

# Communication About Diabetes Risk Factors During Between-Visit Encounters

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**C**lear and actionable patient-provider communication is associated with improvement in health behaviors and outcomes for patients with diabetes.<sup>1</sup> Quality interpersonal interactions between patients and their providers, as well as targeted diabetes-specific communication, have been linked to better self-care<sup>2,3</sup> and improved glycemic control.<sup>4</sup> Moreover, supporting patient-provider diabetes communication could have a significant impact on population health, given that a large portion of patients with diabetes (35%-45% of those aged  $\geq 40$  years) exhibit poor control of 1 or more risk factors for micro- and macro-vascular complications: blood glucose, blood pressure, and/or cholesterol.<sup>5</sup>

The US healthcare system, with its focus on brief in-person office visits, does not adequately address the ongoing needs of patients with chronic conditions including diabetes.<sup>6</sup> Between-visit contacts, including both phone visits and secure messaging, may enhance patient-provider communication. Studies have shown that patients are satisfied with alternate communication forms, and phone and secure messaging use continues to increase in systems that promote multi-modal access.<sup>7,8</sup> Several trials of proactive care management between office visits also demonstrated that both phone and secure messaging can contribute to better control of glycated hemoglobin (A1C), blood pressure, and cholesterol.<sup>9-14</sup> Observational studies have also observed similar effects.<sup>15,16</sup>

In healthcare organizations that actively support phone and secure messaging communications between patient and providers, between-visit encounters amount to up to half of all patient encounters in primary care.<sup>17,18</sup> No study to our knowledge has examined diabetes-specific communication during between-visit encounters. Specifically, among patients with chronic illnesses such as diabetes, it is unclear whether between-visit encounters focus on chronic disease self-management or on other health issues. For patients with diabetes, between-visit encounters may support managing blood glucose, blood pressure, and cholesterol—collectively considered to be risk factors for poor diabetes outcomes. The goals of this paper are to estimate (for patients with diabetes who

are enrolled in a healthcare system with a shared electronic medical record [EMR]): 1) what percent use phone visits or secure messaging, 2) how often diabetes risk factors are discussed during each type of encounter, and 3) what patient

**Objectives:** Secure messaging and phone encounters are becoming widespread to increase patient access to providers between ambulatory care visits. Although these encounters have the potential to improve the control of diabetes risk factors, we know little about their content in relation to traditional in-person visits.

**Study Design:** Cross-sectional analysis of survey and electronic health record data of patients with diabetes receiving care at Group Health Cooperative in 2008 to 2009.

**Methods:** The primary outcome was patient-reported communication with their providers about risk factors for diabetes complications (glucose, blood pressure [BP], and cholesterol) during in-person, phone, and secure messaging encounters. Additional variables included patient demographic, health, and utilization characteristics. We examined unadjusted associations with reported communication by risk factor, encounter type, and demographic/health characteristics.

**Results:** Among 569 patients, 50% were aged  $\geq 65$  years, 50% were male, 35% had  $\geq$ college education, and 64% were white; 77% had  $\geq 1$  between-visit encounter (63% phone, 41% secure messaging). Discussions about glucose were reported by 89% during in-person visits and 42% during between-visit encounters compared with 81% and 17% for BP and 76% and 20% for cholesterol (all  $P < .001$ ). Those who were younger, more educated, of black or other race/ethnicity, on insulin, or in poor control of glycated hemoglobin were more likely to report risk factor discussions during between-visit encounters.

**Conclusions:** In this system, patients with diabetes reported significantly fewer risk factor discussions during between-visit encounters compared with in-person visits. These results suggest potential missed opportunities for proactive support of risk factor management.

(*Am J Manag Care.* 2012;18(12):807-815)

## In this article

Take-Away Points / p808

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eAppendix

For author information and disclosures, see end of text.

### Take-Away Points

- A majority of diabetes patients in this study were using secure messaging and phone encounters.
- The diabetes discussions were substantially different when comparing these between-visit encounters to in-person visits: patients reported significantly more communication about diabetes control during in-person visits.
- This may have implications for systems opening access to additional encounter types. In particular, there may be an opportunity for better promotion of proactive chronic disease management during between-visit encounters.

characteristics are associated with a) having a phone or secure message encounter and b) discussing diabetes control during between-visit encounters.

