Collaborative Online Medical Case Review: A Participatory Medical Cognition Approach to Managing a Complex Patient with Multiple Chronic Conditions

Abstract

Managing patients with multiple chronic comorbidities presents significant challenges within traditional healthcare systems. This paper describes the application of a collaborative online platform, utilizing a Case Based Blended Learning Ecosystem (CBBLE) and Patient Journey Records (PaJR), for the remote review and management of a 44-year-old female patient from rural India, with a complex medical history including diabetes mellitus, Meesmann's corneal epithelial dystrophy (status post-phototherapeutic keratectomy), recurrent infections, pain syndromes (lateral epicondylolagia), and other issues. The platform functions as an online e-log book, where de-identified patient data, shared by a patient advocate (PA), is discussed by a global online community of experts from various specialties. Drawing upon principles of medical cognition and user driven healthcare (UDHC), the approach integrates patient-reported outcomes, vital signs monitoring, image and document review, expert consultation, evidence synthesis (including artificial intelligence assisted retrieval), and structured case documentation. Over a period from December 2024 to May 2025, this participatory setting facilitated diverse expert perspectives, collective evidence critique, enhanced data validation, timely advice delivery, and continuous learning for participants, leading to increased patient confidence and a better quality of life, including a significant reduction in multiple anti-diabetic medications and complete discontinuation of BP medications since March 2025. The patient also discontinued long-standing heart rate–related medications which she had been using since 2018 for what she described as 'irregular heart rate', likely related to palpitations and anxiety as interpreted by

experts. The process highlighted both the advantages of remote collaboration for comprehensive care management, particularly in cases requiring multidisciplinary input and detailed longitudinal tracking, and inherent challenges such as inconsistent data collection and the limitations of remote assessment. This case exemplifies how participatory medical cognition platforms can augment traditional care by fostering collaborative problem-solving and evidence-based decision-making in clinically complex scenarios.

Introduction

Patients presenting with multiple, interacting chronic conditions represent a growing challenge in modern medicine [1]. Effective management often requires integrating expertise from various specialties and adapting treatment plans based on the patient's real-world experiences and responses, which can be difficult to coordinate in traditional, fragmented healthcare settings. The need for improved approaches to navigate diagnostic and therapeutic uncertainty in complex cases is paramount [2].

The evolution of the internet, particularly the transition from Web 1.0 (a passive library) to Web 2.0 (an interactive forum allowing user participation) and beyond, has paved the way for new models of healthcare interaction. Concepts such as ‘user driven healthcare’ (UDHC) [3,4], where multiple healthcare stakeholders including patients interact online to understand and make decisions, and ‘medical cognition’ [5] encompassing various human and artificial cognitive tools to resolve clinical complexity, are emerging. These approaches aim to leverage collective intelligence and asynchronous communication to improve patient care.

From a relational perspective, records of patient journeys are to be understood not as static carriers of information, but as dynamic flow of information that shape and are shaped by users’

actions, technology availability, institutional settings, and cultural norms [6]. This also opens up the possibility for learning from dialogic interactions, where patient journey records, healthcare providers and clinical learners co-construct meaning over time across various contexts.

In this article, we demonstrate how our case-based blended learning ecosystem (CBBLE) combines online and offline components for case-based learning, and integrates Patient Journey Records (PaJR) to facilitate participatory medical cognition [7]. PaJR focuses on patient reported outcomes (PRO), allowing us to learn from the patient's journey beyond the prescribed treatment and the evolving decisions made during the phases of illness along the course of his life. [8]. These platforms not only provide material resources but also actively structure collaborative interactions, adapting to sociocultural contexts and supporting learning in cases of complex multimorbidity. Drawing upon the concept of relational affordances [8,9], the PaJR-CBBLE system serves not merely as a digital repository but as a communication scaffold that enables training in human medical cognition. We illustrate this a participatory approach through management of a 44 year old female patient with diverse and fluctuating chronic conditions, drawing upon the detailed record of discussions, interventions, and outcomes captured within the online platform. Similar to challenges highlighted in other contexts, such as the ethical and clinical dilemmas of overuse medicine and the lack of shared decision-making in interventions like percutaneous coronary intervention (PCI) [10], this case presented its own complexities requiring careful, evidence-informed management. A previous study by Podder et al. [7] demonstrated the potential of CBBLE in reducing overdiagnosis and overtreatment by fostering evidence-based, patient-centered inputs through coordinated team communication. This aligns with the patient's expressed gratitude for achieving health improvements 'without much medication and without getting expensive tests' that were previously common but yielded no

improvement. In this study, by viewing collaboration around PaJR not just as information sharing, but as a dialogic and socio-material process [11,12], we contribute towards more nuanced understanding of how PaJR can serve as communication devices in CBBLE for training of medical cognition [13,14] for managing complex multimorbidity.

Methods

The collaborative online medical case review took place within an online e-log book platform (https://pajr.in/) designed for discussing de-identified patient health data with a global online community of experts. The primary objective was to find solutions to the patient's clinical problems using collective, current best evidence-based inputs via our platform which exemplifies a participatory setting within user driven healthcare.

Figure 1 below describes steps involved in creating a PaJR.

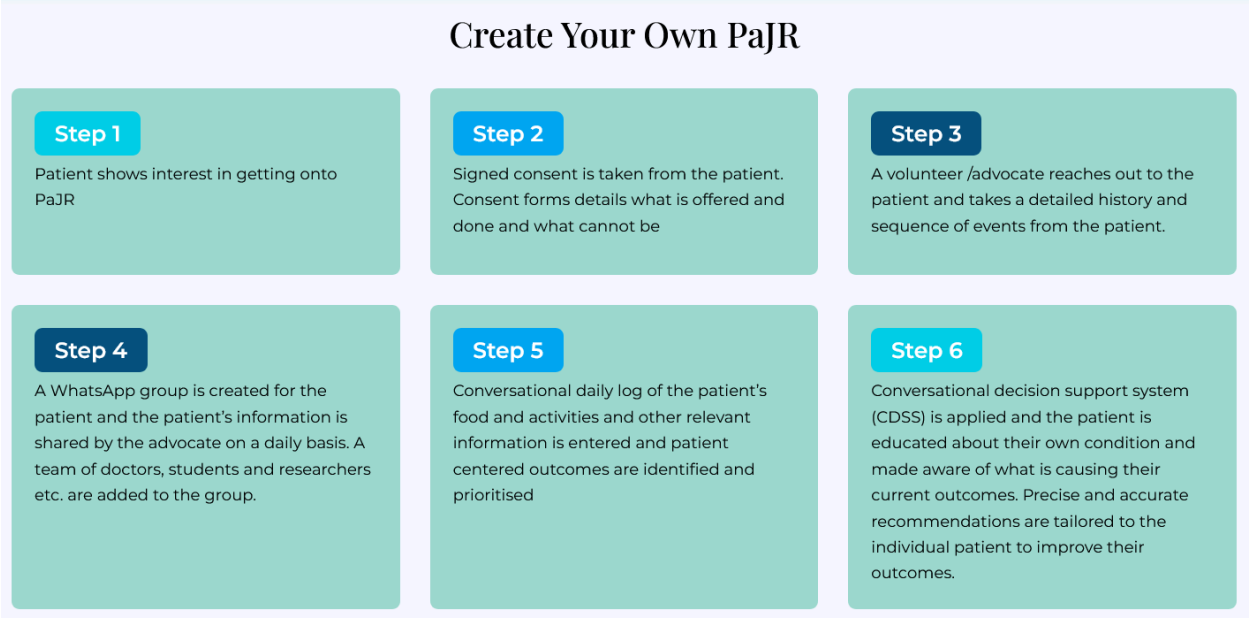

Figure 1: Steps involved in creating a PaJR (Source: pajr.in)

