

***Grant Final Report***

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**Shared Medical Records and Chronic Illness Care**

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# Abstract

**Purpose:** To evaluate the association between the quality of chronic illness care among patients with diabetes and the use of a Web-based interactive electronic medical record shared between patients and healthcare providers.

**Scope:** A mixed-methods study to help inform the development, evaluation and dissemination of patient Web sites designed to support the care of patients with diabetes and multiple comorbidities.

**Methods:** Retrospective cohort analyses and cross sectional survey of patient and provider predictors of portal adoption and quality of care. Semi-structured interviews of patients and providers.

**Results:** Over half of all patients with diabetes used secure messaging and the shared medical record (SMR). Several traditionally underserved patient populations had less use. Secure messaging was associated with better glycemic control but, compared to phone and in person visits, there few conversations in secure messaging about diabetes risk factor control. Provider encouragement of patient use was important for patient engagement in the shared record. Providers needed a supportive system of care to use secure messaging with patients.

**Key Words:** electronic patient-provider communication, personal health records, chronic illness care, diabetes, quality of care

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# Final Report

## Purpose

The overall goal of this project was to evaluate the association between the quality of chronic illness care among patients with diabetes and the use of a Web-based interactive electronic medical record shared between patients and healthcare providers.

We had three specific aims:

**Aim 1.** Describe the use and predictors of online patient-provider communication and shared record use among adult patients with diabetes who also have one or more other chronic conditions.

**Aim 2.** Evaluate the association of patient-provider messaging and shared record use with better chronic illness care.

**Aim 3.** Further understand the potential benefits and the safety of the shared record among patient with diabetes and other co-morbidity through qualitative study.

## Scope

### Background

Websites providing secure access to electronic medical records shared between patients and providers represent a new form of online health services. Such shared medical records (SMRs) allow patients to view personal electronic health information, send secure electronic messages to care teams, and use online services such as appointment scheduling and medication refills. Similar to “integrated personal health records” that have been promoted as facilitating engagement in care, SMRs allow systems to share patient-centered information between patients and care providers. (1) They have the potential to empower patients, support chronic disease self-management, and to move beyond care based on episodic, in-person, and often discontinuous visits.(2-4) Early evidence suggests high levels of patient satisfaction with web-based SMRs, (5, 6) reduced of in-person visits;(7, 8) and improved clinical outcomes.(9, 10)

Questions remain, however, about the SMRs potential to widen existing disparities in access to care among vulnerable, underserved and chronic care populations (11). Early studies have found individuals with lower levels of income and education and those from racial and ethnic minority groups are less likely to sign up and use online services similar to the SMR(11, 12). Another study found that some patients are concerned about the potential of SMRs to lead to the loss of valued personal contact with physicians such as in person and phone encounters(13). These studies suggest that SMRs may have some unanticipated negative impacts on the quality, safety and equity of care.

## Context

Several studies have shown the value of promoting patient review of the medical record as part of multifaceted interventions in chronic disease management.(14-18) Almost all interventions have used copies of the paper record distributed to patients at office visits.(19) Patient Web portals that integrate shared records with patients and patient-provider electronic communication change the nature of health care communication and interaction. Instead of health care information residing in an archived form in a physician's clinic, health care information is dynamic and transparent between patients and health care providers. This new approach to health care information may promote a fundamental shift in the patient-provider relationship to one that is more patient-centered and promotes patient activation. Many health care institutions around the country are implementing patient Web portals with electronic patient-provider messaging and shared portions of the electronic medical record.

## Setting

This study was conducted at Group Health, an integrated care delivery system with over 660,000 members in Washington and North Idaho. The proposed study will be restricted to the 391,749 members who receive primary care at one of Group Health's 28 owned-and-operated clinics. Group Health membership includes 55,239 Medicare members, 19,089 Medicaid members, and 11,623 covered by the Basic Health Plan (a state-supported insurance program for low-income families).

