Supplemental Appendix, Supplemental Tables 1-13, Supplemental Figures 1-2 for:

Basu S, Phillips RS, Song Z, Landon BE, Bitton A. Effects of new funding models for patient-centered medical homes on primary care practice finances and services: results of a micro-simulation model. *Ann Fam Med*. 2016;14:404-414.

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Supplemental Appendix

1 The Primary Care Policy (PCP) Model.

Here, we follow standard international modeling guidelines to describe the programming of the model;[1] code for replication and extension of our results are available concurrent with publication at: http://sdr.stanford.edu. The model was programmed in *R* (The R Foundation for Statistical Computing, Vienna).

The first stage of the model involves the construction of population tables in which table rows reflect individual patients and table columns refer to demographic features of each patient. Specifically, we generate a simulated patient population to reflect the demographic makeup of each state and Washington DC (Supplemental Appendix Table 1). Individuals in the model are assigned demographic features in a probabilistic manner to match US Census Bureau estimates[2] of the covariance between the following characteristics: age (in years), sex (dichotomous), race/ethnicity (in standard Census categories of non-Hispanic White, non-Hispanic Black, Hispanic, and Other), and income (expressed as a poverty income ratio to correct for household size). To assign simulated individuals these characteristics, we Monte Carlo sample from the joint probability distributions of these demographic features using the Census data for each state, constructing a demographically-representative state population. The joint probability distributions are captured using a copula function, which allows the covariance between variables to be taken into account.[3] The input data are freely-accessible online (https://www.census.gov/cps/data/). Based on these demographic features and state of residence, individuals are similarly assigned an insurance status (private, Medicare, Medicaid/CHIP, or self-pay) based on their demographic characteristics and their state of residence, again using Monte Carlo sampling from each state's distribution of insurance among each demographic group.[2] The insurance data are also freely-accessible online (http://kff.org/state-category/health-coverage-uninsured/).

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Insurance status assignments were updated to reflect current insurance coverage estimates following the Affordable Care Act.[4]

The second stage of the model assigns diagnoses to individuals by ICD-9 code based on data from the Agency for Healthcare Research and Quality (AHRQ),[5] which is linked to the number of outpatient medical visits and reimbursements associated with those visits given patient demographics, insurance, and diagnoses. As with the demographic assignment, we used Monte Carlo sampling to assign each simulated individual a diagnosis and number of practice visits per year by sampling from that individual's demographic and insurance group in the data, using survey sample weights to account for differential selection and non-response in the AHRQ data. The data for this stage are also freely-accessible online (http://meps.ahrq.gov/mepsweb/data_stats/download_data_files.jsp) and the statistical code for migrating the data from the baseline SAS format to *R* format and assembling the data using appropriate sample weights are also freely-accessible online (https://github.com/ajdamico/usgsd/tree/master/Medical%20Expenditure%20Panel%20Survey). Using this data and code, we were able to estimate utilization and reimbursements per visit across simulated patients. The visits were distributed among physicians to match data from the Medical Group Management Association (MGMA) database on rates of encounters among primary care practitioners per year[6] to express revenues per full-time primary care physician per year. All data were standardized against a single physician work-year being defined as 1 FTE MD, such that whether or not a physician works for 40 hours or 60 hours on average, their defined job role as a full-time clinician constitutes 1.0 FTE. Primary care practices were defined as either hospital- or non-hospital-based ambulatory general internal medicine or family practices.

The third stage of the model estimated practice expenses. The model calculates practice-level expenses in separate modules reflecting both personnel and overhead expenditures. Staffing ratios per full time physician and detailed compensation data were available from the IBM Kenexa Compensation Analysis[7], summarized in Supplemental Appendix Table 2 and further detailed in a prior publication.[8] Additional overhead expenditures were taken from the Medical Group Management Association (MGMA)

DataDive database, and include staff benefits, building and occupancy, information technology, drug and medical supply, equipment and administrative supplies, liability insurance and fees, laboratory and imaging fees, and other ancillary service costs, detailed in **Supplemental Appendix Table 2**.[8] Because the DataDive is not known to be nationally representative, we used a distributional decomposition method validated previously[9] to weight DataDive entries to match the overall AHRQ distributions of utilization, charges, and revenues.[5] All costs and revenues were updated to 2015 U.S. dollars using the Consumer Price Index [10]. Validation plots are provided in **Supplemental Appendix Figure 2**.

2 Medical home modeling strategy

We estimated the changes in encounters, empanelment, revenue and costs from incorporating more support staff, modifying visit templates, or extending evening/weekend business hours under each newly-piloted medical home funding approach by sequential repeated sampling from the input data reflecting how variations in provider, support staff, business hours and visit rates correlate to encounters and empanelment. Specifically, for support staff, data on the number of new encounters and number of newly-empaneled patients for each additional FTE of support staff by job title were estimated from national data collected by MGMA[6] (**Supplemental Appendix Figure 1**). By performing multivariate sampling across the staffing ratios of practices to identify the synergies between support staff FTEs, we captured how support staff contribute to the ability of providers to undertake encounters or empanelment, as well as contributing to operating costs and overhead (**Supplemental Appendix Figure 1**). Visit template alterations included extending visit length by 5 minutes, which lowers overall visit volume per day to accommodate the reported business hours by practice in the input data; we optimistically increased billing codes to the next higher level from baseline to account for the longer visit length. For telephone and electronic visits, we converted 10% of routine follow-up visits to electronic or telephone visits, reimbursed per state-and insurance-specific rates for CPT code 99444 for 10-minute electronic visits, or 99441 for 10-minute telephone visits.[11–13] We incorporated an additional 5 minutes documentation

time and additional infrastructure costs listed in main text Table 1,[11–13] and permitted the remainder of forfeited visits to be used for new or existing patient visits with the ratio of new patients to total for these new appointment slots varied from a baseline of 50% to a range of 25% to 75% in probabilistic sensitivity analysis. For evening and weekend business hours, data on the number of encounters per extended business hour were estimated from the Medical Expenditure Panel Survey;[5] a log-linear model of annual visits per extended hour was used with intercept 1706, and slope 2461, multiplied by the log of new hours multiplied by 0.52, achieving R^2=93% across *N*=121,999 persons sampled. Costs included staffing per hour from an MD or mid-level provider at overtime salary rates, plus hourly overhead including building occupancy and utility costs as itemized in **Supplemental Appendix Table 2**.

To meet minimum PCMH funding requirements, support staffing costs included 0.23 FTE for a care coordinator (0.21-0.25), 0.31 FTE for an RN (0.28-0.34), 0.53 FTE for an LPN (0.50-0.56), and 1.11 FTE for an MA per FTE physician (1.09-1.13), according to a prior survey of *N*=502 transformed practices across the nation.[14] In the primary data sources used to populate the model,[6] primary care practices in the pre-PCMH-transformation period included 0 FTEs for a care coordinator (95% CI: 0-0), 0.43 FTEs for RNs (95% CI: 0.02-1.48), 0.76 FTEs for LPNs (95% CI: 0.14-1.85), and 1.23 FTEs for MAs (95% CI: 0.21-3.16) per FTE physician; and reported no electronic visits, telephone visits, or extended business hours.

