### Table S1. Number and Percent of Sampled Patients by Health Condition

| Health Condition                              | Diabetes only | Hypertension only | Both diabetes and hypertension | Total   |
|-----------------------------------------------|---------------|-------------------|-------------------------------|---------|
| Patients who met health condition inclusion criteria and who were registered with the patient portal | 683           | 3,546             | 2,503                         | 6,732   |
| Patients who initiated a message thread in 2017, n (%) | 398 (58.3)    | 1,607 (45.3)      | 1,132 (45.2)                  | 3,137 (46.6) |
| Sampled patients, n (% of patients who initiated a message thread) | 398 (100)     | 394 (24.5)        | 239 (21.1)                    | 1,031 (32.9) |
| Total messages sent by patients               | 3,953         | 3,592             | 2,618                         | 10,163  |
| Total unique clinic staff who responded to sampled patients' messages* | 344           | 340               | 293                           | 544     |
| Total unique clinic staff who received sampled patients' messages* | 366           | 365               | 285                           | 567     |
| Total message responses sent by clinic staff  | 3,138         | 2,917             | 2,091                         | 8,146   |

*Unique senders or receivers by category; some clinicians received or responded to patients across categories.

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| Patient Characteristics | Task-oriented requests | Social Communication |
|-------------------------|------------------------|----------------------|
| **Information seeking**  | **Information sharing**  | **Task-oriented requests**  | **Social communication**  |
| Logistics               | Medical questions      | Follow-up or symptom care | Dislike                                |
| Medical questions       | Sharing biometrics    | Laboratory test or diagnostic procedure | Dislike praise                          |
| Sharing biometrics      | Logistics              | Social communication | Life issues                            |
| Logistics               | Medical questions      | Follow-up or symptom care |         |
| Medical questions       | Sharing biometrics    | Laboratory test or diagnostic procedure | Social communication |
Table S3. Odds Ratios (95% Confidence Intervals) Estimating the Association between Clinic Staff Characteristics and Patient-Generated Message Content

| Clinic staff characteristics | Information seeking | Information sharing | Task-oriented requests | Social communication |
|-----------------------------|---------------------|--------------------|-----------------------|---------------------|
|                            | Logistics           | Medical guidance   | Sharing clinic update | Prescription-related |
| Administrative staff        | 1.08 (0.55-2.11)    | 0.16 (0.07-0.39)   | 0.25 (0.11-0.54)      | 2.67 (1.18-6.05)    |
| Licensed practical nurse    | 1.71 (0.68-4.29)    | 0.8 (0.32-2.02)    | 1.1 (0.45-2.7)        | 1.26 (0.47-3.38)    |
| Nurse Practitioner          | 0.47 (0.23-0.97)    | 1.71 (0.79-3.7)    | 1.79 (0.87-3.68)      | 0.5 (0.23-1.12)     |
| Other clinician             | 1.44 (0.69-3.04)    | 1.27 (0.57-2.81)   | 1.05 (0.49-2.26)      | 0.47 (0.2-1.1)      |
| Registered Nurse            | 0.96 (0.59-1.56)    | 0.69 (0.41-1.16)   | 0.79 (0.49-1.3)       | 3.93 (2.18-7.11)    |
| Staff type (vs Physician)   |                     |                    |                       |                     |
| Administrative staff        | 1.08 (0.55-2.11)    | 0.16 (0.07-0.39)   | 0.25 (0.11-0.54)      | 2.67 (1.18-6.05)    |
| Licensed practical nurse    | 1.71 (0.68-4.29)    | 0.8 (0.32-2.02)    | 1.1 (0.45-2.7)        | 1.26 (0.47-3.38)    |
| Nurse Practitioner          | 0.47 (0.23-0.97)    | 1.71 (0.79-3.7)    | 1.79 (0.87-3.68)      | 0.5 (0.23-1.12)     |
| Other clinician             | 1.44 (0.69-3.04)    | 1.27 (0.57-2.81)   | 1.05 (0.49-2.26)      | 0.47 (0.2-1.1)      |
| Registered Nurse            | 0.96 (0.59-1.56)    | 0.69 (0.41-1.16)   | 0.79 (0.49-1.3)       | 3.93 (2.18-7.11)    |
| Clinical speciality (vs Primary care) |                       |                    |                       |                     |
| Not applicable              | 0.52 (0.32-0.84)    | 0.63 (0.39-1.01)   | 0.75 (0.48-1.18)      | 0.76 (0.43-1.35)    |
| Specialist                  | 1.1 (0.78-1.54)     | 1.35 (0.94-1.96)   | 1.03 (0.74-1.43)      | 1.03 (0.69-1.54)    |
| Number of messages sent in 2017 (vs >3400) |                       |                    |                       |                     |
| <=1000                      | 0.44 (0.32-0.59)    | 0.29 (0.2-0.42)    | 0.51 (0.37-0.69)      | 0.32 (0.23-0.46)    |
| 1001-2000                   | 0.86 (0.63-1.18)    | 0.77 (0.53-1.11)   | 0.64 (0.46-0.88)      | 0.55 (0.39-0.79)    |
| 2001-3400                   | 1.16 (0.81-1.65)    | 1.74 (1.13-2.69)   | 1.11 (0.77-1.6)       | 1.67 (1.09-2.34)    |

