Primary Care Provider Continuity Is Associated With Improved Preventive Service Ordering During Brief Visits for Acute Symptoms

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Abstract

Background: If a patient presents for an acute care visit and sees their assigned primary care provider (PCP), they may be more likely to receive preventive and other services than a patient not seeing their assigned PCP.

Methods: After exclusion of 2 visits with insufficient information, we reviewed 98 consecutive, outpatient internal medicine 15-minute acute care visits comparing patients seeing their assigned PCP with those seeing a non-PCP provider. The primary outcome, preventive service ordering, was measured in 2 ways: percentage of patient visits with *any* preventive service ordered and the total number of preventive services ordered as a proportion of all preventive service items due for each entire cohort. The secondary outcome of other work completed was assessed by comparing tests and consults ordered, and by counting the number of physical examination elements and discrete medical diagnoses documented.

Results: The PCPs were significantly more likely than non-PCPs to order any preventive service 45% versus 17% ($P = .005$; odds ratio [OR]: 4.16, 95% confidence interval [CI]: 1.45-12.0). The PCP cohort ordered a higher proportion of the total number of preventive services due compared with the non-PCP cohort (30% vs 11%; $P = .002$; OR: 3.4, CI: 1.5-7.7). The PCPs also addressed more medical diagnoses (2.3 vs 1.4; $P = .008$) and more frequently ordered tests outside the reason for that visit (40% vs 13%; $P = .003$; OR: 4.27, CI: 1.5-11.8).

Conclusion: Patients seeing their assigned PCP in brief, acute visits have higher rates of preventive and other service ordering compared to those not seeing their assigned PCP.

Keywords

appointments, health-care access, health-care quality, preventive health services, primary health care, scheduling

Introduction

Previous studies have shown that preventive services are being addressed in only half of annual physical examinations.[1] Subsequent to this finding, high-profile calls to end the routine practice of the annual physical examination in primary care have also proposed delivering preventive care during acute and other visit types.[2-4] Indeed, acute care visits present an opportunity for primary care providers (PCPs) to address additional patient concerns, chronic disease management, and preventive health-care delivery in addition to the symptoms originally prompting that visit. For example, after agreeing on a treatment plan for a limited concern, a face-to-face visit with a 50-year-old woman provides an opportunity to discuss colon, breast, or cervical cancer screening. This face-to-face interaction allows for a convenient and possibly more effective mode of eliciting patient values, addressing questions, and arranging scheduling for these needed services.

It is unclear to what extent brief-duration (15-20 minutes) acute visits are being used to facilitate delivery of preventive

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and other services. It is also unknown whether a patient seeing their assigned PCP for an acute visit would be more likely to receive recommended preventive services and other services outside the reason for the visit when compared with patients seeing another provider. Although preventive service completion may have differing relative values to patients, providers, and organizations, these rates are being used as publicly reported measures of the quality of care provided.[5-8] Understanding the factors affecting preventive service delivery may help inform primary care scheduling and population health management strategies.

To understand the association between PCP continuity and preventive and other services completed during acute care visits, we reviewed 15-minute face-to-face visits and compared ordering of recommended preventive and other services for those seeing their assigned PCP to those seeing another non-PCP provider.

Methods

Setting

The Division of Primary Care Internal Medicine at Mayo Clinic, Rochester, Minnesota, is a practice of 48 internists caring for approximately 41 000 patients. Providers often have responsibilities outside of direct patient care including supervision of residents and medical students. Providers are salaried; there are no financial or other incentives based on preventive service completion rates or on relative value units.

Patients are first triaged by a nurse in a centralized call center where the risk of their presenting symptom is determined. Specific, low-risk symptoms without complicating factors may be scheduled in a 15-minute appointment slot, typically the same day the patient calls. If a symptom is higher risk or their concern involves other complexity, it is scheduled into a longer visit length and was not included for analysis in this study. These 15-minute visits are typically scheduled on a first available basis, meaning that the patients will be scheduled with the PCP if available, but if the PCP is not available they will be scheduled with another provider. During calendar year 2015, 52% of patients saw their assigned PCP for these 15-minute acute visits.

Study Design

We used a retrospective, observational design in analyzing these 15-minute acute care visits. Our study was approved by the institutional review board of Mayo Clinic (16-002091).

Data Collection

Using the Mayo Clinic electronic health record (EHR), one physician reviewer (J.C.M.) examined 100 consecutive, unique, 15-minute patient visits between October 1, 2015, and November 15, 2015. Two visits were not analyzed due to incomplete information. No other visits were excluded. The symptom prompting the visit, visit provider, and assigned PCP

was available from automated scheduling data. From the EHR, the reviewer abstracted information on the number of preventive services recommended at the time of the visit, the number of preventive services ordered, and the number of physical examination elements and discrete medical diagnoses documented in the assessment and plan section of the clinical note. The reviewer also abstracted medications, laboratory tests, and specialty consults ordered to further evaluate the chief complaint, dichotomously noting whether these orders were associated with a billing diagnosis consistent with the presenting symptom.

