

Perspective

A Framework for Scalable and Sustainable Remote Patient Monitoring in Type 1 Diabetes Care

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Abstract

Despite increasing use of continuous glucose monitoring (CGM) and automated insulin delivery, most children and adolescents living with type 1 diabetes (T1D) in the US do not achieve recommended glycemic targets. Structured, proactive support improves glycemic outcomes, but diabetes teams have historically lacked reimbursement pathways and scalable workflows to support between-visit care. The introduction of remote patient monitoring (RPM) billing codes has created new opportunities to align clinical need with care delivery models, although adoption remains limited. We describe implementation experiences from three pediatric diabetes centers that developed RPM programs across distinct clinical populations and institutional environments. Each site developed workflows for data review, patient outreach, documentation, and billing, supported by digital platforms designed to facilitate population-level management. Common themes emerged around needs for structured patient onboarding, multidisciplinary team alignment, standardized documentation, efficient data aggregation and population health management tools, adaptable communication pathways, and financial alignment. This practice-informed commentary synthesizes common themes across these programs and outlines key considerations for RPM implementation, including workflow design, digital infrastructure, communication strategies, and reimbursement structures. We also highlight practical challenges related to equity, patient engagement, and operational feasibility. This report aims to contextualize early clinical experience with RPM and identify factors that may influence its integration into pediatric diabetes care.

Keywords: pediatric diabetes; type 1 diabetes; remote patient monitoring; diabetes technology



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1. Introduction

Most individuals living with type 1 diabetes in the US do not meet the glycemic target of HbA1c < 7%, placing them at risk for microvascular and macrovascular complications [1,2]. Over the past decade, global HbA1c trends have improved among children and adolescents, although US outcomes lag behind those of other high-income countries [3]. These improvements are strongly associated with increased uptake of continuous glucose monitoring (CGM) and automated insulin delivery (AID) [3,4]. However, although US

pediatric diabetes clinics report comparatively high CGM and AID uptake, this substantial use has not translated into outcomes that match those achieved in peer nations, including some with lower or more variable technology penetration. Combining diabetes technology adoption in the early months after diagnosis with intensive, proactive support from the clinical team improves outcomes for at least the first three years compared to high technology use alone [5]. Therefore, focusing on how care is delivered to youth using diabetes technology beyond increased device adoption alone is essential to improving outcomes.

Unfortunately, while advances in diabetes technology have increased the availability of real-time physiologic data, most clinics lack the ability to translate these data streams into timely clinical action. Remote patient monitoring (RPM) programs represent one approach to redesigning care delivery through more timely and data-driven outreach. As patient panels grow and data streams multiply, population-level tools may help enable prioritization and task redistribution, although implementation remains complex and context-dependent. Digital platforms can organize the data for this paradigm so that RPM can be scaled to benefit a large number of patients simultaneously.

Type 1 diabetes is a complex disease requiring frequent interaction with the care team. The traditional US fee-for-service model provides reimbursement for discrete billable services, such as clinic visits, procedures, or interpretation of glucose data, rather than for the overall management of a chronic condition. As a result, this paradigm incentivizes episodic encounters, often after clinical deterioration, rather than continuous, proactive engagement. Nonbillable activities performed by the care team account for nearly \$100,000 per year for the patient panel of a single provider [6,7]. Given these factors, it is unsurprising that over half of pediatric endocrinology practices report financial losses, pediatric endocrinologists are among the most poorly reimbursed physicians, and a continued pediatric endocrinology workforce shortage threatens patients' access to care [8–10]. Poor reimbursement may also play a role in the current Certified Diabetes Care and Education Specialist (CDCES) shortage [11]. Moreover, misalignment between clinical need and reimbursement opportunities has led to underutilization of continuously available, cloud-connected patient data from modern diabetes technology and secure messaging capabilities to assist patients between quarterly clinic visits. The US Centers for Medicare & Medicaid Services introduced remote patient monitoring (RPM) current procedural terminology (CPT) codes for medical billing in 2019 to help address this gap, creating a potential pathway to support chronic disease management through remote data collection, interpretation, and communication [12]. However, adoption has been variable, reflecting ongoing challenges in integrating these models into existing clinical workflows and institutional structures.