3 Model validation

We externally validated the model by comparing model estimates of clinic utilization to observed utilization from the National Ambulatory Medical Care Survey (*N*=31,229 patients) by age, sex, race/ethnicity, and insurance type.[15] We also validated the model's estimates of cost and revenue per full-time equivalent (FTE) physician against cost and revenue data reported in a survey of *N*=2,518 practices distributed across the country.[16] We finally compared model estimates of total operating cost per FTE physician and medical cost per patient visit to estimates from a national survey of patient-centered medical homes (*N*=679 practices).[17] As illustrated in **Supplemental Appendix**

Figure 2, model estimates had less than 5% absolute error from the empirical data in all validation exercises.

4 Optimization and implementation

For optimization, we utilized a previously-published generalized pattern search algorithm [18] to run the model across all possible combinations of workforce and time use changes to find the combination of providers, support staff, business hours and group visits to find the combinations that would maximize net revenue per FTE physician under each financing approach. We chose this algorithm over alternatives that are more susceptible to finding local but not global optima,[19] although this choice increased the computational run time for the model iterations.

The model was run 10,000 times in each simulation scenario to generate confidence intervals. Total model runtime including optimization and sensitivity analyses required approximately 96 hours of raw computing time on the Stanford Sherlock condominium server system, using 120 general compute nodes with dual socket Intel Xeon CPUs (E5-2650, version 2) running at 2.60GHz (8 core/socket) utilizing 64 GB 1866 MHz DDR3 RAM and 100 GB local storage, as well as 2 "big data" nodes with quad socket Intel Xeon CPUs (E5-4640) running at 2.40GHz (8 core/socket) utilizing 1.5 TB RAM and 13 TB local storage.

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Supplemental Appendix Table 1: Summary distributions across demographic variables. For ease of visualization, the age and income categories are reported in aggregate groups here, while disaggregated estimates are available from the Census Bureau.[2] Insurance coverage estimates are for the year 2013, after which estimates across years are provided by government models published previously, incorporating anticipated effects of the Affordable Care Act.[4] Legend: Unins = uninsured.

State	Age			Sex		Race/ethnicity				Income relative to federal poverty level				Insurance coverage			
	0-18	19-64	65+	M	F	Wh	Bl	Hisp	Oth	<100%	100-199%	200-399%	400%+	Private	Medicare	Medicaid/Other govt	Unins
US Tot	25%	61%	14%	49%	51%	62%	12%	17%	8%	15%	19%	30%	36%	54%	15%	18%	13%
AL	25%	60%	15%	48%	52%	67%	26%	5%	2%	17%	22%	33%	28%	48%	18%	18%	16%
AK	29%	61%	10%	51%	49%	64%	3%	8%	25%	11%	16%	29%	44%	54%	9%	21%	16%
AZ	26%	59%	15%	50%	50%	48%	4%	38%	10%	20%	23%	25%	31%	46%	14%	20%	19%
AR	26%	57%	17%	49%	51%	72%	16%	8%	4%	17%	26%	33%	24%	46%	19%	21%	15%
CA	25%	62%	12%	49%	51%	39%	5%	39%	17%	15%	21%	28%	36%	52%	12%	21%	15%
CO	25%	62%	12%	50%	50%	71%	4%	21%	5%	11%	17%	29%	44%	61%	12%	15%	13%
CT	24%	62%	14%	49%	51%	70%	11%	11%	8%	11%	13%	26%	50%	61%	15%	15%	9%
DE	24%	58%	17%	48%	52%	65%	19%	11%	6%	14%	18%	31%	36%	53%	17%	23%	7%
DC	18%	69%	12%	47%	53%	37%	47%	9%	7%	21%	14%	21%	44%	54%	12%	26%	8%
FL	22%	61%	17%	48%	52%	58%	16%	22%	4%	15%	20%	32%	32%	47%	17%	17%	19%
GA	27%	60%	13%	48%	52%	56%	30%	8%	6%	16%	21%	32%	31%	52%	14%	17%	16%
HI	24%	60%	16%	50%	50%	17%	2%	12%	69%	11%	16%	35%	38%	57%	15%	23%	5%
ID	29%	58%	13%	49%	51%	84%	1%	11%	4%	13%	25%	34%	29%	59%	13%	13%	14%
IL	25%	62%	13%	49%	51%	65%	14%	15%	6%	13%	17%	31%	39%	58%	12%	18%	11%
IN	27%	58%	15%	48%	52%	82%	10%	6%	2%	12%	23%	31%	35%	59%	14%	15%	12%
IA	25%	61%	14%	50%	50%	85%	3%	6%	6%	11%	18%	35%	36%	61%	14%	16%	9%
KS	27%	59%	14%	49%	51%	77%	6%	8%	9%	13%	18%	34%	34%	59%	15%	16%	10%
KE	24%	63%	14%	49%	51%	85%	8%	4%	3%	20%	22%	30%	28%	51%	16%	20%	13%
LA	26%	59%	14%	48%	52%	60%	32%	5%	3%	19%	22%	29%	29%	50%	15%	22%	12%

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ME	21%	63%	17%	49%	51%	95%	1%	1%	2%	12%	20%	31%	37%	51%	17%	22%	10%
MD	24%	61%	15%	49%	51%	50%	29%	10%	12%	10%	16%	28%	46%	60%	14%	16%	10%
MA	23%	63%	14%	48%	52%	75%	6%	11%	8%	12%	15%	24%	49%	64%	14%	18%	4%
MI	24%	62%	15%	49%	51%	75%	14%	4%	8%	15%	19%	30%	37%	58%	15%	16%	11%
MN	26%	61%	13%	50%	50%	83%	5%	5%	6%	12%	14%	28%	46%	66%	13%	14%	7%
MS	27%	60%	13%	48%	52%	57%	37%	3%	3%	23%	20%	29%	28%	48%	17%	21%	14%
MO	25%	59%	17%	49%	51%	81%	12%	3%	4%	14%	17%	32%	38%	56%	19%	14%	11%
MT	26%	59%	15%	50%	50%	89%	1%	2%	8%	15%	19%	35%	31%	44%	18%	23%	15%
NE	26%	59%	15%	49%	51%	80%	4%	12%	4%	11%	17%	36%	36%	64%	14%	12%	10%
NV	26%	60%	14%	50%	50%	52%	8%	29%	11%	17%	26%	28%	29%	53%	13%	13%	20%
NH	22%	63%	15%	50%	50%	93%	1%	2%	4%	9%	13%	29%	49%	62%	15%	12%	11%
NJ	25%	62%	14%	49%	51%	59%	12%	19%	10%	11%	15%	28%	46%	61%	13%	14%	12%
NM	26%	57%	17%	50%	50%	40%	2%	44%	14%	22%	20%	28%	30%	43%	18%	23%	16%
NY	23%	62%	15%	48%	52%	58%	13%	17%	11%	15%	20%	26%	39%	54%	15%	22%	9%
NC	25%	60%	15%	48%	52%	60%	21%	9%	9%	19%	21%	32%	28%	48%	17%	19%	16%
ND	24%	64%	12%	50%	50%	83%	2%	4%	11%	10%	17%	33%	40%	64%	13%	11%	12%
OH	24%	60%	16%	49%	51%	80%	12%	4%	4%	14%	21%	33%	32%	53%	17%	17%	13%
OK	27%	59%	14%	48%	52%	65%	8%	10%	18%	14%	24%	31%	31%	51%	15%	20%	14%
OR	23%	61%	16%	50%	50%	77%	2%	10%	11%	15%	19%	31%	35%	55%	16%	16%	13%
PA	22%	61%	16%	49%	51%	78%	10%	7%	5%	13%	17%	30%	40%	59%	17%	14%	10%
RI	22%	62%	16%	49%	51%	76%	4%	15%	5%	14%	20%	25%	42%	59%	16%	16%	9%
SC	24%	59%	17%	48%	52%	65%	27%	5%	3%	16%	19%	35%	30%	50%	19%	16%	15%
SD	26%	59%	15%	50%	50%	88%	2%	2%	8%	11%	17%	35%	37%	63%	15%	13%	9%
TN	25%	61%	15%	49%	51%	75%	16%	6%	3%	18%	20%	34%	28%	50%	17%	20%	13%
TX	28%	60%	11%	50%	50%	41%	12%	41%	6%	17%	20%	31%	32%	51%	12%	17%	20%
UT	32%	57%	11%	50%	50%	83%	1%	11%	5%	8%	20%	36%	36%	66%	11%	12%	11%
VT	21%	61%	18%	49%	51%	93%	1%	2%	4%	9%	19%	31%	40%	53%	19%	20%	8%

