Medication Safety

Electronic Health Record–Based Monitoring of Primary Care Patients at Risk of Medication-Related Toxicity

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Adverse drug events (ADEs) are common, costly, and harmful[1–7] and result from both incorrect (for example, ordering, dispensing, or administering errors) and correct (for example, toxicities) use of medications. Between 5% and 10% of adult hospitalizations may result from ADEs occurring in ambulatory settings; cardiovascular medications are implicated in more than 40% of such cases.[8] Toxicity-related ADEs are significant both for the direct harm they cause and the indirect effects they may have on medication compliance. In the case of statins, for example, while severe toxicity is rare, 9%–20% of patients may experience statin-related muscle side effects.[9] Patient concern over the potential harms associated with statin use is a significant predictor of noncompliance, which poses a threat to health, given the potential benefits of consistent use.[9]

Prevention of ADEs associated with medication toxicity depends, in part, on conscientious ambulatory medication monitoring. In one study of older adults in ambulatory settings, 61% of errors associated with preventable ADEs involved inadequate monitoring.[1] Furthermore, it may be difficult for health care providers to observe signs or symptoms of medication toxicities in community-based patients. Periodic, targeted laboratory monitoring can reduce the risks associated with high-risk medications in the ambulatory setting. For example, numerous interventions to reduce the potential harm associated with outpatient anticoagulant use have been reported.[10–13] Less attention has been paid, however, to medications for which monitoring might reduce the impact of more slowly developing side effects. To promote broader uptake of robust ambulatory medication monitoring practices, national organizations, such as the National Committee for Quality Assurance (NCQA), have developed quality measures to capture the reliability with which health care providers in ambulatory practices monitor potential medication side effects among their patients.[14] For example, NCQA currently recommends annual blood tests to monitor for possible toxicity associated with the use of digoxin, diuretics, and angiotensin-converting enzyme inhibitors/angiontensin

Article-at-a-Glance

Background: Timely laboratory monitoring may reduce the potential harm associated with chronic medication use. A study was conducted to determine the proportion of patients receiving National Committee for Quality Assurance (NCQA)–recommended laboratory medication monitoring in a primary care setting and to assess the effect of electronic health record (EHR)–derived, paper-based, provider-specific feedback bulletins on subsequent patient receipt of medication monitoring.

Methods: In a single-arm, pre-post intervention in two federally qualified community health centers in Baltimore, patients targeted were adults prescribed at least 6 months (in the preceding year) for at least one index medication (digoxin, statins, diuretics, angiotensin-converting enzyme inhibitors/ angiotensin II–receptor blockers) in a 12-month period (August 2008–July 2009).

Results: Among the 2,013 patients for whom medication monitoring was recommended, 42% were overdue for monitoring at some point during the study. As the number of index medications the patient was prescribed increased, the likelihood of ever being overdue for monitoring decreased. Being listed on the provider-specific monitoring bulletin doubled the odds of a patient receiving recommended laboratory monitoring before the next measurement period (1–2 months). Limiting the intervention to the most overdue patients, however, mitigated its overall impact.

Conclusions: Recommended laboratory monitoring of chronic medications appears to be inconsistent in primary care, resulting in potential harm for individuals at risk for medication-related toxicity. EHRs may be an important component of systems designed to improve medication monitoring, but multimodal interventions will likely be needed to achieve high reliability.

II–receptor blockers (ACEIs/ARBs).

Gaps exist in what is known about medication monitoring to prevent ADEs in ambulatory care settings. Despite the potential for reducing ADEs, preliminary evidence suggests that ambulatory medication monitoring tends to be inconsistent. In large, health maintenance organization (HMO)–based studies, laboratory monitoring indicated at the time of medication initiation was absent 39% of the time.[15] During chronic use, proper monitoring was absent 25% to 50% of the time for select medication classes.[16–20] Similarly, several interventions aimed at improving medication monitoring rates have been evaluated, with mixed results,[21–25] but few interventions have been tested in non-HMO settings. Little data exist to characterize the reliability of medication monitoring for the vulnerable populations served by federally qualified health centers (FQHCs).

We conducted a study of medication monitoring for four classes of medications (ACEIs/ARBs, statins, diuretics, and digoxin) among adult patients served by two Baltimore FQHCs. The primary objective was to determine the proportion of patients whose long-term medication use was appropriately monitored with annual laboratory data, with comparison of patients noted to be overdue at least once with those never overdue for recommended laboratory monitoring. A secondary objective was to assess the effect of provider-specific feedback bulletins on subsequent patient receipt of recommended medication monitoring.

