through these medical homes are lacking. This study is the first of its kind to explore the relationship between the PCMH and PA training. Our results indicate that many PA programs teach some of the core components related to the PCMH during the didactic phase, but exposure to the PCMH during clinical clerkships remains limited.

We also found that many PA programs expose students to interprofessional learning during the didactic phase, which is consistent with previous studies.¹⁵ Another significant finding was that more than 70% of respondents indicated that they expose students to electronic medical records during the

Figure 3. Percentages of Students that Complete Rotations at Sites that Model PCMH (N = 74)

Figure 4. Percentages of Primary Care Sites that Utilize PCMH Models (N = 57)

didactic phase. This finding is in contrast to previous studies, which have reported that PA students have limited exposure to electronic medical records, especially in the classroom setting.¹⁶ It is likely that the incorporation of electronic medical records into PA education is rapidly expanding. Also, many PA programs have started exposing students to patients early in their train-

ing.¹⁷ This "early and often" longitudinal exposure of students to patients may explain the increased instruction in electronic medical records during the didactic phase. As proposed by Barnett et al, electronic medical records could be incorporated into the PA training curriculum during the history and physical examination course or during the clinical decision-making course.¹⁶

While analyzing medical student exposure to electronic medical records, Saultz et al found that more than 50% of clerkship placement sites have electronic medical records compared to 18% noted in prior years.^{8,18}

Our results indicate that the majority of PA programs introduce students to the concepts of the PCMH through traditional lecture formats. As the PCMH might be a newer concept among PA faculty, it may be effective to deliver its core concepts through invited guest speakers and seminar sessions by health policy experts. There may also be opportunities for online instruction as various agencies such as the Agency for Healthcare Research and Quality provide free access to PCMH resources. In addition, the vast majority of respondents reported that their PA programs are housed in a school of allied health or school of medicine; therefore, there is great potential to expose students to the elements of the PCMH through interprofessional education during their didactic and clinical phases. This is in line with the recommendations for interprofessional education in the 1988 World Health Organization (WHO) report, *Learning Together to Work Together for Health*, the recent report from the Institute of Medicine on interprofessional education and collaboration, as well as other similar reports.¹⁹⁻²² It is also consistent with the recent recommendation by PAEA and STFM and the current accreditation standards for PA education, which require programs to prepare students to work collaboratively in interprofessional patient-centered teams.¹⁴

It was surprising to find that participation in quality improvement (QI) projects is very limited and that students are not receiving instruction on payment structures that reward care coordination and performance. Accreditation standards require that program curricula must include instruction in

QI, reimbursement, and health policy. Also, many employers expect that PA graduates have basic knowledge of QI and that they can appropriately code and bill for their services. This limited exposure to QI may reflect a lack of skilled faculty to incorporate these competencies into the curriculum. Undoubtedly, the new certification policy, which requires PAs to complete two practice improvement modules as a part of the 10-year cycle, will motivate PA educators to develop student competence in this area.

Our results showed that 40% of the clinical coordinators surveyed did not know what percentage of their clinical sites use the PCMH model, and that 20% did not even know whether any of their students rotated in sites that model the PCMH. These findings suggest that a more concerted effort is needed in PA programs to restructure their clinical curricula to expose students to the essentials of the PCMH model. It is also possible that either the survey did not present a clear definition of the PCMH, or that clinical coordinators responding to the survey did not know whether or not many of their rotation sites actually qualify as PCMHs. Supplementary studies that target clinical preceptors are needed to fully understand the extent to which students are exposed to the PCMH during their clinical rotations.

It has been previously shown that graduates often practice in environments to which they were exposed during their training.²³ PA students exposed to elements of the PCMH may feel better prepared to function in team-based practices and could be more likely to consider a career in primary care. Failure to expose students to the PCMH model will be a missed opportunity to prepare PA students for this type of practice.

Although our survey did not inquire about the barriers to PCMH exposure, various reports point to lack

of primary care sites and preceptors in medical homes as a significant barrier.²⁴ Federally qualified community health centers may provide more opportunities for exposure to the PCMH as various government agencies increase support for these centers. In November 2011, the Centers for Medicare and Medicaid Services awarded \$42 million to 550 federally qualified health centers to implement the PCMH Demonstration Project. In its efforts to increase the primary care workforce, the Health Resources and Services Administration should increase grant opportunities that support PA program partnerships with community centers where the PCMH is being implemented. In general, more research is needed to determine the most effective ways to expose students to these new models of care and to assess the impact of PCMH exposure on future primary care practice.

Overall, our findings highlight the deficits that exist in PA education with regards to health policy curriculum and exposure to the PCMH during clinical training. This study provides a baseline for tracking future trends in incorporating PCMH elements into PA education. As the Affordable Care Act continues to reform our health care system, medical education, including that of PAs, needs to adapt to prepare students to work effectively in inter-professional patient-centered teams. Future studies are needed to address the extent to which different health professional schools are educating students about these new models of health care delivery as well as the impact on the primary care workforce.

