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The Increasing Number of Clinical Items Addressed During the Time of Adult Primary Care Visits

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BACKGROUND: Primary care physicians report that there is insufficient time to meet patients' needs during clinical visits, but visit time has increased over the past decade.

OBJECTIVE: To determine whether the number of clinical items addressed during the primary care visit has increased, and if so, whether this has been associated with changes in visit length and the pace of clinical work.

DESIGN: Analysis of non-hospital-based adult primary care visits from 1997 to 2005, as reported in the National Ambulatory Medical Care Survey.

PARTICIPANTS: A total of 46,431 adult primary care visits.

MEASUREMENTS: We assessed changes over time for the total number of clinical items addressed per visit (including diagnoses, medications, tests ordered, and counseling), visit duration, and average available time per clinical item. In adjusted analyses we controlled for patient and physician characteristics.

RESULTS: The number of clinical items addressed per visit increased from 5.4 to 7.1 from 1997 to 2005 ($p< 0.001$). Visit duration concurrently increased from 18.0 to 20.9 min ($p<0.001$). The increase in the number of clinical items outpaced the increase in duration, resulting in a decrease in time per clinical item from 4.4 to 3.8 ($p= 0.04$). These changes occurred across patient age and payer status and were confirmed in adjusted analyses.

CONCLUSIONS: The volume of work associated with primary care visits has increased to a greater extent than has visit duration, resulting in less available time to address individual items. These findings have important implications for reimbursing physician time and improving the quality of care.

KEY WORDS: adult; primary care; clinical items; visit duration
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INTRODUCTION

The primary care visit remains the predominant time for providers to address patients' needs. Unfortunately, many aspects of the quality of care during these visits appear to be deficient.[1–4] An important but understudied barrier to providing high-quality comprehensive primary care is the limited time of clinical visits. Physician reports of the inadequacy of visit time have been consistently documented.[5–7] However, other studies have found that visits are growing longer, that physicians are seeing fewer patients per day, and that physicians are receiving increased payment per visit.[8,9]

These conflicting reports about the primary care visit may be reconciled if the volume of work that is performed during the primary care visit has grown in conjunction with the growth in visit length. For individual conditions such as diabetes, it is known that physicians are prescribing more medications and ordering more tests during visits in parallel with changes in clinical recommendations,[10] and in general the number of diagnoses and medications discussed during ambulatory care is increasing.[11] However, there has been no recent attempt to characterize changes in the volume of activities incorporating the full range of possible primary care services. Additionally, few studies have examined the basic interrelationship between the volume of work within the visit and visit length. Understanding how these visit characteristics have changed over time may clarify how primary care practice has changed, explain reports of physician dissatisfaction with primary care practice, and inform policy regarding reimbursement and quality of care targets.

We set out to determine whether the volume of work within primary care visits, as assessed by an itemization of clinical activities, is changing over time. We hypothesized that the number of clinical items addressed per visit has increased. In addition, we aimed to determine whether any change in clinical items is associated with changes in visit length or the pace of clinical work. We hypothesized that, over time, we would find an increase in the pace of care, that is, less time spent per each clinical item.

METHODS

We utilized the National Ambulatory Medical Care Survey (NAMCS),[12] a nationally representative sample of non-hospital-based ambulatory care visits maintained by the National Center for Health Statistics, to identify adult patient visits to physicians

in general internal medicine, family practice, general practice, and geriatrics from 1997 to 2005. NAMCS employs a multistage probability sampling design that samples all the ambulatory patient visits of office-based physicians engaged in direct care for 1 week randomly selected during the year. Physicians across specialties were sampled from 1 of 112 geographically based probability sampling units across the country. Actual visits sampled in each year were weighted accordingly. All of our analyses were adjusted for these weights in order to generate national estimates.