Methods

Study Design and Setting

We conducted a single-arm, pre-post intervention study from August 2008 through July 2009 at two FQHCs in Baltimore. Both centers were members of an umbrella organization consisting of six FQHCs across inner-city Baltimore and Baltimore County. The organization serves a predominantly low-income, minority population. Laboratory studies were performed at a laboratory affiliated with a nearby tertiary academic hospital as part of usual care, and results were reported electronically to the study centers' electronic health record (EHR) via a bidirectional interface.

This study was reviewed and approved by the Johns Hopkins Medicine Institutional Review Board, including a waiver of consent for the involved medical providers.

Study Population

The study population consisted of adult patients at both centers who were prescribed medications from at least one of four classes for which medication monitoring was specifically recommended by NCQA at the time of the study (Table 1, page 218). Patients were selected if they were prescribed at least one index medication for at least 180 days in the preceding 12 months (per NCQA specifications[14]). Patients who met these criteria accrued throughout the study period. Patients were excluded if their insurance stipulated that they receive laboratory studies from a laboratory not linked electronically to the centers' EHR, or if they were hospitalized in the preceding year, consistent with NCQA measure specifications.[14] Because no metadata in the EHR directly identified hospitalizations, we used natural-language parsing of EHR data to identify and exclude patients who were hospitalized in the preceding year.

Intervention

Identification of Eligible Patients. Every one to two months, a data analyst from the umbrella organization [H.C.] queried the EHR for eligible patients. Patients so identified were aggregated on the basis of their primary care provider (PCP) of record. Patients with no assignment to a PCP in the EHR were excluded. After consolidation of duplicate entries (for example, one patient on two index medications), patients were ranked on the basis of the number of months that they were overdue for recommended laboratory monitoring. Patients on more than one target medication were ranked on the basis of the most overdue medication.

Medication Monitoring Bulletins. Following the data extraction, providers were sent a paper-based medication monitoring bulletin that included (1) a summary of NCQA monitoring recommendations; (2) a list of the provider's overdue patients; and (3) a graphical summary of each provider's individual monitoring performance, each center's aggregate performance, and the overall performance of all providers at both centers (Appendix 1, available in online article). Providers could indicate patients that should be removed from future bulletins (for example, "patient no longer seen in the clinic") by indicating this on the bulletin and returning it to the study team.

Providers received a bulletin every one to two months between August 2008 and July 2009 for a total of eight bulletins. Our original intention was to give providers a complete list of all of their overdue patients with each bulletin. We did so in August 2008 (Bulletin Round 1), but provider feedback suggested that the full list was too burdensome (the number of patients listed ranged from 1 to 67 across all providers). As a result, for all subsequent bulletins (with the exception of Bulletin Round 5 (April 2009), we showed only the 10 most overdue patients for each provider. In April 2009 we again provided complete lists of all overdue patients. Providers were not given specific instructions regarding how to manage patients on the bulletin but were given general information regarding the project's overall aim of improving medication monitoring.

Table 1. National Committee for Quality Assurance Measure Specifications*

Medication or Medication Class	Numerator	Denominator	Exclusions
ACEI/ ARB	Number of patients with at least one serum potassium and either a serum creatinine or blood urea nitrogen test in the measurement year	The number of patients age 18 years and older who received at least a 180-days supply of the index medication, including any combination products, during the measurement year	Patients with a hospitalization during the measurement year
Diuretic	Number of patients with at least one serum potassium and either a serum creatinine or blood urea nitrogen test in the measurement year		
Digoxin	Number of patients with at least one serum potassium and either a serum creatinine or blood urea nitrogen test in the measurement year		
Statin†	Number of patients with both an ALT and AST liver enzyme test in the measurement year		

* Adapted from National Committee for Quality Assurance. HEDIS 2010. 2009. Accessed Mar 14, 2012. http://www.ncqa.org/tabid/1044/Default.aspx. ACEI/ARB, angiotensin-converting enzyme inhibitor/angiotensin II–receptor blocker; ALT, alanine aminotransferase; AST, aspartate aminotransferase.

† The measure "annual monitoring for patients on statins" was retired as of November 15, 2006, as an NCQA measure (personal communication between the author [D.G.B.] and Courtney Breece, Manager, Licensure & Certification, NCQA, March 16, 2012).