The three diabetes care teams represented in this manuscript independently initiated RPM in varying pediatric populations and institutional environments, resulting in distinct implementation approaches and workflows. In this practice-informed commentary, we synthesize these experiences to highlight common themes in workflow design, digital infrastructure, and reimbursement considerations. Rather than presenting a formal implementation study or consensus guidelines, our goal is to contextualize early clinical experience with RPM and to identify practical factors that may influence its integration into pediatric diabetes care.

2. RPM Program Structure

To contextualize our experiences, we describe implementation approaches across three distinct clinical environments, focusing on common design elements and areas of variation rather than presenting a standardized model. These RPM programs were implemented with the goals of improving glycemic outcomes and evaluating the operational impact of structured, data-driven workflows on clinic capacity and care team burden.

2.1. Population and Goals

For each program, RPM was applied at clinically meaningful points: soon after diagnosis and during periods of suboptimal glycemic outcomes or disengagement. Stanford Medicine Children's Health (SMCH) implemented RPM in the Teamwork, Targets, Technology and Tight Glycemia (4T) real-world, pragmatic research study in July 2018 [13]. The 4T program is a team-based, clinical precision health care model integrating early CGM initiation with structured, asynchronous remote data review for youth with newly diagnosed type 1 diabetes [13,14]. The 4T RPM program uses algorithm-enabled patient prioritization based on consensus glucose targets, identifying and contacting patients most in need from among the larger cohort (those with <65% time in range 70–180 mg/dL, >1% time < 54 mg/dL, >4% time < 70 mg/dL, >15% drop in time in range, or insufficient data) [15]. Increasing the frequency of engagement results in increased insulin dose adjustments and enhanced diabetes education between clinical care visits. This metric-driven patient prioritization increased clinic capacity and improved glycemic outcomes, with lower mean HbA1c at 6, 9, and 12 months post-diagnosis compared to historical controls and contemporary outcomes at peer institutions; when monthly RPM is continued beyond the first year of diagnosis, glycemic improvements persist [5,15,16]. The SMCH 4T program has approached all new-onset youth with T1D for RPM since March 2019, with over 400 patients thus far receiving RPM. Patients' data were reviewed weekly for 12 months in the Pilot and Study 1 (2018–2022), then weekly for 3 months and monthly thereafter in Study 2 (2022–2024). Since May 2024, the 4T program has been the standard of care.

Building on the knowledge gained in 4T and inspired by the proactive, data-driven approach, pediatric diabetes teams at the University of California, Davis and the University of Colorado, Anschutz Medical Campus, initiated parallel RPM pilot programs for youth with established T1D who were struggling with glycemic management or clinic engagement. Between August 2024 and December 2025, these centers enrolled 40 established patients (20 at each site) who were motivated to initiate RPM to improve diabetes outcomes. This included patients who were already using CGM but were demonstrating inconsistent wear time, infrequent clinical follow-up, or suboptimal glycemic outcomes. At each center, enrolled patients with <70% CGM wear time, $\geq 5\%$ time spent < 70 mg/dL, <30% time in range 70–180 mg/dL, $\geq 15\%$ decrease in time in range from the prior week, or clinic appointment non-attendance without a timely reschedule were contacted on a weekly basis and provided individualized assistance. This intervention continued for four months and resulted in significantly improved time-in-range over that time frame [17].