Physicians and their staffs were responsible for completing a visit record abstraction instrument for each visit that was separate from billing and reimbursement procedures. Each record included characteristics of the patient as well as physician and clinic characteristics. The survey documented visit diagnoses addressed using the *International Classification of Diseases, Ninth Edition, Clinical Modification*,[13] medications prescribed using the National Drug Code Directory,[14] diagnostic and screening tests ordered, various types of counseling provided, and physical therapy ordered. Diagnoses were limited to three in all years, the maximum documentable throughout the survey period. Medications were limited to six in all years. Later years allowed greater reporting of medications, but medications were limited to a maximum of six in all years to maintain consistency. All reports of exams, tests, counseling, and physical therapy were obtained from the use of checkboxes on the survey instrument. Only characteristics or activities that were consistently reported as checkboxes across all years were utilized, although in some cases similar categories were as collapsed into a single variable (Online Appendix Table). In 2005, the survey instrument allowed documentation of 14 chronic diseases by using checkboxes, but this reporting was not utilized in this analysis. Other than a simple count of the diagnoses and medications, no write-in information was used.

The primary outcomes of interest were the number of clinical items addressed, visit duration (direct time spent with physician in minutes), and average available time per clinical item (duration/clinical items), measured in each year from 1997 to 2005. When calculating the total number of clinical items addressed, we assigned an equal weight for each diagnosis code (up to three, the maximum reported across all years), each medication (up to six, the maximum reported in early years), each diagnostic test (blood pressure, urinalysis, EKG, x-ray, mammography, other imaging, pregnancy test, pap smear, hematocrit or CBC, cholesterol, PSA, and other blood work), each act of counseling (diet, exercise, mental health or stress, and tobacco cessation), and physical therapy. Our measure of clinical items is an attempt to itemize the cognitive, logistical, and communication tasks that occur during the visit. For example, caring for a patient who presents with chest pain includes reviewing the differential diagnosis

Table 1. Non-hospital-based Primary Care Visits in NAMCS from 1997 to 2005

Visit characteristics	1997	1998	1999	2000	2001	2002	2003	2004	2005	P Value
Visits (millions)	2.75	2.86	2.59	2.79	3.01	3.17	3.03	3.06	3.35	–
Patient age (%):										<0.01
18–39	28	28	24	25	23	23	24	23	23	
40–49	18	18	19	17	17	18	20	18	19	
50–64	22	24	24	26	25	25	26	28	29	
65–79	23	22	23	23	25	24	22	22	21	
≥80	9	8	9	9	10	10	9	9	9	
Sex (% female)	59	60	58	60	58	60	59	60	57	0.41
Race (%):										0.17
Caucasian	80	81	79	76	84	80	73	74	78	
African-Amer.	11	10	11	10	7	9	10	13	8	
Hispanic	6	5	8	9	6	8	12	8	8	
Asian/Pac. Is.	2	4	3	6	3	3	5	4	5	
Urban (%)	79	72	80	75	78	80	81	84	8	0.51
Region (%):										0.95
Northwest	22	17	19	22	18	24	20	17	18	
Midwest	23	26	23	27	26	25	22	24	27	
South	38	32	36	29	31	32	37	37	34	
West	18	25	22	22	26	19	21	22	21	
Primary care MD (%)	84	81	84	86	85	85	85	83	86	0.87
Seen before (%)	90	91	91	92	92	92	93	93	90	<0.001
Referred (%)	4	4	3	4	2	3	2	3	3	<0.01
Solo MD (%)	37	39	32	41	35	38	39	35	46	0.41
Payer type† (%):										<0.01
Private	49	53	52	55	54	56	55	56	54	
Medicare	27	24	26	25	29	27	27	27	25	
Medicaid	6	6	6	6	5	5	8	5	9	
Self-pay	7	7	5	4	4	5	5	4	5	
Owner (%):										<0.01
Physician	68	72	74	84	84	81	82	81	88	
Hospital	11	11	12	3	6	8	10	8	3	
HMO	2	3	4	3	2	2	1	4	2	
Other health org.	10	10	7	9	7	7	6	6	5	
Other	8	4	3	1	2	2	2	2	2	