Measures

The principal outcome measure was receipt of recommended laboratory monitoring. To assess the effectiveness of the provider-specific bulletin, we instituted a secondary outcome measure—that is, whether or not patients identified as overdue for medication monitoring received recommended laboratory testing prior to delivery of the next bulletin. The exposure for this secondary outcome was whether or not the patient appeared on the monitoring bulletin at the time he or she was first identified as overdue.

Data Analysis

All analyses were conducted in SAS, version 9.2 (SAS Institute, Inc., Cary, North Carolina).

Demographic and Patient Characteristics. Demographic and patient characteristics for the 2,013 study-eligible subjects (patients) were summarized and compared in terms of overdue status (overdue at least once during the study period versus never overdue) in bivariate tests by using the chi-square test for categorical variables and analysis of variance (ANOVA) for continuous variables.

Comparison of Patients Appearing or Not Appearing on Provider Bulletins. Although our study was not originally designed to assess the impact of the provider bulletins, the fact that, on the basis of provider feedback, we shortened the provider bulletin to the 10 most overdue patients resulted in a natural experiment that allowed us to compare outcomes for patients appearing on bulletins with those not appearing. We therefore conducted a post hoc analysis of the medication monitoring of patients who were overdue during the study. We performed logistic regression analyses restricted to patients who had at least one episode of being overdue during the study period and who remained clinic patients with an active prescription for an index medication(s) at the time of the subsequent bulletin ($N = 687$). Each patient who either entered the study overdue for monitoring or became overdue for monitoring during the study contributed one observation to the data. For each patient, we analyzed whether or not that patient received testing before delivery of the bulletin in the next period after the patient was identified as overdue. For example, if a patient was identified as overdue at the time of Bulletin Round 3, we assessed whether or not that patient remained overdue at the time of delivery of Bulletin Round 4. Patients appearing on the bulletin at the time they were identified as overdue comprised the intervention group; patients not appearing on the bulletin at the time they were identified as overdue comprised the control group. Models were adjusted for age, sex, clinical center, number of index medication classes prescribed, insurance status, primary care provider (physician versus midlevel) and number of months overdue at the time of the first overdue episode. The latter variable discriminated between those who were overdue at study onset and those who became overdue during the course of the study.

Results

Center and Provider Characteristics

The study involved 15 providers at two FQHCs (Table 2,

Table 2. Center and Provider Characteristics

	Center A	Center B	Overall
Center characteristics			
Annual number of patient visits (adults ≥ 18 years)	52,995	39,989	92,984
Overall insurance (adults ≥ 18 years)			
Medicare	14%	19%	16%
Medicaid	26%	33%	29%
Private	19%	38%	28%
Uninsured	41%	10%	26%
Provider counts	*N* = 8 providers	*N* = 7 providers	*N* = 15 providers
Physician	6	5	11
Nurse practitioner/physician assistant	2	2	4
Provider characteristics			
Mean age	47 years	40 years	44 years
% Female	50%	57%	53%
Mean years in practice	15 years	8 years	12 years
Specialty training			
Internal medicine	6	1	7
Family practice	2	6	8

above). The 15 providers (11 physicians, 4 midlevel providers) saw approximately 93,000 adult visits annually at the two centers combined. Overall, 41% of all patients seen at Center A had no health insurance, compared with 10% of Center B patients. Center A providers were more experienced, on average, than those at Center B. Center A providers were predominantly internists; Center B providers were predominantly family physicians.

Characteristics of Study-Eligible Patients

Across both centers, 2,013 patients were identified as having been prescribed target medications for at least 180 days in the preceding year and thus eligible for the study (Table 3, page 220).

Ever Overdue Versus Never Overdue

Of the 2,013 study-eligible patients, 1,164 (58%) were never overdue for recommended laboratory monitoring during the study period. Compared with patients who were never overdue for monitoring, those patients overdue at least once during the study were similar in terms of age, sex, and insurance. Patients on medications from three or more index medication classes were more likely to never be overdue for testing (67%), compared with patients on two (60%) or one (54%) medication class(es) ($p < .001$).

