Clinical Decisions Regarding HbA_{1c} Results in Primary Care

A report from CaReNet and HPRN

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OBJECTIVE — To describe decisions made by primary care providers on elevated HbA_{1c} results and their reasons for not intensifying therapy.

RESEARCH DESIGN AND METHODS — In this cross-sectional study, a provider survey was administered in two practice-based research networks when HbA_{1c} results were reviewed on all nonpregnant patients >18 years old with type 2 diabetes. Univariate and Mantel-Hantel analyses assessed associations between patient characteristics and clinical decisions.

RESULTS — A total of 483 surveys were completed by at least 88 providers at 19 clinics. Most patients were female (62.5%), mean age was 60 years, and 28.6% were Hispanic. The overall action rate on HbA_{1c} results ≥7% (n = 294) was 70.7%. Patients who were black or had Medicare without medication insurance had lower rates of action on HbA_{1c} ≥7 and ≥8%, respectively ($P < 0.05$). The most common reasons providers reported for inaction were "patient improving/doing well," "competing demands," and "hypoglycemic risk."

CONCLUSIONS — Primary care providers generally adhere to national glycemic control guidelines, although there may be disparities in black patients and patients without medication insurance coverage. A variety of reasons were given when control was not intensified.

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Randomized trials have demonstrated that aggressive glycemic control, as measured by serum HbA_{1c} levels (1), will reduce diabetic complications (2–4). The American Diabetes Association (ADA) HbA_{1c} guideline is the most widely disseminated in the U.S. (5). At the time of this study, the ADA goal was HbA_{1c} <7%. Clinical intervention was recommended for HbA_{1c} >8% and to be considered for HbA_{1c} between 7 and 8%.

A key factor in achieving glycemic control is the clinician's decision concerning the HbA_{1c} result. One study that investigated point-of-care decisions made by diabetologists after reviewing information on glycemic control (6) found the rate of intervention was 64% when glycemic control was suboptimal. The most common reasons providers reported for not intensifying therapy were chronic illness, advanced diabetic complications, patient refusal, patient improvement, hypoglycemic risk, and medication or dietary noncompliance. The measure of glycemic control was fasting or random glucose, not HbA_{1c}.

In primary care, where most type 2 diabetes management occurs (7), HbA_{1c} results are typically reviewed by providers several days after the sample is collected. Despite the importance of this decision-making process, it is not widely understood in primary care.

The purpose of this study was to investigate decisions made in primary care on HbA_{1c} results.

RESEARCH DESIGN AND METHODS

— Practices in the Colorado Research Network (CaReNet) and the High Plains Research Network (HPRN) were eligible to participate in this study; provider participation was voluntary. CaReNet and HPRN are practice-based research networks—groups of clinical practices organized to efficiently conduct research studies (8–12). CaReNet primarily consists of community health centers, migrant health clinics, residency practices, and other urban practices. HPRN is a network of hospitals and clinics in rural and frontier communities of northeast Colorado. Combined, these two networks comprise a wide variety of practice settings throughout Colorado.

Data collection

A brief provider survey was attached to every HbA_{1c} result for nonpregnant patients aged 18 years or older with type 2 diabetes. Data were collected at each site during a 3- to 6-week period between December 2001 and August 2002. We assumed each survey represented a unique patient.

The survey

We collected data on demographics and other patient characteristics, insurance, HbA_{1c}, and the clinical decision. Provider's name was optional.

The options for the clinical decision on the HbA_{1c} result were "action taken" (change in medication or lifestyle), "no action taken," or "decision deferred". If no

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Abbreviations: ADA, American Diabetes Association; CaReNet, Colorado Research Network; HPRN, High Plains Research Network.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

