

Comparison of Ambulatory Quality Measures Between Shared Practice Panels and Independent Practice Panels

Adria Whiting, APRN, CNP; April E. Poolman, APRN, CNP, MSN; Artika Misra, MD; Joel E. Gordon, MD; and Kurt B. Angstman, MD

Abstract

Objective: To assess for differences in patient care outcomes in the primary care setting for patients assigned to an independent practice panel (IPP) or a shared practice panel (SPP).

Patients and Methods: We retrospectively reviewed the electronic health records of patients of 2 Mayo Clinic family medicine primary care clinics from January 1, 2019 to December 31, 2019. Patients were assigned to either an IPP (physician or advanced practice provider [APP]) or an SPP (physician and ≥ 1 APP). We assessed 6 measures of quality care and compared them between IPP and SPP groups: diabetes optimal care, hypertension control, depression remission at 6 months, breast cancer screening, cervical cancer screening, and colon cancer screening.

Results: The study included 114,438 patients assigned to 140 family medicine panels during the study period: 87 IPPs and 53 SPPs. The IPP clinicians showed improved quality metrics compared with the SPP clinicians for the percentage of assigned patients achieving depression remission (16.6% vs 11.1%; $P < .01$). The SPP clinicians showed improved quality metrics compared with that of the IPP clinicians for the percentage of patients with cervical cancer screening (79.1% vs 74.2%; $P < .01$). The mean percentage of the panels achieving optimal diabetes control, hypertension control, colon cancer screening, and breast cancer screening were not significantly different between IPP and SPP panels.

Conclusion: This study shows a considerable improvement in depression remission among IPP panels and in cervical cancer screening rates among SPP panels. This information may help to inform primary care team configuration.

© 2023 THE AUTHORS. Published by Elsevier Inc on behalf of Mayo Foundation for Medical Education and Research. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>) ■ *Mayo Clin Proc Inn Qual Out* 2023;7(4):256-261

From the Department of Family Medicine, Mayo Clinic Health System, Southwest Minnesota region, Fairmont, MN (A.W., A.E.P.); Department of Family Medicine, Mayo Clinic Health System, Southwest Minnesota Region, Mankato, MN (A.M.); Department of Family Medicine and Community Health Madison, University of Wisconsin, Madison (J.E.G.); and Department of Family Medicine, Mayo Clinic, Rochester, MN (K.B.A.).

Primary care delivery is rapidly evolving as a result of many factors. Currently, the demand for primary care physicians is outpacing supply, and this is not expected to improve. Whereas the Centers for Medicare and Medicaid Services project an increase in Medicare beneficiaries from 54 million in 2016 to more than 80 million by 2030,¹ fewer physicians are going into primary care. The Association of American Medical Colleges projects a shortage of 42,600 to 121,300 physicians by 2030.² A family medicine provider is responsible for managing preventive care, chronic diseases, and acute care services for patients assigned to them, but even with current patient loads, meeting all the recommended care guidelines for an average patient panel size of 2,500 would require an ~21

hours per day.³ The COVID-19 pandemic has further strained health care professionals—a recent study showed that 1 in 3 physicians intend to reduce their work hours and 1 in 5 physicians intend to leave practice altogether.⁴ All these factors occurring simultaneously are devastating to our health care system and are forcing organizations to explore ways to deliver primary care differently.

Health care organizations, policymakers, and researchers have suggested the use of a shared team model to help manage patient panels in primary care.⁵ These teams often comprise a physician and an advanced practice provider (APP).⁶⁻⁸ Overall, 70% of nurse practitioners (NPs) work in primary care.⁷ APPs are graduating at increasing rates, with all

states expecting no shortage of NPs by 2025.⁹ These factors make APPs a viable solution to the projected clinician shortage. However, new approaches to health care management and delivery must also ensure that the quality of patient care is not negatively affected.