Systemwide Monitoring and the Effect of the Provider Bulletin

At each cross-sectional measurement, 1,109/1,495 (74%)–1,114/1,408 (79%) of the eligible patients in the two centers were up-to-date for medication monitoring, with a slight downward trend over time (Figure 1, page 221). After adjustment for other available variables, the center where care was delivered and appearance on the provider-specific bulletin were associated with receipt of testing before the subsequent bulletin (Table 4, page 222). At Center B, where providers were less experienced, patients were less likely than Center A patients to receive testing (adjusted odds ratio [aOR] 0.6 [0.4–0.9]). Patients appearing on the bulletin were more likely than those not appearing on the bulletin to receive recommended testing (aOR 2.0 [1.3–3.1]). Whether a patient was overdue at the beginning of the study or became overdue during the study was not associated with subsequent receipt of testing (aOR for patients more than 15 months overdue at identification (that is, overdue at the beginning of the study) compared with those 15 or fewer months overdue at identification (that is, became overdue during the study) 0.8 [0.5–1.2]).

Discussion

In one of the first studies of the reliability of medication monitoring in FQHCs, we found that two in five patients on ACEIs/ARBs, statins, digoxin, and diuretics were overdue for labora-

Table 3. Characteristics of Patients Prescribed Index Medications for at Least 180 Days, August 2008–July 2009 (*N* = 2,013)*

	Never Overdue for Monitoring (*N* = 1,164)	Ever Overdue for Monitoring (*N* = 849)	*P* Value
Sex (N [%])†			
Female	799 (58.0)	578 (42.0)	
Male	359 (57.1)	270 (42.9)	.69
Age (Mean [SD])‡	57.2 years (13.9)	56.3 years (15.4)	.17
Number of Index Medication Classes Prescribed to Patient (N [%])			
1	558 (54.0)	475 (46.0)	
2	453 (60.2)	299 (39.8)	
3 or more	153 (67.1)	75 (32.9)	< .001
Center Where Care Received (N [%])			
A	585 (57.2)	437 (42.8)	
B	579 (58.4)	412 (41.6)	.59
Insurance			
Medicare	419 (58.8)	293 (41.2)	
Medicaid	368 (58.6)	260 (41.4)	
Private	317 (58.1)	229 (41.9)	
Uninsured	60 (47.2)	67 (52.8)	.10
Primary Care Provider			
Physician	976 (58.5)	691 (41.5)	
Midlevel provider (physician assistant or nurse practitioner)	188 (54.3)	158 (45.7)	.15
Mean Number of Months Overdue for Monitoring (SD)	N/A	17.1 (2.8)	
Mean Number of Appearances on the Medication Monitoring Bulletin (SD)	N/A	1.7 (1.7)	

* SD, standard deviation; N/A, not applicable.
† Seven records had missing data.
‡ Seven records had missing data.

tory monitoring during the year-long study according to NCQA monitoring recommendations. Individuals taking medications from multiple medication classes were less likely to be overdue. Provider-specific feedback reports increased the likelihood that identified patients would receive recommended testing. Limiting our intervention to the most overdue patients, however, mitigated its overall impact on systemwide monitoring performance.

Our finding that 58% of patients consistently received recommended monitoring during the study period is comparable to existing findings.[15–20] In a study of thyroid replacement therapy monitoring, only 56% of patients received the minimal recommended monitoring.[26] Notably, in this study individuals receiving recommended monitoring had fewer ADEs than those who were not properly monitored. Similarly, a recent study of potassium monitoring for patients who were using medications associated with hyperkalemia found that only 71% of patients received recommended monitoring.[27] Receipt of monitoring was associated with a reduced risk of hyperkalemia-associated adverse events (adjusted relative risk = 0.50). Unfortunately, our study was not designed to track monitoring-related ADEs.

The finding that patients on medications from more than one index medication class were more likely to receive recommended laboratory monitoring has been observed previously. In a study of liver and thyroid monitoring among patients taking amiodarone, concomitant receipt of statin therapy was associated with an increased likelihood of receiving recommended testing.[20] Possible explanations for this finding include (1) monitoring "overlap" (that is, laboratory monitoring intended for one medication class also suffices for another medication class for which monitoring was indicated but not necessarily considered); (2) greater provider concern for evaluating for medication toxicity when multiple medications, potentially those that affect the same organ system, are in use; or (3) multiple medication classes in use simultaneously identifies patients with more, and more severe, chronic conditions, for whom laboratory testing may be conducted for other reasons.

