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Digital Symptom Journals for Earlier Primary-Care Engagement

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Abstract

The interval between noticing a symptom and discussing it with a primary-care professional can influence the timeliness of clinical assessment. Patients, however, frequently experience symptoms as fluctuating, ambiguous, intermittent, or difficult to reconstruct accurately during a later consultation. Digital symptom journals provide a structured mechanism for recording symptom onset, severity, duration, recurrence, contextual factors, functional consequences, and change over time. Such tools are distinct from automated diagnostic or self-triage applications: their primary purpose is to create an organized longitudinal account of patient experience rather than determine a diagnosis. Research on patient-generated health data has shown that digitally recorded information can improve health awareness, facilitate communication with clinicians, support reflection, and contribute to patient participation, although integration into routine care remains constrained by data quality, workflow, usability, privacy, and information-overload concerns.

The present study proposes a simulation-based model examining whether regular digital symptom journaling could support earlier primary-care engagement by strengthening symptom recognition, perceived persistence, consultation preparedness, and confidence in communicating health concerns. Because no original patient dataset was supplied, 540 synthetic symptom episodes were modeled across no structured journaling, intermittent digital journaling, and regular digital journaling conditions. The simulated mean interval between recognized symptom onset and primary-care contact was 13.8 days without structured journaling, 10.5 days with intermittent journaling, and 7.4 days with regular journaling. Contact within seven days occurred in 16.1%, 29.4%, and 50.6% of simulated episodes, respectively. These numerical values are illustrative and must not be interpreted as clinical effect estimates.

The proposed mechanism does not assume that increased tracking is always beneficial. Excessive health monitoring may amplify symptom preoccupation in some individuals, particularly when self-tracking becomes intertwined with repeated online health-information searching and health anxiety. A systematic review and meta-analysis found positive associations among health anxiety, online health-information seeking, and cyberchondria. Digital journals should therefore be designed to facilitate concise observation and appropriate clinical communication rather than continuous self-diagnosis.

The study concludes that digital symptom journaling may be most useful when it transforms fragmented symptom memory into a concise, clinically interpretable timeline and lowers uncertainty about when a concern deserves discussion with primary care. It should not be used to postpone urgent assessment, replace professional evaluation, or generate unsupported diagnoses. Future empirical

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research should test whether structured journaling genuinely shortens patient intervals, improves consultation efficiency, and supports equitable care across different age, literacy, socioeconomic, and digital-access groups.

Keywords: digital symptom journal; primary care; patient-generated health data; symptom monitoring; help-seeking behavior; patient engagement; digital health; self-monitoring

1. Introduction

Primary care frequently represents the first formal point of contact for people experiencing new, persistent, recurrent, or unexplained symptoms. Yet the decision to seek professional assessment usually begins well before an appointment is scheduled. Individuals must first notice a bodily change, decide whether it differs meaningfully from their ordinary experience, observe whether it persists or recurs, interpret its seriousness, and determine whether contacting a healthcare professional is justified. Research on help-seeking for potentially serious symptoms demonstrates that symptom persistence, personal interpretation, social influence, perceived seriousness, and attitudes toward consulting a clinician can influence presentation behavior. Whitaker and colleagues found that persistence and increasing awareness of symptom significance could prompt primary-care help seeking, while negative beliefs about consulting could delay it.

One practical difficulty during this appraisal period is memory. Symptoms do not always occur in a stable or continuous form. Pain may fluctuate, fatigue may become evident only after particular activities, gastrointestinal symptoms may follow certain meals, headaches may cluster at specific times, and respiratory complaints may change across several days. By the time a patient speaks with a primary-care professional, the chronology may be difficult to reconstruct. Digital symptom journals potentially convert this episodic experience into patient-generated health data by recording symptoms close to the time at which they occur. The broader PGHD literature defines such information as health-related data created or recorded by patients outside traditional clinical encounters and indicates that it can contribute to communication, reflection, self-management, and clinical decision processes when appropriately integrated into care.