The Group Health population is generally similar to that of the surrounding area. Group Health has a slightly higher proportion of women (53%) than the regional community (50%) and the nation (51%). Group Health members are also older (46%  $\geq$ 45 years) than the regional community (38%) and the nation (39%). Compared to the rest of the country, Group Health members are more likely to be Asian or Pacific Islanders (9% versus 4%), but less likely to be African American (4% versus 12%) or report Hispanic ethnicity (4% versus 15%). The Group Health racial and ethnic composition broadly represents the Puget Sound region.

Group Health currently has one of the larger and more comprehensive patient Web portals. Table 1 shows the portal services available on the MyGroupHealth patient Web portal. For access to the portal, patients initially register for basic services by entering their enrollee number on the Group Health Web site ([www.ghc.org](http://www.ghc.org)) and then set a self-selected password. For a password to access the SMR and patient-provider electronic messaging enrollees must go through the additional step of identification verification (ID verification); enrollees can obtain this password by either presenting identification at a Group Health clinic or by requesting a password be mailed to the home address. As of July 2012, 70% of adult enrollees receiving care in the Integrated Group Practice had completed ID verification.

## Participants

The overall study sample included patients over 18 years of age who have been continuously enrolled in Group Health for 12 months prior to the implementation of the SMR on the Web portal in August of 2003 through June 30<sup>th</sup>, 2010. We chose 12 months of continuous enrollment prior to portal implementation in order to stabilize baseline exposure to clinical care at Group

Health, to allow adequate time for enrollees to be accrued into the Group Health diabetes registry and to be able to assess clinical quality of care indicators for diabetes prior to implementation of the SMR on the patient portal.

**Table 1. Patient services on MyGroupHealth Web Portal**

Service	Level of Access: Basic Registration Only*	Level of Access: ID Verification†
Healthwise® Knowledgebase	X	X
Discussion groups	X	X
Health assessment tools	X	X
Choose a primary care provider	X	X
Appointment requests		X
SMR		
Pharmacy refills and List of Medications		X
Secure messaging to and from health care team		X
Medical test results		X
After-visit summaries		X
Medical Conditions		X
List of allergies		X
Immunization history		X

\* Basic Registration only: enrollees enter identification number and self-select a password.

† ID Verification: enrollees obtain password by presenting identification at Group Health clinic or requesting one mailed to home address

## Methods

### Study Design

In a retrospective cohort of patients with type 1 or 2 diabetes mellitus who had co-morbid chronic conditions and who used the MyGroupHealth patient Web portal, we evaluated whether electronic patient-provider messaging and shared record use was associated with certain patient and provider characteristics and indicators of better clinical quality of care. Within this cohort we compared shared record users to themselves over time and to those who do not use the shared record. We conducted a cross-sectional survey of a subsample of this cohort to evaluate whether portal use was associated with patient report of better chronic illness care. We also used this subsample to assess the association between portal use and individual patient characteristics collected in the survey that we are not able to obtain from automated data. In a qualitative analysis of secure messages, after-visit summaries and patient and provider interviews, we sought to better understand patient provider and organizational factors associated with patient Web portal adoption and better chronic illness care. We used the qualitative analysis to inform the survey elements.

### Statistical Analysis

Following descriptive and unadjusted analysis, we used the following methods to address to aims.

### **Aim 1: Predictors of Patient Web Site Use.**

- a. Retrospective longitudinal analyses. We used cox proportional hazard analysis with robust standard errors to examine the relationship of baseline predictors and time to initial SMR use and then rates of use (20).
- b. Cross sectional analyses of use by age and race and ethnicity. Multivariable logistic regression models were used to examine the association between patient factors and use of the SMR(21) (22)

### **Aim 2: Association of Quality with Patient Web Site Use.**

- a. Longitudinal analysis. We used robust Poisson regression models within a GEE framework to estimate the adjusted rate ratio of meeting three indicators of glycemic control (HbA1c < 7%, HbA1c < 8%, and HbA1c > 9%) and HbA1c testing adherence by level of prior use. Multiple imputation and inverse probability weights were used to account for missing data (23)
- b. Cross sectional analyses of diabetes risk factor communication between office visits. This paper did not use adjusted analyses. (24)

**Aim 3: Clarifying Potential Unanticipated Benefits and Harms of the Shared Electronic Medical Record On The Patient Web Site.** We used purposive sampling to identify 16 patients and 10 primary care providers to serve as the subjects of qualitative analyses. We consented patients and providers to chart review for notes from in person encounters, telephone encounters and secure messaging encounters. For both patient and physician interviews two investigators coded transcripts independently and established a codebook and acceptable inter-rater reliability.