2.2. Initiation and Workflow

At SMCH, the CDCES team starts every patient on CGM, which includes device training and initial placement, connects the CGM to the manufacturer's web platform via a compatible smart device, and then connects the CGM data to third-party software for population health surveillance. Families unable to provide their own smart device are given one, provided via philanthropic funds, by the clinic team to ensure RPM access. Patients in the UC Davis/University of Colorado pilot were already using CGM, and they were offered similar support by clinic staff to ensure the necessary CGM data connections for remote monitoring. Families in each RPM program were informed during onboarding that RPM provides asynchronous data review and does not involve real-time or even daily data surveillance. They were also advised about the anticipated cadence, criteria, and modalities for outreach from the RPM team, and the expectation that RPM codes would be billed to their insurance each month. Financial assistance was offered on a case-by-case basis for families who faced high RPM-associated fees.

Teams at each center adhered to defined cadences for data review and role-specific responsibilities with cross-coverage during staff absences. Each team has utilized patient navigators to coordinate follow-up touchpoints and monitor data connectivity. Patient navigators are unlicensed clinic staff who can extend diabetes clinic expertise by working within defined protocols and performing many RPM activities, such as resolving supply or technical issues, addressing CGM wearability barriers, facilitating clinical follow-up, and supporting routine diabetes care in coordination with clinical staff. Additional RPM team members varied between institutions. Patient outreach and treatment recommendations have been primarily handled by CDCES staff members at SMCH with physician oversight, by multiple clinicians (MDs and APPs) at University of Colorado, and by a single physician at University of California, Davis. These differences were determined by the availability, interests, and skill sets of staff at each institution.

2.3. Lessons Learned

Across these distinct implementations, several shared lessons emerged that may inform other pediatric diabetes clinics considering RPM. Clear role delineation emerged as an important factor in enabling efficient workflow. While CDCES staff or clinicians conducted clinical interpretation and insulin management, many RPM tasks were efficiently handled by patient navigators working within defined protocols. This allowed licensed team members to work at the top of their licenses and improved overall clinic capacity. Some hospitals do not consider insulin dose adjustment to be in scope for licensed, registered nurses and dietitians in CDCES roles, but the SMCH team has demonstrated that this may be navigated successfully and safely with a protocol-driven approach [18]. Importantly, the addition of RPM work to any staff member's responsibilities requires close examination and may necessitate task redistribution. For example, SMCH added pharmacy technicians to shift prior authorization and durable medical equipment paperwork away from CDCES staff.

Assigning each reviewer a consistent patient panel strengthens rapport and improves engagement. Predictable communication from a familiar team member enhances continuity and supports more individualized guidance, even with a structured workflow. Communication preferences can vary widely, underscoring the need to identify at enrollment whether caregivers, adolescents, or both should be contacted via various modalities (e.g., text messaging, communication via the medical record portal, telephone) and to document parental consent when direct adolescent contact is requested. These decisions intersect with considerations of adolescent autonomy, confidentiality, and evolving independence and should be addressed explicitly during program design. Institutional differences in portal messaging rules, adolescent confidentiality, and texting require site-specific processes to ensure compliance and responsiveness.

Experiences from all three programs underscored the importance of initial and ongoing education of patients and families about the role of RPM in their overall care. For example, it is important at onboarding to educate families that RPM augments rather than replaces traditional diabetes care. Standardized enrollment messaging should emphasize that urgent concerns must be addressed via established pathways and that the need for quarterly diabetes visits remains unchanged. A subset of patients and families will not respond to outreach even after agreeing to participate in RPM. Therefore, RPM should have clearly defined un-enrollment criteria and procedures, based on patient preference, a pre-defined interval, or if RPM is not proving beneficial.

Finally, technological and financial considerations must be addressed to ensure equity. Access to compatible smart devices is critical for remote data review. In addition, discussing potential charges with families at enrollment and using any available institutional data to estimate expected ranges for monthly RPM co-pays, as well as offering assistance in case

of unexpectedly high bills, may mitigate financial concerns and allow families to make informed decisions about participation.

Our experiences with RPM were shaped by local staffing models, institutional policies, and available infrastructure and may not be directly generalizable to all practice settings. A successful RPM program should have clear clinical goals, a defined patient population and expected duration, and may be most successful when timed around events during a patient's treatment course, such as directly after diagnosis, hospitalization, or when they are struggling with glycemic management, initiation of CGM or automated insulin delivery, or with emerging independence. Key lessons for RPM program structure are summarized in Supplementary Table S1.