Preventive services due at the time of the patient encounter were determined by reviewing our preventive service tracking tool, which is based on United States Preventive Services Task Force (USPSTF) and other chronic disease management guidelines. Please see the Appendix for a detailed description of this tool and how preventive services were classified in this analysis. This tool has previously been shown to successfully extract data from our medical record and recommend appropriate preventive services at the time of a patient visit.[9-11] It has also been used to describe routine primary care task distribution and efforts required to complete these tasks.[12]

Primary Outcome

Eligibility for preventive services is described further in the Appendix. To calculate a rate in which any preventive service was ordered, eligible visits were included in the denominator if the patient was due for at least one recommended preventive service. To be included in the numerator, the patient had at least one preventive service ordered at the time of the visit. For example, if a patient had 4 preventive service items due of which 1 was ordered, this patient visit would be recorded dichotomously as having had *any* preventive service item completed.

We also determined the proportion of recommended preventive services ordered for each, entire cohort. For example, if the PCP cohort had 50 unique patient visits in which a total of 100 preventive services were due and we assessed that 25 of those 100 recommended services were ordered, the preventive service ordering rate would be 25% for that entire cohort.

Secondary Outcomes

The same single reviewer assessed other work completed in these visits by counting the number of discrete physical examination systems documented from 0 (minimum) to 14 (maximum), the number of medical diagnoses addressed in the assessment and plan section of the note, the proportion of visits in which medications and laboratory tests unrelated to the acute problem and consults related to the acute problem were ordered. The reviewer assessed whether the medication, test, or consult order was associated with the acute problem by reviewing whether the *International Classification of Diseases* code associated with that order was pertinent to the acute problem.

Table 1. Baseline Demographics of PCP and Non-PCP Visit Cohorts.

	Cohort		
Variable	PCP (N = 53)	Non-PCP (N = 45)	P Value
Patient variables			
Average age, years (SD)	60 (16.5)	62 (16.4)	.57
Female gender	28 (53%)	22 (49%)	.69
English speaking	52 (98%)	40 (89%)	.05
Caucasian	49 (93%)	39 (87%)	.23
Provider had previously seen patient	50 (94%)	7 (16%)	<.001
Average number of medications (SD)	8.8 (6.5)	9.0 (7.8)	.5
Average number of preventive services due (SD)	2.0 (1.6)[a]	1.8 (1.4)[b]	.46

Abbreviations: PCP, primary care provider; SD, standard deviation.
[a]Nine patient visits in the PCP cohort had no preventive services due.
[b]Nine patient visits in the non-PCP cohort had no preventive services due.

Table 2. Preventive Service Ordering of PCP and Non-PCP Cohorts.

	Cohort		
Variable	PCP (N = 44)	Non-PCP (N = 36)	P Value
Visits with any preventive service ordered	20 (45%)	6 (17%)	.005
Visits with all due preventive services ordered	3 (7%)	3 (8%)	.99
Total number of preventive services completed	32 (30%)[a]	9 (11%)[b]	.002

Abbreviation: PCP, primary care provider.
[a]One hundred five total, eligible preventive services due in the PCP cohort.
[b]Seventy-nine total, eligible preventive services due in the non-PCP cohort.

Statistical Analysis

JMP Pro version 11 (SAS Institute, Cary, North Carolina) was used for the statistical analysis and for calculation of descriptive statistics. We used an analysis of variance for comparison of continuous data and χ^2 for categorical data.

Results

We reviewed 98 eligible visits conducted by 43 unique clinicians; 53 (54%) of these patients were seen by their assigned PCP. Forty-four (83%) patients in the PCP cohort and 36 (80%) in the non-PCP cohort had preventive services due at the time of their acute visit. Baseline patient characteristics of the PCP and non-PCP cohorts are shown in Table 1.

Primary Outcomes

Among the primary outcomes, the PCP cohort had a significantly greater proportion of visits with *any* preventive services ordered, compared with the non-PCP group (45% vs 17%; P = .005; odds ratio [OR]: 4.54, 95% confidence interval [CI]: 1.6-13.0; Table 2). The PCPs also completed a greater

Table 3. Comparison of Other Work Completed Between PCP and Non-PCP Cohorts.