To date, limited studies have compared the quality of patient care delivered by individual providers with that of shared panels. In a study comparing ambulatory quality with care team types, Kurtzman and Barnow⁶ showed that patients assigned to shared teams did not always receive better care. Shared teams were less likely to receive recommended quality care such as statins for diabetes, statins for hyperlipidemia, depression treatment for adults, and blood pressure screening during general medical examinations.⁶ In other studies, however, shared teams have reported improved outcomes for patients with diabetes when compared with independent providers,¹⁰ improved geriatric health outcomes in a community-based setting with NP comanagement,¹¹ and improved patient outcomes for diabetes and hypertension when compared with an independent provider group.⁸ The care team's quality and composition have previously been studied at our institution. Several studies of team composition showed the following: (1) the role and collaboration of care between clinicians was more important than team composition for diabetic quality outcomes¹²; (2) care team type was not associated with emergency department visits, hospital utilization, or readmission rates¹³; and (3) regarding physician burnout, lower emotional exhaustion was markedly associated with inclusion on a care team.¹⁴ Additional care team members, such as registered nurses and pharmacists were also shown to positively affect quality metrics.^{15,16}

The aim of this study was to compare the quality of care provided by shared practice panels (SPPs) with that provided by independent practice panels (IPPs) by evaluating 3 preventive medicine quality metrics and 3 chronic disease quality metrics as defined by Minnesota Community Measurement (MNCM).¹⁷ We hypothesized that there would be no difference in patient care outcomes in the primary care setting for patients assigned to an IPP (physician or APP led) or an SPP (physician and ≥ 1 APP).

METHODS

Study Setting and Sample

This study encompassed 2 primary care clinics in the Mayo Clinic health system: The department of family medicine located in Southwest Minnesota and in Southwest Wisconsin. This study was approved by the Mayo Clinic institutional review board.

We conducted a retrospective study using electronic health records during the year 2019. Primary care clinicians were defined as physicians, NPs, and physician assistants (PAs) working in the department of family medicine. For the purpose of this study, an SPP was defined as a physician and ≥ 1 APP (NP or PA) working together to care for a single panel of patients, and an IPP was defined as an individual clinician (physician, NP, or PA) providing care for their own assigned patients. Patients were excluded from the study if they opted out of research; clinicians were excluded if they did not have assigned patients.

Variables Collected

We collected data on characteristics of the care teams, such as the clinician team makeup (IPP vs SPP), total number of clinicians, total number of patients assigned to each team, and total number of assigned patients meeting the criteria for empanelment on the MNCM list. The clinician characteristics required included type of clinical practice (IPP or SPP), raw patient panel size, and risk-adjusted patient panel size. Patient outcome variables required included 3 preventive health metrics and 3 chronic disease metrics, as described further.

Outcome Variables

To assess clinical outcomes for quality of care, we selected 3 preventive health metrics and 3 chronic disease metrics as reported by MNCM as markers of performance regarding quality. MNCM works with health care organizations, insurance companies, and state agencies to design quality measures so that statewide data can be collected and compared to improve care in the future. The quality metrics data were reviewed for each patient assigned to a primary care clinician or team to determine the percentage of patients at goal for each measure by the end of 2019.

Preventive Health Metrics. Patient-specific preventive health data included screening for breast cancer, cervical cancer, and colon cancer. The outcome goal for breast cancer screening was the completion of mammography for assigned women aged 50-74 years within the previous 24 months. The outcome goal for cervical cancer was the completion of cervical cancer screening for assigned women aged 21-64 years.¹⁷ Criteria for cervical cancer screening were met with cervical cytology every 3 years for women aged 21-64 years or cervical cytology with human papillomavirus every 5 years for women aged 30-64 years.

For colon cancer screening, the outcome goal was the completion of colon cancer screening for assigned patients aged 50-75 years at time-specific intervals based on the type of screening completed: colonoscopy completed within the past 10 years; flexible sigmoidoscopy completed within the past 5 years; computed tomography colonography completed within the past 5 years; fecal immunochemical test-DNA stool test (Cologuard; Exact Sciences) completed within the past 3 years; or annual stool blood test.