Abbreviations: HMO: health maintenance organization

**P value based on chi-square test of variable by year*

†*Aggregate total less than 100% as minor categories of worker's compensation, no charge, and other not shown*

based on the history and physical exam, ordering diagnostic tests, and prescribing appropriate medications. Our measure of clinical items does not attempt to account for variation in the complexity of medical decision-making, challenges in patient-doctor communication, or administrative and clinical work performed outside of the visit. Visit duration was directly reported in NAMCS and represents the time that the physician directly spent with the patient. Average available time per clinical item for each visit was calculated by dividing visit duration by number of clinical items. The analysis was performed using nationally representative data on the average number of clinical items addressed, duration of visits, and available time per clinical item, derived from a sample of 46,431 adult primary care visits over the interval 1997–2005. To assess how these outcomes changed over time, we compared each subsequent year to the baseline year of 1997, allowing the pattern of change over time to be nonlinear.

In addition to assessing changes in all available visits, we also performed stratified analyses for visit by patients of different ages (18–39, 40–49, 50–64, 65–79, and ≥80) and by patients with different payer types (private insurance, Medicare, Medicaid, and self-pay), since age and insurance status were found to be significantly associated with complexity in all years. As well, in order to understand what clinical components contributed to changes in the overall volume of work associated with visits over time, we evaluated changes in the individual subcategories of clinical activity over time and evaluated their contribution to the total number of clinical items addressed per visit.

In addition, we performed adjusted analyses for each of the visit characteristics to account for potential secular changes in patient, physician, and clinic characteristics. Specifically, visit characteristics were adjusted for year of the patient visit, patient demographics (age, sex, race), payer type, urban setting for the clinic visit, geographic region of the clinic visit, whether the patient was seen by the patient's regular primary care physician, whether the patient had been seen by the doctor before, whether the patient was referred to be seen by another physician, whether the physician is a solo practitioner, and ownership type of the clinic. Practice and payment characteristics were included in the model because they are plausibly related to visit duration, and similar variables have been shown to effect visit duration in past analyses.[9] In all analyses, we used ordinary least squares regression models.

Lastly, to evaluate the relationship between duration and clinical items, we created an additional adjusted model of duration that also included the number of clinical items as a predictor. For this model, the number of clinical items was assumed to be exogenous to duration. More specifically, clinical items were assumed to derive from the medical issues associated with an individual patient and by the standard of care promulgated by the medical community to address those issues. To the extent that individual physicians to some degree induced more clinical items, we attempted to account for this possibility by adjusting for physician and clinic characteristics.

The primary outcome measures were not normally distributed and we conducted analyses with log-transformed outcomes. We found that log-transformation of outcome measures did not significantly alter our results in comparison to analyses with the original outcome measures. To enhance the interpretability of our analyses, we present results from analyses using the original untransformed outcome measures. All models utilized cluster analysis at the individual physician level. All data analyses were performed using Stata version 9.0 (Statacorp).