Note: Each column represents a separate logistic regression model for which the dependent variable is the column header and the rows represent the independent variables. Models for self-reporting biometrics, new or changed prescription requests, appointment cancellation requests, follow-up appointment requests, requests for appointments for new conditions or symptoms, preventive care appointment requests, appreciation or praise, and life issues did not converge.

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| Clinic staff characteristics | Action response | Information seeking | Deferred information sharing | Information sharing | Recommendation to schedule appointment |
|-----------------------------|----------------|----------------------|-----------------------------|---------------------|-----------------------------------|
| Acknowledge                  | Denies request |                         |                             |                     |                                   |
| **Administrative staff**     | 0.38 (0.17-0.83) | 2.01 (1.14-3.55) | 0.21 (0.1-0.44) | 1.64 (0.71-3.78) | 0.75 (0.43-1.32) | 0.52 (0.3-0.92) | 0.04 (0.02-0.11) | 0.63 (0.37-1.08) | 0.12 (0.03-0.43) |
| Licensed practical nurse     | 1.83 (0.8-4.18) | 0.63 (0.32-1.26) | 1.28 (0.61-2.69) | 0.59 (0.15-2.3) | 0.97 (0.47-2.01) | 1.47 (0.73-2.95) | 0.85 (0.41-1.79) | 0.84 (0.42-1.69) | 1.08 (0.42-2.73) |
| Nurse Practitioner           | 2.21 (0.93-5.26) | 0.78 (0.37-1.64) | 3.21 (1.42-7.25) | 2.18 (0.57-8.24) | 1.49 (0.68-3.28) | 1.17 (0.54-2.51) | 2.74 (1.12-6.68) | 0.94 (0.42-2.13) | 2.18 (0.9-5.24) |
| Other clinician              | 0.47 (0.16-1.41) | 1.36 (0.68-2.72) | 0.63 (0.26-1.53) | 0.4 (0.07-2.27) | 0.54 (0.24-1.22) | 0.7 (0.34-1.47) | 1.42 (0.68-2.95) | 1.72 (0.81-3.63) | 1.08 (0.41-2.85) |
| Registered Nurse             | 1.38 (0.8-2.38) | 0.97 (0.63-1.5) | 1.36 (0.85-2.18) | 1.34 (0.64-2.84) | 1.14 (0.72-1.78) | 1.61 (1.04-2.49) | 1.4 (0.87-2.26) | 1.66 (1.04-2.63) | 1.44 (0.82-2.53) |
| Specialist                   | 0.52 (0.27-1.01) | 1.14 (0.68-1.9) | 1.38 (0.78-2.47) | 1.52 (0.58-4.02) | 0.98 (0.57-1.68) | 0.85 (0.5-1.45) | 0.82 (0.46-1.43) | 0.66 (0.38-1.14) | 0.87 (0.47-1.59) |
| Not applicable               | 1.32 (0.81-2.13) | 0.88 (0.59-1.33) | 0.8 (0.5-1.29) | 0.93 (0.42-2.08) | 0.81 (0.53-1.26) | 1.09 (0.72-1.67) | 0.9 (0.55-1.46) | 1.23 (0.79-1.93) | 1.08 (0.69-1.71) |
| **Clinical speciality (vs Primary care)** |                         |                             |                             |                     |                                   |                     |                     |                     |
| Medical guidance             | 0.41 (0.27-0.61) | 0.46 (0.34-0.63) | 0.47 (0.32-0.68) | 0.54 (0.3-0.99) | 0.41 (0.29-0.56) | 0.51 (0.37-0.69) | 0.3 (0.21-0.43) | 0.48 (0.35-0.66) | 0.51 (0.34-0.78) |
| Orientation to procedures, treatments, or preventive behaviors | 0.71 (0.49-1.02) | 0.78 (0.57-1.07) | 0.56 (0.39-0.81) | 0.72 (0.4-1.28) | 0.45 (0.32-0.63) | 0.53 (0.38-0.73) | 0.81 (0.56-1.17) | 0.67 (0.48-0.93) | 0.67 (0.45-1.00) |
| Information sharing          | 1 (0.69-1.46) | 1.1 (0.78-1.56) | 1.35 (0.95-1.92) | 0.82 (0.44-1.5) | 1.66 (1.18-2.34) | 1.12 (0.8-1.57) | 1.57 (1.03-2.38) | 1.24 (0.84-1.83) | 1.33 (0.91-1.95) |