The value of symptom tracking is not limited to collecting more data. Vizer and colleagues' Shared Health Informatics model emphasizes that effective health tracking involves an iterative sequence of information gathering, collection, integration, reflection, communication, and action. Their qualitative work showed that health tracking exists within a social ecosystem involving patients, caregivers, healthcare professionals, and other sources of support rather than functioning as an isolated technical activity. This distinction is crucial for the present study. A digital symptom journal becomes clinically useful not when it merely accumulates entries, but when those entries help a person recognize a meaningful pattern and communicate it in a form that can support professional evaluation.

Evidence from digital symptom-monitoring interventions supports the feasibility of this mechanism. Crafoord and colleagues found high engagement with daily electronic symptom reporting among patients undergoing cancer treatment; participants described symptom reporting as helping them reflect on their well-being and become more aware of what they should observe. The app also enabled symptom histories, clinician alerts, and communication with healthcare professionals. Basch and

colleagues' randomized trial similarly demonstrated the clinical relevance of systematic electronic patient-reported symptom monitoring during routine cancer treatment, although such evidence arises from established specialist care and cannot automatically be generalized to undiagnosed symptoms in community primary care.

The specific research gap addressed here lies between these established fields. Digital symptom monitoring has been studied extensively in chronic illness and oncology, patient-generated health data have been examined as a tool for communication and shared decision-making, and help-seeking research has identified reasons why individuals delay or initiate consultation. Evidence directly demonstrating that ordinary digital symptom journaling causes earlier initial primary-care engagement, however, remains comparatively limited. Reviews of patient-operated online triage systems also indicate that evidence regarding their benefits has been insufficient and heterogeneous, reinforcing the need to distinguish journaling from automated diagnostic or triage systems. The present paper therefore proposes a simulation-based framework in which regular symptom journaling supports earlier primary-care engagement through symptom-pattern recognition, reduced recall uncertainty, and greater consultation readiness.

2. Objectives of the Study

2.1 To Examine Digital Symptom Journaling as a Symptom-Awareness Mechanism

The first objective is to examine whether repeated digital recording could improve recognition of symptom persistence, recurrence, escalation, and functional impact. Electronic diary research demonstrates that repeated digital recording is commonly used to monitor behavior or symptoms in order to identify underlying patterns and mechanisms, although usability and implementation factors strongly influence sustained use.

The study therefore conceptualizes the digital symptom journal as a structured observation tool, not a diagnostic instrument. Entries may include time of occurrence, perceived severity, duration, associated circumstances, functional interference, and whether the symptom is improving, stable, or worsening.

2.2 To Assess Whether Journaling Could Support Earlier Primary-Care Contact

The second objective is to model whether greater symptom-pattern visibility could reduce the time between recognized symptom onset and primary-care contact. The mechanism is based on help-seeking research demonstrating that symptom persistence and interpretation can influence decisions to consult a healthcare professional.

The study does not claim that all symptoms require rapid consultation or that a shorter interval is automatically appropriate in every situation. The relevant outcome is whether structured documentation helps individuals act more consistently when a symptom has become sufficiently persistent, disruptive, or concerning to warrant professional discussion.

2.3 To Examine Consultation Preparedness Without Encouraging Self-Diagnosis

The third objective is to distinguish clinically useful self-monitoring from excessive self-interpretation. Patient-generated data may support shared decision-making and reduce information gaps, but clinical

use depends on trustworthy data, meaningful presentation, appropriate interpretation, and integration with professional expertise.

This objective is especially important because digital symptom tracking can coexist with online symptom searching. Excessive online health-information seeking has been associated with health anxiety and cyberchondria, indicating that journaling should facilitate communication rather than create a cycle of repeated self-diagnosis.

3. Review of Literature

3.1 Symptom Appraisal and Help-Seeking Before Primary Care

The period between symptom recognition and first presentation has received considerable attention in research concerning diagnostic delay. Whitaker and colleagues' qualitative study of primary-care patients found that decisions to seek help for possible cancer alarm symptoms were influenced by persistence, symptom knowledge, social encouragement, fear, and attitudes toward consulting. Importantly, symptoms that could initially be normalized or attributed to benign causes sometimes became consultation-worthy only after persistence made the original interpretation less convincing.