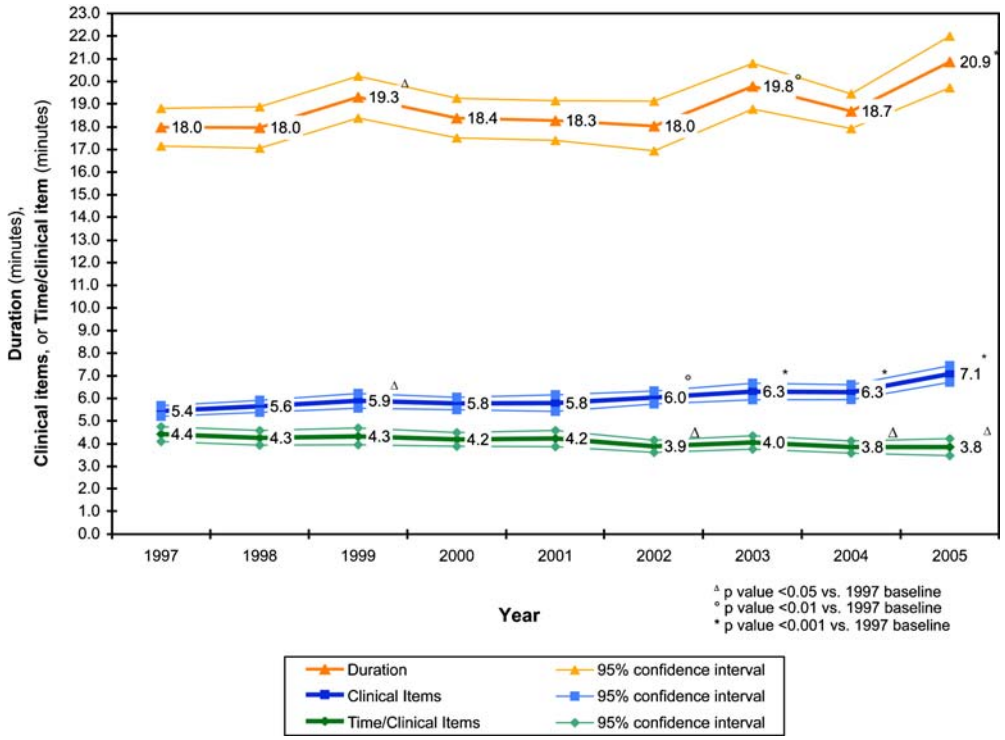

Figure 1. Time trend analysis for complexity, duration, and pace of non-hospital based primary care visits from 1997–2005 as derived from NAMCS.

RESULTS

A total of 46,431 visits were identified representing a low of approximately 259 million visits in 1999 to a high of 335 million visits in 2005 (Table 1). The age distribution of patients changed slightly over time with a decline in the proportion of young adults (age 18–39, 28% to 23%) and an increase in the proportion of middle-aged patients (age 50–64, 22% to 29%) ($p<0.01$). The proportion of visits for privately insured patients increased from 49% to 54% ($p<0.01$). Visits

Table 2. Average Number of Clinical Items Addressed, Visit Duration, and Average Available Time Per Clinical Item for Primary Care Visits from 1997 to 2005 by Age and Payer Type