The platform utilized several techniques inherent to user-driven healthcare and participatory medical cognition. Below we present an abstracted actant and activity (both human and non-human) view of this process. We highlight the relevant affordances [15, 16], agencies and materialities that became relevant as we make various agential cuts [8,17] in the process described in Figure 1:

- **Collaborative online platform:** An asynchronous online e-log book served as the central hub for communication and documentation. This provided a persistent, asynchronous space for patient-case documentation and collaborative feedback. It also enabled distributed communication and longitudinal dialogue between stakeholders, decoupled from temporal and spatial constraints.
- **De-identified data sharing:** Patient privacy was protected by sharing de-identified patient documents, images, and health data. Signed informed consent was obtained for this. This allowed shared access to patient data for collaborative diagnostic interpretation and opened up spaces for distant experts to ethically enter the interpretive dialogue without compromising privacy.

- **Patient-reported outcomes (PROs):** The patient advocate (PA) served as the primary liaison, sharing detailed subjective accounts of the patient's symptoms, pain levels, daily activities, meals, and general well-being, providing crucial context. This is a key component of the PaJR system. Ongoing reporting by the PA fosters co-interpretation and helps the patient move from being a passive recipient to an epistemic contributor [18].
- The PA shared detailed subjective accounts of the patient's symptoms, pain levels, daily activities, meals, and general well-being, providing crucial context. This continuous

logging allowed the patient to 'pinpoint what food intake is affecting her blood glucose levels' and to 'understand how her blood sugar levels were throughout the day and correlate her energy levels' by sharing hourly activity. The patient's historical medication record revealed that nearly 8–10 years ago, she was on anti-diabetic medications (metformin 850 mg after breakfast and a combination of metformin 500 mg and Glimepiride 1 mg after dinner). The dosage was significantly reduced during the current intervention period. As part of the detailed history captured, the patient reported use of propranolol 10 mg and bisoprolol 2.5mg from 2018 onward for irregular heart rate symptoms. These medications had been discontinued for 5 months by the time of this report, and group experts interpreted these symptoms as likely palpitations associated with anxiety, rather than a formal arrhythmia diagnosis.

- **Regular monitoring and logging:** The PA reported objective measurements including blood sugar readings and blood pressure measurements over time. These were logged consistently to help identify trends and inform decisions.
- **Sharing and reviewing images/documents:** Visual data, such as eye photos and meal photos, and historical medical records were shared and reviewed by experts. Images (eyes, meals), past records act as visual genres enabling richer multimodal dialogue and expert interpretation.
- **Expert consultation and discussion:** Experts who are Primary PaJR Monitor (PPM), included from various specialities internal medicine (PPMs), physiatry (PPM 3), and ophthalmology (Ophthalmologist / Ophthal expert 2), provided specialized consultation, debated approaches, and synthesized information.

- **Evidence review and critique:** Experts discussed and referenced external medical literature and artificial intelligence (AI)-synthesized information to inform decisions. This included critical evaluation of the quality and limitations of available evidence. Experts compared AI-suggested findings with real-world data, applying a careful epistemic judgment. This process draws upon System 2 thinking [19], making communication and thinking slower for analysis.
- **AI Integration for information and translation:** Throughout the patient's journey within the online e-log book, artificial intelligence (AI) tools played a significant role in facilitating information retrieval and synthesis, especially as part of the collaborative, evidence-based approach. AI tools operate as external cognitive scaffolds, helping participating clinicians and even the patient, quickly access medical information and summarize knowledge landscapes. Meta AI, Perplexity, and Scholar ChatGPT were regularly consulted by team members to quickly access and summarize medical information. For instance, Meta AI was used to understand the role of otoliths in vertigo and dizziness, and to substantiate the link between internal inflammations and hyperglycemia, even providing relevant scientific references. Perplexity AI was leveraged for discussions on the efficacy of oral doxycycline for internal hordeolum, clarifying the absence of high-quality randomized controlled trials (RCTs in this area and the differences in managing internal versus external hordeolum's. Similarly, Scholar ChatGPT was utilized to conduct a deep dive analysis of a study on Vitamin D levels. While AI tools were effective in rapidly summarizing research and providing information, the platform emphasized that human expert interpretation and validation were crucial for making informed clinical decisions. This integration of AI allowed for

comprehensive information gathering and contributed to the platform's role as an educational tool by highlighting where robust evidence was lacking. AI tools like NotebookLM also helped synthesize information from various sources towards writing of this paper. ChatGPT was also used to create Mermaid.js code for one of the figures. Beyond expert use, the patient herself utilized AI tools, consulting them once every 2-3 days to analyze the calories, protein and fat content of new food recipes. AI tools were used as part of the case, not as final authorities, but as "dialogic partners" providing competing interpretations, generated ideas, and reference points that clinicians evaluated to better inform their own decisions [20,21].

- **Structured Case report (PaJR) system:** A structured case report was maintained to document the patient's journey, discussions, and findings for reference and learning. The case report becomes an index of dialogic activity [11,12], pattern recognition, and medical judgment—while also serving as an output contributing to broader knowledge dissemination and education. This process was acknowledged by the patient, who sought clarification on how publication would open up new avenues for medical treatment and education, highlighting its role in spreading knowledge within the scientific community.

The cast of characters **(Supplementary Data 1)** involved included the patient advocate (PA), various physician participants (PPMs 1, 3, 4, 5, 6, 7) with distinct roles from lead clinician/coordinator (PPM 1) to specialists like a physiatrist (PPM 3) and team members involved in admissions and monitoring, a case reporter (CR) responsible for the **PaJR**, Ophthalmology experts, other patient advocates contributing personal insights (e.g., 33F PA), artificial intelligence tools (Meta AI, Perplexity), and the patient herself, whose data and experiences were central to the discussion.