## METHODS

### Study Setting

Group Health Cooperative is an integrated delivery system that operates in Washington and Idaho. Over 300,000 members receive care from 25 Group Health Cooperative–owned facilities and over 1000 physicians. Group Health has offered patient access to a shared EMR since 2003, which includes multiple features: viewing after-visit summaries, viewing medical history and diagnoses, making appointments, refilling prescriptions, viewing doctor’s notes, viewing laboratory test results, and/or secure messaging with healthcare providers. Group Health also promotes scheduled phone visits as an alternative to in-person visits,<sup>7,19</sup> but these were not specifically structured a priori during the study period.

We conducted a survey in September 2009 among adults with diabetes within 5 primary care clinics in western Washington. We sampled from a pool of 910 potential participants who met the Healthcare Effectiveness Data and Information Set definition for type 1 or type 2 diabetes,<sup>20</sup> were continuously enrolled for 24 months, and were paneled to a primary care physician with whom they had 2 or more visits in the past 2 years. We stratified the sample so that one-half had used at least 1 of the EMR features on the patient website ([www.ghc.org](http://www.ghc.org)) on 2 or more occasions at least 30 days apart in the past 2 years. This captured users who were active rather than those who simply logged onto the website once. We also asked respondents for permission to link their EMR data, including diagnoses, laboratory results, and visit counts. Group Health’s institutional review board approved the study.

### Key Measures

The primary variables of interest were survey items that asked about communication with healthcare providers about risk factors for diabetes complications (termed “risk factor communication”) in the year prior to the survey. We created 3 separate questions for communication about each risk fac-

tor (blood sugar/glucose, blood pressure, and cholesterol), and each item had options for how the discussion occurred (not mutually exclusive): at an in-person visit, on the phone, or secure message ([eAppendix](#), available at [www.ajmc.com](http://www.ajmc.com)). Using the linked utilization data from EMR records, we calculated the numbers of in-person, phone, and secure message encounters during the concurrent period, combining any phone or secure message visits into a joint category of “between-visit encounters.” We then created an indicator of any risk factor communication during a between-visit encounter, defined as discussion about any of the 3 risk factors via phone or secure message.

Covariates included age categories (<50, 50-64, or ≥65 years), sex, race (white, black, Asian, or other; which included Hispanic/Latino and those specifying 2 or more races), and education (high school or less, some college, or college graduate or more)—all self-reported from the survey. We assessed insulin use from automated pharmacy data and diabetes severity (measured by the Diabetes Complications and Severity Index<sup>21</sup>) from the *International Classification of Diseases, Ninth Revision, Clinical Modification* diagnosis codes and laboratory data. Finally, A1C, systolic and diastolic blood pressure, and low-density lipoprotein (LDL) values were extracted from automated laboratory data. We calculated the average yearly results for these values and dichotomized according to standard definitions for clinical control: A1C <7%, blood pressure <130/80 mm Hg, and LDL <100 mg/dL. Standard cleaning was performed to ensure that nonsensical values were excluded.

### Analyses

We first computed the proportion of patients with each encounter type in the past year (in-person, phone, secure message, or any between-visit encounter). We then computed the proportion who reported discussing each diabetes risk factor with their provider by encounter type, and compared the proportions with  $\chi^2$  tests. In addition, we compared the proportions reporting discussions across risk factors (eg, glucose vs blood pressure, glucose vs cholesterol), also using  $\chi^2$  tests. Next, we described the amount of overlap in discussions by encounter type—that is, reports of risk factor communication only at in-person visits, only during between-visit encounters, during both, or during neither.