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005
Clinical items	5.4	15.6	5.9	5.8	5.8	6.0	6.3	6.3	7.1
P value by year◊	–	0.26	0.02	0.08	0.10	0.002	<0.001	<0.001	<0.001
Age:									
18–39	4.5	4.5	4.6	4.5	4.7	4.7	5.1	5.0	5.6
40–49*	5.1	5.2	5.4	5.4	5.4	5.8	5.7	6.1	6.3
50–64*	5.9	6.1	6.4	6.1	6.0	6.2	6.7	6.7	7.5
65–79+	6.1	6.6	6.8	6.8	6.5	6.8	7.3	6.8	8.3
≥80+	6.3	6.6	6.6	6.5	6.6	7.2	7.3	7.1	8.3
p value by year†	–	0.23	0.03	0.13	0.23	0.004	<0.001	<0.001	<0.001
Payer type:									
Private	5.2	5.3	5.3	5.5	5.4	5.7	6.0	6.1	6.7
Medicare*	6.2	6.7	6.9	6.8	6.8	7.0	7.2	6.8	8.3
Medicaid*	5.7	5.6	6.3	6.6	5.8	6.6	6.5	6.6	7.3
Self-pay*	4.8	5.2	4.8	4.8	4.1	4.9	5.7	5.9	5.5
p value by year‡	–	0.18	0.02	0.07	0.15	0.002	<0.001	<0.001	<0.001
Duration (min)	18.0	18.0	19.3◊	18.4	18.3	18.0	19.8^	18.7	20.9+
P value by year◊	–	0.98	0.04	0.50	0.64	0.94	0.007	0.24	<0.001
Age:									
18–39	17.7	18.2	18.2	17.5	17.3	16.8	18.7	17.9	20.0
40–49	17.3	18.1	18.9	17.9	18.5	17.2	19.4	18.5	20.4
50–64Δ	18.4	17.8	19.9	18.7	18.0	18.3	20.3	19.2	21.5
65–79°	18.1	18.0	19.7	19.0	18.9	19.0	20.4	19.1	20.4
≥80Δ	19.1	18.8	20.7	19.0	19.2	19.2	20.5	18.6	23.0
p value by year†	–	0.98	0.05	0.54	0.73	0.99	0.008	0.28	<0.001
Payer type:									
Private	18.1	18.2	18.9	18.4	17.7	17.8	19.7	18.7	20.8
Medicare§	18.8	18.3	20.1	18.9	19.3	19.2	20.1	18.8	21.1
Medicaid	15.7	16.0	17.8	18.8	16.7	17.7	19.8	20.0	20.6
Self-pay	16.7	19.1	18.7	18.0	17.7	15.0	18.1	17.5	19.2
p value by year‡	–	1.00	0.05	0.51	0.71	0.98	0.007	0.27	<0.001
Time/clin. item (min.)	4.4	4.3	4.3	4.2	4.2	3.9	4.0	3.8	3.8
P value by year◊	–	0.51	0.79	0.39	0.59	0.03	0.15	0.02	0.04
Age:									
18–39	5.2	5.0	5.1	5.0	4.7	4.6	4.5	4.5	4.5
40–49*	4.4	4.6	4.5	4.2	4.5	3.7	4.3	3.9	4.1
50–64Δ	4.3	3.8	4.0	4.0	4.0	3.8	3.9	3.6	3.7
65–79+	3.8	3.6	3.8	3.6	3.9	3.6	3.7	3.6	3.1
≥80Δ	3.9	3.9	4.0	3.9	4.1	3.3	3.6	3.2	3.6
p value by year†	–	0.51	0.79	0.39	0.59	0.03	0.15	0.02	0.04
Payer type:									
Private	4.7	4.4	4.3	4.3	4.2	3.9	4.1	4.0	4.0
Medicare#	3.9	3.6	3.7	3.6	3.9	3.5	3.6	3.5	3.3
Medicaid	3.9	3.8	4.6	3.8	4.1	3.3	4.3	4.0	3.5
Self-pay	4.6	5.2	5.1	5.0	5.2	4.3	3.9	3.7	4.5
p value by year‡	–	0.48	0.71	0.34	0.54	0.03	0.17	0.02	0.04

◊*Using linear regression with 1997 as reference year*

†*Using linear regression controlling for age with 1997 as reference category*

‡*Using linear regression controlling for payer type with 1997 as reference category*

**Strata for stratified variable significantly different ($p<0.001$) from other strata using regression of variable by strata and year with as appropriate: age 18–39 as reference for age, private insurance as reference for payer type, and 1997 as reference for year*

Δ*Strata for stratified variable significantly different ($p<0.001$) from ages 18–39 and 40–49 using regression of variable by age and year with age 18–39 as reference for age and 1997 as reference for year*

+*Strata for stratified variable significantly different ($p<0.001$) from ages 18–39, 40–49, and 50–64 using regression of variable by age and year with age 18–39 as reference for age and 1997 as reference for year*

°*Strata for stratified variable significantly different ($p<0.01$) from ages 18–39 and 40–49 using regression of variable by strata and year with age 18–39 as reference for age and 1997 as reference for year*

§*Strata for stratified variable significantly different ($p<0.01$) from other strata using regression of variable by strata and year with private insurance as reference for payer type and 1997 as reference for year*

#*Strata for stratified variable significantly different ($p<0.001$) from private insurance and self-pay using regression of variable by strata and year with private insurance as reference for payer type and 1997 as reference for year*

to clinics owned by physicians increased from 68% to 88% (p<0.01).