Timeline: The case discussion and management activities documented in the sources spanned from December 2024 to May 2025 **(Supplementary Data 2).**

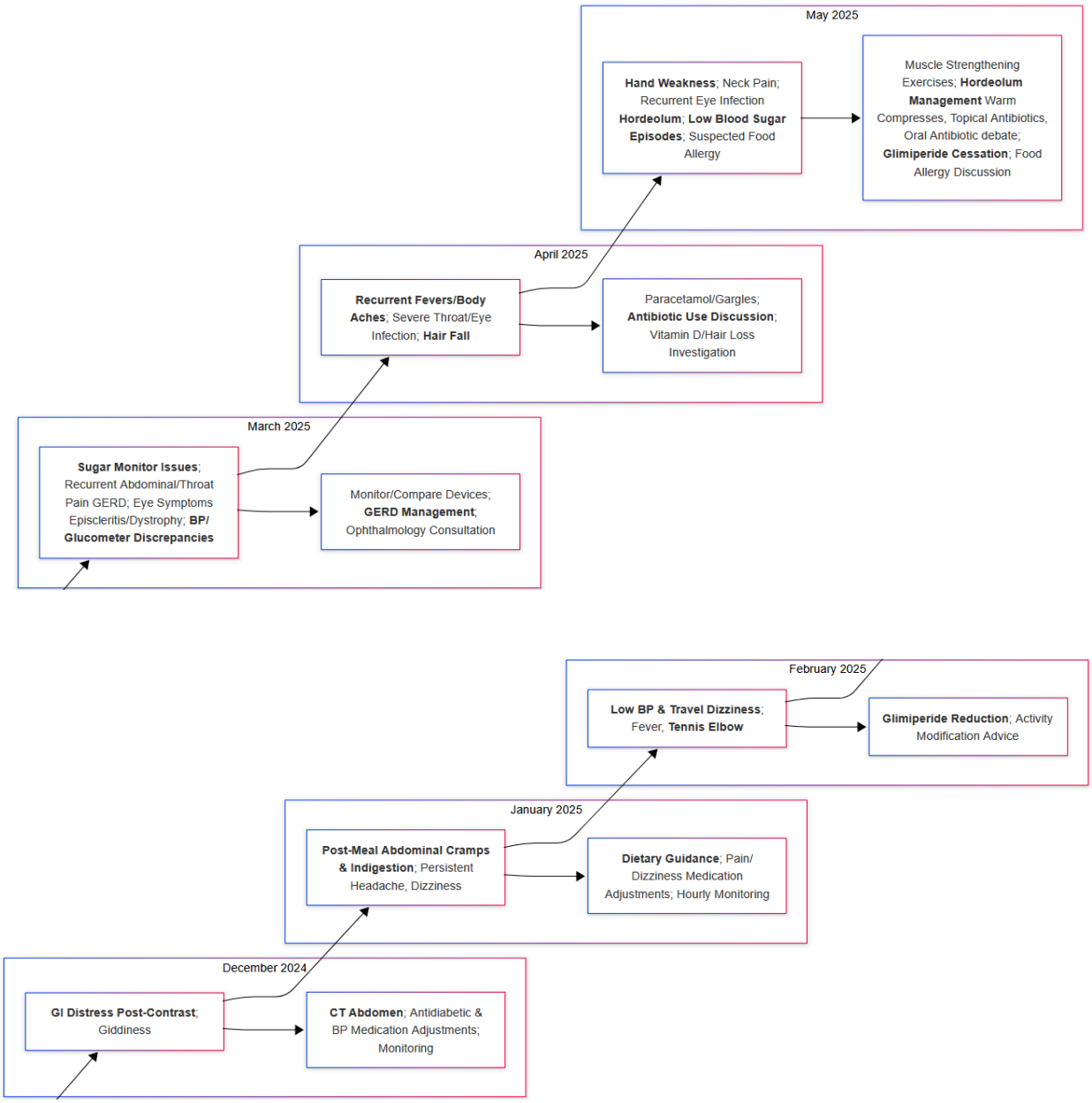

Figure 2 – Patient journey at a glance

Results

The patient's journey, documented through the online platform, revealed the dynamic nature of her multiple chronic conditions and the team's collaborative efforts to manage them. The timeline summary provides a structured overview of symptoms, reports, discussion, interventions, and results. The findings described above reflect the outcomes of decisions and actions taken by various human and non-human participants throughout the ongoing, interactive process of working with PaJR's participatory medical cognition device. They are no-way definitive, but they play an important role in managing the clinical condition of a patient's case and learning from the patient's journey with the flow as described below.

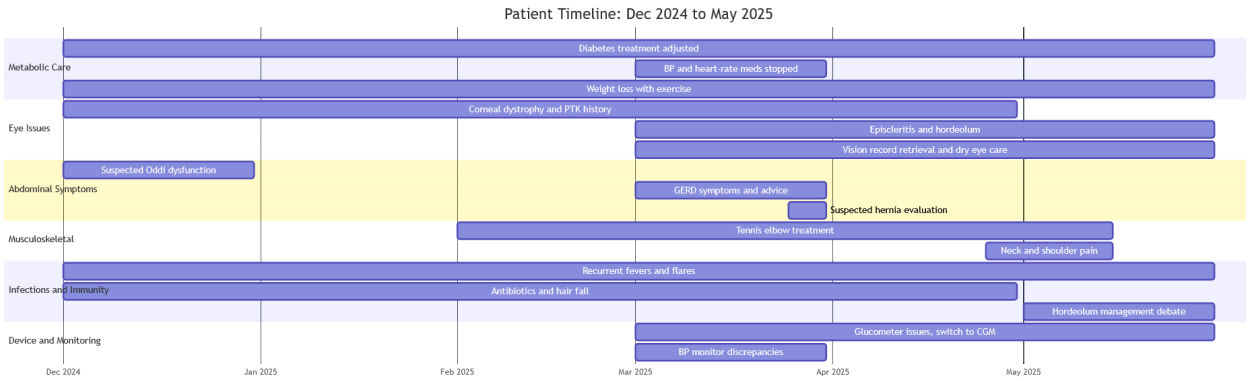

Figure 3: Patient journey summarized in a Gantt Chart (from Dec 2024 to May 2025)

Pre-December 2024: The patient had a history of wisdom teeth issues, leading to infection and antibiotic treatment. She was diagnosed with type 2 diabetes mellitus, experiencing fatigue, weakness, abdominal cramps, appetite loss, difficulty eating, early satiety, and a sour taste. She also had hypertension and a gall bladder issue. Notably, she reported recurrent low-grade fever and significant weight loss (10 kg in two months) prior to December 2024. Her long-standing history included corneal dystrophy diagnosed in 2018, causing severe eye pain, photophobia, itching, and redness until her phototherapeutic keratectomy (PTK) in 2018. She had experienced

blurred vision since 2017 and dry eyes since childhood, using eye drops from age 16. Other symptoms included headache, migraine, vomiting tendency, and recurrent subconjunctival hemorrhage with high fever starting at age 19. Interventions prior to the online platform included dental treatment, antibiotics, diabetes medication (initially reducing blood glucose to 174 mg/dL), PTK, admissions, and long-term use of eye drops. Blurred vision persisted post-PTK.