VA	24%	62%	14%	49%	51%	64%	19%	9%	9%	11%	15%	26%	48%	61%	13%	15%	11%
WA	25%	60%	15%	49%	51%	71%	4%	11%	15%	12%	19%	28%	41%	56%	15%	18%	11%
WV	22%	60%	17%	49%	51%	93%	3%	2%	2%	18%	22%	33%	27%	47%	20%	20%	13%
WI	25%	59%	16%	49%	51%	84%	6%	7%	3%	11%	15%	31%	42%	61%	17%	14%	9%
WY	25%	62%	13%	51%	49%	86%	0%	9%	4%	12%	18%	31%	39%	54%	12%	16%	17%

Supplemental Appendix Table 2: Disaggregated estimates of practice-level cost by line item.[6,7,20] Compensation costs include both salary and benefits (approximately 30% of salary). All costs are expressed in 2015 U.S. dollars.[10] 95% confidence intervals are in parentheses. Those staff positions not included in the baseline clinic are left blank in the second column.

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Staff member	**Cost per 1 staff FTE**	**Cost per 1 MD FTE (baseline clinic)**
MA	$41360 (34122-48598)	$33626 (162486-15379)
LPN	$57740 (47636-67845)	$75974 (340257-36476)
RN	$90773 (74888-106658)	$211100 (3744400-72066)
RN care coordinator	$100055 (82545-117565)	-
NP	$125171 (103266-147076)	-
PA	$124488 (102703-146273)	-
MD	$239992 (176499-303485)	$239992 (176499-303485)
Pharmacist	$156293 (128942-183644)	-
SW	$76986 (63513-90459)	-
Nutritionist	$72345 (59685-85005)	-
Health coach	$41360 (34122-48598)	-
Clinical data specialist	$76713 (63288-90138)	-
Overhead expenditures		
Admin supplies and services		$2057 (292-5673)
Billing and collection purchased services		$3452 (1944-14510)
Building and occupancy		$14600 (8513-27075)
Building/occupancy depreciation		$911 (218-2331)
Clinical laboratory		$3001 (80-9317)
Consulting fees		$449 (261-834)
Cost allocated to practice from partners		$12023 (5373-25652)
Drug supply		$5849 (105-18052)
Furniture and equipment		$1277 (908-2033)
Furniture/equipment depreciation		$1911 (774-4240)
Information technology		$3248 (318-10555)
Management fees paid to MSO		$6460 (1595-16430)
Medical and surgical supply		$3079 (733-7886)

Miscellaneous operating cost	$6580 (4843-29992)
Other insurance premiums	$327 (107-1217)
Outside professional fees	$1260 (238-4328)
Prof liability insurance	$2032 (807-4543)
Promotion and marketing	$361 (164-767)
Radiology and imaging	$913 (183-2411)

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Supplemental Appendix Table 3: Increased pay-for-performance success rate. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when pay-for-performance success rate is increased from 10% (baseline) to 100%. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-53464 ($-69725 to $-37203)	$103835 ($24462 to $183208)	$202283 ($122910 to $281657)	N/A
Service delivery enhancements					
Optimize staff ratio	$46722 ($25737 to $155577)	$-53464 ($-69725 to $-37203)	$103835 ($24462 to $183208)	$202283 ($122910 to $281657)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-184925 ($-149057 to $-255049)	$-62771 ($-57134 to $-156974)	$33550 ($41680 to $-68839)	Not in optimal result
Replace 10% of visits with electronic visits	$-16175 ($-15165 to $-17134)	$-71497 ($-83935 to $-59960)	$80427 ($11394 to $145836)	$178237 ($109666 to $242909)	Not in optimal result
Replace 10% of visits with telephone visits	$-16151 ($-15144 to $-17107)	$-71473 ($-83915 to $-59931)	$80451 ($11413 to $145868)	$178261 ($109684 to $242941)	Not in optimal result
Offer once weekly group visits	$-2076 ($-2181 to $-1964)	$-55425 ($-71518 to $-39341)	$102127 ($24281 to $179780)	$200278 ($122580 to $277756)	Not in optimal result
Extend evening/weekend hours	$380 ($373 to $386)	$-52959 ($-69227 to $-36692)	$104781 ($25402 to $184160)	$203223 ($123844 to $282602)	3.0-3.8 hrs/week
Net revenue-maximizing combination	**$47101 ($26110 to $155963)**	**$-52959 ($-69227 to $-36692)**	**$104781 ($25402 to $184160)**	**$203223 ($123844 to $282602)**	**FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-3.8 hrs/week evening/weekend service**

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Supplemental Appendix Table 4: Reduced PCMH funding. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when PCMH funding is 80% of the baseline estimates shown in main text **Table 1**. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-64602 ($-79227 to $-49977)	$61238 ($-3878 to $126353)	$68844 ($-638 to $138326)	N/A
Service delivery enhancements					
Optimize staff ratio	$46722 ($25737 to $155577)	$-64602 ($-79227 to $-49977)	$61238 ($-3878 to $126353)	$68844 ($-638 to $138326)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-196063 ($-158559 to $-267823)	$-105368 ($-85473 to $-213830)	$-99889 ($-81868 to $-212169)	Not in optimal result
Replace 10% of visits with electronic visits	$-16175 ($-15165 to $-17134)	$-83006 ($-93895 to $-72974)	$36425 ($-18659 to $87984)	$43644 ($-15321 to $98803)	Not in optimal result
Replace 10% of visits with telephone visits	$-16151 ($-15144 to $-17107)	$-82982 ($-93875 to $-72945)	$36449 ($-18640 to $88015)	$43668 ($-15303 to $98835)	Not in optimal result
Offer once weekly group visits	$-2076 ($-2181 to $-1964)	$-66985 ($-81419 to $-52560)	$58126 ($-5411 to $121469)	$65687 ($-2080 to $133230)	Not in optimal result
Extend evening/weekend hours	$380 ($373 to $386)	$-64130 ($-78761 to $-49498)	$62042 ($-3078 to $127163)	$69673 ($185 to $139161)	2.9-3.6 hrs/week
Net revenue-maximizing combination	$47101 ($26110 to $155963)	$-64130 ($-78761 to $-49498)	$62042 ($-3078 to $127163)	$69673 ($185 to $139161)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 2.9-3.6 hrs/week evening/weekend service