As shown in Figure 1, the number of clinical items addressed per visit increased from 5.4 to 7.1 from 1997 to 2005 (p<0.001). Visit duration increased from 18.0 to 20.9 min (p<0.001). The increase in the number of clinical items outpaced the increase in duration, resulting in a decrease in time per clinical item from 4.4 to 3.8 (p=0.04). The rise in the number of clinical items per visit was observed in all age groups and across patients with different payer types (Table 2). However, visits by older patients (age ≥65) had significantly more clinical items (p<0.001) and had less available time per item as compared to younger patients (p< 0.01). Similarly, visits by Medicare patients had significantly more items than privately insured patients (both p<0.01). Medicare patients tended to have the most clinical items, the longest visit times, and the shortest time per item (p< 0.01). Although visit durations for Medicaid patients increased the most dramatically, the corresponding increase in clinical items kept the time per item relatively stable for these patients. However, time per clinical item decreased for both privately insured and Medicare patients.

The number of diagnoses, medications, and tests all increased over time and accounted for a significant proportion of the increase in the overall number clinical items addressed per visit (Table 3). The proportions of patients with the maximum number of diagnoses (three) and medications (six) both increased significantly (both p<0.001). Measurement of blood pressure, hematocrit, cholesterol, and other blood work all increased significantly. All other clinical items, including all counseling activities, did not change significantly. The number of diagnoses and medications alone explained 71% of the variability in the total number of clinical items addressed.

Adjusted analyses confirmed the original results (Table 4). The number of clinical items increased by 1.61 clinical items in 2005 from the baseline in 1997 in adjusted analyses. Clinical items were associated with age, female sex, Medicare and Medicaid status, solo practitioners, and not having seen the patient before. Visit duration also increased significantly by 2.80 min in 2005 from the baseline in 1997 in adjusted analyses (p<0.001). Time per clinical item significantly decreased by 0.55 min, or 33 s, in 2005 from 1997 in adjusted analyses (p=0.03). When including clinical items in the adjusted regression model for duration to assess the relationship between duration and clinical items, visit duration continued to demonstrate an association with year with duration in 2005 increased by 1.64 min from 1997 (p=0.03), and of particular note, duration increased by 0.72 min for each additional clinical item addressed (p<0.001).

DISCUSSION

Over the past decade primary care physicians have been addressing more clinical items per visit at a slightly increasingly rapid pace. This increase in the number of clinical items appears to be driven primarily by increases in the number of diagnoses addressed and medications prescribed as well as increased monitoring of blood pressure and blood work. This increase in clinical items may possibly be due to changes in the demographic and clinical characteristics of patients, increasing knowledge about the benefits of intensive treatment of

Table 3. Proportion of Non-hospital-based Primary Care Visits Addressing Specific Clinical Items

Clinical items	1997	1998	1999	2000	2001	2002	2003	2004	2005	P Value*
Diagnoses (%):										<0.001
0 Diagnoses	1	1	1	2	1	2	1	1	1	
1 Diagnosis	50	47	41	44	42	39	37	38	37	
2 Diagnoses	28	27	29	28	28	29	28	27	27	
3 Diagnoses	21	26	29	26	29	30	33	35	35	
Medications (%):										<0.001
0 Medications	24	21	21	22	26	23	21	22	16	
1 Medication	30	28	26	27	25	26	26	26	21	
2 Medications	21	20	21	20	17	19	19	17	17	
3 Medications	10	12	12	11	10	11	11	11	12	
4 Medications	6	7	8	8	6	6	7	6	8	
5 Medications	4%	4	5	5	4	4	5	5	6	
≥6 Medications	5	7	8	8	12	10	12	13	19	
Blood pressure (%)	78	73	76	76	80	78	87	86	94	<0.001
Urinalysis (%)	12	11	10	10	8	12	10	10	8	0.02
EKG (%)	5	5	5	5	4	7	5	4	6	0.28
X-ray (%)	8	7	7	7	7	7	6	6	7	0.45
Mammogram (%)	2	2	2	2	3	2	2	2	3	0.56
Other imaging (%)	3	3	3	3	3	4	3	3	6	<0.001
Pap smear (%)	3	4	3	3	3	3	2	2	2	<0.01
Hematocrit/hemoglob. (%)	8	7	8	8	14	16	16	14	19	<0.001
Cholesterol (%)	8	8	8	11	10	11	15	15	17	<0.001
PSA (%)	2	2	2	3	3	3	3	3	3	0.07
Other blood work (%)	19	20	24	22	21	20	22	22	26	0.03
Diet counseling (%)	22	22	21	21	16	22	20	21	21	0.28
Exercise counseling (%)	16	15	16	16	10	15	15	13	16	0.24
Mental health counseling (%)	5	5	5	5	4	6	5	5	6	0.31
Tobacco counseling (%)	4	5	6	4	4	4	4	4	5	0.13
Physical therapy (%)	2	3	3	3	1	2	2	2	2	0.11