Chronic Disease Metrics. Chronic disease information for assigned patients was collected to assess the quality of optimal chronic disease management by tracking outcome metrics for diabetes, hypertension, and depression: optimal diabetes care, hypertension control, and depression remission at 6 months.

For patients aged 18-75 years with type 1 or type 2 diabetes, 5 quality metrics for optimal care were assessed: blood pressure (BP) less than 140/90 mm Hg, current statin use, tobacco free, current aspirin use, and hemoglobin A1c less than 8.0%. The diabetes quality measure goal was reached when a patient met all 5-quality metrics.

Hypertension control was measured in assigned patients aged 18-85 years with a diagnosis of hypertension. Different BP goals were noted depending on age and diabetes diagnosis: (1) aged 18-59 years: BP less than 140/90 mm Hg; (2) aged 60-85 years with diabetes: BP less than 140/90 mm Hg; and (3) aged 60-85 years without diabetes: BP less than 150/90 mm Hg.

Depression remission outcomes were measured in assigned patients aged 12 years

or older by obtaining a patient health questionnaire-9 (PHQ-9 or PHQ-9M [Modified]) score. Remission was assessed as a score of less than 5 at 6 months (within ± 60 days) after an initial PHQ-9 or PHQ-9M score of greater than 9.¹⁸ The goal for this outcome was considered met when the assigned patient met the PHQ-9 score criterion for remission.

Statistical Analyses

In evaluation of quality metrics, to account for clinicians with smaller panels of patients with specific conditions (which implies potential variability in percentages), we used summary statistics for the range of patients with each condition. Clinicians in the 5th percentile or lower for the number of applicable patients were excluded for that specific quality metric. The cutoffs were as follows: 7 patients for diabetes, 19 patients for hypertension, 5 patients for depression care, 15 patients for breast cancer screening, 9 patients for cervical cancer screening, and 30 patients for colon cancer screening. The risk-adjusted panel size was calculated as follows: (raw patient panel size \times patient complexity score)/clinician full-time equivalents. The patient complexity score is calculated as an individual patient's Hierarchical Condition Categories (HCC) score divided by the institutional average HCC score for all patients.

MedCalc statistical software version 20.2 (MedCalc Software Ltd; <https://www.medcalc.org>; 2021) was used for statistical analysis. For comparison between the SPP and IPP groups, the χ^2 test was used for categorical variables, and the *t* test was used for continuous variables. $P < .05$ was considered statistically significant.

RESULTS

A total of 114,438 patients were assigned to primary care clinicians in the study group in 2019. Data were collected for 140 family medicine panels during the study period. Of these, 87 (62.1%) were IPPs and 53 (37.9%) were SPPs, which included 62,354 patients and 52,084 patients, respectively. The risk-adjusted patient panel size was similar between the IPP and SPP clinicians (Table).

For the quality outcomes, the IPP clinicians reported a significantly higher mean percentage of patients achieving depression

TABLE. Comparison of Clinical Outcomes by Number of Care Teams Using IPPs vs SPPs^{a,b,c}