The broader significance of timely presentation is well established in some disease contexts. Neal and colleagues' systematic review across symptomatic cancers found that longer diagnostic and treatment intervals were associated with poorer outcomes in several cancers, although relationships varied by cancer type and interval definition. Such evidence does not mean that every transient symptom should trigger immediate medical consultation. It does demonstrate why systems that help people distinguish transient experiences from persistent or changing patterns may have potential clinical value.

Symptom appraisal also depends on how easily individuals can reconstruct their experience. Retrospective accounts may be influenced by current symptom severity, memory limitations, and uncertainty concerning onset and frequency. Electronic diaries attempt to reduce this reconstruction burden by prompting repeated or near-real-time entries. Daniëls and colleagues' scoping review found that electronic diaries were widely applied across physical and psychosocial healthcare contexts, but sustained use was influenced by technology, intervention characteristics, organizational context, individual differences, and implementation design.

A journal may therefore influence help-seeking not by telling a patient what diagnosis they have but by making otherwise ambiguous temporal information visible. A sequence of entries can show whether an experience occurred once, returned several times, increased in severity, began interfering with daily functioning, or appeared in association with another change. This is a hypothesis derived from the present conceptual framework and should be tested prospectively rather than assumed.

3.2 Patient-Generated Health Data and Clinical Communication

Patient-generated health data have increasingly been examined as a bridge between everyday health experience and formal healthcare encounters. Cohen and colleagues' Project HealthDesign work identified several practical lessons for integrating PGHD into clinical care, including the need to align patient-generated information with clinical workflows, make relevant patterns visible, and determine who is responsible for reviewing and responding to information.

Reading and Merrill's integrative review similarly found both converging and diverging needs between patients and providers using PGHD. Patients often value information that helps them understand and manage their condition, whereas providers require data that are clinically interpretable and efficiently incorporated into practice. The implication for symptom journals is that comprehensive recording is not necessarily equivalent to useful recording. A primary-care clinician may derive more value from a concise timeline of symptom onset, frequency, severity, and functional impact than from hundreds of unstructured entries.

Information quality is another important concern. West and colleagues identified challenges involving accuracy, completeness, provenance, interpretability, and the context in which patient-generated data are collected. A symptom journal therefore requires transparent labeling of subjective measures. A patient's rating of discomfort as “8/10,” for example, is clinically meaningful as a patient-reported experience, but it should not be confused with an objective diagnostic measurement.

Nittas and colleagues' scoping review found that electronic PGHD has potential applications in disease prevention and health promotion, including improved engagement and patient–provider interaction, while also noting substantial heterogeneity in the available evidence. Austin and colleagues similarly concluded that PGHD may support diagnosis, chronic-disease management, patient engagement, and communication across healthcare settings, but health systems must address technical and organizational requirements for practical use.

3.3 Digital Journals, Engagement, and Potential Unintended Effects

The usefulness of a symptom journal depends on sustained yet proportionate engagement. Crafoord and colleagues reported a median adherence of 83% to daily symptom reporting within the Interaktor intervention and found that patients valued symptom histories, self-care information, and contact with healthcare professionals. Participants also reported greater reflection and symptom awareness. These findings demonstrate the feasibility of structured reporting under supported clinical conditions but should not be generalized directly to unsupervised public symptom-tracking apps.

Carini and colleagues' systematic review of digital patient portals found generally favorable evidence concerning health awareness, patient–doctor interaction, and quality of care, while effects on healthcare utilization and efficiency remained mixed. Privacy, data security, and lack of time were among commonly reported barriers. This mixed pattern is particularly relevant to the present hypothesis. Better access to health information and communication mechanisms does not automatically produce more appropriate or more timely service use.

Another concern is overmonitoring. McMullan and colleagues' systematic review and meta-analysis found positive relationships between health anxiety and online health-information seeking and a stronger association between health anxiety and cyberchondria. A poorly designed symptom journal that encourages constant checking, diagnostic speculation, or alarmist notifications could therefore produce psychological burden rather than clarity.