## **Data Sources/Collection**

We used a combination of structured automated data (administrative and electronic medical records), survey data, qualitative interviews (patient and provider dyads) and unstructured notes from in person encounters, telephone encounters and secure messaging encounters. Age, gender and insurance status were collected from administrative data sources. Laboratory test results, medication ordering and dispensing information, medical diagnoses and healthcare utilization were collected from a combination of claims and electronic health record data. All data sources were available from 2003 or earlier.

For self-report measures, we conducted a survey in September 2009 among patients with diabetes within Group Health's five medical clinics in western Washington with the highest racial and ethnic minority representation. Sampling from 910 potential adult participants who met the HEDIS definition for type 1 or 2 diabetes, we included patients who were continuously enrolled for 24 months and had a primary care physician with whom they had two or more visits. We stratified on previous use of the SMR through the patient Website ([www.ghc.org](http://www.ghc.org)): half of the sample had used one or more of services (e.g., secure messaging, viewing lab results, requesting refills, viewing medical history) on at least two occasions separated by 30 days or more in the

two years prior to the survey. We also asked respondents for permission to access their medical record data, including diagnoses, lab results, and utilization.

## Measures

We describe below the chief measures of adoption and use in our studies for this grant.

**Web Portal User.** For retrospective analyses, a user of the Web portal was defined as someone who has registered to use MyGroupHealth’s enhanced online services and accessed at least one of the available services shown in Table 1. We then constructed variables specific to each of the Web portal’s services as follows.

**Table 2. Selected quality of care and communication measures**

Domain	Instrument
Patient Activation	PAM
Global rating of care.	CAHPS 4.0 Health Plan
If not via email, how would have contacted healthcare team	GHC’s MyGH Survey
Value of email in enhancing visits to healthcare team?	GHC’s MyGH Survey
Value of MyGH in understanding Health Condition	GHC’s MyGH Survey
Getting Appointments and Healthcare When Needed	CAHPS Clinician Group Survey 2008
Needed care over email.	CAHPS Clinician Group Survey 2008,
Questions answered over email.	CAHPS HIT Field 1.
Contact medium if email wasn’t available	MyGH Web survey
How well doctors communicate	CAHPS Clinician Group Survey 2008
Contact between office visits on BP, blood glucose levels or lipids	Based on wording in CAHPS, self developed
Adherence measure	Chesney M single item for each medication type

PAM: Patient Activation Measures

GHC: Group Health Cooperative

MyGH: MyGroupHealth patient website

CAHPS: Consumer Assessment of Health Plan Survey

**Secure Messaging.** The structured options of Group Health’s Web-based secure messaging application allowed us to distinguish clinical secure messaging from other online services including requests for medication refills and appointments. For this study, we limited the analysis to clinical secure messaging between patients and either their primary care providers or a specialty care providers. We assessed secure messaging activity by the number of secure messaging threads between providers and patients. These threads were defined by an initial message sent by either the patient or the provider and the series of subsequent replies from both parties. The thread ended if there was no reply activity for thirty days. Although threads can vary in length from a single message to 100s of messages, we have found limited variability in thread length and duration; 96% of threads contain five or fewer messages and 86% spanned 3 or fewer calendar days(25).

**SMR Use.** SMR features implemented included: secure messaging with health care providers; requesting medication refills and in-person appointments; viewing test results, after-visit summaries, medical problem lists, allergies, and immunizations (26).