Previous research suggests that audit and feedback efforts can be effective in improving quality. In particular, feedback that is delivered with specific suggestions for improvement, frequently and in writing, may be most effective.[28,29] However, moving be-

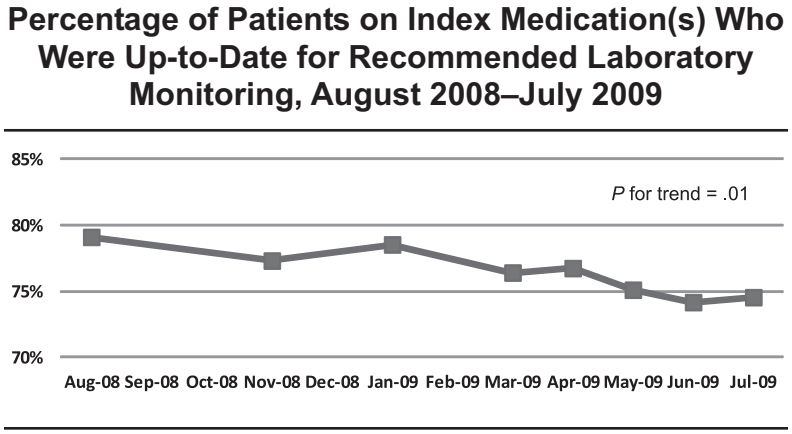

Figure 1. *At each cross-sectional measurement, 1,109/1,495 (74%)–1,114/1,408 (79%) of the eligible patients in the two centers were up-to-date for medication monitoring, with a slight downward trend over time.*

yond provider-focused interventions to multimodal ones may further increase overall effectiveness. In one study of monitoring at medication initiation, EHR reminders to the prescribing health care provider, automated voice messages to the patient, and pharmacy team outreach were each effective at improving rates of medication monitoring.[21] In a subsequent cost-effectiveness analysis, however, provider reminders were found to be the least efficient method of the three for improving medication monitoring.[30] A limitation of our intervention, therefore, was that it was strictly provider focused. In addition, the providers in our study had minimal administrative time to conduct nonclinical tasks; no additional administrative time or support was given to providers during the study, potentially limiting their ability to effectively participate in this effort. Future iterations could potentially be strengthened by including patient- or pharmacy-focused interventions.

In addition to time barriers, providers in our study frequently reported other barriers to bringing overdue patients in for testing. Although providers could easily order the indicated laboratory studies within the EHR when notified that they were overdue, nonworking patient phone numbers and out-of-date mailing addresses made relaying the need for monitoring to patients difficult. Further, some patients were resistant to coming to the clinic for "laboratory only" visits, citing transportation, child care, and mobility issues as reasons for preferring to receive laboratory testing at their next planned visit instead. Because our study measured completion of recommended laboratory monitoring and not ordering, we were not able to distinguish between instances when providers failed to take action on the basis of the monitoring bulletin data and when patients failed to respond to attempts from providers to bring them in for monitoring. A process measure capturing EHR–based laboratory ordering would help make this distinction and could be helpful in future studies in this area.

Our study was not able to delineate the reasons why a subset of patients do not reliably receive timely medication monitoring, but there are likely to be many reasons, including patient-, provider- and system-related factors.[31] Patient-related factors may include aversion to needlesticks, cost, and logistical barriers. Patients also may not perceive chronic medication use as risky or may assume that they will become symptomatic if toxicities develop and plan to seek care at that time. Provider-related factors may include a lack of awareness that medication monitoring is indicated or a lack of belief in the value of medication monitoring.[32] System-related factors may include technology inadequacies that make identification of patients due for screening difficult or impossible. Many clinical settings do not have fully integrated pharmacy, laboratory, and clinical data systems, which are a prerequisite for approaching medication monitoring in a robust, technology-driven fashion.

NCQA and other national organizations are leading a growing movement toward quality measurement as part of global efforts to improve the quality of health care delivery in the United States. The Office of the National Coordinator for Health Information Technology published a Notice of Proposed Rule Making that includes quality measures as part of "meaningful use" of EHRs.[33] Although we applaud this effort generally, it is worth noting that the implementation of the quality measures described in this study was laborious. Despite highly experienced health information technology personnel, both at the FQHCs and on the research team, developing an automated system to produce data as specified by NCQA was extremely time intensive. This raises questions about the feasibility of deploying measures such as these in unsupported ambulatory care practices. Organizations that are developing quality measures should consider partnering with larger EHR vendors to begin to develop off-the-shelf measurement tools that might be easily deployed within existing EHRs in primary care for the purposes of robust quality measurement.