December 2024: The patient presented with giddiness, which worsened after taking oral contrast for a planned computed tomography (CT) abdomen for potential gastric/duodenal diverticulum. Sphincter of Oddi dysfunction (Type 2) was suspected based on Rome II criteria for biliary pain [22]. Monitoring of BP (2-hourly) and blood sugars (fasting, 2 hours post-meal) was initiated, along with informed consent collection for the case report. The antidiabetic regimen was adjusted, first to Glimepiride 1mg before breakfast and Metformin 500mg after lunch, then revised to Metformin 500mg after every meal in addition to Glimepiride 1mg before breakfast. The CT abdomen was performed with oral contrast and appeared normal, as did the gall bladder and pancreas, aligning with previous normal serum amylase/lipase. Patient's General Random Blood Sugar (GRBS) was 86 mg/dl and BP was 110/70 mmHg.

January 2025: Patient experienced abdominal cramps and indigestion after eating nuts and sprouts. Advice included sharing food plate images and following the Harvard plate proportion [23], continuing Metformin after every meal. Amidst complaints of weakness, headache, dizziness, and eyes feeling dark, the team advised hourly BP readings and adjusted Bisoprolol dose. BP and sugar monitoring continued, showing fluctuating readings.

February 2025: Headache continued despite feeling generally better. Episodes of low BP occurred (85/59 mm Hg supine, 80/50 mm Hg standing). Advice included walking short

distances. Recurrent low-grade fever (99.4-100 F) with stomach discomfort and painful, stiff hand muscles resumed. Pain and stiffness in the tennis elbow area (lateral epicondylolagia) worsened with activity and improved with rest or a band. A physiatrist expert was added to the group for activity modification suggestions. [24] Advice included using the hand "palm up" and reducing glimepiride dose, with continued sugar monitoring. BP readings remained sometimes low. Requests were made for historical ophthalmic documents regarding corneal dystrophy.

March 2025: Issues with the sugar monitor were reported, suggesting switching to continuous glucose monitoring (CGM) and requesting specific sugar readings. Discussions requested de-identified lateral arm and abdomen images for the case report to document phenotype, noting that maintaining muscle and losing abdominal fat could help reverse diabetes. Patient reported weight and waist measurements and shared photos. Fluctuating upper abdominal pain, discomfort, feverish feeling, choked throat, cough, and chest congestion occurred. Symptoms were suspected to be due to GERD, with advice on elevating the head of the bed. Despite fever subsiding, body aches, headache, and severe cough persisted. Symptomatic paracetamol and steam inhalation were advised for cough. The potential relationship between throat pain/inflammation and hyperglycemia was noted and substantiated using Meta AI. An eye issue resembling episcleritis was noted. Ophthalmologist's clinical findings from a local evaluation were shared, confirming left corneal opacity with epithelial changes (likely Meesmann's dystrophy post PTK) and right corneal epithelial changes with an iris Lisch nodule, suggesting Meesmann's and ruling out Neurofibromatosis Type 1. Diagnosis of Meesmann’s corneal epithelial dystrophy was confirmed based on clinical work up. The patient is status post-PTK performed in 2018 for symptomatic relief. An ophthalmologist's opinion stated the corneal dystrophy was not very significant on the current exam, but pre-PTK visual acuity data was

needed. After detailed monitoring during the March 2025 follow-up, the BP medication was stopped entirely. [25] In addition, the patient disclosed that she had been self-administering propranolol 10 mg and bisoprolol 2.5 mg (since 2018 for ‘irregular heart rate.’ Upon collaborative review, this was interpreted as probable anxiety-related palpitations rather than documented arrhythmia. These medications had been stopped for approximately five months at the time of reporting without adverse cardiovascular events. The patient has remained off BP medicine since then. Symptoms of weakness, darkness of eyes, and pain in shoulder/arms recurred. Discrepancies between patient's BP machine and ward machines were observed, leading to checks with multiple machines. Discrepancies were also noted between the patient's glucometer and ward readings.

April 2025: Severe hair fall was reported. Androgen excess was suggested as a possible explanation. Discussion occurred regarding checking Vitamin D levels and critically reviewing evidence and guidelines for Vitamin D deficiency in the Indian context [26], highlighting potential artifacts from using Western cut-offs and assay variations. **AI tools** were discussed in the context of evaluating hair loss. Efforts continued to obtain pre-PTK visual acuity data, but the file was reported missing. A summary and recommendations regarding the corneal dystrophy post-PTK were provided, emphasizing that PTK is for symptomatic relief rather than acuity, and management should focus on dry eye, refractive correction, and monitoring. Severe hair fall was reported. The patient believed this increased hair loss from December to April was due to the frequent antibiotics she was consuming during that time. Despite adherence to advice, the patient identified persistent issues where the platform 'did not aid in relief' in certain instances, such as recurring eye problems and her inability to straighten her arm despite following instructions.

May 2025: Patient reported right hand muscle weakness and neck pain. The patient was learning muscle strengthening exercises. Ophthalmic opinion suggested oral antibiotics for a likely internal hordeolum, noting diabetic patients' proneness to recurrent infection. The efficacy of antibiotics for hordeolum/chalazion was debated based on available evidence accessed via Web 2.0, [27] which suggested doubtful benefit over warm compresses and hygiene. Fexofenadine was noted as helpful for itching. A detailed management plan for hordeolum was provided, emphasizing warm compresses, eyelid hygiene, and reserving antibiotics for complications or failure after 1 week. Topical antibiotic ointment was also suggested. Oral antibiotics (Azithromycin, amoxycillin-clavulanate) were recommended by @PPM4. While 10 kg weight loss was noted prior to December 2024, the patient further reported a clinically significant loss of 'more than 8kgs in 6 months' (December 2024 to June 2025) which she attributed to her adherence to the 'recommended diet and muscle strengthening exercises. Discussion continued about the role of surgery (incision and currettage, steroid injection) for resistant styes after 4-6 weeks of failed conservative treatment. The distinction between internal and external hordeolum and management implications was discussed. Therapeutic uncertainty regarding oral doxycycline for hordeolum was noted, reiterating lack of high-quality evidence and reliance on lower-level evidence and patho-physiological rationale. Practical recommendations emphasized the stepwise approach starting with conservative measures. This discussion highlighted the challenge of relying on lower-level evidence and patho-physiological rationale when high-quality trials are absent, a feature of Web 3.0 medical cognition.

Table 1 summarizing five chronic conditions of the patient based on diagnostic timeline, interventions suggested, monitoring and the current status of the patient.