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Supplemental Appendix Table 5: Increased PCMH funding. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when PCMH funding is 120% of the baseline estimates shown in main text **Table 1**. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-42327 ($-60224 to $-24429)	$146433 ($52801 to $240064)	$157843 ($57660 to $258025)	N/A
Service delivery enhancements					
Optimize staff ratio	$46722 ($25737 to $155577)	$-42327 ($-60224 to $-24429)	$146433 ($52801 to $240064)	$157843 ($57660 to $258025)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-173788 ($-139555 to $-242275)	$-20173 ($-28795 to $-100118)	$-10890 ($-23570 to $-92471)	Not in optimal result
Replace 10% of visits with electronic visits	$-16175 ($-15165 to $-17134)	$-59989 ($-73974 to $-46945)	$124429 ($41448 to $203689)	$135576 ($46542 to $220605)	Not in optimal result
Replace 10% of visits with telephone visits	$-16151 ($-15144 to $-17107)	$-59965 ($-73954 to $-46917)	$124453 ($41466 to $203720)	$135600 ($46560 to $220637)	Not in optimal result
Offer once weekly group visits	$-2076 ($-2181 to $-1964)	$-43865 ($-61616 to $-26122)	$146128 ($53973 to $238091)	$157616 ($59045 to $255969)	Not in optimal result
Extend evening/weekend hours	$380 ($373 to $386)	$-41789 ($-59693 to $-23885)	$147520 ($53882 to $241158)	$158969 ($58780 to $259157)	3.0-4.0 hrs/week
Net revenue-maximizing combination	$47101 ($26110 to $155963)	$-41789 ($-59693 to $-23885)	$147520 ($53882 to $241158)	$158969 ($58780 to $259157)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-4.0 hrs/week evening/weekend service

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Supplemental Appendix Table 6: Reduced costs of delivery. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when costs of service delivery are 80% of the baseline estimates summarized in **Appendix Table 2**. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-31634 ($-46279 to $-16989)	$125666 ($47908 to $203423)	$135174 ($51958 to $218390)	N/A
Service delivery enhancements					
Optimize staff ratio	$49197 ($28212 to $158052)	$-31634 ($-46279 to $-16989)	$125666 ($47908 to $203423)	$135174 ($51958 to $218390)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-95273 ($-66402 to $-136699)	$-136803 ($-109744 to $-191266)	$-7619 ($-17368 to $-68723)	$187 ($-13026 to $-62007)	Not in optimal result
Replace 10% of visits with electronic visits	$-9025 ($-8840 to $-9051)	$-41774 ($-53895 to $-30297)	$112259 ($42461 to $179178)	$121569 ($46712 to $193321)	Not in optimal result
Replace 10% of visits with telephone visits	$-9006 ($-8823 to $-9029)	$-41755 ($-53879 to $-30274)	$112278 ($42476 to $179203)	$121588 ($46727 to $193346)	Not in optimal result
Offer once weekly group visits	$1846 ($1660 to $2040)	$-29273 ($-43907 to $-14643)	$129209 ($52522 to $205745)	$138793 ($56754 to $220660)	Not in optimal result
Extend evening/weekend hours	$450 ($443 to $457)	$-31051 ($-45703 to $-16400)	$126710 ($48946 to $204473)	$136250 ($53028 to $219473)	3.0-3.8 hrs/week
Net revenue-maximizing combination	$49646 ($28655 to $158508)	$-31051 ($-45703 to $-16400)	$126710 ($48946 to $204473)	$136250 ($53028 to $219473)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-3.8 hrs/week evening/weekend service

Supplemental Appendix Table 7: Increased costs of delivery. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when costs of service delivery are 120% of the baseline estimates summarized in **Appendix Table 2**. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-75295 ($-93172 to $-57417)	$82005 ($1015 to $162994)	$91513 ($5064 to $177962)	N/A
Service delivery enhancements					
Optimize staff ratio	$44247 ($23263 to $153102)	$-75295 ($-93172 to $-57417)	$82005 ($1015 to $162994)	$91513 ($5064 to $177962)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-142910 ($-99602 to $-205049)	$-233048 ($-188370 to $-318832)	$-117923 ($-96900 to $-245225)	$-110967 ($-92412 to $-242633)	Not in optimal result
Replace 10% of visits with electronic visits	$-23326 ($-21490 to $-25217)	$-101220 ($-113974 to $-89622)	$48596 ($-19672 to $112495)	$57650 ($-15491 to $126088)	Not in optimal result
Replace 10% of visits with telephone visits	$-23297 ($-21465 to $-25185)	$-101192 ($-113950 to $-89588)	$48624 ($-19650 to $112533)	$57679 ($-15469 to $126126)	Not in optimal result
Offer once weekly group visits	$-5997 ($-6023 to $-5967)	$-81576 ($-99128 to $-64039)	$75045 ($-3960 to $153814)	$84510 ($211 to $168540)	Not in optimal result
Extend evening/weekend hours	$310 ($303 to $316)	$-74867 ($-92751 to $-56983)	$82852 ($1857 to $163848)	$92391 ($5937 to $178845)	3.0-3.8 hrs/week
Net revenue-maximizing combination	$44556 ($23566 to $153418)	$-74867 ($-92751 to $-56983)	$82852 ($1857 to $163848)	$92391 ($5937 to $178845)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-3.8 hrs/week evening/weekend service

Supplemental Appendix Table 8: Lower patient utilization. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when patient utilization is 80% of the baseline estimates. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-64602 ($-79227 to $-49977)	$61238 ($-3878 to $126353)	$68844 ($-638 to $138326)	N/A
Service delivery enhancements					
Optimize staff ratio	$34903 ($18115 to $121987)	$-64602 ($-79227 to $-49977)	$61238 ($-3878 to $126353)	$68844 ($-638 to $138326)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-196063 ($-158559 to $-267823)	$-105368 ($-85473 to $-213830)	$-99889 ($-81868 to $-212169)	Not in optimal result
Replace 10% of visits with electronic visits	$-20091 ($-18457 to $-21790)	$-86921 ($-97187 to $-77630)	$32510 ($-21951 to $83328)	$39728 ($-18613 to $94147)	Not in optimal result
Replace 10% of visits with telephone visits	$-20067 ($-18436 to $-21763)	$-86897 ($-97167 to $-77602)	$32534 ($-21933 to $83359)	$39752 ($-18595 to $94179)	Not in optimal result
Offer once weekly group visits	$-5582 ($-5587 to $-5574)	$-70491 ($-84825 to $-56171)	$54620 ($-8817 to $117858)	$62180 ($-5485 to $129620)	Not in optimal result
Extend evening/weekend hours	$234 ($229 to $239)	$-64276 ($-78906 to $-49645)	$61896 ($-3223 to $127015)	$69527 ($40 to $139013)	2.9-3.8 hrs/week
Net revenue-maximizing combination	$35136 ($18344 to $122225)	$-64276 ($-78906 to $-49645)	$61896 ($-3223 to $127015)	$69527 ($40 to $139013)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 2.9-3.8 hrs/week evening/weekend service