We then analyzed patient demographics and health characteristics by encounter type and by self-reported risk factor communication. First, we examined the percent of respondents with any between-visit encounter by various patient

demographics (eg, gender, age, education) and health characteristics (eg, insulin use, control of A1C, blood pressure, and LDL), comparing groups using  $\chi^2$  tests. For example, we compared the percentages with a between-visit encounter among men and women. We then limited the analysis to those with at least 1 between-visit encounter and compared those reporting any between-visit risk factor discussions by the same patient and health characteristics. For example, we compared the percentages of men versus women reporting any between-visit risk factor discussions with their provider. Because our goal was to describe patterns within these cross-sectional data, we completed unadjusted analyses.

### RESULTS

The longer, written version of the survey had a 68% response rate (592 of the 873 eligible individuals without language, hearing/vision, or other impairments). Our final analysis sample included the 501 patients (57% of those eligible) who answered the risk factor communication outcomes of interest and who gave permission to access their EMR data. Overall, more than three-fourths (77%) of these respondents had a between-visit encounter in the preceding year. There was an average of 8.3 in-person visits (primary and specialty care), compared with 3.1 phone visits (among the 63% who had any phone encounters), and 7.1 secure message encounters (among the 41% who messaged with providers, counting a single secure message encounter as 1 e-mail thread<sup>22</sup>). In addition, half of the respondents were 65 years or older, half were male, 35% had a college education or more, and 64% were white (Table 1). Half of respondents were on insulin therapy and had on average 1.1 diabetes complications (standard deviation = 1.3). In terms of intermediate diabetes outcomes, 33% of patients had A1C <7%, 43% had blood pressure <130/80 mm Hg, and 73% had LDL <100 mg/dL; 13% were in control of all 3 risk factors simultaneously. Survey non-respondents (also shown in Table 1) were more likely to be younger, more educated, and non-white, without secure message use in the previous year; however, there were no significant differences in non-response to the communication outcomes of interest by granting permission to view medical records or by clinical control of A1C, BP, or LDL.

There were high reports of communication about all 3 diabetes risk factors at in-person visits: 89%, 81%, and 76% reported communication about glucose, blood pressure, and cholesterol, respectively (Figure 1). These discussions were significantly lower during between-visit encounters: 42%, 17%, and 20% reported communication about glucose, blood pressure, and cholesterol, respectively (all  $P < .001$ , comparing proportions in person vs between visit by risk factor).

Within each encounter type, there was also significantly more reported discussion about glucose as opposed to blood pressure and lipid control (all  $P < .01$ ). When examining the reported risk factor discussions across all encounter types (Figure 2), the majority (61%-70%) of the patient-provider conversations occurred *only* during in-person visits. However, 32% reported discussing glucose, 13% reported discussing blood pressure, and 12% reported discussing cholesterol during both in-person and between-visit encounters.

Respondents were more likely to have a between-visit encounter if they had higher in-person utilization, higher diabetes severity, or were using insulin (Table 2). Those with between-visit encounters also had better A1C control, but worse LDL control. When examining reported risk factor communication during these between-visit encounters (Table 3), older and less-educated patients reported less between-visit communication, while those with more in-person visits, insulin use, and in poor control of their A1C were more likely to report risk factor discussions during between-visit encounters. Sensitivity analyses examining risk factor communication by each encounter type (not shown) found that those with poorer control of A1C, blood pressure, and LDL reported significantly more discussions during phone visits, but not secure message encounters. Finally, there were different patterns by race: compared with whites, black and other race/ethnicity respondents reported more risk factor communication during between-visit encounters, while Asian patients reported less. Upon further examination, 94% of secure message users and 57% of phone-visit users who were black reported risk factor communication during between-visit encounters, compared with only 53% and 35% of white respondents.

### DISCUSSION

To our knowledge, this study was the first examination of patient-provider diabetes risk factor communication patterns across all encounter types. A majority of the sample (77%) had a phone or secure message encounter in this integrated delivery system, suggesting that these encounters are a regular part of care. Overall, more than three-fourths of patients with diabetes reported discussing their diabetes risk factors at in-person visits, but substantially fewer patients reported these discussions during phone or secure message encounters. In addition, the majority of respondents reported discussing risk factors only during in-person visits, even though almost 80% had a phone or secure message encounter in the same time period. Finally, there appeared less discussion about blood pressure and cholesterol compared with glucose (consistent with previous evidence<sup>23</sup>), despite standards to focus on all 3 risk