Table 1—*Distribution of patient characteristics based on HbA_{1c} value*

Characteristic	All patients	HbA_{1c} <7%	HbA_{1c} 7–8%	HbA_{1c} >8%
n	483	172	115	196
Age (years)	60 ± 14.6	62 ± 14.5	65 ± 12.5	55 ± 14.5
Sex				
Male	37.5	34.9	33.0	42.3
Female	62.5	65.1	67.0	57.7
Race (multiple choices possible)				
White*	72.5	82.2	72.2	64.6
Black	7.0	6.4	8.7	6.7
Other/don't know	20.7	12.8	18.2	24.6
Hispanic ethnicity*	28.6	20.9	21.7	39.3
Insurance				
Medicare only (no medication coverage)	26.5	27.9	33.0	21.4
All other	73.5	72.1	67.0	78.6
At least three comorbidities	64.1	63.7	70.4	60.7
Number of glycemic medications				
0	12.6	25.6	7.0	4.1
1	37.3	42.4	34.8	33.2
≥2	46.2	26.7	52.2	57.7
Don't know	3.1	5.2	6.1	1.0
Provider reviewing HbA_{1c} is . . .				
Same as provider who ordered it	88.2	86.6	87.0	90.3
The patient's primary care physician*	81.1	82.6	83.5	78.1
Communication problem with patient	7.5	7.0	7.0	8.2

Data are means ± SD or %. *$P < 0.05$ (ANOVA or χ^2 analysis).

action was taken, the survey asked why. Deferred decision refers to postponing making or implementing the decision until the next clinical encounter. Several months later, we reviewed charts on over half of the deferred cases and reclassified most of these into the action and no action groups. The remaining 17 deferred cases (no decision could be determined or chart was unavailable for review) were excluded from the decision-making portion of the analysis.

To investigate whether medication costs are an important predictor of HbA_{1c} decision making, we compared Medicare only (lacks medication coverage) with all other insurance types combined (including patients with both Medicare and additional insurance that covers medications). HbA_{1c} values were classified into three categories based on ADA clinical guidelines: <7% ("no action needed"), 7–8% ("consider action"), and >8% ("recommend action").

Statistical analysis

We used χ^2 tests and ANOVA to compare sociodemographic and clinical characteristics of patients by HbA_{1c} levels. Patient characteristics associated with action/no action were assessed using χ^2 tests and Mantel-Hantzel analysis, stratified by HbA_{1c} levels. Provider characteristics were not analyzed because of the high rate of missing information. Overall and strata-specific action rates are reported, along with crude and adjusted odds ratios.

RESULTS — We received 483 usable surveys from 19 clinics (16 family medicine, 1 internal medicine, and 1 geriatric). Eight sites were residencies, four were community health centers, and four were rural.

Eighty-eight providers identified themselves on 353 (72.9%) surveys; 84.1% were physicians, with the remainder mostly physician assistants and nurse practitioners. Of the physicians, 29.7% were residents.

Most patients were female (62.5%), and there was a large group of Hispanic patients (28.6%) (Table 1). Patients were generally taking at least one glycemic medication (83.5%) and had at least three other comorbidities (64.1%). Over one-third of the patients achieved the HbA_{1c} target (<7%).

As expected, the action rate was low (7%) for HbA_{1c} <7%. The action rate for the cases with an HbA_{1c} ≥7% and a known clinical decision ($n = 294$) was 70.7%; for HbA_{1c} >8% ($n = 188$), it was 89.9%. Patients who were black were less likely to have action taken (adjusted OR 0.18), and patients with Medicare only (no medication insurance) had a significantly lower rate of action (80.5 vs. 92.5%) on HbA_{1c} measurements >8% (Table 2). Age and ethnicity are significantly associated with action, but the relationship is no longer significant after controlling for HbA_{1c}. Sensitivity analyses, using models that accounted for clustering at the clinic level, yielded similar results.

For 80 patients with HbA_{1c} values ≥7% and no action taken, the provider gave at least one reason for no action. Over half the reasons were "improving/doing well"; "other reasons" was selected 11 times. Additional reasons listed at least twice were as follows (in order of most to least frequent):

- Competing demands
- Hypoglycemic risk
- Patient noncompliance
- Medication intolerance
- Medication costs
- Cognitive impairment
- Polypharmacy concerns
- Short life expectancy
- Provider unfamiliar with patient
- Transient event raised glucose.