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Supplemental Appendix Table 9: Higher patent utilization. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when patient utilization is 120% of the baseline estimates. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-42327 ($-60224 to $-24429)	$146433 ($52801 to $240064)	$157843 ($57660 to $258025)	N/A
Service delivery enhancements					
Optimize staff ratio	$58541 ($33360 to $189167)	$-42327 ($-60224 to $-24429)	$146433 ($52801 to $240064)	$157843 ($57660 to $258025)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-173788 ($-139555 to $-242275)	$-20173 ($-28795 to $-100118)	$-10890 ($-23570 to $-92471)	Not in optimal result
Replace 10% of visits with electronic visits	$-12260 ($-11873 to $-12478)	$-56074 ($-70682 to $-42289)	$128344 ($44740 to $208345)	$139491 ($49835 to $225261)	Not in optimal result
Replace 10% of visits with telephone visits	$-12236 ($-11852 to $-12451)	$-56050 ($-70662 to $-42260)	$128368 ($44758 to $208376)	$139515 ($49853 to $225293)	Not in optimal result
Offer once weekly group visits	$1431 ($1224 to $1647)	$-40358 ($-58211 to $-22511)	$149634 ($57379 to $241701)	$161123 ($62450 to $259580)	Not in optimal result
Extend evening/weekend hours	$526 ($517 to $534)	$-41643 ($-59549 to $-23738)	$147666 ($54027 to $241305)	$159115 ($58924 to $259305)	3.0-3.8 hrs/week
Net revenue-maximizing combination	$59067 ($33877 to $189701)	$-41643 ($-59549 to $-23738)	$147666 ($54027 to $241305)	$159115 ($58924 to $259305)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-3.8 hrs/week evening/weekend service

Supplemental Appendix Table 10: High PCMH efficiency. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when infrastructure costs of maintaining PCMH services are changed from $2.96 per patient per month in the baseline assessment, to -$5, reflecting high efficiency. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-25493 ($-41754 to $-9232)	$131806 ($52433 to $211179)	$141314 ($56482 to $226147)	N/A
Service delivery enhancements					
Optimize staff ratio	$46722 ($25737 to $155577)	$-25493 ($-41754 to $-9232)	$131806 ($52433 to $211179)	$141314 ($56482 to $226147)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-156954 ($-121086 to $-227078)	$-34800 ($-29163 to $-129003)	$-27419 ($-24748 to $-124349)	Not in optimal result
Replace 10% of visits with electronic visits	$-16175 ($-15165 to $-17134)	$-43526 ($-55964 to $-31989)	$108398 ($39365 to $173807)	$117581 ($43582 to $187675)	Not in optimal result
Replace 10% of visits with telephone visits	$-16151 ($-15144 to $-17107)	$-43502 ($-55944 to $-31960)	$108422 ($39384 to $173839)	$117605 ($43600 to $187707)	Not in optimal result
Offer once weekly group visits	$-2076 ($-2181 to $-1964)	$-27454 ($-43547 to $-11370)	$130098 ($52252 to $207751)	$139622 ($56454 to $222571)	Not in optimal result
Extend evening/weekend hours	$380 ($373 to $386)	$-24988 ($-41256 to $-8721)	$132752 ($53373 to $212131)	$142292 ($57453 to $227130)	3.0-3.8 hrs/week
Net revenue-maximizing combination	$47101 ($26110 to $155963)	$-24988 ($-41256 to $-8721)	$132752 ($53373 to $212131)	$142292 ($57453 to $227130)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-3.8 hrs/week evening/weekend service

Supplemental Appendix Table 11: Risk-adjusting PMPM rates. Model-based estimates of change in net revenue per full-time physician for primary care clinics delivering patient-centered medical home (PCMH) services, as compared to the net revenue in the "status quo" clinic prior to PCMH transformation, when risk-adjusting PMPM rates. Revenues include four funding scenarios—standard fee-for-service (SFFS), increased fee-for-service (IFFS), per member per month (PMPM), and per member per month with pay-for-performance bonus (PMPM+P4P). 95% confidence intervals are listed in parentheses from probabilistic sensitivity analyses in which the model was re-run 10,000 times while sampling from the probability distributions of all input parameters to generate confidence intervals around model results. Compare to main text **Table 2**.

Change in net revenue ($/MD FTE/year)	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**	**Optimization result**
Minimum required changes for PCMH funding	N/A	$-16153 ($-37895 to $5589)	$246537 ($119398 to $373676)	$262416 ($126160 to $398671)	N/A
Service delivery enhancements					
Optimize staff ratio	$46722 ($25737 to $155577)	$-16153 ($-37895 to $5589)	$246537 ($119398 to $373676)	$262416 ($126160 to $398671)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA
Extend visit length by 5 min.	$-119092 ($-83002 to $-170874)	$-147614 ($-117226 to $-212257)	$79931 ($37802 to $33493)	$93683 ($44930 to $48175)	Not in optimal result
Replace 10% of visits with electronic visits	$-16175 ($-15165 to $-17134)	$-32945 ($-50567 to $-16361)	$227833 ($112072 to $339641)	$243596 ($119232 to $363722)	Not in optimal result
Replace 10% of visits with telephone visits	$-16151 ($-15144 to $-17107)	$-32921 ($-50547 to $-16333)	$227857 ($112091 to $339673)	$243620 ($119250 to $363754)	Not in optimal result
Offer once weekly group visits	$-2076 ($-2181 to $-1964)	$-16699 ($-38348 to $4943)	$249529 ($123749 to $375121)	$265634 ($130866 to $400187)	Not in optimal result
Extend evening/weekend hours	$380 ($373 to $386)	$-15540 ($-37288 to $6209)	$247956 ($120811 to $375102)	$263891 ($127630 to $400153)	3.0-3.8 hrs/week
Net revenue-maximizing combination	$47101 ($26110 to $155963)	$-15540 ($-37288 to $6209)	$247956 ($120811 to $375102)	$263891 ($127630 to $400153)	FTE's: 0.23 CC, 0.31 RN, 0.53 LPN, 1.11 MA + 3.0-3.8 hrs/week evening/weekend service

Supplemental Appendix Table 12: Variations in new net revenue for the optimized clinic across financing approach and state, incorporating state-level variations in compensation and overhead costs as well as reimbursement regulations, billing behavior, payer mix and reimbursement rates.

State	Net annual revenue in 2015 US$ per full-time physician (95% CI)		
	IFFS	PMPM	PMPM+P4P
AL	-10291 (-54047 to 43139)	157581 (53401 to 268918)	167728 (58020 to 284250)
AK	42624 (-32946 to 110805)	103762 (53353 to 150981)	108491 (60320 to 153830)
AZ	44183 (-24670 to 135751)	107558 (39950 to 184971)	112460 (45167 to 188462)
AR	49901 (-34524 to 138641)	121477 (55908 to 188909)	127014 (63208 to 192474)
CA	55619 (-44574 to 141099)	135396 (72183 to 192259)	141568 (81609 to 195886)
CO	44183 (-27788 to 128881)	107558 (44999 to 175611)	112460 (50875 to 178924)
CT	54579 (-47014 to 131250)	132866 (76134 to 178838)	138922 (86076 to 182212)
DE	46782 (-22913 to 150804)	113885 (37105 to 205482)	119076 (41951 to 209360)
DC	47822 (-7979 to 188182)	116416 (12921 to 256413)	121722 (14609 to 261251)
FL	47822 (-34254 to 130289)	116416 (55471 to 177528)	121722 (62715 to 180878)
GA	55099 (-41542 to 145543)	134131 (67273 to 198314)	140245 (76058 to 202056)
HI	35867 (-23236 to 103125)	87312 (37628 to 140516)	91291 (42542 to 143168)
ID	41584 (-29679 to 113532)	101231 (48062 to 154696)	105845 (54338 to 157615)
IL	53020 (-45358 to 128188)	129069 (73453 to 174667)	134952 (83045 to 177963)
IN	50421 (-35024 to 139775)	122743 (56718 to 190454)	128337 (64124 to 194048)
IA	47302 (-38051 to 119687)	115150 (61619 to 163083)	120399 (69666 to 166160)
KS	45743 (-22348 to 147577)	111354 (36190 to 201085)	116430 (40916 to 204879)
KY	44183 (-36716 to 109209)	107558 (59457 to 148806)	112460 (67221 to 151614)
LA	42104 (-29428 to 116321)	102496 (47655 to 158496)	107168 (53878 to 161487)
ME	45223 (-36830 to 113430)	110089 (59643 to 154558)	115107 (67431 to 157474)