3. Digital Tools

Digital infrastructure was a key determinant of RPM feasibility across sites. We describe tools used for data review, communication, and documentation, followed by lessons learned.

3.1. Data Review

Efficient population-level data review is foundational to RPM programs and requires tools that aggregate data across multiple device manufacturers while supporting prioritization of patients for outreach. These functional requirements may be achieved through a variety of approaches, including locally developed solutions, open-source tools, and commercially available platforms.

One example of this approach is the Timely Interventions for Diabetes Excellence (TIDE) population precision health dashboard, which was initially developed within the 4T program by Stanford's bioengineering department as a population-level prioritization tool using glucose metrics adapted from clinical guidelines [15,19]. Such dashboards may be implemented within broader digital health platforms that provide data aggregation, device integration, and workflow support. In their pilot, the University of California, Davis, and the University of Colorado teams also utilized TIDE, implemented through commercial platforms (e.g., Tidepool+, Glooko) that incorporate TIDE alongside other clinical and administrative tools. Core functionalities across implementations include aggregation of data from multiple device manufacturers, display of data for all patients of interest on a single page, prioritization based on predefined clinical metrics, and workflow tools such as tagging, filtering, and tracking review status.

In addition to the population-level dashboard, the commercial platforms mentioned here also provide additional features to support clinical workflows, such as filtering patients by review cadence and facilitating transfer of summary data into the electronic medical record. The selection of platform at each site reflected local infrastructure, existing partnerships, and implementation feasibility.

3.2. Communication with Patients

Communication workflows differed substantially based on institutional tools and patient preferences. Stanford's 4T program relied primarily on messaging via the electronic medical record (EMR) for English-speaking patients and families, setting up accounts at the time of diagnosis and training families to expect and respond to messages from their care team. For non-English-speaking families, however, outreach was primarily via telephone, given the barriers inherent in EMR messaging apps.

At the University of Colorado, initiation of the RPM pilot coincided with a rollout of bidirectional texting capability within the EMR. The team primarily used this tool to write custom messages to make suggestions and coordinate follow-up care.

At UC Davis, participants in prior RPM research had indicated a strong preference for text messaging, but this was not yet available in the EMR or outside of research studies [20]. Therefore, a separate secure text platform was enabled by the hospital information technology team to facilitate RPM. Due to legal and compliance concerns, this platform was programmed to deliver pre-specified messages, tailored to each reason for outreach with numeric response options rather than allowing free-text interaction. For this reason, initial text outreach was typically followed by telephone contact or EMR messaging to provide individualized assistance. Despite participants' expressed preferences for text messaging, the response rate to initial text outreach remained low.

3.3. Electronic Medical Record

Documentation of RPM outreach in the EMR varied. EMR messaging encounters and telephone encounters were easily documented, while text exchanges were transcribed or summarized in telephone encounter type. To facilitate use of RPM CPT codes for billing (see "CPT Codes for RPM" section below), the time spent in synchronous and asynchronous outreach had to be totaled and documented each month in the EMR for patients in the UC Davis/University of Colorado pilot. This time was tracked and summed manually through review of encounter-level documents within each patient's record, which was inefficient and error-prone. Although UC Davis had a preexisting "home monitoring encounter" type within its EMR, with designated fields to record total synchronous and asynchronous outreach time, this was useful mainly for routing the documentation to the appropriate billing team each month and did not facilitate automatic time calculation across encounters. Since completion of the pilot, additional EMR tools have been developed at both sites, including ways to link encounters within a single episode of care and enable automatic summation of time fields.