Notes: Each column represents a separate logistic regression model for which the dependent variable is the column header and the rows represent the independent variables. Model for Social communication/Encouragement did not converge.

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Table S5. Odds Ratios (95% Confidence Intervals) Estimating the Association between Patient Characteristics and Staff-Generated Message Content

| Patient Characteristics | Action response | Information seeking | Deferred information sharing | Information sharing | Recommendation to schedule appointment |
|-------------------------|----------------|---------------------|------------------------------|---------------------|----------------------------------------|
|                        | Acknowledge | Fulfills request | Partially fulfills request | Medical guidance | Orientation to procedures, treatments, or preventive behaviors |
| 18-59 years vs 60+ years | 0.83 (0.69-1.00) | 1.15 (0.96-1.38) | 0.76 (0.63-0.91) | 0.97 (0.81-1.15) | 1.05 (0.89-1.23) |
| Female vs Male          | 1.01 (0.84-1.21) | 0.82 (0.69-0.98) | 0.88 (0.74-1.05) | 1.03 (0.87-1.22) | 1.12 (0.95-1.31) |
| Race (vs White)         |                |                     |                             |                     |                         |
| Black                   | 0.88 (0.62-1.26) | 1.08 (0.79-1.49) | 0.99 (0.72-1.35) | 1.24 (0.91-1.69) | 0.85 (0.64-1.14) |
| Other race              | 0.74 (0.41-1.31) | 0.88 (0.53-1.46) | 1.23 (0.74-2.03) | 0.82 (0.5-1.35) | 1.3 (0.82-2.06) |
| Health condition (vs Both) |            |                     |                             |                     |                         |
| Diabetes                | 0.9 (0.71-1.15) | 0.9 (0.71-1.14) | 0.92 (0.73-1.17) | 1.14 (0.91-1.44) | 0.91 (0.74-1.13) |
| Hypertension            | 1.33 (1.04-1.69) | 0.9 (0.71-1.13) | 1.04 (0.82-1.32) | 0.88 (0.71-1.1) | 1.08 (0.88-1.33) |
| Non-urban vs Urban      | 1.2 (0.68-2.11) | 0.54 (0.32-0.92) | 1.26 (0.74-2.16) | 1.01 (0.59-1.72) | 1.19 (0.72-1.96) |
| Payer Type (vs Private payer) |            |                     |                             |                     |                         |
| Other payer             | 1.15 (0.7-1.89) | 1.18 (0.79-1.77) | 0.95 (0.58-1.55) | 1.53 (0.99-2.37) | 0.83 (0.58-1.19) |
| Public payer            | 1.12 (0.69-1.81) | 0.7 (0.48-1.04) | 1.29 (0.8-2.06) | 1.26 (0.83-1.92) | 1.04 (0.73-1.46) |
| Uninsured               | 0.69 (0.2-2.42) | 1.06 (0.42-2.69) | 0.54 (0.16-1.86) | 0.37 (0.13-1.06) | 1.67 (0.73-3.81) |