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MD	50941 (-30773 to 151379)	124008 (49834 to 206265)	129660 (56341 to 210158)
MA	57698 (-51514 to 134753)	140458 (83422 to 183612)	146860 (94315 to 187077)
MI	49381 (-31680 to 142670)	120212 (51303 to 194399)	125691 (58002 to 198068)
MN	45743 (-35177 to 119310)	111354 (56965 to 162569)	116430 (64404 to 165637)
MS	58738 (-40345 to 163835)	142989 (65335 to 223238)	149506 (73867 to 227451)
MO	49901 (-27766 to 153531)	121477 (44964 to 209198)	127014 (50836 to 213146)
MT	51461 (-30868 to 153406)	125273 (49987 to 209027)	130983 (56515 to 212972)
NE	40545 (-34318 to 98837)	98700 (55574 to 134674)	103199 (62831 to 137215)
NV	46782 (-24952 to 146311)	113885 (40407 to 199361)	119076 (45684 to 203123)
NH	49901 (-41757 to 122704)	121477 (67621 to 167194)	127014 (76451 to 170349)
NJ	53540 (-43433 to 134667)	130335 (70335 to 183495)	136276 (79519 to 186957)
NM	45223 (-32093 to 123868)	110089 (51971 to 168779)	115107 (58758 to 171964)
NY	59258 (-47677 to 149917)	144254 (77209 to 204273)	150829 (87291 to 208128)
NC	49901 (-36709 to 133826)	121477 (59446 to 182349)	127014 (67209 to 185790)
ND	47302 (-32624 to 131645)	115150 (52831 to 179377)	120399 (59729 to 182761)
OH	47822 (-39103 to 119605)	116416 (63323 to 162972)	121722 (71592 to 166047)
OK	46263 (-41558 to 107487)	112619 (67299 to 146459)	117753 (76087 to 149223)
OR	47302 (-37347 to 121238)	115150 (60479 to 165197)	120399 (68377 to 168314)
PA	44703 (-38869 to 106702)	108823 (62944 to 145390)	113783 (71163 to 148134)
RI	50421 (-32049 to 146331)	122743 (51900 to 199388)	128337 (58677 to 203150)
SC	45743 (-31828 to 126689)	111354 (51542 to 172623)	116430 (58273 to 175880)
SD	39505 (-26890 to 110729)	96169 (43546 to 150877)	100553 (49233 to 153724)
TN	47822 (-34582 to 129567)	116416 (56002 to 176545)	121722 (63314 to 179877)
TX	47822 (-41764 to 113741)	116416 (67633 to 154981)	121722 (76465 to 157906)
UT	44183 (-32607 to 118262)	107558 (52804 to 161141)	112460 (59699 to 164182)
VT	47302 (-42486 to	115150 (68802 to	120399 (77786 to

	109915)	149767)	152594)
VA	50421 (-38106 to 132984)	122743 (61709 to 181201)	128337 (69767 to 184621)
WA	57698 (-49434 to 139338)	140458 (80053 to 189859)	146860 (90506 to 193441)
WV	49901 (-26888 to 155466)	121477 (43542 to 211835)	127014 (49228 to 215832)
WI	44183 (-30890 to 122046)	107558 (50023 to 166297)	112460 (56555 to 169435)
WY	46263 (-27255 to 139001)	112619 (44136 to 189400)	117753 (49900 to 192974)

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Supplemental Appendix Table 13: Disaggregation of main text Table 2 to illustrate sources of mean revenues and costs before and after PCMH transformation under each financing strategy.

Payment model	**SFFS**	**IFFS**	**PMPM**	**PMPM+P4P**
Visits per physician FTE	4,586	5,369	5,369	5,369
Empaneled patients per physician FTE	2,349	3,827	3,827	3,827
Gross revenue per physician FTE	$487,390	$543,079	$700,378	$709,886
Costs per physician FTE				
Physician staffing and benefits	$239,992	$239,992	$239,992	$239,992
Other staffing and benefits	$133,788	$127,664	$127,664	$127,664
Non-staff costs	$69,790	$185,066	$185,066	$185,066
Total costs	$443,569	$552,722	$552,722	$552,722
Net revenue	$43,821	-$9,643	$147,656	$157,164
Change in net revenue from SFFS		-$53,464	$103,835	$113,343