Our study has several limitations in addition to those described above. Because we were limited to data readily available in the EHR, some variables of interest (for example, patient race and income, medications dispensed) were either absent or incomplete. Although our data were generated in an automated fashion from the EHR, we were unable to integrate the paper-based provider monitoring bulletin into the EHR. The bulletin

Table 4. Factors Associated with Eventual Receipt of Recommended Laboratory Monitoring Among Patients Identified as Overdue for Monitoring (*N* = 687)

Factor	Odds Ratio (95% Confidence Interval)	
	Crude	Adjusted*
Patient Age	1.0 (0.9–1.0)	1.0 (0.9–1.0)
Insurance		
Medicare	Reference	Reference
Medicaid	1.0 (0.6–1.7)	1.1 (0.6–2.0)
Private	0.7 (0.4–1.2)	0.8 (0.4–1.5)
Uninsured/other insurance/unknown insurance	0.3 (0.1–1.0)	0.3 (0.1–1.1)
Number of Index Medications		
1	Reference	Reference
2	1.3 (0.8–1.9)	1.2 (0.8–1.9)
3 or more	1.3 (0.6–2.6)	1.1 (0.5–2.3)
Sex		
Male	Reference	Reference
Female	1.3 (0.8–2.1)	1.4 (0.9–2.3)
Center		
Center A	Reference	Reference
Center B	0.6 (0.4–0.9)	0.6 (0.4–0.9)
Primary Care Provider		
Physician	Reference	Reference
Midlevel provider	1.1 (0.7–1.9)	1.0 (0.6–1.8)
Months overdue when identified as overdue		
≤ 15 months	Reference	Reference
> 15 months	0.9 (0.6–1.4)	0.8 (0.5–1.2)
Bulletin status		
Not on bulletin for first overdue	Reference	Reference
On bulletin for first overdue	1.9 (1.3–2.9)	2.0 (1.3–3.1)

* Model adjusted for each of the variables appearing in the first column.

might have been more effective if it had been entirely EHR–based, facilitating direct documenting or lab ordering for overdue patients. Although we examined the effectiveness of the provider bulletins in this study, it was principally designed to determine the proportion of patients receiving recommended laboratory monitoring at baseline. A randomized, controlled design would provide more robust estimates of true bulletin effectiveness. Our nonrandomized intervention focused, by design, on the most overdue patients. These patients likely differed in other, unmeasured ways from the less overdue patients not appearing on the bulletins. Similarly, the providers with the shortest lists of overdue patients were more likely to have newly identified overdue patients appear on their list (that is, to, make the "top 10" cutoff). Therefore, apparent effectiveness of the bulletin might be partly attributable to characteristics of those providers most reliably performing medication monitoring at baseline, and not the bulletin itself. In addition, a limitation of the NCQA measures, and therefore our study, is that excluding hospitalized patients may in fact exclude those patients at highest risk of medication-related harm. Finally, our effort was limited to two FQHCs. As such, our results may not be generalizable to other clinical settings.

Conclusions

We found that individuals at risk for medication-related toxicity frequently go unmonitored. Provider-specific bulletins, based on nationally recommended quality measures, can enhance receipt of recommended monitoring among target patients, but implementation is technically complex, and thus this type of intervention may not provide a robust fix at the population level. Optimizing the safety of patients using potentially hazardous medications will require further implementation research, likely involving multimodal interventions. J

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Online-Only Content

See the online version of this article for

Appendix 1. Medication Monitoring Bulletin

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Online-Only Content

Appendix 1. Medication Monitoring Bulletin

Medication Monitoring Bulletin
Dr. Sample

This is a list of your patients due for medication monitoring. Please complete and give one copy to your Center Medical Director. Make a second copy for your own use.