■ **Table 1.** Patient Demographics and Health Characteristics, by Survey Response

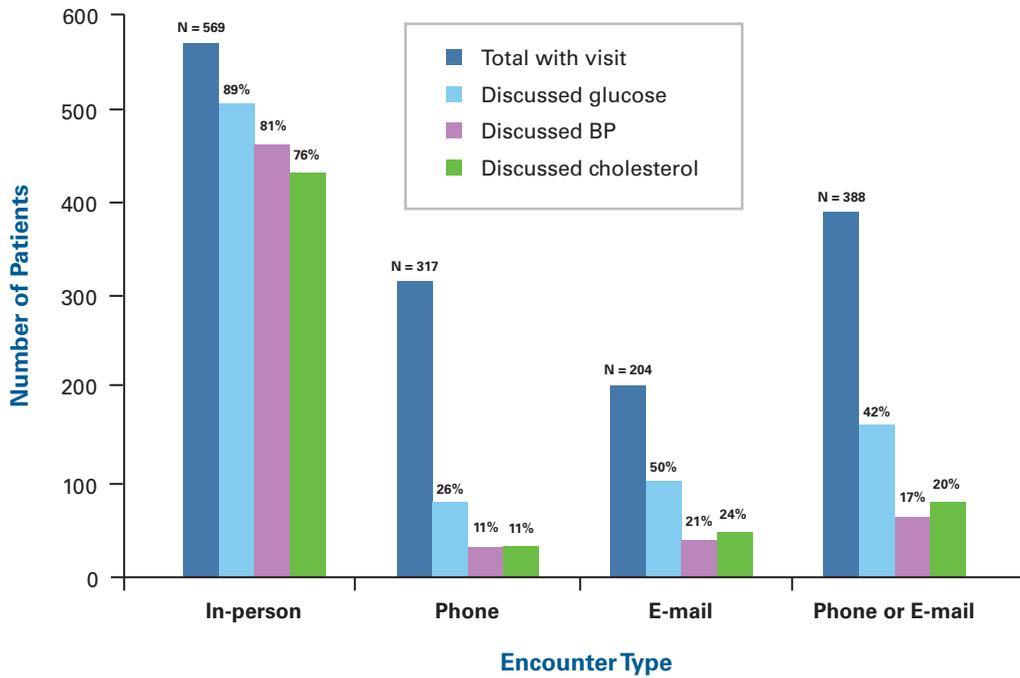
	<b>Total (n = 718) N (%)</b>	<b>Respondents (n = 569) N (%)</b>	<b>Non-respondents (n = 149) N (%)</b>	<b>P</b>
<b>Age, y</b>				<.001
<50	90 (13)	57 (10)	33 (22)	
50-64	288 (40)	224 (40)	64 (43)	
≥65	336 (47)	286 (50)	50 (34)	
<b>Sex</b>				.38
Male	348 (49)	281 (50)	67 (46)	
Female	365 (51)	285 (50)	80 (54)	
<b>Education</b>				<.01 <sup>a</sup>
≤High school	207 (29)	178 (32)	29 (20)	
Some college	260 (37)	191 (34)	69 (49)	
≥College graduate	239 (34)	195 (35)	44 (31)	
<b>Race</b>				<.01
White	426 (61)	359 (64)	67 (46)	
Black	107 (15)	73 (13)	34 (23)	
Asian	96 (14)	72 (13)	24 (16)	
Other	75 (11)	54 (10)	21 (14)	
<b>Insulin</b>				.88
No	355 (51)	289 (51)	66 (52)	
Yes	342 (49)	280 (49)	62 (48)	
<b>Diabetes complications and severity index</b>				.98
0	288 (46)	231 (46)	57 (46)	
≥1	337 (54)	270 (54)	67 (54)	
<b>In-person visits (median)</b>				.95
<7	331 (53)	265 (53)	66 (54)	
≥7	294 (47)	236 (47)	58 (46)	
<b>Phone encounters</b>				.67
0	227 (36)	184 (37)	43 (35)	
≥1	398 (64)	317 (63)	81 (65)	
<b>Secure messages</b>				<.01
0	390 (62)	297 (59)	93 (75)	
≥1	235 (38)	204 (41)	31 (25)	
<b>Glycemic control</b>				.45
A1C <7	198 (33)	163 (33)	35 (30)	
A1C ≥7	410 (67)	327 (67)	83 (70)	
<b>BP control</b>				.62
BP <130/80 mm Hg	270 (43)	214 (43)	56 (46)	
BP ≥130/80 mm Hg	355 (57)	287 (57)	68 (55)	
<b>Cholesterol control</b>				.19
LDL <100 mg/dL	387 (72)	324 (73)	63 (66)	
LDL ≥100 mg/dL	152 (28)	120 (27)	32 (34)	