3.4. Lessons Learned

Across platforms and implementation strategies, population-level dashboards enabled identification of patients requiring intervention and supported redistribution of tasks across multidisciplinary teams. This facilitates more efficient data review compared with manual navigation of manufacturer-specific platforms. It also allows licensed clinicians to focus on clinical decision-making while other team members address connectivity, education, and engagement barriers. An RPM program that is available to all patients and efficient for the care team demands a single, well-organized dashboard to review many patients' data at once.

Successful TIDE implementation at SMCH without a third-party host was labor-intensive and dependent on substantial institutional infrastructure, including support for hosting, security maintenance, and continuous oversight. Patients enter and exit RPM workflows frequently, and uninterrupted data flow requires routine verification and troubleshooting. Moreover, diabetes technology continually evolves, requiring new connections to be built and maintained. Commercially available platforms with TIDE embedded (e.g., Tidepool+ and Glooko) reduce the burden of such maintenance and have features to further aid data organization.

Communication in RPM requires flexibility. Bidirectional, free text messaging with minimal authentication barriers is ideal. However, some families preferred messaging through the EMR portal, while others responded only to text or telephone. Therefore, we relied on multiple methods to reach out to families to ensure that RPM could reach the broadest spectrum of patients and not exclude families based on their communication preferences or needs. Patients who are non-English speaking and those with minimal technology literacy represent vulnerable populations whose communication capacities

should be evaluated carefully to ensure equity. We also encountered messaging nuances with adolescents and young adults, highlighting the need to clarify at enrollment whether families preferred that we contact the patient, parent, or both simultaneously. In some cases, we found the most effective messages were those delivered to the adolescent; for other families, it was more effective to message the parents. Institutional differences in privacy policies, adolescent messaging rules, and texting capabilities shaped what was possible, highlighting the need for site-specific outreach strategies. Our programs also found that regular outreach and positive messages to enrolled patients and families, even when their glucose metrics did not meet criteria for intervention, were helpful for keeping them engaged with the care team and encouraged in their self-management.

While effective for traditional visit-based care, EMR systems are often not optimized for the continuous, asynchronous workflows required for RPM care management. Integrating modern bidirectional text messaging directly into the EMR has the potential to reduce fragmentation, improve documentation, and streamline family outreach, but functionality is inconsistently available and often limited by institutional privacy and compliance policies. Both Tidepool and Glooko platforms have the ability to pull patient-level glucose data into the EMR, though implementation requires developers to integrate these platforms at each institution separately. Creation of RPM-specific encounter types with structured data fields that can be harnessed to sum outreach time and automatically submit charges aligned with monthly billing cycles is essential for an efficient and widespread RPM program. Without innovative and automated methods for time tracking and billing, these complexities will continue to be impediments to large-scale RPM care. Key lessons regarding digital infrastructure, communication, and EMR integration are summarized in Supplementary Table S1.

4. RPM Reimbursement

RPM programs depend on reimbursement to ensure financial sustainability. The following discussion reflects the United States context, where billing structures are a key determinant of RPM feasibility. In other healthcare systems, similar care delivery models may be supported through alternative funding structures, and the specific coding frameworks described here may not apply.

In US diabetes care, two families of Current Procedural Terminology (CPT) codes are relevant: codes for CGM placement, training, and interpretation (Table 1) and codes for remote physiologic monitoring, which reimburse for device setup, data transmission, and ongoing care management (Table 2). These code families differ in documentation requirements, eligible billing providers, reimbursement structures, and implications for workflow and staffing.

Table 1. CPT codes for CGM.

CPT Code	95251 *	95249 *	95250 *
Description	CGM interpretation	Personal CGM training: insertion and download of data	Professional CGM: insertion, training and removal; download of data
Requirements	72 h CGM data	Patient owned CGM 72 h CGM data	Office provided CGM 72 h CGM data
Staff	Physician PA/NP/CDCES **	Any qualified staff ***	Any qualified staff ***
Documentation	Report: analysis & interpretation	Patient training	Procedure note

Table 1. Cont.