Abbreviations: PSA: prostate-specific antigen; EKG: electrocardiogram resonance imaging
*P value based on chi-square test of variable by year

Table 4. Adjusted Ordinary Least Squares Analysis of the Number of Clinical Items Addressed, Visit Duration, and Average Available Time Per Clinical Item of Primary Care Visits From 1997 to 2005*

Adjusted outcome	Clinical items model		Duration model		Time per clinical item model	
	6.39	p-value	19.6	p-value	4.16	p-value
	ß (coefficient)		ß (coefficient)		ß (coefficient)	
Year						
1997†	–	–	–	–	–	–
1998	0.28	0.10	0.06	0.917	−0.21	0.41
1999	0.42	0.02	1.42	0.028	−0.06	0.80
2000	0.33	0.07	0.48	0.413	−0.20	0.39
2001	0.29	0.16	0.32	0.606	−0.13	0.62
2002	0.55	0.001	0.06	0.933	−0.49	0.03
2003	0.83	<0.001	1.93	0.004	−0.31	0.19
2004	0.81	<0.001	0.83	0.160	−0.51	0.02
2005	1.61	<0.001	2.80	<0.001	−0.55	0.03
Age						
18–39†	–	–	–	–	–	–
40–49	.78	<0.001	0.58	0.002	−0.51	<0.001
50–64	1.53	<0.001	1.34	<0.001	−0.80	<0.001
65–79	1.64	<0.001	1.29	<0.001	−0.85	<0.001
≥80	1.65	<0.001	1.86	<0.001	−0.75	<0.001
Payer type						
Private†	–	–	–	–	–	–
Medicare	0.52	<0.001	0.17	0.468	−0.22	0.009
Medicaid	0.62	<0.001	−0.41	0.245	−0.30	0.027
Self-pay	−0.29	<0.001	−1.08	0.006	0.12	0.523
Other significant variables						
Sex (female)	0.10	0.006	0.002	0.99	−0.14	0.01
Not 1° MD	−0.93	<0.001	−0.39	0.39	0.76	<0.01
Not seen before	0.39	<0.001	3.85	<0.001	0.44	0.02
Not referred	0.21	0.12	−2.40	<0.001	−0.96	0.001
Solo MD	0.32	0.002	−0.84	0.02	−0.34	<0.01

**Adjusted for year of patient visit, patient age, sex, race, urban status of clinic visit, region of clinic visit, whether the patient was seen by the patient's regular primary care physician, whether the patient had been seen by the doctor before, whether the patient was referred to be seen by another physician, whether the physician is a solo practitioner, payer type, and ownership of the clinic*

†*Reference category for variable*

outpatient issues, and a growing focus on providing quality primary care.

Primary care physicians appear to be addressing more clinical care items during visits by spending more time with patients. At the same time, however, the amount of available time per item appears to have declined because the increasing number of clinical care items addressed has outpaced the increase in visit time. This asymmetric rise in work volume and visit length may help to explain physicians' perception that visit lengths are inadequate, even though actual visit length is increasing.

Although the rise in clinical items and the decreasing time per item seem small, the differences may be perceived as important by physicians and patients. For example, the decrease in time per clinical item in 2005 from 1997 amounted to a 13.6% reduction for a single item. Moreover, any reduction in available time per clinical item should be assessed in the context of the already limited scope of clinical visits, including their limited discussion about prescription drugs[15] and the absence of key measures of quality of care.[1] Attempting to accomplish more during visits will presumably impair efforts to improve patient-provider communication and quality of care. Thus, it is not surprising that primary care physicians sense that visit time is inadequate.