## Survey Items

Selected survey measures for quality are in Tables 2. We describe further details of these measures in publications. (20, 21, 23) (22, 24). We kept our survey time to 20 minutes in order to minimize respondent burden and maximize response rate. Based on our qualitative provider and patient interviews and reviews of clinic, phone and secure message notes, we shifted some of our hypotheses and instruments in the survey. Instead of the hypothesis of trust being higher among SMR users, we focus on access and patient provider communication. Instead of global measure of quality of chronic illness care, we focused on understanding diabetes risk factor communication occurring in secure messages compared to phone visits and in person visits. We additionally added questions on email access developed for the CAHPS 4.0 supplement (Group Health patients participated in testing of the instrument)(27). We chose a 3 point difference in CAHPS composite and individual items as clinically significant. (28)

## Results

### Principal Findings

We summarize our principal findings by aim below. Results not yet published or in submission have more detail.

**Aim 1: Describe the Use and Predictors of Online Patient-Provider Communication and Shared Record Use among Adult Patients with Diabetes Who Also Have One or More Other Chronic Conditions.** We confirmed hypotheses that SMR use was higher among patients with higher overall co-morbidity, female sex, age less than 65 years, non-Hispanic white race/ethnicity, broadband internet access, higher educational attainment, higher income, commercial insurance, higher neighborhood socioeconomic status, and having a primary care provider that commonly messages with other patients. Patients over the age of 65 years had one fifth the odds of using the SMR compared to those 18 to 50 years (OR 0.25:  $p < 0.0001$ ). In adjusted models, Blacks (OR=0.18, 95% CI: 0.11-0.30) and Asians (OR=0.40, 95% CI: 0.20-0.77) were also significantly less likely than Whites to use the SMR. When restricted to individuals reporting at least occasional Internet use, this finding remained for Black respondents (OR=0.25, 95% CI: 0.10-0.63) (22). We also found personal encouragement by a primary care physician to use the shared record was strongly associated with patient use(22) (21) (Table 3)(20). Contrary to our hypothesis, the study did not find higher SMR use among those with more diabetes specific complications.

**Aim 2: Evaluate the Association of Patient-Provider Messaging and Shared Record Use with Better Chronic Illness Care.** Glycemic control was modestly higher among patients using patient-provider messaging. (23) On the other hand, we found diabetes patients reported significantly fewer risk factor discussions during between-visit encounters compared to in-person visits. Discussions about glucose were reported by 89% during in-person visits and 42% during between-visit encounters, compared to 81% & 17% for BP and 76% & 20% for cholesterol (all



p<0.001). Those who were younger, more educated, racial minorities, on insulin, and in poor control of A1c were more likely to report risk factor discussions during between-visit encounters. Compared to those not using secure messaging, those using were more likely to report better communication by the CAHPS composite (92.8 vs. 90.4 p = 0.04 adjusted difference) though these differences were not clinically significant. Among individual communication items with greater than or equal to 3 point difference and p < 0.05, patients using secure messaging were more likely to report primary care provider explained things in a way that was easy to understand, provider spend enough time with you, and provider gave easy to understand instructions about taking care of health problems or concerns.

Compared to those not using secure messaging, those using were not more likely to report better access to care by CAHPS composite (81.0 SM vs 78.2 no SM, p = 0.42). Global rating of care was higher in secure messaging users (88.5) compared to no secure messaging users (86.1) (adjusted difference 4.0, p = 0.008; adjusted for age, sex, education, self reported health status and race/ethnicity).