Condition	Diagnostic Date	Key Interventions	Monitoring	Status
Type 2 Diabetes Mellitus	Pre-Dec 2024	Metformin 500mg after meals- Glimepiride 1mg before breakfast (later reduced)- Dietary changes (Harvard plate)- Symptom tracking. Previously on higher doses of anti-diabetic medications of metformin 850 mg after breakfast and a combination of metformin 500 mg and Glimepiride 1 mg after dinner decade ago. These were reduced	Blood glucose (fasting, post-meal, random)- GRBS readings- Symptoms (fatigue, weakness, dizziness)	Currently on 750 mg/day Metformin only; Glimepiride and BP medicines fully withdrawn since March 2025. Glucose under better control with lifestyle corrections and regular monitoring.

		significantly during the current care process.		
Meesmann's Corneal Epithelial Dystrophy (S/P PTK)	2018	Phototherapeutic Keratectomy (PTK, 2018) Long-term use of lubricating eye drops Ongoing management focused on dry eye and refractive correction	Ophthalmic evaluations Observation of epithelial changes	Persistent dry eye symptoms status post-PTK; currently not visually significant; regular ophthalmic review advised
Lateral Epicondylalgia (Tennis Elbow)	Feb 2025 (worsening)	Activity modification-Physiatrist input-Positioning advice ("palm up")	Subjective pain response-Functional limitation tracking	Intermittent worsening; improving with rest and ergonomics; physiatric management ongoing

Internal Hordeolum (Eye Infection)	May 2025	Warm compresses (first line)- Eyelid hygiene- Topical antibiotic ointment- Oral antibiotics debated (Azithromycin/Amoxicillin-Clavulanate if not improving)- Steroid/surgical options discussed for resistant cases	Symptom resolution (pain, swelling, redness)- Response to conservative therapy	Likely internal hordeolum diagnosed; conservative measures initiated; oral antibiotics used selectively; under observation
Hypertension	Pre-Dec 2024	Bisoprolol (dose adjusted)- Later stopped by patient temporarily	2-hourly BP monitoring- Standing and supine BP readings- Multiple machine checks due to device discrepancies	BP medicine (Bisoprolol) was completely stopped in March 2025 and has remained off since then, with regular monitoring.

Table 1 - Patient's Chronic and Acute Conditions Summary

Discussion

Principal Results

The case presented above demonstrates the application and advantages of a collaborative online platform grounded in the principles of medical cognition and user driven healthcare (UDHC). This participatory setting, acting as an online e-log book and a component of a CBBLE, enabled remote, multidisciplinary management of a patient with multiple comorbidities (diabetes, corneal dystrophy, recurrent infections, pain syndromes). In the methods section we discuss various affordances around PaJR that emerged while the patient's care unfolded as a dynamic process involving ongoing interpretations and decision-making shaped by material tools and dialogic exchanges.

The platform facilitated input from various specialists at one place (physiatry, multiple ophthalmologists, general physicians PPMs) which is often challenging in traditional clinical set-ups overburdening the patient to keep up with multiple follow-ups from different departments and extra-logistical work. This was crucial in navigating diagnostic nuances, such as distinguishing between potential episcleritis and hordeolum, or understanding the implications of Meesmann's corneal epithelial dystrophy in a patient status post-PTK. For example, the patient's historical use of heart rate–modulating drugs for perceived arrhythmia was reinterpreted as somatic anxiety rather than arrhythmia, prompting appropriate discontinuation**.**

The platform fostered collective evidence review and synthesis. Experts actively discussed and critiqued medical literature, reflecting a core aspect of evidence-based medicine. The detailed

debate surrounding the efficacy of antibiotics for hordeolum, referencing published literature and discussing the hierarchy of evidence, is a prime example. PPM 5's comment regarding the need to accept different levels of evidence in the context of Web 3.0 medical cognition highlights the practical challenges and adaptive thinking required when high-quality RCT evidence is lacking. Also, the clinical learners (healthcare providers) participating (observing or engaging) in this process are encouraged to embody the system 2 thinking inherent in medical cognition, facilitating slower, more analytical processing of information.

Notably, platform's role is here not constrained to data logging; it facilitates participatory *distributed medical cognition* [28] through discussion, dissent, iterative re-interpretation. We noted that participants were also actively involved in discussions and all the questions, inputs were facilitated in a conversational approach in contrast to the usual medical learning and teaching pattern which often involves long didactic lectures. Therefore, this aspect aligns with user driven learning (UDL) and the creation of user driven learning community ontologies (UDLCOs), which weave contextual patient data into a tapestry for reasoning and AI driven processing and allow participatory learning for medical students. We are calling this as participatory medical cognition.

This was powerfully echoed by the patient, who expressed being 'extremely happy' with reduced medication and regained confidence, stating 'I've gotten back a much better life' and 'I can now do my own work'. This positive sentiment underscores the platform's capacity to facilitate holistic care. This reduction is particularly striking given when she was on anti-diabetic medications with metformin 850 mg after breakfast and a combination of metformin 500 mg and Glimepiride 1 mg after dinner a decade ago . Through the platform's participatory care approach, she now takes only 750 mg Metformin daily and has stopped both Glimepiride and BP medicine

entirely since March 2025. This was possible only because of the patient's commitment to battling her sarcopenia and trunkal obesity through regular sharing of her muscle strengthening exercises from the gym as seen in the images logged on April 30 in the 44F case PaJR [31] and her well regulated diet as seen in the images of food plates in the 44F case PaJR [31]. This demonstrates the role of continuous lifestyle-guided care, intensive monitoring, and informed stepwise withdrawal of medication. At the same time data logging enabled patient to critique care gaps, where the clinical collaboration either empowered self-care (particularly weight loss, diet, exercise) or did not offer symptom relief (arm-straightening, eye complaints) showing both the empowering and limiting dimensions of participatory care. Progressive reduction of blood pressure and anti-diabetic medications can be seen in Table 2 below.