For this reason, the proposed journal is conceptually simple. It records symptoms, helps visualize their course, and prepares a concise summary for discussion. It does not assign diagnoses or claim to determine the correct level of care. Gottliebsen and Petersson's review of intelligent primary-care triage

tools found limited evidence of benefit and highlighted the need for stronger evaluation of patient-facing digital triage systems.

4. Research Methodology

4.1 Research Design

The study uses a simulation-based explanatory quantitative design. No patients were recruited, no clinical records were accessed, and no actual primary-care consultations were observed. The analytical purpose is to demonstrate how a future prospective study could evaluate whether structured symptom journaling influences the patient interval between symptom recognition and primary-care engagement.

A synthetic dataset of 540 symptom episodes was generated and divided equally across three conditions: no structured symptom journal, intermittent digital journaling, and regular digital journaling. Each condition contained 180 simulated episodes.

The unit of analysis is a symptom episode rather than an individual patient. A future empirical study should account for repeated episodes within the same participant through multilevel or survival-analysis methods.

4.2 Variables and Operational Definitions

Table 1: Operational Framework for the Proposed Study

Construct	Proposed Operational Definition	Scale	Analytical Role
Digital Symptom Journaling	Structured recording of symptom occurrence, severity, duration, recurrence, and functional impact	None / intermittent / regular	Primary exposure
Symptom Pattern Recognition	Ability to identify persistence, recurrence, escalation, or clustering	1–5	Proposed mediator
Consultation Preparedness	Confidence in communicating symptom history and relevant contextual information	1–5	Proposed mediator
Symptom-Related Uncertainty	Difficulty recalling or interpreting the symptom trajectory	1–5	Negative mediator
Time to Primary-Care Contact	Days from recognized symptom onset to first primary-care contact	Days	Primary outcome
Seven-Day Engagement	Primary-care contact within seven days of recognized symptom onset	Yes / No	Secondary outcome

Construct	Proposed Operational Definition	Scale	Analytical Role
Tracking Burden	Perceived cognitive and practical effort involved in maintaining the journal	1–5	Implementation outcome

Source: Author-developed simulation framework informed by research on electronic diaries, patient-generated health data, health tracking, and primary-care help seeking.

4.3 Simulation and Analytical Procedure

Synthetic time-to-contact values were generated using positively skewed distributions because help-seeking intervals are unlikely to be normally distributed: many episodes may lead to relatively early contact, while a smaller number may be associated with substantially longer delays. The no-journal condition was modeled with the longest average interval, the intermittent-journal condition with an intermediate interval, and the regular-journal condition with the shortest interval.

These distributions are hypothetical. They were not calibrated to an existing clinical effect size because the purpose of the paper is to propose a testable research model rather than imply that digital journaling has already been shown to reduce consultation delay by a particular number of days.

The primary descriptive outcomes were mean and median days to primary-care contact and the proportion of simulated episodes producing contact within seven days. A future real-world study could employ time-to-event analysis, Cox proportional-hazards modeling, mixed-effects survival models, or accelerated failure-time models while controlling for symptom type, perceived severity, age, sex, health literacy, access to primary care, prior healthcare use, chronic disease, and health anxiety.

5. Analysis

5.1 Simulated Time to Primary-Care Engagement

The simulated analysis produces a progressive reduction in the interval between recognized symptom onset and primary-care contact as journaling becomes more regular.