| Number of threads initiated (vs 8+) |             |                     |                             |                     |                         |
| 1                       | 0.25 (0.14-0.43) | 0.14 (0.1-0.2) | 0.13 (0.06-0.26) | 0.14 (0.1-0.2) | 0.27 (0.19-0.37) |
| 2                       | 0.5 (0.3-0.83) | 0.46 (0.33-0.64) | 0.51 (0.31-0.85) | 0.56 (0.4-0.77) | 0.49 (0.35-0.68) |
| 3-4                     | 0.71 (0.48-1.06) | 1.07 (0.79-1.44) | 1.35 (0.94-1.94) | 0.87 (0.66-1.15) | 0.88 (0.67-1.16) |
| 5-7                     | 1.93 (1.38-2.72) | 1.57 (1.13-2.17) | 1.92 (1.35-2.72) | 1.83 (1.37-2.45) | 1.70 (1.29-2.24) |
| Distance to clinic in miles (vs 40+) |             |                     |                             |                     |                         |
| 0-8                     | 0.93 (0.68-1.25) | 1.13 (0.84-1.53) | 0.95 (0.71-1.28) | 1.1 (0.83-1.47) | 0.95 (0.73-1.23) |
| 9-16                    | 1.23 (0.92-1.63) | 1.08 (0.81-1.44) | 0.96 (0.68-1.21) | 0.99 (0.75-1.3) | 1.25 (0.97-1.62) |
| 17-39                   | 1.4 (0.68-1.24) | 0.93 (0.71-1.22) | 1.08 (0.82-1.43) | 1.17 (0.9-1.52) | 0.93 (0.72-1.19) |
| Number of co-occurring conditions (vs 6-9) |             |                     |                             |                     |                         |
| 1                       | 0.83 (0.55-1.24) | 0.92 (0.64-1.32) | 0.79 (0.53-1.18) | 1.24 (0.87-1.77) | 1.17 (0.83-1.63) |
| 2                       | 0.98 (0.71-1.34) | 0.96 (0.71-1.29) | 0.85 (0.62-1.17) | 0.82 (0.62-1.1) | 0.93 (0.71-1.22) |
| 3-5                     | 0.85 (0.66-1.1) | 0.95 (0.73-1.24) | 1.08 (0.84-1.39) | 0.92 (0.72-1.18) | 0.93 (0.74-1.17) |
| Number of outpatient visits (vs 21+) |             |                     |                             |                     |                         |
| 1-5                     | 0.9 (0.59-1.38) | 1.16 (0.82-1.65) | 0.99 (0.66-1.48) | 0.97 (0.69-1.36) | 0.77 (0.55-1.06) |
| 6-10                    | 0.86 (0.6-1.22) | 1.01 (0.72-1.41) | 1.04 (0.75-1.44) | 1.19 (0.87-1.63) | 1.11 (0.83-1.49) |
| 11-15                   | 0.85 (0.57-1.27) | 1.5 (1.00-2.40) | 1.26 (0.87-1.83) | 0.78 (0.53-1.13) | 0.89 (0.63-1.27) |
| 16-20                   | 1.45 (1.04-2.02) | 0.88 (0.66-1.19) | 0.89 (0.64-1.23) | 0.93 (0.69-1.24) | 1.05 (0.8-1.38) |

Notes: Each column represents a separate logistic regression model for which the dependent variable is the column header and the rows represent the independent variables. Models for request denials and Social communication/Encouragement did not converge.