	Cohort		
Variable	PCP (N = 53)	Non-PCP (N = 45)	P Value
Physical examination systems documented (SD)	2.5 (2.0)	2.8 (2.2)	.55
Number of medical diagnoses documented (SD)	2.3 (1.9)	1.4 (0.8)	.007
Visits with an ordered, nonrelated test	21 (40%)	6 (13%)	.003
Visits with an ordered nonrelated medication	15 (28%)	9 (20%)	.34
Visits with a related consultation ordered	17 (32%)	18 (40%)	.41

Abbreviation: PCP, primary care provider.

proportion of the total number of preventive service items due for each, entire cohort (30% vs 11%; P = .002).

Secondary Outcomes

In measuring workload outcomes in the PCP and non-PCP cohorts, significant differences were found in the number of medical diagnoses addressed (2.3 vs 1.4; P = .007) and unrelated orders placed (40% vs 13%; P = .003; OR: 4.43, 95% CI: 1.5-11.8; Table 3). There was no difference in the rate of consultations ordered to evaluate the presenting complaint (40% in non-PCP vs 32% in PCP cohort; P = .41).

Discussion

The PCPs seeing their own patients demonstrated significantly higher rates of preventive service ordering, and more often delivered other care separate from the primary complaint.

There are several possible reasons for the higher rates of preventive and other service ordering among PCPs during the study period. There may be a component of personal responsibility, or viewing this additional work as "my job" that may not be shared by a non-PCP. Another consideration is the PCPs' familiarity with their patient's social support structure, medical history, personality, and preferences. Completion of certain preventive service items, particularly cancer screening may require this familiarity to be completed effectively. This same familiarity with the patient may also allow for a more efficiently developed diagnostic and management plan, possibly resulting in additional time being available for discussion of other issues.

Depending on the situation, the 15- or 20-minute scheduled appointment may not allow sufficient time for anything other than managing the acute problem. Future work should examine differences in preventive and other service completion in visits of longer duration. If there are persistent differences between PCPs and non-PCPs during longer duration visits, it would clarify whether the limiting factor for preventive service delivery was the time available or which provider saw the patient. If

continuity with the PCP is determined to be critically important for completion of preventive and other services, it may make sense to select non-PCPs to complete brief, acute visits, while reserving PCP time for longer, scheduled visits with an express intent of addressing these other services.

Although it did not reach statistical significance, there was a trend toward increased consultation ordering for related complaints among non-PCPs. If differences in consultation orders were found to be present in a larger sample of brief, acute care visits could represent an important cost contributor.

Our study has limitations. Patients were not randomly selected. Although it would be difficult for patients to consent to see a non-PCP even when their PCP may be available, our study occurred in a context which closely simulated randomization. The acute, 15-minute visits in our practice are typically seen the day that the patient calls with their concern. Our patients have inconsistent access to their PCP for these same day appointments; in calendar year 2015 PCPs only saw their own patients 52% of the time. Therefore, when a patient calls for a same day concern, they have an approximately equal chance of seeing their PCP or a non-PCP. In view of that it was not a surprise that our PCP and non-PCP cohorts of consecutive 15-minute visits were so evenly distributed (53 patient visits to PCPs, 45 to non-PCPs). A large sample of providers in both groups (29 unique providers in the PCP cohort and 24 in the non-PCP cohort) also limits nonrandom influences.

We measured ordering of preventive services but did not determine whether the patient actually completed that order. The process measure of orders placed, does provide valuable information related to provider intention, and in our view is more directly modifiable than actual completion of that order. Additionally, we did not assess the number of concerns patients initially brought forward and did not verify electronic order placement with the provider. The chart abstraction was completed by a single author without verification from another abstractor; the single abstractor is a board certified, practicing internal medicine physician. Seasonal variation is a consideration as our study coincided with a directive for universal influenza vaccination, but was conducted during the same time period for both cohorts, so there was equal exposure to vaccination and other clinic directives.

Our practice has some features that limit the generalizability of our results. We are a primary care internal medicine practice in which a substantial proportion of physicians are not engaged in full-time clinical practice, due to teaching and other commitments. We use a mature and validated preventive service tracking tool (Appendix) to help clinicians quickly identify preventive services due at the time of the visit. Importantly, as a practice operating outside of the fee-for-service environment, we see our patients less frequently (average twice annually) compared with similar internal medicine practices in our region. This decreased visit frequency perhaps makes the issue of preventive service delivery during acute visits more compelling because we have fewer face-to-face opportunities compared with other health-care systems.

Conclusion

Brief, acute visits with a patient's assigned PCP are associated with higher rates of preventive service and other service ordering than visits in which a patient does not see their assigned PCP.