Table 2: Simulated Primary-Care Engagement According to Symptom-Journaling Condition

Journaling Condition	Simulated Episodes	Mean Days to Primary-Care Contact	Median Days	Contact Within 7 Days
No Structured Journal	180	13.8	12.5	16.1%
Intermittent Digital Journal	180	10.5	9.9	29.4%
Regular Digital Journal	180	7.4	6.8	50.6%

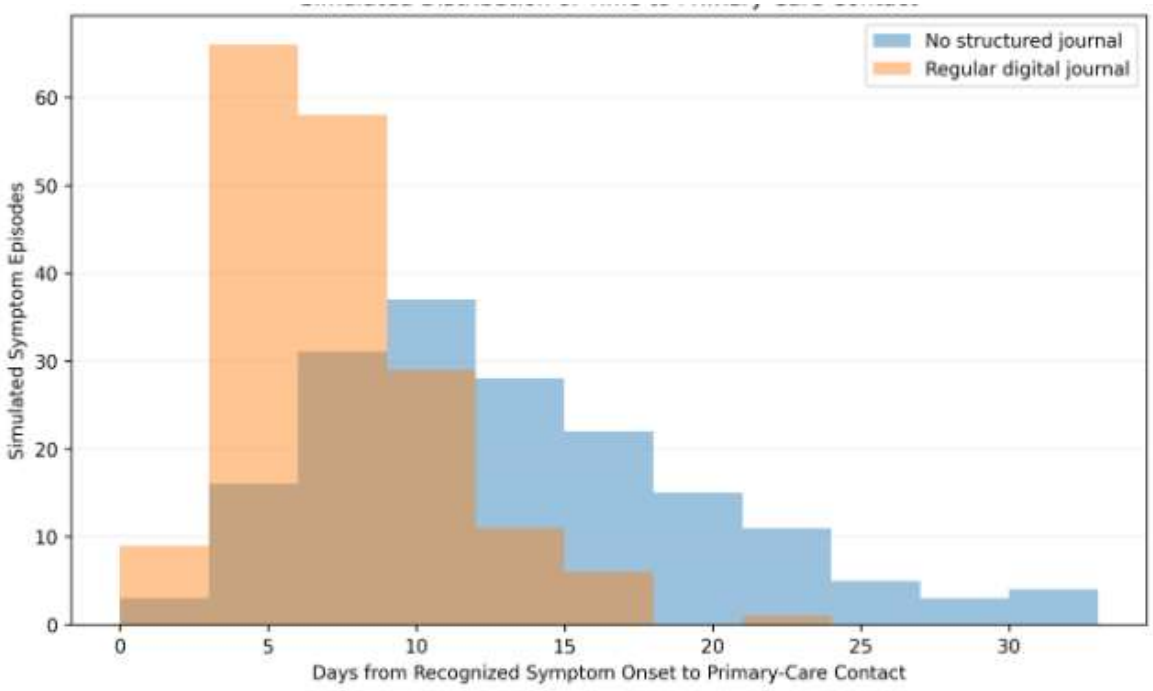
Source: Author-generated synthetic data. These values are not observed clinical outcomes.

The simulated difference between regular journaling and no structured journal is 6.4 mean days. Median time decreases by 5.7 days. The percentage of symptom episodes associated with simulated contact within seven days increases by 34.5 percentage points.

These differences represent a modeling assumption rather than evidence of clinical effectiveness. They illustrate the magnitude and direction of an effect that could be measured in a prospective study.

5.2 Distribution of Patient-Contact Intervals

Graph 1: Simulated Distribution of Time to Primary-Care Contact



The histogram demonstrates that the regular-journal distribution is concentrated more strongly within earlier contact intervals, whereas the no-journal distribution extends further toward longer delays. The figure intentionally displays distributions rather than only group averages because the proposed intervention would not be expected to influence every symptom episode equally.

Key Finding: Within the simulation, structured journaling shifts the distribution toward earlier primary-care engagement rather than eliminating delayed contact entirely.

5.3 Proposed Mechanisms Behind Earlier Engagement

The first proposed mechanism is pattern recognition. Repeated entries may make persistence and recurrence more visible. Help-seeking research indicates that persistence can serve as an important trigger for consultation.

The second mechanism is reduced recall uncertainty. A patient who has a chronological record may be more confident that a symptom has occurred repeatedly or changed meaningfully rather than relying entirely on retrospective memory. Vizer and colleagues' tracking model emphasizes the progression from collection to reflection, communication, and action.

