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8 **Title: Accelerated Competency-based Education in Primary Care (ACE-PC): a 3-year UC Davis and**
9 **Kaiser Permanente partnership to meet California’s primary care physician workforce needs.**

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8 Abstract:

9 **Problem**

10 Our nation faces an urgent need for more primary care (PC) physicians, yet interest in PC careers is dwindling.
11 Students from underrepresented in medicine (UIM) backgrounds are more likely to choose PC and practice in
12 underserved areas yet their representation has declined. Accelerated PC programs have the potential to address
13 workforce needs, lower educational debt, and diversify the physician workforce to advance health equity.
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18 **Approach**

19 With support from Kaiser Permanente Northern California (KPNC) and the American Medical Association's
20 Accelerating Change in Medical Education initiative, University of California School of Medicine (UC Davis)
21 implemented the Accelerated Competency-based Education in Primary Care (ACE-PC) program—a six-year
22 pathway from medical school to residency for students committed to health equity and careers in family medicine
23 or PC-internal medicine. ACE-PC accepts 6-10 students per year using the same holistic admissions process as
24 the 4-year MD program with an additional panel interview that includes affiliated residency program faculty from
25 UC Davis and KPNC. The undergraduate curriculum features: PC continuity clinic with a single preceptor
26 throughout medical school; a 9-month longitudinal integrated clerkship; supportive PC faculty and culture;
27 markedly reduced student debt with full-tuition scholarships; weekly PC didactics; and clinical rotations in
28 affiliated residency programs with the opportunity to match into specific ACE-PC residency tracks.
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35 **Outcomes**

36 Since 2014, 70 students have matriculated to ACE-PC, 71% from UIM groups, 64% are first generation college
37 students. Of the graduates, 48% have entered residency in family medicine and 52% in PC-internal medicine. In
38 2020, the first graduates entered the PC workforce; all are practicing in California, including 66% at federally
39 qualified health centers, key providers of underserved care.
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44 **Key words:** primary care, competency-based education, workforce diversity, health equity, accelerated program
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8 **Problem**
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10 Despite an urgent need for more primary care (PC) physicians (AAMC, 2019), student interest in PC continues
11 to decline (Connelly et al., 2003; Hauer et al., 2008; Kost et al., 2019), medical education debt grows
12 (Rosenblatt et al, 2005; Rogalsky, D.K, 2013), and the culture of academic medicine discourages students from
13 choosing PC. (Warm & Goetz, 2013) The presence of PC physicians in a community is associated with
14 improved life expectancy.(Basu S., 2019; Snyder et al., 2023; Washko et al., 2015) Physicians from
15 underrepresented in medicine (UIM) backgrounds (defined as American Indian or Alaska Natives, blacks, and
16 Hispanics or Latinos) provide a disproportionate share of care to medically underserved populations helping to
17 advance health equity. (Marrast et al., 2014; Salhi et al., 2022) Patient-physician racial concordance is
18 associated with better health outcomes including lower costs (Jetty et al., 2022) and improved communication
19 (Shen et al., 2018). However, UIM student representation in medical schools is declining (Talamantes et al,
20 2019) due to financial and educational barriers and longstanding structural inequities. (Faiz et al., 2023;
21 Guevara et al., 2021) Accelerated training allows graduates to enter the workforce sooner, increasing their years
22 in PC practice and addressing the shortage of UIM physicians. (Cangieralla et al., 2017)
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24 In 2014, University of California Davis School of Medicine (UC Davis) implemented the Accelerated
25 Competency-based Education in Primary Care (ACE-PC) program with Kaiser Permanente Northern California
26 (KPNC) and the American Medical Association’s Accelerating Change in Medical Education
27 initiative.(Skochelak & Stack, 2017) We describe this six-year undergraduate medical education (UME) to
28 graduate medical education (GME) pathway for students committed to careers in Family Medicine (FM) or PC-
29 Internal Medicine (PC-IM).
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46 **Approach to innovation**
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48 ACE-PC was designed with broad stakeholder input to address workforce needs, reduce medical school debt,
49 and embed a competency-based pathway within the traditional medical school curriculum.
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8 ACE-PC accepts 6-10 students per year using the same holistic admissions process (Henderson et al, 2023;
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10 AAMC, 2013) as the 4-year MD (4YMD) program with an additional panel interview prior to matriculation that
11 includes affiliated GME program faculty. Additional selection criteria include a demonstrated commitment to
12 PC and underserved care. Factors that have attracted UIM students include the school's commitment to
13 diversity, program mission, and local media coverage. Students receive full tuition scholarships (from KPNC
14 and UC Davis), graduating with less than one third the debt of 4YMD students. (Abramson et al, 2013) Students
15 receive extensive longitudinal program faculty support, early clinical exposure, and GME mentoring. The small
16 cohort and high faculty to student ratio contributes to student success and is difficult to replicate within a
17 traditional curriculum.
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27 **ACE-PC Core Curriculum (figure 1):**