**Table 3. SMR users and nonusers**

Patient Characteristics	No SMR* User % or Mean	SMR* User % or Mean	Unadj Odds Ratio or	P- value	Adj. OR	Adjusted P-value
N	276	342				
18-50 years %	8	17			ref	
51-65 years %	31	46	0.69	0.20	0.64	0.12
>65 years %	62	38	0.28	0.0001	0.25	0.0001
Age [mean (SD)]	69(12)	61(13)	-6.8	0.0001	-6.2	0.0001
Female gender %	55	47	0.72	0.04	0.67	0.02
Married or living as married %	52	67	1.88	0.0006	1.56	0.03
Race: White %	51	72	Ref		Ref	
Race: Black %	22	11	0.36	0.0001	0.26	0.0001
Race: NatAmer/Haw/PI %	7	4	0.43	0.02	0.33	0.004
Race: Asian %	15	7	0.35	0.0001	0.29	0.0001
Hispanic Ethnicity %	5	5	0.97	0.99	0.76	0.49
Education: Less than HS grad %	14	3	ref		ref	
Education: HS grad or GED %	25	17	3.51	0.002	3.18	0.0007
Education: post-high school or college grad %	62	81	6.71	0.0001	5.20	0.0001
Income: 20K or less %	29	9	ref		ref	
Income: 20 to 49K %	42	32	2	0.0001	2.5	0.0008
Income: 50 to 100K %	25	42	5.32	0.0006	4.42	0.0001
Income: over 100K %	5	16	11.19	0.0001	8.78	0.0001
Employment: FT/PT %	36	50	ref		ref	
Employment:Homemaker %	5	4	0.68	0.39	0.88	0.77
Employment:Retired %	56	42	0.53	0.001	0.55	0.004
Employment:Other %	4	3	0.52	0.19	0.53	0.21
Low neighborhood SES %	32	25		0.03		
Insurance: Commercial %	47	67	ref		ref	
Medicare %	53	33	0.45	0.0001	0.97	0.92
Distance to Clinic >= 20 miles %	6	7	1.19	0.58	1.27	0.49
Overall health Fair/Poor %	30	31	1.03	0.85	1.00	0.99

**Table 3. SMR users and nonusers (continued)**

Patient Characteristics	No SMR* User % or Mean	SMR* User % or Mean	Unadj Odds Ratio or	P- value	Adj. OR	Adjusted P-value
Comorbidity Index (ACG): Lowest Quartile (best health) %	24	26	ref.	ref.	ref.	ref.
Comorbidity Index (ACG): 2nd quartile %	24	26	0.98	0.92	1.59	0.07
Comorbidity Index (ACG): 3rd quartile %	25	25	0.90	0.65	1.58	0.08
Comorbidity Index (ACG): Highest quartile %	27	23	0.76	0.24	1.92	0.05
Comorbidity Index (ACG): Hypertension %	73	70	0.88	0.46	1.07	0.72
Comorbidity Index (ACG): Chf %	14	8	0.52	0.01	0.63	0.18
Comorbidity Index (ACG): Depression %	12	18	1.67	0.03	1.37	0.21
Comorbidity Index (ACG): Diabetes Duration, years	12.3	11.5	-0.79	0.34	-0.37	0.63
Treatment intensity: oral hypo/diet/none %	55	46	ref	ref	ref	ref
Treatment intensity: insulin %	45	55	1.46	0.02	1.48	0.03
Internet Use %	31	91	24.5	0.0001	29.2	0.0001
Email Use %	29	91	24.9	0.0001	26.6	0.0001
Broadband Internet %	20	66	7.67	0.0001	6.74	0.0001
PCP encourages use of patient Website: Never %	37	14		Ref		Ref
PCP encourages use of patient Website: Sometimes %	24	19	2.18	0.003	1.80	0.03
PCP encourages use of patient Website: Usually %	17	33	5.02	0.0001	4.09	0.0001
PCP encourages use of patient Website: Always %	22	34	4.12	0.0001	3.07	0.0001
Group Health Rating (0-10) [mean(SD)]	8.52(1.73)	8.7(1.44)	0.18	0.16	0.31	0.02
Primary Care Visits, annual [mean(SD)]	4.0(2.6)	3.9(2.7)	-0.24	0.57	0.10	0.81
Specialty Visits annual [mean(SD)]	3.3(3.8)	3.6(4.0)	0.45	0.47	0.72	0.21
Primary Care Phone Visits annual [mean(SD)]	1.3(1.6)	1.1(1.5)	-0.24	0.34	-0.20	0.43
SpecialtyPhone annual [mean(SD)]	0.5(1.0)	0.7(1.3)	0.31	0.09	0.31	0.09
Primary Care Secure Messages [mean(SD)]	0.0(0.1)	3.4(6.3)	6.82	0.0001	5.99	0.0001
Specialty Secure Messages [mean(SD)]	0.0(0.0)	1.0(2.6)	1.93	0.0001	1.64	0.0001
ER and Urgent Care Visits [mean(SD)]	0.9(1.8)	0.8(1.2)	-0.29	0.22	-0.39	0.09