Period	**BP Readings (mmHg)**	**Sugar Readings (mg/dL)**	**Medication/Intervention (BP & Sugar Related)**
Pre-Dec 2024	History of hypertension	PP 202 mg/dL (initial diabetes finding); came down to 174 mg/dL with medication	Medically treated with Amlodipine 5 mg (for hypertension); Glimiperide 1 mg before breakfast and Metformin 850 mg after dinner (for diabetes)
Dec 2024	110/70 mmHg; BP monitoring initiated (2-hourly)	GRBS 86 mg/dL	Tablet Concor (bisoprolol) advised to continue in same dose; Antidiabetic regimen adjusted to Glimiperide 1 mg before breakfast and Metformin 500 mg after breakfast, lunch, and dinner
Jan 2025	157/89 mmHg (9 AM); 124/52 mmHg (Pulse 59, 2 hrs post-lunch); 105/48 mmHg (8:45 PM); Later: 169/99 mmHg (at 14:42), then	Fasting: 118 mg/dL; Post-lunch: 141 mg/dL; Post-tiffin: 130 mg/dL; Post-dinner: 142 mg/dL	Bisoprolol (Concor) dose advised to be halved

	112/72 mmHg (at 15:19)		
Feb 2025	85/59 mmHg (PR 94) (supine); 80/50 mmHg (after 3 min standing); Later: 90/60 mmHg (supine); 92/58 mmHg (after 3 min standing)	Fasting: 123 mg/dL; Post-breakfast: 128 mg/dL; Post-lunch: 92 mg/dL; Post-dinner: 90 mg/dL	Glimiperide reduced to 0.5 mg
Mar 2025	89/57 mmHg (morning); 90/49 mmHg (after 3 min standing); 122/82 mmHg (7 AM); 90/60 mmHg (on OPD review)	Fasting: 94 mg/dL; Post-lunch: 129 mg/dL	Advised to not take BP medicine in this situation; Patient reported not taking BP medicine for the last 6 days;
Apr 2025	135/84 mmHg (PR 97); 123/81 mmHg (PR 91) (after 3 min standing); Later: 124/83 mmHg (post-dinner)	Fasting: 144 mg/dL; Post-dinner: 148 mg/dL	Patient stopped her BP medicine for the last 20 days as per doctor's advice
May 2025	Fasting BP: 97/64 mmHg; Later: 114/72 mmHg	Fasting: 101 mg/dL; Later: 58 mg/dL (2 hrs after breakfast)	BP medicine has been stopped since 25 days; Due to low sugar reading, advised to stop taking Glimiperide for a few days; Glimiperide stopped for the last 7 days

The integration of technology and AI was evident. AI tools like Meta AI and Perplexity were used for rapid information retrieval and synthesis on specific topics, such as the link between inflammation and hyperglycemia or evidence for antibiotic use. While human expert validation remained crucial, AI served as a tool to augment the collective information gathering process.

This aligns with the use of asynchronous intelligence AI tools in human cognition where continued reliance on Web 3.0 tools (Meta AI, Perplexity, LLMs) is integrated as a dialogic supplement for medial cognition (another participant), not a replacement, to clinical judgment.

While not explicitly framed within a formal shared decision-making (SDM) model as discussed in the context of PCI, the process inherently involves shared information and facilitates a degree of patient involvement (through the PA) in understanding options and rationale, potentially leading to more confident choices. The continuous logging of patient data by the PA allowed the team to identify patterns, understand potential triggers (diet, travel, weather), and observe the interplay between conditions. Discrepancies noted between the patient's self-monitored BP/sugar readings and ward measurements prompted collaborative troubleshooting and investigation into potential device issues or measurement techniques. This was instrumental in the patient's experience and to a certain extent emergence of her own medical cognition (or health cognition), as she felt 'monitored very closely which helps her adhere to a good lifestyle' and found the group provided 'accountability especially with regard to food intake'. The platform also has emergent affordances for the PA. The PA, acting as the liaison, was empowered to share detailed patient information and receive collective expert advice relatively quickly. This participatory approach also provided the patient with 'mental strength and a sense of hope that she is not alone', enabling her to 'ask and update about her symptoms in the group everyday'. She did also find motivation to 'make innovative healthy food for herself' and became 'more conscious about outside food.

The CR's role in de-identification and case report maintenance was vital to this process. The patient's direct query about the impact of publishing her case report 'will this open up new avenues.. for students?' and the assurance that it would 'spread further in the scientific

community' to help 'many more patients' clearly demonstrate the platform's role in fostering user-driven learning and community ontologies."

Overall, we find that maintenance of a structured case report via PaJR system also serves as documentation and a learning resource. The PaJR captures the patient's journey, discussions, and findings, contributing to a broader "participatory medical cognition" and serving as an educational tool for participants. The timeline in case report represents more than a linear record; it embodies ongoing negotiations of meaning where patient experiences, clinical interpretations, and treatment decisions are continuously shaped by social and technological interactions within the platform.

Theoretically, we identify that the digital platform functions as a generative socio-material infrastructure [11,12, 29] not merely as a passive data repository, but as an active participant in the shaping of healthcare practice and cognition. This active participation that is emerging is coming together with multiple materialities: patient-generated data, AI tools, biometric monitoring devices, historical clinical records, images, and expert annotations. These material entities, each with their own material properties [15, 16], interact relationally to enable clinical sensemaking as part of participatory medical cognition. By allowing the capture of evolving symptomatology, monitoring data, expert discussions, and therapeutic interventions in a structured, but non-linear, timeline, the platform enables the asynchronous construction and reconstruction of the patient’s health narrative. Thus PaJR becomes more than a sequential log; it is a dialogic space where diverse voices (patient, patient advocate, clinicians, AI tools) negotiate meaning, context, and care pathway. The interventions and decisions documented on the platform, ranging from medication adjustments to nuanced symptom analysis, illustrate habitual and situated utilization of the emergent technology capabilities, available in the context to the

users. These uses reflect an epistemic practice whereby digital technologies support medical cognition training [13,14]. Learners engaging with this data-rich environment are not only exposed to complex case material, but are also trained to manage diagnostic uncertainty, connect multimodal clinical inputs, and critically assess contextualized evidence over time.

We looked for patients connected via PaJR for similar outcomes. Interestingly, we noted one such case where, a 63-year-old male with metabolic syndrome, dyspnoea and previously diagnosed as hypertensive too, was able to stop his anti-hypertensives therapy with regular BP recordings shared on his PaJR journey by engaging with some clinicians as part of this study. It was argued and doctors concluded that BP recordings were not consistently high enough to merit further antihypertensive therapy [30]. This suggests the current clinical practices observed in different parts of the world, where prescription of anti-hypertensives based on single clinic BP recordings could be leading to the over-diagnosis of hypertension. Thus, we can argue on the basis of another PaJR that clinical judgement and decisions when made using active participatory data sharing approaches can help ensure optimal treatment plan preventing over-diagnosis following over-treatment.

Through repetition, reflection, and feedback, the platform (PaJR) thus serves as an *online participatory medical cognitive apprenticeship space* - enabling both clinicians and patients to participate in a dialogic and deeply contextual model of clinical reasoning aligned with the complexities of multimorbidity.

Limitations:

Some challenges remain evident in our case too. such as ensuring complete historical documentation and the inability to replace face-to-face physical examination for certain

conditions were common. The patient's feedback provides specific examples, noting instances where she 'did not get satisfying answers or solutions to her problems' regarding 'recurring eye problems' and her inability to 'straighten her arm'. Although our system enables participatory medicine, the daily logging of activities is still dependent on the patient and PA's interest to continue further.