CPT Code	95251 *	95249 *	95250 *
Frequency	Monthly ****	Once	Monthly ****
Billing	Day of interpretation	Day of training	Day of removal or insertion
Work RVU	0.68	0	0
MC Natl 2026	35.07	69.81	152.64

* Use modifier 25 for E & M code on the same day; ** Physician/NP/PA as the billing provider; CDCES as the service provider performing the CGM interpretation; *** Qualified staff such as trained RN, PharmD/RPh, RD, CDCES or MA (if within their scope of practice); **** Some commercial insurances only reimburse every 3 to 6 months; Abbreviations: RVU, relative value unit, a standardized measure used in the US health care system to quantify clinician work and calculate reimbursement. MC Natl 2026, Medicare National payment amount for calendar year 2026 (<https://www.cms.gov/medicare/payment/fee-schedules/physician>, accessed on 25 June 2025).

Table 2. CPT codes for RPM.

CPT Code	99453	99454	99445 *	99470 *	99457	99458
Description	RPM set up & education	RPM data transmission	RPM data transmission	RPM care management **	RPM care management **	RPM care management **
Requirements	2 to 16 days of data	16–30 days of data	2–15 days of data	Interactive synchronous communication	Interactive synchronous communication	Interactive synchronous communication
Staff	Any	Any	Any	Any	Any	Any
Documentation	Education	Monitoring	Monitoring	10 to 19 min	20 to 39 min	Additional 20 min
Frequency	Once	Every 30 days	Every 30 days	Monthly	Monthly	Monthly
Billing	With 99454 or 99445	Every 30 days	Every 30 days	1st week of each month	1st week of each month	1st week of each month
Work RVU	0	0	0	0.31	0.61	0.61
MC Natl 2026	21.71	52.11	52.11	26.05	51.77	41.42

* New RPM codes for 2026; ** Maximum amount of time that can be billed monthly for RPM care management is 60 min (99457 + 99458 + 99458). Abbreviations: RVU, relative value unit, a standardized measure used in the US health care system to quantify clinician work and calculate reimbursement. MC Natl 2026, Medicare National payment amount for calendar year 2026 (<https://www.cms.gov/medicare/payment/fee-schedules/physician>, accessed on 25 June 2025).

4.1. Using CGM Family Codes for RPM

Since transitioning remote data review from a research context into clinical practice, the SMCH team has relied primarily on CPT code 95251 to support RPM activities [21]. This code covers interpretation of CGM data either in remote or in-person settings, but may be billed only once per month. Although billing requires a physician, nurse practitioner, or physician assistant, aspects of CGM interpretation and insulin dose adjustment may be performed by CDCES staff under supervision, with final review and attestation by the billing provider. In the 4T model, this approach enabled integration of remote review into clinical practice without requiring adoption of newer RPM-specific codes. However, use of 95251 requires coordination to avoid duplicate billing and close collaboration between clinical and billing teams to ensure compliance. The CGM code 95251 generates professional work relative value units (RVUs), a standardized measure used in the US health care system to quantify clinician work and determine professional reimbursement. At SMCH, this was particularly important, as RVU attribution is a key mechanism for enabling revenue flow to the pediatric endocrinology division and supporting clinical staffing.

4.2. Use of RPM Family Codes

The University of California, Davis and the University of Colorado teams utilized CPT codes from the RPM family, which were introduced in 2019 to support data collection, transmission, and care management in chronic disease. RPM codes are unique in that they distinguish practice expense and professional services, include explicit data transmission and time-based requirements, and allow much of the work to be performed by non-licensed team members under protocol. Implementation required updates to workflows, including incorporation of RPM into consent-for-treatment documentation and establishing reliable data transmission through third-party platforms that meet definitions of software as a medical device.

RPM coding supports three core components: patient onboarding, ongoing data transmission, and care management. Setup and onboarding codes capture the resources required to establish data connections and support initial program participation. Data transmission codes support continuous monitoring, even when no interaction is necessary with the patient, and cover the practice expense associated with the long-term institutional costs related to maintaining software access and data review. Care management codes capture cumulative monthly work related to data review, clinical decision-making and patient engagement, when there is at least one instance of synchronous communication.