\*SMR (Shared Medical Record)

**Aim 3: Clarify the Potential Benefits and the Safety of the Shared Record among Patient with Diabetes and Other Co-morbidity.** We provide the list of patient and provider experience themes below from the patient and provider interviews.

#### Patient Experience Themes:

- The patient website provides convenient and efficient ways for me to get more of what I need from my healthcare
- The patient website helps me coordinate my care by helping me remember what I'm supposed to do and when
- The patient website helps me connect and communicate more effectively with my doctor, who is very thoughtful and timely in responding to my secure messages
- My doctor is very busy, and being responsive to me takes more of his/her valuable time
- Using the patient website helps me understand and manage my healthcare and my health conditions
- Taking this type of support away from me would be very disruptive to my healthcare

#### Provider Experience Themes:

- The patient website, particularly Secure Messaging, provides me with convenient and efficient ways to do more for my patients in a shorter period of time.
- Secure messages don't require my immediate attention, and can wait until I can take just an extra minute to focus and think about what I'm doing and what I'm saying to my patients.
- Using the patient website and actively messaging with my diabetes patients helps me to better understand them and keep them engaged in their care.
- PCPs who haven't used Secure Messaging are concerned about patients using it inappropriately and overwhelming them with messages.
- Patients use Secure Messaging very appropriately with only rare exceptions, and in those cases the patients would have been challenging to work with regardless of whether the interactions occurred online, in person or on the telephone.
- This is real patient care work, and without [my current Medical Home environment or] system-level changes to how appointment scheduling and physician productivity measurement work, there's a limit to the volume of online work I can do.
- My workload is my problem, not my patients' problem, and I will continue to encourage them to use the patient website and to message me about any of their needs or concerns – and I would advise other PCPs to do the same.

## Limitations

Users of the SMR with diabetes differed systematically from non-users in important characteristics such as prior use of health services, and sociodemographic characteristics. Although we made an effort in cross sectional studies using survey data to be comprehensive in predictors of use based on literature review and patient and provider interviews, the potential of unmeasured confounding remained. In studies of both adoption and clinical quality, we were able to address this limitation through longitudinal analyses.

The generalizability of our findings may be limited by Group Health's somewhat more educated and Caucasian demographic compared to the general United States population. We were also not studying a controlled intervention targeting specific behaviors. Providers and patients incorporated secure messaging and other SMR services into existing patterns and care and relationships. Thus, we were not able to fully distinguish quantitatively how the services are being used to support chronic care.

## Discussion

We confirmed our hypotheses on patient and provider differences in use of secure messaging and the SMR. Although some of our findings raise additional important questions (e.g. African Americans lower use regardless of education or income), our findings also clarified systems level changes that need to occur to for appropriate and optimal adoption and use of the SMR. This includes alignment of provider reimbursement, workflow, team roles and training to allow providers to encourage patients to use the SMR. Most importantly, providers need devoted time to meaningfully engage patients online. Leadership, redesign and appropriate resourcing are likely to be important for success. The patient centered medical home provides promise as model to help move towards the larger healthcare redesign needed for broader adoption of the SMR.

We also identified key unused opportunities to use secure messaging for management of diabetes risk factors. Our prior intervention trials have found proactive secure messaging from providers to help manage glycemic and blood pressures control improves outcomes(9, 10). In the current project, where secure messaging was used outside of these organized interventions, we found little discussion of diabetes risk factors compared to in person or phone visits. Healthcare redesign promoting active outreach over the phone and secure messaging could address these missed opportunities for improving risk factor management for patients with diabetes.