Variable	IPPs (n=87)	SPPs (n=53)	P value
Panel size			
Total patients	62,354	52,084	—
Risk-adjusted panel size	1,771	2,019	.29
Diabetes	(n=59) ^c	(n=44) ^c	—
Patients per panel	63.4 (35.2)	87.8 (39.8)	<.01
Diabetes at goal, % of assigned patients	50.6 (11.7)	49.1 (7.6)	.48
Hypertension	(n=61) ^c	(n=50) ^c	—
Patients per panel	50.5 (24.0)	57.3 (23.5)	.14
Hypertension at goal, % of assigned patients	75.0 (11.3)	75.1 (10.4)	.99
Depression	(n=59) ^c	(n=45) ^c	—
Patients per panel	37.0 (22.3)	45.3 (22.9)	.07
Depression at goal, % of assigned patients	16.6 (8.2)	11.1 (5.0)	<.01
Breast cancer screening	(n=60) ^c	—	—
Patients per panel	39.6 (16.1)	42.2 (17.4)	.42
Screening at goal, % of assigned patients	83.0 (11.2)	85.7 (8.5)	.16
Cervical cancer screening	(n=62) ^c	(n=47) ^c	—
Patients per panel	232.1 (156.0)	253.1 (213.9)	.55
Screening at goal, % of assigned patients	74.2 (10.8)	79.1 (6.2)	<.01
Colon cancer screening	(n=60) ^c	—	—
Patients per panel	71.4 (27.2)	83.8 (32.1)	.03
Screening at goal, % of assigned patients	80.0 (8.6)	80.5 (5.3)	.73

^aAbbreviations: IPP, independent practice panel; SPP, shared practice panel.

^bValues are number of patients or mean ± SD.

^cExcludes clinicians who have panel sizes in the 5th percentile or lower for patients with condition.

remission than the SPP group (16.6% vs 11.1%; $P < .01$) (Table). The SPP clinicians reported a significantly higher mean percentage of patients meeting the cervical cancer screening goal compared with the IPP clinicians (79.1% vs 74.2%; $P < .01$). The quality outcomes for hypertension, diabetes, breast cancer screening, and colon cancer screening were similar between the IPP and SPP clinicians (all $P > .05$).

DISCUSSION

The issue of how best to use APPs in the looming physician shortage is much debated. A common concept is for these clinicians to participate in a shared care team model. Many studies have compared APP with that of physician quality outcomes, with varied results.^{6,15,19,20} The consistency of outcome measures used for diabetes has also varied widely, with studies measuring statin use,

hypertension, or hemoglobin A1c.^{6,21-23} Our study evaluated the care received by primary care patients in the Midwest using a shared team model versus an independent clinician model by using 6 important measures. On direct comparison between the 2 practice styles, 1 of the 6 measures of quality (depression remission) showed statistically significant improvement for the IPP model of care, and 1 measure (cervical cancer screening) showed statistically significant improvement for the SPP model. There were no statistically significant differences between SPP and IPP care team models for hypertension control, diabetes control, breast cancer screening, or colon cancer screening.

Our results are similar to those of other studies that showed variability in patient clinical outcomes, with findings favoring SPP models.⁷ Our findings were also similar to those of studies showing lower odds of receiving recommended

depression treatment among SPP teams compared with those of physician IPPs.⁶ Our study differed from one that evaluated NP comanagement, in which the quality scores for depression were lower for patients in IPPs.¹¹ It is noteworthy that working as a team allows for larger patient panel sizes.²⁴

Recently, health care focus has been on the quadruple aim: reducing costs and improving population health, patient experience, and team well-being.²⁵ Because these aims can occur separately from patient clinical outcomes, our observations should be aligned with those of other previously published studies on clinician team design to comprehensively determine the effects of care team composition. Two specific articles from our same primary care network can clearly illuminate this discussion.^{14,26} In the study by Bruhl et al,¹⁴ the composition of the care teams was shown to either positively or negatively affect provider burnout, but IPPs and SPPs were not particularly compared with each other. Angstman et al²⁶ observed decreased diabetic quality results with larger panel sizes. This finding aligns with our finding that diabetes outcomes have improved outcomes with SPP as a preferred care team composition.

We are unaware of other studies of health care teams that consider all 6 specific outcomes included in this study. Results from this study may help to inform primary care team configuration. We have shown that different team configurations within health care systems may provide effective primary care because either practice style has advantages. Future research considerations in care team establishment include effects on efficiency, patient satisfaction, time spent performing nonclinical tasks, team member roles, care plan compliance, patient complexity, clinician composition, and access to resources in rural versus urban settings.