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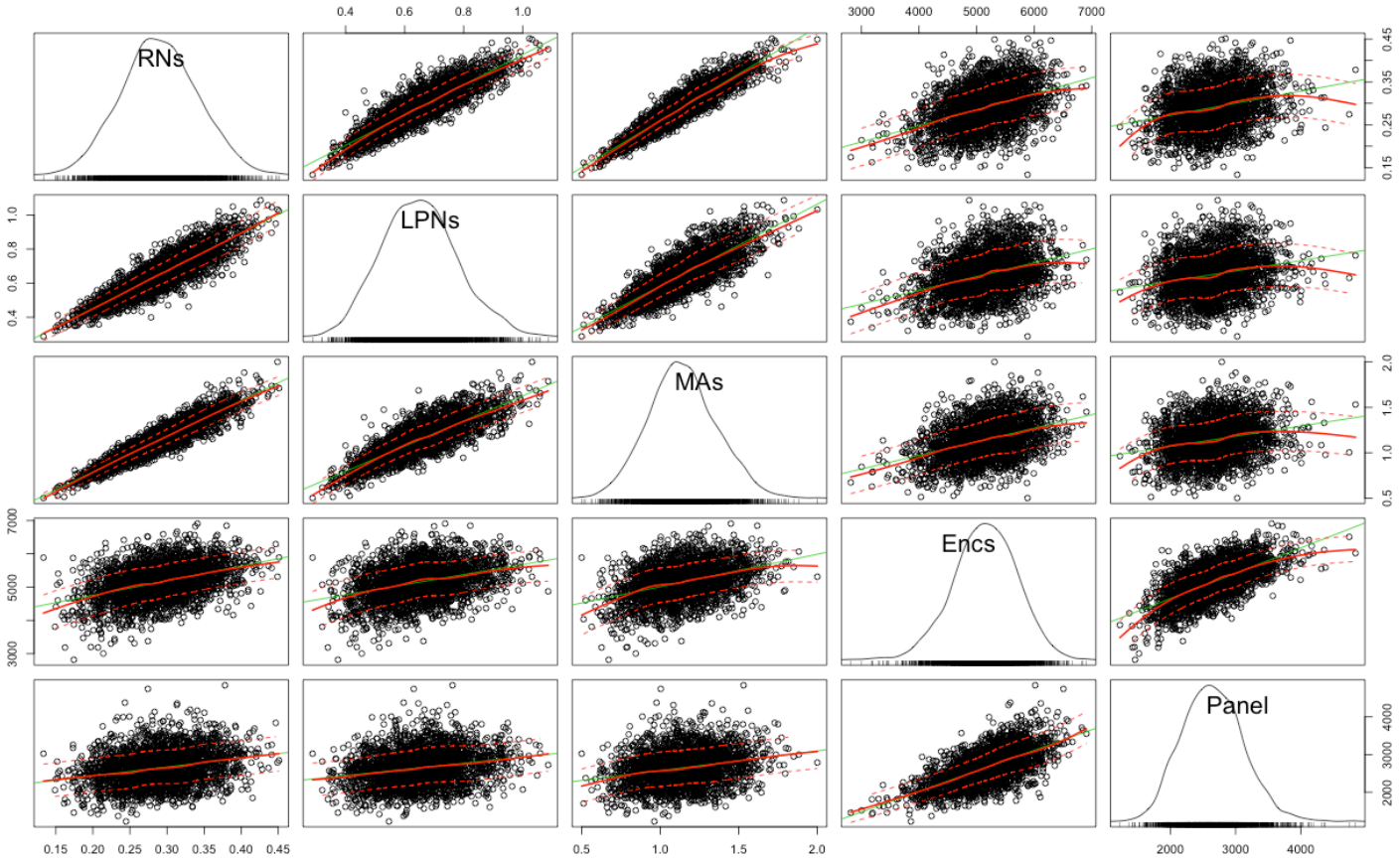
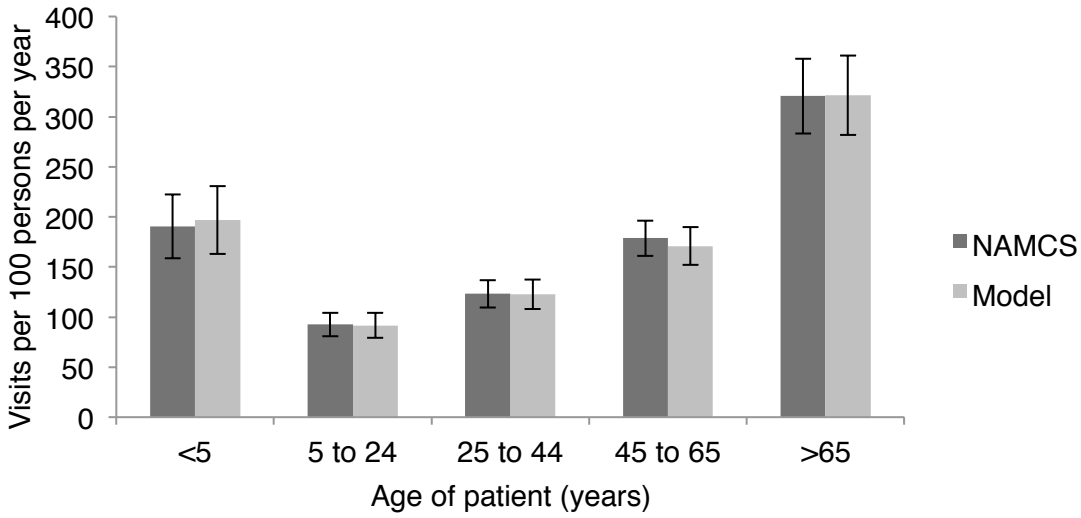
Supplemental Appendix Figure 1: Scatterplot matrix of staffing ratios (in full-time equivalents, FTEs) per full-time physician among primary care practices, and associated encounters (Encs) and empanelment (Panel). The non-parametric locally-weighted regression of encounters across support staff ratios are shown as red curves with dashed 95% CI lines, contrasted with green linear regressions. The distributions shown here were repeatedly sampled using copula functions[21] to capture the joint probability distributions of support staff, encounters, and empanelment, allowing us to incorporate the effect of increased staffing on efficiency and utilization.


RNs
LPNs
MAs
Encs
Panel

Supplemental Appendix Figure 2: Comparison of modeled utilization estimates to dat from the National Ambulatory Medical Care Survey (NAMCS, *N*=31,229 patients) specific to each (A) age, (B) sex, (C) race/ethnicity, (D) ICD-I diagnostic category and (E) insurance type (using historical insurance data without ACA correction) [15]; comparison of modeled (F) cost and (G) revenue estimates to data per physician FTE from a revenue and cost survey of 2,518 practices distributed across the country.[16]

(A)



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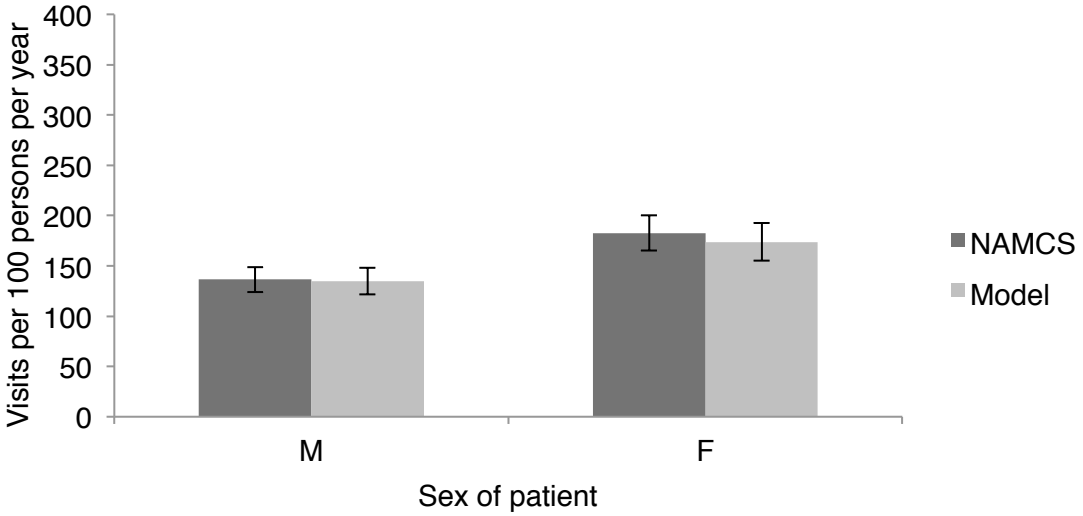
(B)



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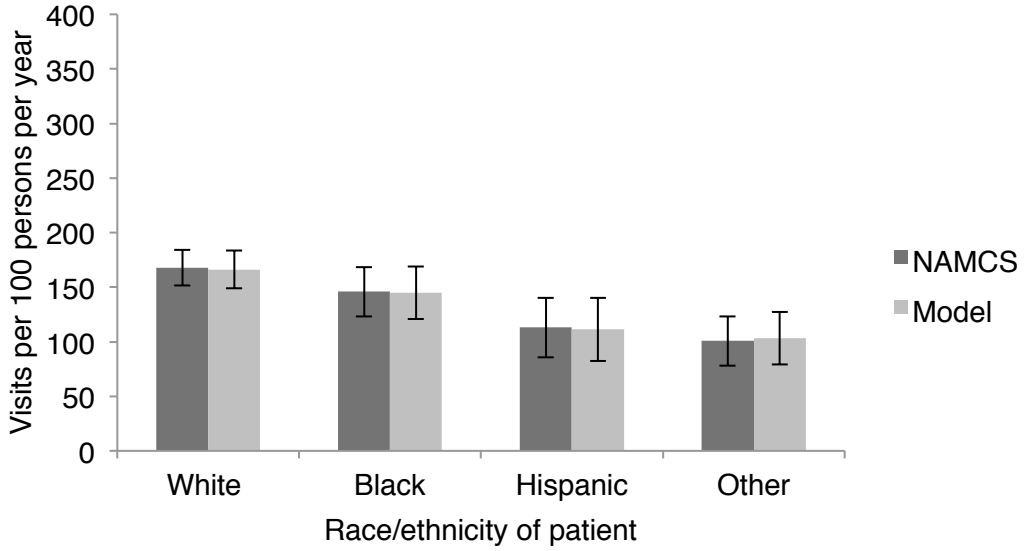
(C)