In practice, asynchronous data review typically generated billing through data transmission codes, while months requiring interactive outreach enabled the use of time-based management codes. This distinction had important implications for workflow design, staffing, and expected revenue. Although 99445 was not available during the UC Davis and University of Colorado pilot, it represents an important evolution that simplifies alignment between clinic schedules and billing requirements. Also new in 2026, 99470 provides a pathway for billing for the first 10 min of RPM care management rather than the 20 min threshold previously required.

4.3. Billing Workflows, Documentation, and EMR Support

A key distinction between RPM family codes and CGM interpretation codes is that RPM services do not require the work to be performed by a billing provider or even a licensed clinician. Many activities, including data review, outreach, and coordination of care, may be conducted by unlicensed team members working under defined protocols. Nevertheless, when RPM management codes are billed as professional services in hospital-based clinics, physician co-signature is typically required under “incident-to” billing rules.

Implementation required adaptation to institutional billing infrastructure. At UC Davis, where the diabetes clinic is associated with the hospital, RPM charges required use of a hospital account record (HAR), necessitating creation of monthly encounters that were assigned and linked to a supervising physician, even though care delivery occurred asynchronously. This introduced administrative complexity and required coordination among clinical, scheduling, and billing teams. Time tracking also posed a major challenge at both institutions, as detailed in Section 3.3.

4.4. Insurance Coverage, Reimbursement Variation, and Patient Financial Impact

Insurance coverage for RPM CPT codes varied substantially across payors and between states during the pilot period, influencing program feasibility [22]. Public payers generally reimbursed at lower rates than private insurers, and whether RPM was covered at all was inconsistent across plans. Most participants did not report being required to pay copays for RPM, but exceptions highlighted the potential financial risks. For example, one UC Davis participant with a high-deductible commercial insurance plan incurred monthly charges exceeding \$300 for CPT 99454, necessitating individualized financial assistance.

Similarly, one University of Colorado participant withdrew from RPM due to unexpected out-of-pocket expenses. At SMCH, where CGM interpretation code 95251 was used, patient complaints regarding RPM-related billing were rare. One family inquired about a charge after prolonged participation, likely following a deductible reset. In response, the program implemented standardized patient portal messaging to provide ongoing transparency about RPM billing.

Reimbursement rates varied widely by payor type. In the UC Davis pilot, mean reimbursement was approximately \$100 per patient per month across a cohort that was 50% publicly insured. Public payors reimbursed RPM codes at two to six times lower rates than private insurers, and fewer than half of private plans represented during the pilot covered RPM CPT codes at all. These findings highlight that payer variability and out-of-pocket costs are important determinants of RPM feasibility and may introduce barriers to equitable access if not addressed proactively.

4.5. Lessons Learned

Several lessons emerged regarding the use of CPT codes for RPM. First, early and ongoing collaboration with institutional billing teams is essential to clarify which activities are billable, which staff members may perform them, and what documentation is required. Interpretation of billing rules varied across institutions, resulting in different operational models.

Second, accurate time tracking is a critical but fragile component of RPM billing, particularly for time-based management codes. Manual approaches are inefficient and error-prone, especially in multidisciplinary teams, underscoring the need for EMR-integrated solutions that automate time capture and charge generation. Ongoing work at our institutions aims to automate cumulative time capture.

Third, the choice between CGM family codes and RPM family codes has important implications for workflow and staffing. CGM interpretation codes generate professional RVUs and may better support physician-led models, whereas RPM family codes offer redistribution of work across licensed and unlicensed team members and may support team-based care models. In some settings, both approaches may be used, but care must be taken to avoid duplicate billing. In addition, hospital-based clinics must comply with additional requirements of physician oversight to enable “incident-to” billing of RPM codes.