Clinic standard (derived from NCQA recommendations)			
Medication class	**Example**	**Recommended laboratory test(s)**	**Frequency**
ACEI / ARB	captopril	Potassium AND (creatinine OR BUN)	Annually
Diuretics	hydrochlorothiazide	Potassium AND (creatinine OR BUN)	Annually
Digoxin	digoxin	Potassium AND (creatinine OR BUN)	Annually
Statins	atorvastatin	AST or ALT	Annually

Action codes	"Off my list" reason codes
a. Asked MA to contact pt for appointment with me	k. Someone else monitors (e.g., subspecialist)
b. Asked MA to contact pt for lab appointment / ordered blood work	l. Pt moved / no visit in last 2 yrs
c. Checked chart for next expected visit	m. Unable to contact (3 tries)
d. Called pt personally	n. Pt not on medication
e. Sent pt a letter with my signature	o. Pt declined testing
f. Posted chart in my office	p. Blood work done in last 12 mo (MM/YY)
g. Put note in pt record	q. Pt in hospital in last 12 mo (MM/YY; location)
h. Added alert to EMR	r. Not my patient
i. Other: _____	s. Patient deceased
j. None	t. Other:_____

Dr. Sample's "10 MOST WANTED"

Last name	First name	Pt ID	Medication(s)	Time overdue (months)	Address	City	Zip	Phone	Next appt.	Action plan code	"Off my list" code
Doe	John	999-999-999	LIPITOR, FUROSEMIDE	**23**	999 Home St	Baltimore	99999	999-999-9999	1/17/09		
Test	Jane	999-999-999	LISINOPRIL	**23**	999 Local St	Baltimore	99999	999-999-9999	None		
...	...	...	LASIX	**22**	...	...	...	...	...		
...	...	...	CAPTOPRIL	**21**	...	...	...	...	...		
...	...	...	LIPITOR, COZAAR	**20**	...	...	...	...	...		
...	...	...	CRESTOR	**17**	...	...	...	...	...		
...	...	...	HCTZ, LIPITOR	**16**	...	...	...	...	...		
...	...	...	SPIRONOLACTONE	**16**	...	...	...	...	...		
...	...	...	LASIX, ZOCOR	**14**	...	...	...	...	...		
...	...	...	CRESTOR, LISINOPRIL	**13**	...	...	...	...	...		

THANKS for all you do to keep our patients safe!

(continued on page AP2)

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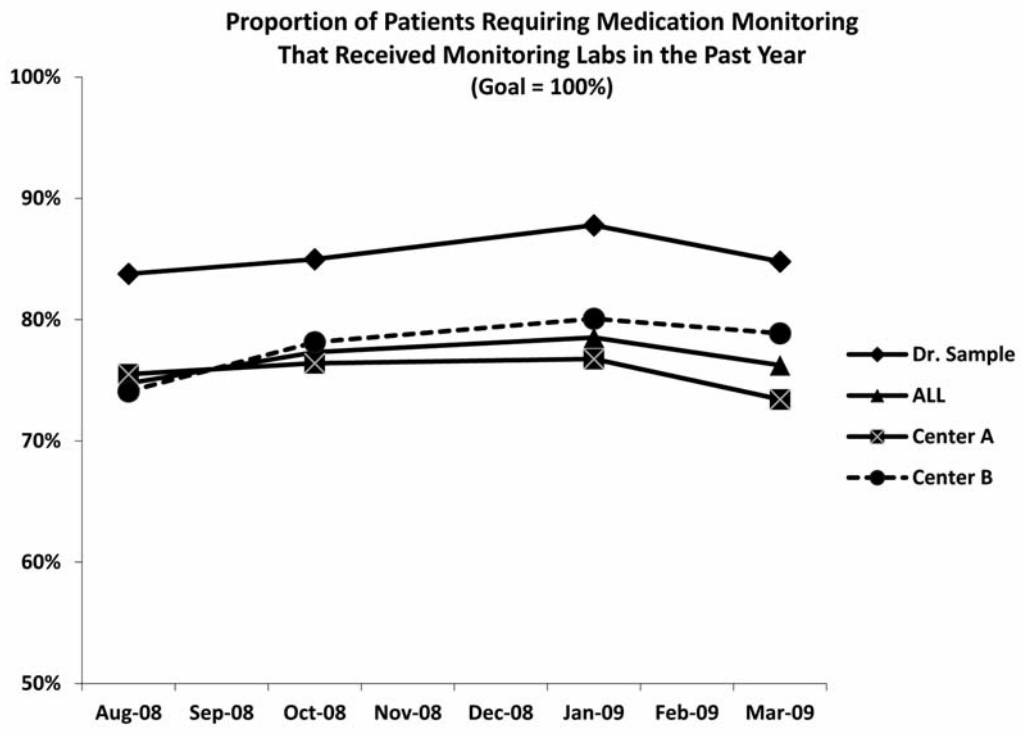
Appendix 1. Medication Monitoring Bulletin (continued)



THANKS for all you do to keep our patients safe!