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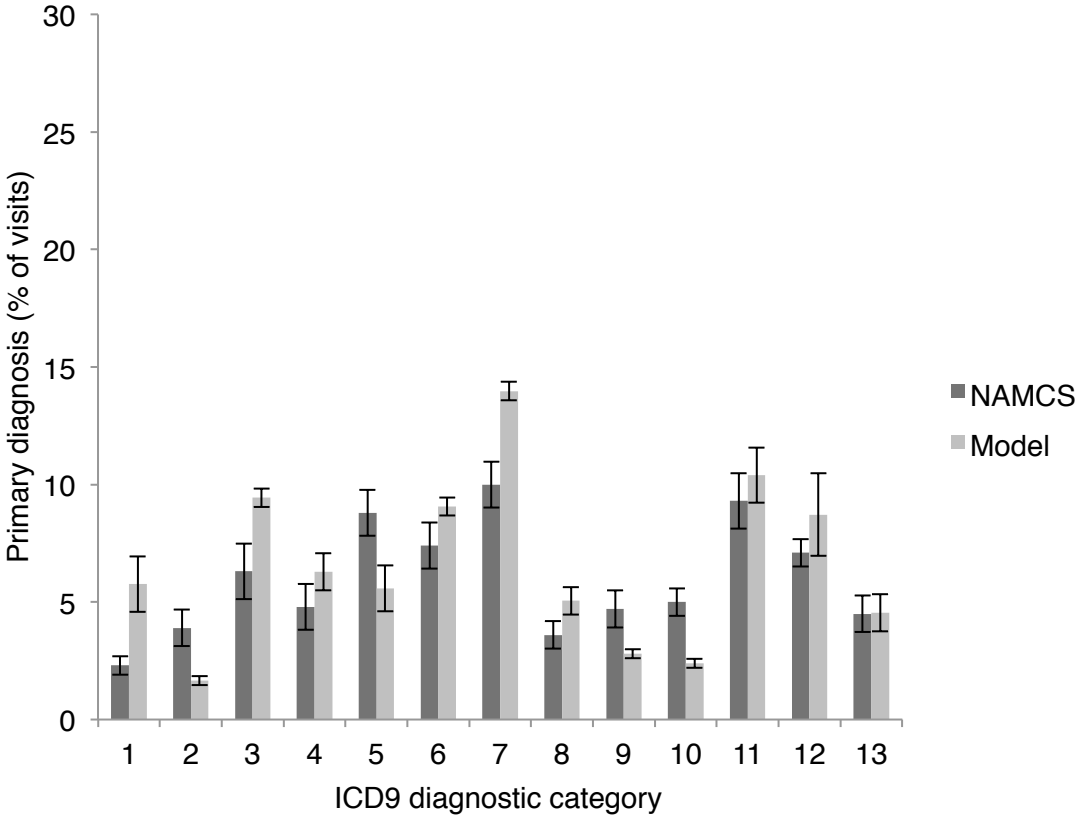

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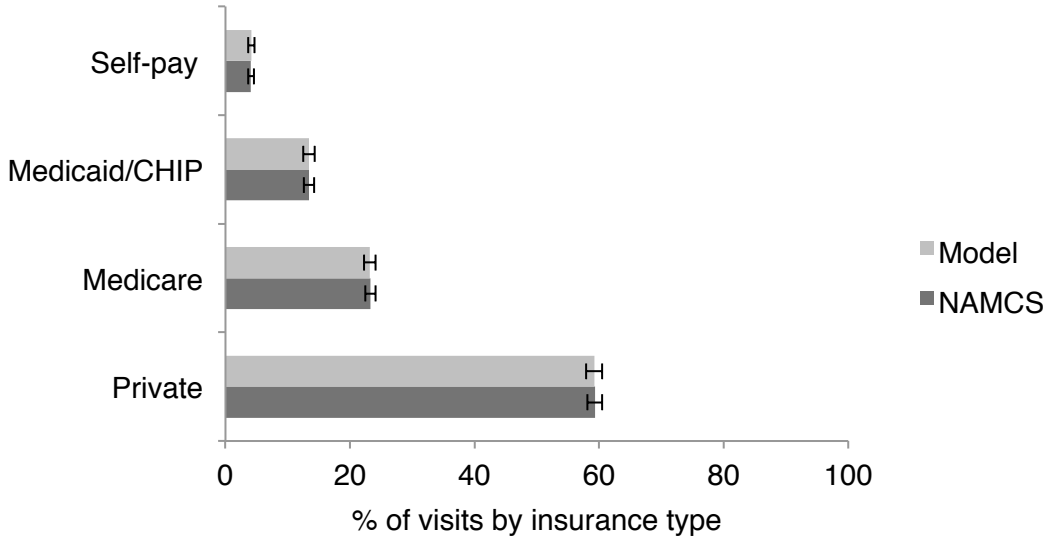
(E)



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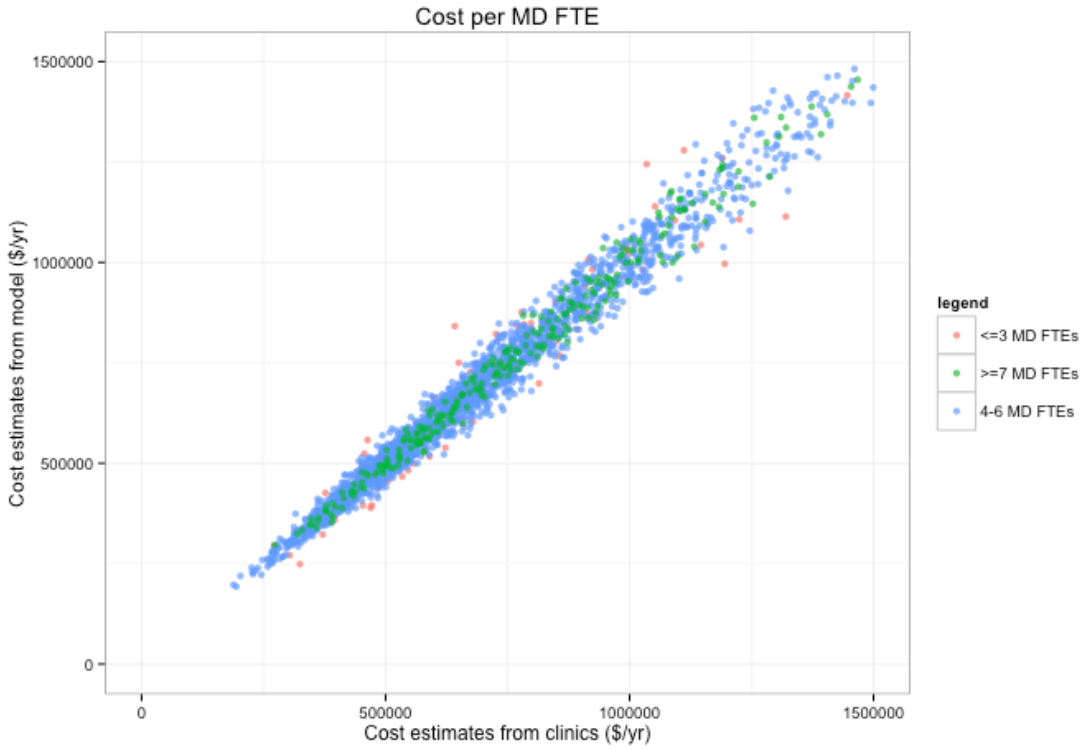
(F)



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(G)

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