Compared to prior literature on overuse of PCI overuse [10] this case offers complementary insights into participatory decision-making and resource optimization. While the financial burden or invasive procedure concerns seen in PCI were absent here, the case underscores the shared need for diagnostic clarity and judicious use of interventions. [23] The patient's appreciation for improving without excessive tests or medications affirms the platform's role in promoting prudent care. Similar to the CBBLE in earlier work, this platform united multidisciplinary inputs and patient-reported outcomes. However, unlike direct physician-patient interactions in PCI cases, the asynchronous, proxy-mediated communication posed unique challenges for real-time shared decision-making.

Conclusion

The case study of the current patient effectively illustrates the potential of collaborative online platforms rooted in user driven healthcare and medical cognition principles for managing complex patients with multiple chronic conditions. The patient's direct experience validated this potential, as she reported increased confidence, improved daily functioning, and satisfaction with reduced medication requirements, enhancing her overall quality of life. Ongoing reporting by the patient advocate fostered co-interpretation and helped the patient move from being a passive

recipient to an epistemic contributor. The participatory setting supports evidence-based decision-making and provides an educational ecosystem for healthcare stakeholders. While challenges related to data collection consistency and the limitations of remote physical assessment persist, evidenced by the patient's ongoing concerns about recurring eye issues and difficulties with arm function despite remote guidance, the advantages demonstrated in this case suggest that such platforms can significantly enhance comprehensive, patient-centered care, particularly in resource-constrained or geographically dispersed settings. AI tools were used, not as final authorities, but as "dialogic partners" providing competing interpretations, generated ideas, and reference points that clinicians evaluated to better inform their own decisions. Further development and widespread adoption of these systems, integrated into case-based blended learning ecosystems, hold promise for improving outcomes and fostering a more collaborative learing and evidence-informed practice of medicine

AI Use Acknowledgement

While the substantive research, analysis, and conclusions presented here are entirely the work of the authors, we acknowledge using an AI language model to help polish language, streamline structure, and explore alternative expressions. Any AI-generated text has been carefully reviewed, edited, and approved by the authors to ensure accuracy, clarity, and consistency with our scholarly intent.

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Supplementary Information 1

Cast of characters and roles played

Based on the provided sources and our conversation history, the interaction takes place within an **Online E Log Book**, which serves as a platform for discussing a patient's de-identified health data with a global online community of experts. The goal is to find solutions to the patient's clinical problems using collective current best evidence-based inputs.

Here is a summary of the cast of characters, their roles, the techniques they used, and the effect of their interactions:

Cast of Characters and Their Roles:

- **Patient Advocate (PA):** This individual acts as the **primary liaison** between the patient and the expert group. The PA shares detailed updates on the patient's symptoms, daily activities, meals, blood sugar readings, and blood pressure measurements. They convey the patient's history, ask questions seeking advice and clarification from the experts, and relay expert instructions and advice to the patient. The PA is also responsible for sharing de-identified patient documents and images or facilitating their deidentification.
- **PPM 1:** Appears to be a **lead clinician or coordinator** of the discussion. They initiate and guide the conversation, assign tasks to other team members (PPMs and CR), provide medical opinions and advice, review patient data, and integrate information from various sources, including AI tools and literature. PPM 1 also uses the handle "cm" in some conversations.
- **PPM 3:** Identified as a **Physiatrist**. They are involved in monitoring patient vitals like blood sugar and BP, provide expertise related to activity modification, contribute to discussions on research and evidence, particularly regarding Vitamin D, and summarize medical concepts and management plans, including providing translations.
- **PPM 4:** Participates in patient admissions, facilitates medical imaging like CT abdomen, is involved in patient reviews, monitors vital signs, requests access to patient reports, and provides specific recommendations for eye conditions, including medication and diagnostic steps.

- **PPM 5:** Involved in managing patient reports, including handling privacy concerns. Also part of the patient review team and contributes to discussions on evidence.
- **PPM 6 & PPM 7:** Involved in implementing monitoring orders in the ward and managing patient consent forms.
- **CR (Case Reporter):** Responsible for the **creation and maintenance of the patient's case report (PaJR)**. They assist with de-identifying patient documents for sharing.
- **Ophthalmologist / Ophthal expert 2:** These roles represent **Ophthalmology experts** who provide specialized consultation on the patient's complex eye conditions, including corneal dystrophy (Meesmann's) and eyelid issues (hordeolum/chalazion). They interpret clinical findings and images, discuss treatment history (PTK), evaluate management strategies, and differentiate between conditions. "S" and "pm" appear to be handles used by these experts.
- **Meta AI & Perplexity: Artificial intelligence tools** consulted by the team for specific information retrieval and synthesis on medical topics like otoliths and vertigo, food allergies, and evidence regarding antibiotics for hordeolum.
- **33F PA:** Another **Patient Advocate** who contributes insights based on their own or others' experiences with similar problems, specifically related to hair loss and Vitamin D.
- **Patient:** The individual whose complex health conditions and experiences are the central focus of the discussion. Her history, symptoms, objective measurements, and response to treatment drive the conversation and expert inputs.

Techniques Used:

- **Collaborative Online Platform:** Utilizing an online E Log Book for asynchronous communication and documentation.

- **De-identified Data Sharing:** Protecting patient privacy while allowing experts to review relevant information.
- **Patient-Reported Outcomes (PROs):** The PA frequently shares detailed subjective accounts of the patient's symptoms, pain levels, general well-being, and daily experiences, providing crucial context for the objective data.
- **Regular Monitoring and Logging:** Tracking vital signs (BP, sugar) and activities over time to identify patterns and evaluate interventions.
- **Sharing and Reviewing Images/Documents:** Utilizing visual data (CT scans, eye photos, meal photos) and historical medical records to aid diagnosis and management discussions.
- **Expert Consultation and Discussion:** Experts across different specialties (general medicine, physiatry, ophthalmology) provide opinions, debate approaches, and synthesize information.
- **Evidence Review and Critique:** Experts discuss and reference external medical literature and AI-synthesized information to inform decisions. This includes discussing the quality and limitations of available evidence.
- **Utilizing AI for Information and Translation:** Integrating outputs from Meta AI and Perplexity to quickly access information and attempt language translation.
- **Case Report (PaJR) System:** Documenting the patient's journey, discussions, and findings in a structured format for future reference and learning.