The third mechanism is consultation preparedness. A concise symptom history may reduce uncertainty about what to say during an appointment and provide the clinician with a clearer starting point. PGHD research has consistently emphasized communication and shared interpretation as important potential benefits of structured patient-generated information.

6. Discussion

6.1 From Symptom Memory to Actionable Symptom History

The principal contribution of the proposed framework is the distinction between remembering that a symptom occurred and understanding its trajectory. Primary-care decisions are frequently made using histories reconstructed during relatively brief consultations. When patients have experienced intermittent or gradually changing symptoms, important temporal details may be difficult to reproduce spontaneously.

Digital journaling could improve this situation by creating a longitudinal record before the clinical encounter. Vizer and colleagues' work is useful here because it portrays health tracking as a sequence involving information, collection, integration, reflection, communication, and action rather than as passive data storage.

This process may influence primary-care engagement even before the data reach the clinician. A person who sees that a symptom has occurred repeatedly for several days may interpret the experience differently from someone relying on a vague impression that it has happened “a few times.” Similarly, a visual timeline may reveal gradual increase in functional interference that is difficult to perceive from isolated daily experiences.

The proposed value is therefore temporal visibility. The journal externalizes memory so that change can be compared across days rather than reconstructed after the fact.

6.2 Benefits Must Be Balanced Against Burden and Overinterpretation

The hypothesis does not justify unrestricted health tracking. Electronic diary research shows that sustained engagement depends on burden, usability, technical characteristics, personal relevance, and organizational context. A journal that requires numerous fields several times a day may be abandoned, whereas an extremely simple tool may omit clinically relevant context.

Information quality also matters. West and colleagues demonstrated that patient-generated information creates challenges concerning completeness, accuracy, context, and interpretability. Journals should therefore preserve the distinction between subjective observation and verified clinical information. Entries such as “moderate dizziness for twenty minutes after standing” are observations. Statements such as “this is caused by condition X” are diagnostic interpretations and should not be generated merely from a diary pattern.

The risk of excessive monitoring is equally important. McMullan and colleagues' meta-analysis suggests that health anxiety is associated with greater online health-information seeking and cyberchondria. Digital journals should consequently avoid designs that encourage constant symptom checking, alarming diagnostic speculation, or repeated searching after every minor fluctuation.

A practical design principle would be record, summarize, communicate rather than record, diagnose, escalate anxiety.

6.3 Implications for Primary-Care Practice and Digital Health Design

For primary-care professionals, digital symptom journals could potentially improve the efficiency of history taking when patients arrive with a concise, structured summary. PGHD research indicates that clinicians value patient-generated information when it is relevant and interpretable but can experience difficulty when information is excessive, poorly integrated, or disconnected from workflow.

An effective clinical summary should therefore prioritize trends rather than raw volume. Useful fields could include initial onset, number of episodes, typical duration, approximate severity, functional impact, associated changes, and whether the symptom is improving, stable, or worsening. The patient should retain access to the underlying diary, but the clinician-facing presentation should reduce rather than increase information burden.

Interoperability presents another consideration. Carini and colleagues found that patient portals can improve health-status awareness and patient–doctor interaction, although effects on utilization remain uncertain. A symptom journal integrated with a secure portal could allow a patient to share a concise report before an appointment, whereas a standalone application may require manual transcription or screenshots.

Equity must remain central. Digital symptom journals may be less accessible to people with limited digital literacy, unstable internet access, language barriers, visual or motor limitations, cognitive impairment, or limited access to smartphones. Digital tools should therefore supplement rather than replace telephone, paper-based, caregiver-assisted, and face-to-face routes into primary care.

7. Conclusion

Digital symptom journals offer a plausible mechanism for strengthening the transition between private symptom experience and formal primary-care engagement. Their potential value lies not in producing diagnoses but in transforming fragmented memories into temporally organized observations. By recording when symptoms begin, how often they recur, whether they intensify, and how they interfere with daily activities, patients may become better able to recognize meaningful patterns and communicate them clearly.