CONCLUSIONS — In this study, the primary care rate of clinical intervention when glycemic control was suboptimal (71%) compares favorably with the rate (64%) reported from a diabetes practice (6), although different methodologies were used. This finding contrasts with other reports suggesting lower quality diabetes care in primary care compared with endocrinology (13–16). Additionally, this study is the first to describe primary care providers' reasons for not intensifying glycemic treatment when the

Table 2—*Association between selected patient characteristics and action for patients with HbA_{1c} ≥7%*

Characteristic	Rate of action Overall (%)	Crude OR (95% CI)	Strata-specific rates (%) "Consider action" (HbA_{1c} 7–8%) (n = 106)	Strata-specific rates (%) "Recommend action" (HbA_{1c} >8%) (n = 188)	Adjusted OR (95% CI)
Age					
>65 years (n = 97)	60.0*	0.45* (0.27–0.76)	36.4	86.0	0.80 (0.43–1.49)
<65 years (n = 197)	76.6		37.3	91.3	
Sex					
Male (n = 113)	74.3	1.33 (0.79–2.25)	32.4	92.4	1.05 (0.55–2.0)
Female (n = 181)	68.5		38.9	88.1	
Race					
Black (n = 19)	47.4*	0.34* (0.13–0.88)	0*	81.8	0.18* (0.04–0.69)
Non-black (n = 275)	72.4		39.8	90.4	
Ethnicity					
Hispanic (n = 97)	79.4*	1.94* (1.09–3.44)	34.8	93.2	1.29 (0.64–2.58)
Non-Hispanic (n = 197)	66.5		37.4	87.7	
Insurance					
Medicare only (n = 76) (Medication costs not covered)	59.2*	0.49* (0.28–0.85)	34.3	80.5*	0.59† (0.31–1.14)
All other (n = 218)	74.8		38.0	92.5	
Glycemic medications					
2 or more (n = 168)	73.8	1.41 (0.85–2.34)	40.0	90.3	1.24 (0.67–2.28)
0 to 1 (n = 126)	66.7		33.3	89.3	
3 or more chronic comorbidities					
Yes (n = 190)	68.4	0.72 (0.42–1.24)	34.2	91.2	0.95 (0.50–1.81)
No (n = 104)	75.0		43.3	87.8	

*$P < 0.05$; †$P = 0.10$. P values determined for crude associations, strata-specific associations, and stratified analysis (Mantel-Hantzel).

HbA_{1c} was above ADA-recommended targets.

We found disparities suggestive of less aggressive glycemic control interventions in black patients and in Medicare patients who lacked insurance for medications. Although many factors may contribute to poorer outcomes in black patients (17–23), this finding suggests that primary care providers may play a role in this disparity. An investigation of provider decisions in a population with more black patients may further clarify this disparity. Patient insurance status has been reported previously as a factor in providers' clinical decisions (24–26). Medication coverage for Medicare beneficiaries may contribute to improved glycemic control.

More than half of the provider-reported reasons for inaction were that the patient was doing well or improving. The remaining reasons for inaction were related to a variety of clinical situations, which may reflect the complexity of diabetes management in primary care, or they may be "soft reasons" for inaction, indicative of "clinical inertia" (27). Future studies could further clarify the meaning of these reasons.

There are several limitations to this study. It is possible completing a survey at the time of clinical decision may affect the decision (Hawthorne effect) (28). In another study that examined provider glycemic-control decisions at the point of care, the rate of action increased modestly from 55% before the survey to 64% during the survey (6). In a CaReNet study that retrospectively examined HbA_{1c} decisions, the rate of action on HbA_{1c} values >8% (78%, CaReNet, unpublished data) was somewhat lower than the rate we found here (89.9%). Thus, although there is likely a modest Hawthorne effect, it probably does not substantially change the findings in the present study.

There may also be bias due to differential completion of surveys by providers. While not required, six clinics voluntarily tracked survey completion rates and found high rates (mean 97%).

There are likely other influences on the HbA_{1c} action rate that were not investigated in this study (e.g., provider characteristics, specific comorbidities, patient income, or the duration and severity of diabetes). In addition, there may be confounding effects that were not addressed in this analysis. The two practice-based research networks in this study consist of multiple practices and providers in a variety of urban, rural, academic, and community settings. There was a relatively high proportion of physicians-in-training and underserved patients. Our results may not generalize to other practice settings with different patient populations.

Our findings suggest that primary care providers are generally aggressive with glycemic management in patients with type 2 diabetes, comparable to providers in diabetes specialty practices. When primary care providers are not ag-

gressive, their reasons for inaction reflect a wide variety of patient situations.

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