This study has both strengths and limitations. A strength of this study is the comparison of different primary care models within a health system with similar resources and referral capacity. Because both models were effective at most metrics, previous studies that have focused on 1 or 2 clinical outcomes may not provide a full picture of the complexity of primary care or the effect of local practice initiatives. Limitations of this study include the

small number of SPP groups and the inclusion of only 1 department, which may limit the generalizability of the study. Another limitation is the variability in the APP: physician ratios for the SPP group. Although not measured in this study owing to sample size, this may be an important factor in determining optimal clinical organization. Moreover, this study did not account for social determinants of health and their effects on quality outcomes, nor did it account for clinician time in clinical practice.

CONCLUSION

The future of the health care industry is heavily dependent on patient access to clinicians. With a projected physician shortage, APPs will fast become an indispensable team of members in primary care. Identifying the optimal care team makeup will be key to ensuring effective and efficient health care management and delivery to improve the quality of care. Our data show comparable quality care provided by independent versus shared care teams for most of the metrics measured. Previous studies based on 1 or 2 clinical outcomes may have an outcome bias, and further studies are indicated. More research is also needed to help define the optimal makeup of care teams. Leveraging the expertise of APPs to help build collaborative care teams may help overcome current and future barriers to clinician access.

POTENTIAL COMPETING INTERESTS

The authors report no competing interests.

ACKNOWLEDGMENT

The scientific publications staff at Mayo Clinic provided editorial consultation, proofreading, and administrative and clerical support. Authors Adria Whiting and April E. Poolman contributed equally to this work.

Abbreviations and Acronyms: APP, advanced practice provider; BP, blood pressure; HCC, Hierarchical Condition Categories; IPP, independent practice panel; MNMCM, Minnesota Community Measurement; NP, nurse practitioner; PA, physician assistant; PHQ-9, Patient Health Questionnaire-9; SPP, shared practice panel

Correspondence: Address to Kurt B. Angstman, MD, Department of Family Medicine, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (angstman.kurt@mayo.edu).