Our findings are consistent with prior studies examining the relationship between visit length, clinical work, and the pace of clinical work. Lasker and Marquis demonstrated that there is a strong relationship between visit time and the total amount of clinical work completed during visits.[16] Extending this work, Yarnall and colleagues found in a simulation study that providing all recommended preventive services would easily exceed the usual time that physicians and patients spend together.[17] More recently, Tai-Seale and colleagues conducted a cross-sectional study of clinical visits observed from 1998 to 2000 in Texas.[18] They found that physicians addressed a median of six topics during visits that were on average 15.7 min in length and that the longest amount of time spent on a given issue was 5 min. The study suggested the pace of discussions was already quite rapid and in danger of growing even faster if more quality of care issues are to be addressed. Our study results suggest that primary care physicians have been managing more diagnoses, medications, and diagnostic tests over the last decade at an increasingly rapid pace.

If the delivery of higher quality primary care requires longer visits, both public and private insurers should consider whether changes in physician reimbursement are warranted in order for providers to respond to the changing demands of primary care. This consideration may be particularly relevant for Medicare and Medicaid patients, who consistently had the most complex visits and received less direct attention per item addressed. Potentially, innovations in management and reimbursement for care coordination without the need for face-to-face patient-doctor contact may be more effective in improving quality than methods that focus solely on the clinical visit.[19–22]

There are several limitations to this study worth noting. We recognize that our measure of the number of clinical items

addressed may not capture the true complexity or volume of work associated with a visit. Assessing complexity in primary care remains an unresolved clinical and policy issue.[23,24] Complexity of care is reflected in the patient's medical complexity,[25] but it is also influenced by non-biological factors, such as health literacy and socioeconomic circumstances.[23,26] As a measure of volume of work, our measure of clinical items does not account for acts of omission, such as determining if a test or medication was unnecessary,[27] and does not include care activities that take place outside of the visit.[28,29] Despite these limitations, which would all act to minimize changes in the volume of work of primary care visits, our analysis still shows a significant rise in clinical items addressed over time. If a more comprehensive method for measuring clinical items throughout the last decade were readily available, we suspect that an even more dramatic rise in the number of clinical items addressed would have been observed.

Apart from this limitation of our analysis, there are limitations of the National Ambulatory Medical Care Survey itself. NAMCS relies on physician self-report, which may introduce measurement errors. The visit duration variable in NAMCS is known to overestimate direct visit time.[28,30,31] This bias would, in fact, suggest that physicians may be spending even less time per clinical item. In terms of documentation of activities, NAMCS has been shown to be fairly specific, but not sensitive in terms of reporting various interventions in comparison to direct observation of care.[30] Some important activities, such as colonoscopy and glycosylated hemoglobin, were not routinely documented. In addition, the numbers of diagnoses and medications recorded have been capped by NAMCS throughout the history of the survey.

By utilizing additional information on chronic diseases and medications available in 2005, we know that clinical items are certainly higher than what we were able to measure consistently over the last decade using this available dataset. These biases all suggest that our clinical item measure likely underestimates the true number clinical items addressed.

Greater awareness of the need to meet quality of care standards during the study period and perhaps even incentive programs may have led to some of the increase in clinical items addressed we observed. But changes in this regard nevertheless reflect important secular changes in clinical practice. It is important to note that the data analyzed here were collected separately from medical records as well as billing and reimbursement. Thus, we do not suspect the changes we observed were an artifact of better documentation to increase reimbursement.

The number of items addressed in primary care visits has increased to a greater extent than their duration, resulting in less available time to address individual items. Given our ongoing increases in medical knowledge and medical technology, coupled with an aging population and the growing epidemic of obesity,[32] we have every reason to believe that this increase in primary care work will only continue to grow. Primary care will likely need significant investments to ensure, develop, and maintain an adequate primary care infrastructure for our future medical needs.

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