A1C indicates glycated hemoglobin; BP, blood pressure; LDL, low-density lipoprotein.

Age: <1% missing; sex: <1% missing; education: <1% missing; race: 2% missing; insulin: 3% missing; diabetes complication score, in-person visits, phone encounters, secure messages, BP control: 12% missing (who did not grant permission to assess their medical record data); A1C: 14% missing; and LDL: 22% missing (additional missing for those without a test in the prior year).

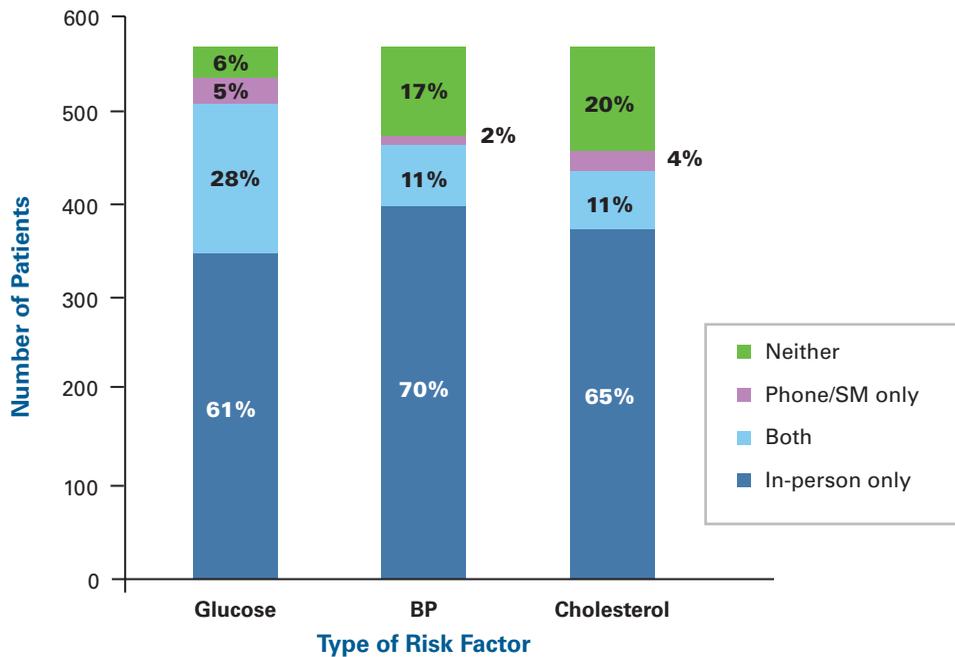
## Diabetes Risk Factor Communication Between Visits

**Figure 1.** Patient-Reported Communication About Risk Factors for Diabetes Complications, by Encounter Type



BP indicates blood pressure.

**Figure 2.** Comparison of In-Person and Between-Visit Risk Factor Communication



BP indicates blood pressure; SM, secure messaging.