REFERENCES

- Muench U, Guo C, Thomas C, Perloff J. Medication adherence, costs, and ER visits of nurse practitioner and primary care physician patients: evidence from three cohorts of Medicare beneficiaries. *Health Serv Res.* 2019;54(1):187-197.
- The Complexities of Physician Supply and Demand: Projections From 2018 to 2033. Association of American Medical Colleges. <https://www.aamc.org/system/files/2020-06/stratcomm-aamc-physician-workforce-projections-june-2020.pdf>. Accessed December 5, 2022.
- Yamall KS, Østbye T, Krause KM, Pollak KI, Gradison M, Michener JL. Family physicians as team leaders: "time" to share the care. *Prev Chronic Dis.* 2009;6(2):A59.
- Sinsky CA, Brown RL, Stillman MJ, Linzer M. COVID-related stress and work intentions in a sample of US health care workers. *Mayo Clin Proc Innov Qual Outcomes.* 2021;5(6):1165-1173.
- Bodenheimer T, Ghorob A, Willard-Grace R, Grumbach K. The 10 building blocks of high-performing primary care. *Ann Fam Med.* 2014;12(2):166-171.
- Kurtzman ET, Bamow BS. Do teams improve the quality of ambulatory care? *J Ambul Care Manage.* 2021;44(2):89-100.
- Norful AA, Swords K, Marichal M, Cho H, Poghosyan L. Nurse practitioner-physician comanagement of primary care patients: the promise of a new delivery care model to improve quality of care. *Health Care Manage Rev.* 2019;44(3):235-245.
- Litaker D, Mion L, Planavsky L, Kippes C, Mehta N, Frolkis J. Physician—nurse practitioner teams in chronic disease management: the impact on costs, clinical effectiveness, and patients' perception of care. *J Interprof Care.* 2003;17(3):223-237.
- State-level projections of supply and demand for primary care practitioners: 2013-2025. U.S. Department of Health and Human Services, Health Resources and Services Administration, National Center for Health Workforce Analysis 2016. <https://bhwhrsa.gov/sites/default/files/bureau-health-workforce/data-research/primary-care-state-projections2013-2025.pdf>. Accessed December 5, 2022.
- Guo F, Lin YL, Raji M, Leonard B, Chou LN, Kuo YF. Processes and outcomes of diabetes mellitus care by different types of team primary care models. *PLoS One.* 2020;15(11):e0241516.
- Reuben DB, Ganz DA, Roth CP, McCreath HE, Ramirez KD, Wenger NS. Effect of nurse practitioner comanagement on the care of geriatric conditions. *J Am Geriatr Soc.* 2013;61(6):857-867.
- Meyerink BD, Lampman MA, Laabs SB, et al. Relationship of clinician care team composition and diabetes quality outcomes. *Popul Health Manag.* 2021;24(4):502-508.
- Bernard ME, Laabs SB, Nagaraju D, et al. Clinician care team composition and health care utilization. *Mayo Clin Proc Innov Qual Outcomes.* 2021;5(2):338-346.
- Bruhl EJ, MacLaughlin KL, Allen SV, et al. Association of primary care team composition and clinician burnout in a primary care practice network. *Mayo Clin Proc Innov Qual Outcomes.* 2020;4(2):135-142.
- Kurtzman ET, Bamow BS. A comparison of nurse practitioners, physician assistants, and primary care physicians' patterns of practice and quality of care in health centers. *Med Care.* 2017;55(6):615-622.
- Herges JR, Ruehmann LL, Matulis JC 3rd, Hickox BC, McCoy RG. Enhanced care team nurse process to improve diabetes care. *Ann Fam Med.* 2020;18(5):463.
- Minnesota Community Measurement. MN Community Measurement. <https://mncm.org/about/#our-vision>. Accessed December 5, 2022.
- Spitzer RL, Kroenke K, Williams JB. Validation and utility of a self-report version of PRIME-MD: the PHQ primary care study. Primary care evaluation of mental disorders. Patient Health Questionnaire. *JAMA.* 1999;282(18):1737-1744.
- Johnson D, Ouenes O, Letson D, O'Reilly-Jacob M, Zolotusky G, DesRoches CM. A direct comparison of the clinical practice patterns of advanced practice providers and doctors. *Am J Med.* 2019;132(11):e778-e785.
- Buerhaus P, Perloff J, Clarke S, O'Reilly-Jacob M, Zolotusky G, DesRoches CM. Quality of primary care provided to medicare beneficiaries by nurse practitioners and physicians. *Med Care.* 2018;56(6):484-490.
- Everett CM, Morgan P, Smith VA, et al. Primary care provider type: are there differences in patients' intermediate diabetes outcomes? *JAAPA.* 2019;32(6):36-42.
- Virani SS, Akeroyd JM, Ramsey DJ, et al. Comparative effectiveness of outpatient cardiovascular disease and diabetes care delivery between advanced practice providers and physician providers in primary care: Implications for care under the Affordable Care Act. *Am Heart J.* 2016;181:74-82.
- Kuo YF, Goodwin JS, Chen NW, Lwin KK, Baillargeon J, Raji MA. Diabetes mellitus care provided by nurse practitioners vs primary care physicians. *J Am Geriatr Soc.* 2015;63(10):1980-1988.
- Dai M, Willard-Grace R, Knox M, et al. Team configurations, efficiency, and family physician burnout. *J Am Board Fam Med.* 2020;33(3):368-377.
- Ametz BB, Goetz CM, Ametz JE, et al. Enhancing healthcare efficiency to achieve the quadruple aim: an exploratory study. *BMC Res Notes.* 2020;13(1):362.
- Angstman KB, Hom JL, Bernard ME, et al. Family medicine panel size with care teams: impact on quality. *J Am Board Fam Med.* 2016;29(4):444-451.