Finally, billing cadence and payer variability introduce ongoing challenges. Misalignment among calendar months, 30-day billing cycles and weekday diabetes clinic schedules, as well as variation in insurance coverage and out-of-pocket costs, may affect both program sustainability and equitable access. Submitting RPM charges on a day coinciding with an office visit may create insurance payment rejections. Clear communication with patients and proactive financial support strategies are important. These reimbursement frameworks, while enabling RPM implementation in some settings, also introduce administrative complexity and may not translate easily to other healthcare systems or resource-constrained environments. Key lessons regarding RPM reimbursement, billing workflows, and financial considerations are summarized in Supplementary Table S1.

5. Ethical and Equity Considerations

Remote patient monitoring introduces important ethical considerations, particularly in pediatric populations. These include balancing the potential benefits of more frequent, data-driven support with concerns related to continuous physiologic surveillance, autonomy of adolescents, and the role of caregivers in the decision-making and communication. Communication strategies must be tailored to respect developmental stage, privacy expectations, and family preferences. In addition, RPM relies on access to devices, connectivity, and digi-

tal literacy, which may disproportionately exclude or burden certain patient populations. Financial considerations, including variability in insurance coverage and out-of-pocket costs, further introduce risk of inequitable access. These factors highlight the need for thoughtful implementation strategies that aim to maximize benefits while minimizing harms and disparities.

6. Limitations and Generalizability

The implementation experiences described here reflect programs developed within well-resourced academic centers and may not be directly generalizable to all practice settings. Successful RPM programs depend on institutional infrastructure, staffing models, and digital integration capabilities that may not be available in smaller or resource-constrained environments. In addition, RPM workflows introduce new demands on clinical teams, including potential for increased workload, alert fatigue, and administrative complexity. Evidence supporting improved clinical outcomes through RPM continues to evolve, and further study is needed to define which patient populations benefit most and to identify the most efficient implementation strategies across diverse healthcare systems.

7. Conclusions

Remote patient monitoring represents an important evolution in pediatric diabetes care delivery. Despite major advances in diabetes technology, most individuals living with type 1 diabetes remain unable to achieve recommended glycemic targets when care is delivered through episodic, visit-based models alone. RPM offers an augmented, individualized, and proactive approach to care by enabling structured, data-driven support between clinic visits, when many opportunities to influence glycemic trajectories arise.

As demonstrated across the diverse implementations described in this commentary, effective RPM requires more than access to glucose data. Scalable programs depend on population-level data review tools, clearly defined workflows, thoughtful task distribution across multidisciplinary teams, and billing strategies aligned with institutional practices. Attention to documentation, communication modalities, financial transparency, and equitable access is essential to ensure that RPM benefits are available to all patients.

By aligning clinical need with sustainable reimbursement, RPM creates an opportunity for diabetes clinics to improve outcomes while mitigating care team burden and supporting the long-term viability of the pediatric endocrinology workforce. As diabetes technology adoption continues to expand, care models that reliably translate continuous data into coordinated clinical action will be increasingly critical to delivering high-quality, equitable care between visits.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/endocrines7030038/s1>, Table S1: Lessons learned for implementing RPM in pediatric type 1 diabetes care.

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Institutional Review Board Statement: Components of this manuscript describe experience from the Teamwork, Targets, Technology, and Tight Glycemia (4T) program, which was initially conducted as an IRB-approved research study at Stanford University. Participants enrolled under the 4T research protocol provided informed consent and were followed in accordance with institutional ethical guidelines. Following completion of the research phases, the 4T model was transitioned to a standard-of-care clinical program. The remaining implementation activities described for the University of California, Davis, and the University of Colorado represent quality improvement and program development efforts, did not involve prospective data collection for research purposes, and were therefore determined not to require institutional review board approval. No identifiable patient information is included in this manuscript, and all outcomes referenced are presented in aggregate or have been previously published under appropriate ethical oversight.

Informed Consent Statement: No identifiable patient information is included in this manuscript, and all outcomes referenced are presented in aggregate or have been previously published under appropriate ethical oversight.

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