We did not find significant safety concerns in the use of the shared record or secure messaging in our qualitative or quantitative work in this study. We acknowledge, however, that our study's focus and resources may not have been sufficient to identify these. Our qualitative studies, in particular, focused on patient and provider users of secure messaging. These individuals may have been more able to judge the appropriate use of the SMR. Future studies should further identify those patients and providers who may have difficulty using the SMR or have experienced a near miss or error in care related to its use.

## Conclusions

We summarize the important conclusion of our study below:

- Most patients with diabetes will use secure messaging and the SMR when providers are able to actively encourage its use.
- Differences in patients use by race, age, education and income raise concerns about the potential to exacerbate existing disparities in care if the shared record is not implemented in a manner that ensures strong access to care across in person phone and electronic means.
- Secure patient provider messaging is associated with better glycemic control but there continue to be missed opportunities to use secure messaging to manage all three major diabetes risk factors (blood pressure, glycemic and lipid control).
- For those who are able, secure messaging may be an important part of enabling better overall communication with healthcare providers.
- For patients to use and benefit from shared records and secure messaging, health care systems need to align support for providers and healthcare teams for secure messaging education, workflow, reimbursement and time.

## Significance

As the use of secure messaging and shared records spread as part of meaningful use in the HITECH act, this study identified:

- Key underserved populations needing attention in order to avoid possible widening of disparities in access to care.
- Potential of the shared record to improve the quality of care and patient provider communication among patients with diabetes.

## Implications

- Healthcare policies, systems and providers should align to incorporate secure messaging and the shared record into care as part of larger efforts to ensure open access to care, whether over the phone, in person or through electronic means.
- Researchers should continue to understand and address why certain underserved populations are less likely to use secure messaging and the SMR.
- Use of secure messaging and the SMR can improve the clinical quality of diabetes care and may improve patient provider communication.

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26. Ralston JD, Coleman K, Reid RJ, Handley MR, Larson EB. Patient experience should be part of meaningful-use criteria. *Health Aff (Millwood)*. 2010;29(4):607-13.
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## List of Publications and Products

### Publications

1. Weppner WG, Ralston JD, Koepsell TD, et al. Use of a SMR with secure messaging by older patients with diabetes. *Diabetes Care*. Nov 2010;33(11):2314-2319.
2. Lyles CR, Harris LT, Jordan L, et al. Patient race/ethnicity and SMR use among diabetes patients. *Med Care*. May 2012;50(5):434-440.
3. Lyles CR, Grothaus L, Reid RJ, Sarkar U, Ralston JD. Communication about Diabetes Risk Factors during Between-Visit Encounters In revision to *American Journal of Managed Care*
4. Harris LT, Koepsell T, Lyles CR, et al. Shared Electronic Medical Record and Secure Messaging in Diabetes Care: An Analysis of Age-Related Differences in Use In submission to *Age and Aging*.
5. Harris LT, Koepsell TD, Haneuse SJ, Martin DP, Ralston JD. Glycemic Control Associated with Secure Patient-Provider Messaging within a Shared Electronic Medical Record: A Longitudinal Analysis In submission *Diabetes Care*.

### Posters and Presentations

1. Weppner W, Ralston JD, Koepsell T, et al. Use of a SMR among older patients with diabetes. Paper presented at: Society for General Internal Medicine Annual Session; Jun, 2009; Miami, FL.
2. Lyles CR, Harris LT, Jordan L, Reid RJ, Grothaus RJ, Ralston JD: Patient Race/Ethnicity and SMR Use among Diabetes Patients at Group Health Cooperative. Poster presented at Academy Health National Meeting, 2011.

### Manuscripts in Preparation

1. Ralston JD et al. Quality of Primary Care Provider Communication and Use of Secure Electronic Messaging quality of communication.
2. Reid RJ, Ralston JD et al. Continuity of Care and Use of Secure Patient Provider Messaging.
3. Ralston JD, Tufano J. Patient and Provider Experience with Secure Messaging and SMR Use.