■ **Table 2.** Proportion With Between-Visit Encounters, by Patient Demographic and Health Characteristics

	<b>N = 501<sup>a</sup></b>	<b>Phone or SM Encounter, %</b>	<b>P</b>
<b>Sex</b>			
Male	248	77	0.99
Female	253	77	
<b>Age, y</b>			
<50	53	79	0.05
50-64	191	83	
≥65	257	73	
<b>Education</b>			
≤High school	147	74	0.5
Some college	177	78	
≥College graduate	174	79	
<b>Race</b>			
White	332	80	0.35
Black	58	74	
Asian	60	72	
Other	47	72	
<b>Diabetes complications and severity index</b>			
0	231	72	.01
≥1	270	82	
<b>Treatment intensity</b>			
Not on insulin	249	73	0.02
Insulin	252	82	
<b>In-person visits</b>			
1-6	265	69	<.01
≥7	236	87	
<b>Glycemic control</b>			
A1C <7	163	83	.03
A1C ≥7	327	75	
<b>Blood pressure control</b>			
BP <130/80 mm Hg	214	78	0.78
BP ≥130/80 mm Hg	287	77	
<b>Cholesterol control</b>			
LDL <100 mg/dL	324	76	.04
LDL ≥100 mg/dL	120	85	

A1C indicates glycated hemoglobin; BP, blood pressure; SM, secure messaging.  
<sup>a</sup>All respondents who allowed access to their EMR data.

factors to prevent micro- and macro-vascular complications.<sup>24</sup> Phone or secure message visits appeared to address a different balance of topics than in-person visits. Competing health demands, including acute illnesses and management of comorbidities, are common at visits for patients with diabetes,<sup>25</sup> and this could be influencing the risk factor discussions across different encounter types. In addition, those in better clinical

control of their A1C were more likely to have a between-visit encounter, but those in poorer A1C control were more likely to report risk factor communication if they had such an encounter. Moreover, those on insulin were more likely to both have a between-visit encounter and report risk factor communication during such encounters, as these patients likely need additional support due to increased treatment intensity.

## Diabetes Risk Factor Communication Between Visits

**■ Table 3.** Proportion Reporting Risk Factor Communication During Between-Visit Encounters, by Patient Demographic and Health Characteristics

	N = 388 <sup>a</sup>	Between-Visit Risk Factor Communication, %	P
<b>Sex</b>			
Male	192	36	0.63
Female	196	34	
<b>Age, y</b>			
<50	42	51	<.01
50-64	158	36	
≥65	188	30	
<b>Education</b>			
≤High school	109	23	<.01
Some college	139	38	
≥College graduate	138	40	
<b>Race</b>			
White	265	34	.02
Black	43	44	
Asian	43	21	
Other	34	43	
<b>Diabetes complications and severity index</b>			
0	182	39	0.66
≥1	206	37	
<b>Treatment Intensity</b>			
Not on insulin	167	27	<.01
Insulin	221	42	
<b>In-person visits</b>			
1-6	182	34	.03
≥7	206	43	
<b>Glycemic control</b>			
A1C <7	136	35	.03
A1C ≥7	244	47	
<b>BP control</b>			
BP <130/80 mm Hg	167	44	0.82
BP ≥130/80 mm Hg	221	43	
<b>Cholesterol control</b>			
LDL <100 mg/dL	247	44	0.5
LDL ≥100 mg/dL	102	40	

A1C indicates glycosylated hemoglobin; BP, blood pressure; LDL, low-density lipoprotein.  
<sup>a</sup>All respondents with a between-visit encounter (phone or secure message).

Previous randomized trials found improved control of A1C, blood pressure, and/or LDL control with secure message and phone outreach.<sup>9-13,26</sup> A previous cross-sectional, observational study among patients with diabetes in the same system also found small but positive association between secure message encounters and better glycemic control.<sup>15</sup> In contrast, patients

reporting specific risk factor communication in this study were in poorer control. To understand this paradox, a detailed content analysis of between-visit encounters for chronic disease patients in real-world practice is needed. As a previous survey found that patients preferred self-management support via the phone,<sup>27</sup> it will be important to conduct future work to better

understand patient self-management needs and provider practice patterns by encounter type. Finally, another study found that speaking with a provider outside of the office was significantly related to increased satisfaction with an individual's choice of their provider, suggesting that additional provider and patient-provider relationship variables are also likely to influence communication patterns across encounter types.<sup>28</sup>