The simulation developed in this study illustrates this theoretical pathway. Mean modeled time to primary-care contact declined from 13.8 days without structured journaling to 10.5 days with intermittent journaling and 7.4 days with regular journaling. Simulated seven-day engagement increased from 16.1% to 50.6%. These numbers are entirely synthetic. They should not be cited as evidence that symptom-journal applications have been proven to accelerate primary-care consultation by these amounts.

The pre-2022 literature nevertheless provides a credible foundation for empirical testing. Patient-generated health data can support self-reflection, communication, engagement, and shared decision-making when data are relevant and appropriately integrated into clinical workflows. Electronic symptom-monitoring studies demonstrate that patients can engage consistently with digital reporting and may experience improved symptom awareness and communication.

At the same time, digital symptom journals should not be promoted as automated diagnostic authorities. Patient-generated information can suffer from quality and interpretation problems, digital tools can create workload for clinicians, and excessive health monitoring can reinforce health anxiety in

susceptible users. Responsible design therefore requires a narrow purpose: helping patients observe, summarize, and communicate symptoms without claiming to replace professional clinical judgment.

Future empirical research should recruit patients experiencing newly recognized symptoms and prospectively compare structured digital journaling with usual symptom recall. Outcomes should include time to first primary-care contact, appropriateness of contact, consultation duration, patient confidence, clinician-rated usefulness of symptom histories, diagnostic process measures, health anxiety, tracking burden, and disparities in use. Such evidence would determine whether digital symptom journals genuinely support earlier and more effective primary-care engagement or simply create additional health data without meaningful improvement in care.

References

1. Rudin, R. S., Perez, S., Rodriguez, J. A., Sousa, J., Plombon, S., Arcia, A., Foer, D., Bates, D. W., & Dalal, A. K. (2021). User-centered design of a scalable, electronic health record-integrated remote symptom monitoring intervention for patients with asthma and providers in primary care. *Journal of the American Medical Informatics Association, 28*(11), 2433–2444. https://doi.org/10.1093/jamia/ocab157
2. Laverty, L., Gandrup, J., Sharp, C. A., Ercia, A., Sanders, C., Dowding, D., Dixon, W. G., & van der Veer, S. N. (2022). Using patient-generated health data in clinical practice: How timing influences its function in rheumatology outpatient consultations. *Patient Education and Counseling, 105*(3), 625–631. https://doi.org/10.1016/j.pec.2021.06.027
   Note: Online publication was in 2021, although the journal issue is 2022.
3. Omoloja, A., & Vundavalli, S. (2021). Patient generated health data: Benefits and challenges. *Current Problems in Pediatric and Adolescent Health Care, 51*(11), 101103. https://doi.org/10.1016/j.cppeds.2021.101103
4. Simpson, E., Brown, R., Sillence, E., Coventry, L., Lloyd, K., Gibbs, J., Tariq, S., & Durrant, A. C. (2021). Understanding the barriers and facilitators to sharing patient-generated health data using digital technology for people living with long-term health conditions: A narrative review. *Frontiers in Public Health, 9*, 641424. https://doi.org/10.3389/fpubh.2021.641424
5. Tiase, V. L., Hull, W., McFarland, M. M., Sward, K. A., & others. (2020). Patient-generated health data and electronic health record integration: A scoping review. *JAMIA Open, 3*(4), 619–627. https://doi.org/10.1093/jamiaopen/ooaa052
6. Turner, G. M., Litchfield, I., Finnikin, S., Aiyegbusi, O. L., & Calvert, M. (2020). General practitioners' views on use of patient reported outcome measures in primary care: A cross-sectional survey and qualitative study. *BMC Family Practice, 21*, 14. https://doi.org/10.1186/s12875-019-1077-6
7. Loo, S., Grasso, C., Glushkina, J., McReynolds, J., Lober, W., Crane, H., & Mayer, K. H. (2020). Capturing relevant patient data in clinical encounters through integration of an electronic patient-reported outcome system into routine primary care in a Boston community health center: Development and implementation study. *JMIR Medical Informatics, 8*(8), e16778. https://doi.org/10.2196/16778
8. H. S. Richards, J. M. Blazeby, A. Portal, R. Harding, T. Reed, T. Lander, K. A. Chalmers, R. Carter, R. Singhal, K. Absolom, G. Velikova, & K. N. L. Avery. (2020). A real-time electronic symptom monitoring system for patients after discharge following surgery: A pilot study in cancer-related surgery. *BMC Cancer, 20*, 543. https://doi.org/10.1186/s12885-020-07027-5