This study was limited by the fact that the survey assumed that the respondents were familiar with how the PCMH is integrated into curricula; if this were not the case, some of the responses could have been skewed. Some clinical coordinators may not have been sufficiently knowledgeable about the didactic curriculum of their own pro-

grams. In addition, there could have been response variation, as some PA programs have a single clinical coordinator, while others have teams with multiple members. The survey also allowed for respondents to skip questions, which could have skewed the results. Follow-up studies that survey students and their preceptors would also be valuable and are currently under way.

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REFERENCES

1. Agency for Healthcare Research and Quality. Patient centered medical home resource center. <http://pcmh.ahrq.gov>. Accessed January 30, 2014.
2. Bodenheimer T. The future of primary care: transforming practice. *New Engl J Med*. 2008;359(20):2086, 2089.
3. Goldberg DG, Kuzel AJ. Elements of the patient-centered medical home in family practices in Virginia. *Ann Fam Med*. 2009;7(4):301-308.
4. Rosenthal TC. The medical home: growing evidence to support a new approach to primary care. *J Am Board Fam Med*. 2008;21(5):427-440.
5. Jackson GL, Powers BJ, Chatterjee R, et al. The patient-centered medical home: a systematic review. *Ann Intern Med*. 2013;158(3):169-178.
6. Starfield B, Shi L. The medical home, access to care, and insurance: a review of evidence. *Pediatr*. 2004;113(5 Suppl):1493-1498.
7. Landon BE, Gill JM, Antonelli RC, Rich EC. Prospects for rebuilding primary care using the patient-centered medical home. *Health Aff*. 2010;29(5): 827-834.
8. Saultz JW, O'Neill P, Gill JM, et al. Medical student exposure to components of the patient-centered medical home during required ambulatory clerkship rotations: implications for education. *Acad Med*. 2010;85(6): 965-973.

9. David A, Baxley L. Education of students and residents in patient centered medical home (PCMH): preparing the way. *Ann Fam Med*. 2011;9(3):274-275.
10. Association of American Medical Colleges. *Moving the Medical Home Forward: Innovations in Primary Care Training and Delivery*. <https://members.aamc.org/eweb/upload/Moving%20the%20Medical%20Home%20Forward.pdf>. Published November 2010. Accessed January 31, 2014.
11. American College of Physicians. *Internists and Physician Assistants: Team-Based Primary Care*. Philadelphia: American College of Physicians; 2010: Policy Monograph. (Available from American College of Physicians, 190 N. Independence Mall West, Philadelphia, PA 19106)
12. Accreditation Review Commission on Education for the Physician Assistant. Standards of Accreditation. <http://www.arc-pa.org/standards>. Accessed January 31, 2014.
13. Lausen H, Kruse JE, Barnhart AJ, Smith TJ. The patient-centered medical home: a new perspective for the family medicine clerkship. *Fam Med*. 2011;43(10):718-720.
14. Nolte T. STFM collaborates with PAEA to promote interprofessional education. *Ann Fam Med*. 2012;10(5): 470-471.
15. Hegmann TE, Kasson BG, Stafford HA. Comparison of medical and physician assistant study performance in interprofessional pharmacology and clinical medicine courses. *J Physician Assist Educ*. 2009;20(4):21.
16. Barnett JS. Incorporating electronic medical records into the physician assistant educational curriculum. *J Physician Assist Educ*. 2013;24(2):48-54.
17. Abu-Rish E, Kim S, Choe L, et al. Current trends in interprofessional education of health sciences students: a literature review. *J Interprof Care*. 2012;26(6):444-451.
18. Linder JA, Ma J, Bates DW, Middleton B, Stafford RS. Electronic health record use and the quality of ambulatory care in the United States. *Arch Intern Med*. 2007;167(13):1400-1405.
19. World Health Organization. Learning together to work together for health. Report of a WHO Study Group on Multiprofessional Education of Health Personnel: the Team Approach. *World Health Organization technical report series*. 1988;769:1-72.
20. Kohn LT, Corrigan JM, Donaldson MS. *To Err Is Human: Building a Safer Health System*. Washington, DC: National Academies Press; 2000:135-136.
21. Institute of Medicine. *Interprofessional Education for Collaboration*. Published May 2013. <http://www.iom.edu/Reports/2013/Interprofessional-Education-for-Collaboration.aspx>. Accessed September 15, 2013.
22. Greiner A, Knebel E. *Health Professions Education: A Bridge to Quality*. Washington, DC: National Academies Press; 2003:45-46.
23. Coombs JM, Morgan P, Pedersen DM, Koduri S, Alder SC. Factors associated with physician assistant practice in rural and primary care in Utah. *Int J Family Med*. 2011;879036.
24. Phillips RL, Phillips J. *Specialty and Geographic Distribution of the Physician Workforce: What Influences Medical Student and Resident Choices?* Washington, DC: The Robert Graham Center: Policy Studies in Family Medicine and Primary Care; 2009.

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