Appendix A

Additional Description of Mayo Clinic's Preventive Service Tracking Tool, Generic Disease Management System

Mayo Clinic's Generic Disease Management System (GDMS) captures patient information from multiple data sources within the electronic medical record to give a summary of a patient's current medical information including diagnosis, immunizations, and lab and procedure reports. Utilizing this information, GDMS applies rules and calculators to provide recommendations on preventive services and chronic disease management items that are due. For example, GDMS examines previous immunization histories to determine what immunizations the patient would be due for based on prior administration and the time interval since last given. Generic Disease Management System also identifies cancer screening tests that may be indicated such as mammography and colon cancer screening using the patient's age and gender, as well as national guidelines to identify the age of screening initiation, and screening intervals using the date of the most recent screening as reference.

The recommendations in GDMS are based on national and international guidelines and reviewed by Mayo Clinic physicians, who take into consideration competing guidelines and the evidence base for the guidelines. Ask Mayo Expert physicians cover a broad scope of medical practice and review guidelines from multiple sources, including resources such as The USPSTF, The Centers for Disease Control, specialty societies such as the American College of Cardiology, and other groups authoring guidelines such as the Institute for Clinical Systems Improvement, American Cancer Society, and the American Heart Association.

The GDMS recommendations are based on algorithms generated from patient data. Patient information such as diagnoses, completed immunizations, and completed screening tests are imported into GDMS on a real-time basis and recommendations are transmitted into the EHR in real time. A list of due preventive services can be reviewed at any time whether the patient is present in clinic or not. When the patient does arrive for a visit, a printed paper list of recommendations generated from GDMS is given to the provider to review with the patient. This article list prompts providers to consider these recommendations at the point of care, including during acute care visits.

In addition to general cancer screening recommendations, GDMS can also use diagnosis, laboratory, and procedural information to identify very specific screening recommendations such as screening for hepatocellular carcinoma in high-risk individuals such as those with cirrhosis and chronic hepatitis C. The GDMS uses a combination of diagnoses,

Table A1. Categorization of Preventive Services Content Available to Providers in GDMS.

Task Category	Preventive Service Content
Cancer screen	Screen for colon cancer, hepatocellular carcinoma, breast cancer, cervical cancer
Disease monitoring	Monitoring of anti-seizure medications (phenytoin, carbamazepine), thyroid medication (TSH), diabetes monitoring (A1C, microalbumin), antihypertensive monitoring (sodium, potassium), vitamin B12 monitoring (bariatric surgery, intestinal disorders, alcoholism)
Disease screen	Diabetes and lipid screening (includes for patients on high-risk medications such as olanzapine)
Immunizations	Hepatitis B, human papilloma virus, herpes zoster, pneumonia (PPSV 23 and PCV 13), tetanus diphtheria, tetanus diphtheria pertussis
Infectious disease screen	Screen for chlamydia, hepatitis C, human immunodeficiency virus
Procedure screen, not cancer	Abdominal ultrasound screen for aneurysm, eye examination due for diabetic retinopathy screening, osteoporosis screening
Specialty referral	Referral alert for kidney (low estimated glomerular filtration rate), consider cardiovascular referral for defibrillator placement in advanced heart failure

Abbreviations: GDMS, Generic Disease Management System; PCV 13: pneumococcal conjugate vaccine 13; PPSV 23, pneumococcal polysaccharide vaccine 23; TSH, thyroid stimulating hormone.

medications, and previous laboratory test dates and values to calculate when certain tests such as lipid or blood glucose screening tests may be due.

The GDMS uses a variety of data sources, rules, and calculators to create recommendations for providers to use at the point of care. When this study took place in 2015, GDMS had an inventory of 73 recommendations that were being reviewed. In Table A1, we have classified preventive service alerts reviewed which were prompted by GDMS into different categories which were used in our assessment of preventive services ordering.

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Author Biographies

John C. Matulis is a senior associate consultant and assistant professor of Medicine at Mayo Clinic in Rochester, Minnesota. Dr Matulis conceptualized and designed the study, abstracted and analyzed the data, drafted the initial abstract, introduction, methods, results, and discussion sections of the manuscript, reviewed and revised the manuscript, and approved the final manuscript as submitted.

Jason J. Schilling is a senior business analyst in Mayo Clinic's office of access management. Mr Schilling provided and cleaned the data used in the project from institutional data sources. He also provided consultation on overall direction of the project; he reviewed and revised the manuscript, and approved the final manuscript as submitted.

Frederick North is a consultant at Mayo Clinic and an associate professor of Medicine. He assisted with project design and methodology, statistical analysis and in writing the methods and discussion section of the manuscript. He reviewed and revised all sections of the manuscript, and approved the final manuscript as submitted.