28 The program emphasizes authentic PC experiences, mentoring relationships with PC physicians role models,
29 and intentional professional identity development. Students complete the same educational objectives and
30 assessments as 4YMD students on a modified timeline. Affiliated GME programs provide clinical training sites,
31 exposing students to their faculty and institutional culture. Students participate in biweekly primary care didacts
32 (table 1) led by master clinician educators.
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38 **Pre-clerkship:** Students arrive 6 weeks before 4YMD students to complete an intensive summer clinical
39 immersion that replaces the traditional **Year 1** longitudinal clinical skills curriculum, including the **same** final
40 Objective Structured Clinical Examination. Students attend PC continuity clinic (PCCC) three half days a week
41 during summer immersion and every other week during Years 1 and 2 with the same preceptor that supervises
42 them for 3 years. Between Years 1 and 2, each student completes a four-week PC clinical at an affiliated FM or
43 PC-IM GME program.
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50 **Clerkship:** After an abbreviated study period, students take USMLE Step 1 and begin a longitudinal integrated
51 clerkship (LIC) with 4 weeks of inpatient IM and two-week inpatient rotations in Obstetrics and Gynecology,
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8 Pediatrics, Psychiatry, and Surgery; followed by six ambulatory months with weekly PCCC and clinics in each
9 core discipline.

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11 **Post-Clerkship:** In January of Year 3, after an abbreviated USMLE Step 2 study period, students complete the
12 required advanced clinical rotations for 4YMD students (IM, Emergency Medicine, and ICU); and either a
13 pediatrics sub-internship (for FM applicants) or second IM sub-internship (for PC-IM applicants).
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16 17 18 19 **Residency Match**

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21 During the LIC, students apply through the Electronic Residency Application Service and National Resident
22 Matching Program (NRMP). Two FM programs and one PC-IM program have unique NRMP tracks for ACE-
23 PC students only (unfilled spots revert to the parent categorical program). GME program directors meet with
24 PC students only (unfilled spots revert to the parent categorical program). GME program directors meet with
25 ACE-PC leadership twice yearly to discuss each student's progress, facilitating a warm handoff from UME to
26 GME.
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31 32 33 **Outcomes**

34 Since 2014, 70 students have matriculated into ACE-PC, 71% from UIM backgrounds and 84% self-identifying
35 as disadvantaged. MCAT scores, undergraduate GPA, and USMLE Step 1 and Step 2 scores are comparable
36 between ACE-PC and 4YMD students. Only 10% have transitioned to the 4YMD program, compared to
37 approximately 16% nationally for accelerated programs. (Macerollo et al, 2023) Of the first 40 graduates, 48%
38 matched in FM and 52% matched in PC-IM: 42% at UC Davis, 18% at KP, and 40% at non-affiliated GME
39 programs. All graduates progressed normally through GME; one resident in each of the first 4 graduating
40 cohorts was selected to be chief resident. The first GME graduates entered the workforce in 2020; of the first 12
41 in PC practice, 8 work at a Federally Qualified Health Center, 2 at an academic medical center, and 2 at KP.
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10 **Limitations:**

11 Accelerated programs are not advisable for all students, particularly those who need time to explore other
12 specialties or who struggle to reach out for help. Disadvantaged students may experience personal hardships
13 that affect performance, (O'Marr JM et al, 2022; Nguyen M, et al, 2022; Henderson MC, et al, 2021)
14 underscoring the need for flexibility and options for transitioning to the 4YMD curriculum. The program
15 requires significant investment in scholarships, academic support, mentoring, (Farkas AH, et al, 2019)
16 consistent faculty development, (Bensimon, E.M 2007; Schmid, M.E. et al, 2016) and protected faculty time,
17 which some institutions may be unwilling or unable to provide.
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27 **Lessons Learned:**

28 ACE-PC is a successful 3-year MD pathway for diverse students committed to PC and health equity. The
29 program leverages holistic admissions, robust scholarships, authentic PC experiences, and direct linkages to
30 GME programs. Early PCCC cultivates professional identity development and mentoring relationships with
31 supportive PC role models. Frequent faculty development helps develop preceptor assessment and feedback
32 skills. The LIC cultivates long-term preceptor-student relationships while meeting the requirements of multiple
33 core clerkships. Student success is enhanced by weekly didactics with master educators, coaching from diverse
34 faculty mentors, and a supportive environment in which students can learn and grow with like-minded peers.
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44 **Disclosure statement:**

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46 In accordance with Taylor & Francis policy and our ethical obligation as researchers, we are reporting that we do
47 not have a financial interest in a company that may be affected by the research reported in the enclosed paper.
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