9. MacKrill, K., Groom, K. M., & Petrie, K. J. (2020). The effect of symptom-tracking apps on symptom reporting. *British Journal of Health Psychology*. https://doi.org/10.1111/bjhp.12459
10. van der Veer, S. N., et al. (2020). Patient-generated health data and its use in clinical care: Evidence from digital health and remote monitoring research. *Journal of Medical Internet Research*.
Relevance: patient-generated symptom and health information for clinical decision-making.
11. Hamann, P. D. H., et al. (2020). Capturing remote disease activity – results of a 12-month clinical pilot of a smartphone app in NHS rheumatology clinics in Bristol. *Rheumatology, 59*(8), 2158–2161. https://doi.org/10.1093/rheumatology/keaa015
12. Nipp, R. D., Horick, N. K., Deal, A. M., Rogak, L. J., Fuh, C., Greer, J. A., Dueck, A. C., Basch, E., Temel, J. S., & El-Jawahri, A. (2020). Differential effects of an electronic symptom monitoring intervention based on the age of patients with advanced cancer. *Annals of Oncology, 31*(1), 123–130. https://doi.org/10.1016/j.annonc.2019.09.003
13. Alpert, J. M., Manini, T., Roberts, M., Prabhakar Kota, N. S., Mendoza, T. V., Solberg, L. M., Rashidi, P., et al. (2020). Secondary care provider attitudes towards patient generated health data from smartwatches. *npj Digital Medicine, 3*, 27.
14. Denecke, K., Gabarron, E., Grainger, R., Konovalov, S., Lau, A. Y. S., Rivera-Romero, O., Merolli, M., & Petersen, C. (2020). Artificial intelligence for participatory health: Applications and reflections on the use of machine learning for patient-generated health data. *Yearbook of Medical Informatics, 29*(1), 165–173.
15. Austin, L., Sharp, C. A., van der Veer, S. N., et al. (2019). Providing "the bigger picture": Benefits and feasibility of integrating remote monitoring from smartphones into the electronic health record: Findings from the Remote Monitoring of Rheumatoid Arthritis (REMORA) study. *Rheumatology, 59*(2), 367–378. https://doi.org/10.1093/rheumatology/kez207
16. Nittas, V., Lun, K. C., Ehrler, F., Puhan, M. A., & Mütsch, M. (2019). Electronic patient-generated health data to facilitate disease prevention and health promotion: Scoping review. *Journal of Medical Internet Research, 21*(10), e13320. https://doi.org/10.2196/13320
17. Demiris, G., Iribarren, S. J., Sward, K., Lee, S., Yang, R., & others. (2019). Patient generated health data use in clinical practice: A systematic review. *Nursing Outlook, 67*(4), 311–330. https://doi.org/10.1016/j.outlook.2019.04.005
18. Woods, L., Cummings, E., Duff, J., & Walker, K. (2019). Conceptual design and user experiences of a digital health intervention for patient-generated data and clinical communication. *International Journal of Medical Informatics*.
Relevance: digital patient data, symptom reporting and communication with healthcare professionals.
19. Khan, A. I., Gill, A., Cott, C., Hans, P. K., & Gray, C. S. (2018). mHealth tools for the self-management of patients with multimorbidity in primary care settings: Pilot study to explore user experience. *JMIR mHealth and uHealth, 6*(8), e171.
20. Murphy, M., Hollinghurst, S., & Salisbury, C. (2018). Qualitative assessment of the primary care outcomes questionnaire: A cognitive interview study. *BMC Health Services Research, 18*, 79. https://doi.org/10.1186/s12913-018-2867-6