In preliminary, unadjusted comparisons, those discussing diabetes risk factors during between-visit encounters were also more likely to be younger, more educated, and from racial/ethnic minority groups, as well as have higher in-person healthcare utilization. The findings by education and in-person utilization are in the expected direction, given that these patients might already be more involved in their healthcare and be more active in managing their disease.<sup>29,30</sup> In addition, younger patients with diabetes are much more likely to be users of secure messages compared with older patients,<sup>15,31</sup> which was likely driving this association with age. Unlike prior studies,<sup>32,33</sup> however, we did not find significant differences in use of between-visit encounters (phone or secure messaging) by racial/ethnic minority status. Furthermore, among those with between-visit encounters, blacks and other race/ethnicity respondents were more likely to report risk factor discussions between office visits compared with whites. In contrast, Asians were less likely to report such risk factor discussions. Additional examination of the content of between-visit encounters (such as discussions about risk factors/complications and self-management) may provide important insights for improving diabetes care across diverse patient groups—especially among patients already engaged in using a variety of encounter types.

There are several limitations in this study. First, we did not capture encounter discussion content beyond reports of risk factor communication. Therefore, we do not know the underlying reason for between-visit encounters, such as whether it was in follow-up to an in-person visit or for a separate health concern, or how these differed between phone or secure message visits. We performed our study before Group Health spread its version of the patient-centered medical home (PCMH).<sup>17,18</sup> Since at Group Health, the PCMH model promoted proactive outreach through all encounter types for diabetes care, risk factor discussions during between-visit encounters may increase. Moreover, the cross-sectional design precluded our ability to determine the direction of causation between risk factor communication and clinical control or to follow patients over time. We also relied on self-report for the communication of outcomes of interest, which may be subject to recall bias. In addition, we did not perform adjusted analyses in this study because we were interested in examining descriptive patterns by encounter type and self-reported risk factor communication. Additional research into the types

of patients using between-visit encounters for diabetes self-management support, as well as the relationships with their longitudinal clinical outcomes, is warranted. Finally, we had missing data with some differences across age, education, and race/ethnicity categories.

Overall, we found lower reports of diabetes risk factor discussions during between-visit encounters (phone or secure message) compared with in-person visits. It is possible that addressing competing health concerns other than diabetes during between-visit encounters allows providers to focus more in-person visit time on optimization of diabetes risk factors. However, our results may also suggest that there is room for improvement in using phone and secure message encounters to engage patients in discussions about their diabetes management. Providers could be using more of these between-visit contacts with patients to proactively focus on medication adjustment and lifestyle factors related to risk factor control rather than the more standard practice of waiting weeks to months between in-person visits to have such conversations. As more systems move to open access to care through all available encounter types, systems and providers could increasingly look to these additional contacts with patients as opportunities to improve diabetes care.

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**Funding Source:** Funds were provided by the Agency for Healthcare Research and Quality (AHRQ) R01 HS016759.

**Author Disclosures:** Dr Lyles was supported by an AHRQ NRSA post-doctoral traineeship T32 HS013853, and Dr Sarkar was supported by an AHRQ career development award K08 HS017594. The other authors (LG, RJR, US, JDR) report no relationship or financial interest with any entity that would pose a conflict of interest with the subject matter of this article.

**Authorship Information:** Concept and design (CRL, LG, RJR, JDR); acquisition of data (JDR); analysis and interpretation of data (CRL, LG, RJR, US); drafting of the manuscript (CRL, US); critical revision of the manuscript for important intellectual content (CRL, LG, RJR, US, JDR); statistical analysis (CRL, LG); provision of study materials or patients (JDR); obtaining funding (JDR); and supervision (JDR).

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## Diabetes Risk Factor Communication Between Visits

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■ **eAppendix.** Risk Factor Discussion Survey Items

**For questions 1-3, please check all that apply.**

In the past 12 months, did you discuss with your doctor or healthcare provider:

	<b>Yes, at an office visit</b>	<b>Yes, over the phone</b>	<b>Yes, in an e-mail</b>
1. Your blood sugar?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Your blood pressure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Your blood cholesterol?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>