Effect of Interactions and Techniques:

- **Comprehensive Care Management:** The collaborative approach allowed for the management of a patient with multiple co-morbidities (Diabetes, Corneal Dystrophy, etc.) by drawing on diverse expertise remotely.
- **Timely Advice and Reassurance:** The patient, through the PA, received relatively quick responses and advice during symptomatic periods, including during episodes of fever, pain, or eye discomfort.
- **Detailed Patient Understanding:** The continuous logging of patient data, activities, and symptoms allowed the team to gain deeper insights into potential triggers (like diet spikes, travel, weather changes, or even sun exposure) and the interplay between her conditions (e.g., throat pain/infection and sugar levels, diet and abdominal cramps/sugar).
- **Evidence-Based Decision Making:** The discussions frequently referenced available evidence and guidelines, leading to advice aligned with current medical understanding, while also highlighting areas where robust evidence is lacking (e.g., antibiotics for hordeolum).
- **Educational Platform:** The detailed discussions, evidence reviews, and critiques served as an educational tool for the participants, including understanding the nuances of conditions like Vitamin D deficiency in specific populations or the management of eyelid infections. The PaJR served as both documentation and a learning resource. The patient's direct query about the impact of publishing her case report – 'will this open up new avenues... for students?' – and the assurance that it would 'spread further in the scientific community' to help 'many more patients' clearly demonstrate the platform's role in fostering user-driven learning and community ontologies.

- **Identification of Discrepancies:** The comparison of patient's self-monitored BP with ward measurements highlighted potential issues with devices or measurement techniques.
- **Integration of AI:** The use of AI tools demonstrated their potential for rapidly summarizing research and providing information, although human expert interpretation and validation remain crucial.
- **Challenges Highlighted:** The process also revealed challenges inherent in remote collaboration, such as obtaining complete historical documents, ensuring consistent data collection (e.g., BP measurement), and the difficulty of replacing face-to-face physical examination for certain conditions.

Patient Feedback

The patient, a 44-year-old female from rural India, provided comprehensive feedback on her experience with the collaborative online platform and its impact on her health and quality of life. This feedback was crucial for understanding the direct benefits and limitations of the participatory medicine approach from a user's perspective.

- Overall Satisfaction and Empowerment: The patient expressed being "extremely happy" with the care received, noting that her blood pressure medication was stopped (though it had been temporarily stopped before) and her diabetes medicine dose had been reduced. She reported a significant improvement in her life, stating, "I've gained confidence, and I've gotten back a much better life" where she can now "do my own work". She felt deeply grateful for achieving health improvements "without much medication and without getting expensive tests" that were previously common but yielded no improvement.

- Specific Positive Impacts and Learnings: The patient highlighted several measurable impacts attributable to the platform:
    - Constant contact with doctors and feeling "monitored very closely" which greatly aids her adherence to a healthy lifestyle.
    - The group provided "mental strength and a sense of hope that she is not alone", allowing her to "ask and update about her symptoms in the group everyday".
    - She learned to "pinpoint what food intake is affecting her blood glucose levels" and to correlate her energy levels by sharing hourly activity.
    - The group fostered "accountability especially with regard to food intake".
    - She felt "seen and heard," which motivated her to "make innovative healthy food for herself" and become more conscious about outside food.
    - Her weight loss of "more than 8kgs in 6 months" (December 2024 to June 2025) was directly attributed to her adherence to the "recommended diet and muscle strengthening exercises".
    - She also noted that increased hair loss from December to April was believed to be "due to the frequent antibiotics she was consuming during that time".
- Patient's Engagement with AI Tools: Beyond the expert discussions, the patient herself actively engaged with digital tools, utilizing AI "once every 2-3 days when she tries out a new food recipe and doesn't know the amount of calories, protein and fat content in it". Her motivation to consistently update the group stemmed from feeling "accountable and empowered" and her "internal interest" in how the group assists her daily.

Supplementary Information 2

Timeline summary

Symptoms, reports, discussion, interventions, results

Here is a summary of the patient's journey, symptoms, discussions, recommended and implemented interventions, and results, drawn from the provided sources along a timeline:

Timeline Summary for the 44F Patient

Pre-December 2024:

- **Symptoms:** Initial problems with **wisdom teeth**, leading to infection, itching, and requiring antibiotics. While on antibiotics, she experienced **fatigue and weakness**. She was found to be **diabetic** with a postprandial sugar level of 202 mg/dl. She also suffered from **cramps in the abdomen**. Starting August 2024, she lost appetite, felt weak, had difficulty eating, felt full quickly, health deteriorated, and experienced a **sour taste in the mouth**. She continued to have **no appetite** despite medication. In October, her **spo2 was 72**, **heart rate was high**, and she had a problem in her **gall bladder**. In the month prior to December 29, 2024, she had a **temperature of 99-100 F** every 2-3 days and lost **10 kgs of weight** in the two months prior. She was diagnosed with **corneal dystrophy in both eyes in 2018**. Symptoms in 2018 included **severe pain when opening eyes in the morning**, pain lasting all day, inability to go out during the day, **itching, redness, and sensitivity to lights**. These symptoms lasted until her PTK procedure. She experienced **blurred vision since 2017**, initially thinking it was due to diabetes. She faced day-to-day difficulties because of this. She had **dry eyes since childhood** and used eye drops since

age 16. She also reported **headache, migraine, and vomiting tendency**. She experienced **blood hemorrhage in her eyes** (subconjunctival hemorrhage) with high fever, first noticing it at age 19. In October 2016, after losing her father and feeling depressed, she had **burning sensation in her eyes**, couldn't read sign boards, and had **watery eyes** when outside.

- **Interventions Implemented:** She was treated by a dentist with medication for wisdom teeth issues, then antibiotics for infection. She was given medication for controlling sugar levels. She had a PTK operation for corneal dystrophy in January 2024 on her left eye in 2018 at LVPEI. While admitted to a nursing home in West Bengal, she was prescribed several injections: Meropenem, Hiocimax, Pantodac, Drotin, Cyclopalm, and Ondam. She used eye drops since she was 16 years old.
- **Results:** Her sugar values initially came down to 174 mg/dl with medication. Her blurred vision symptoms persisted even after PTK.

December 2024:

- **Dec 29-30:**
    - **Symptoms:** Patient waiting at the OPD hall. Complains of **giddiness**. After taking oral contrast, she experiences **loose motion, nausea, feeling very weak, dry mouth, and feeling tasteless**.
    - **Discussions/Recommendations:** The case was discussed in an online E Log Book by global experts. Questioned why the patient wasn't admitted to the super speciality ward. Advised for **CT abdomen tomorrow morning** to look for gastric and duodenal diverticulum, requiring oral contrast. Discussed with radiology and surgery teams. Suspected to have **Type 2 Sphincter of Oddi dysfunction** based

on Rome II criteria for biliary-type pain. Discussion about **biliary manometry** at NIMs/Srujan. Advised **monitoring BP 2 hourly** and **blood sugars (fasting and 2 hours post-meal) till Monday**. Advised collecting signed informed consent form. Antidiabetic schedule changed to **Glimepiride 1mg before breakfast** and **Metformin 500mg after lunch**. Later revised to **Glimepiride 1mg before breakfast** and **Metformin 500mg after breakfast, lunch, and dinner**.

- **Interventions Implemented:** Patient went to room 78 in the OPD hall. Patient took oral contrast.
- **Results:** CT abdomen done with oral contrast; noted as appearing normal. Gall bladder looks alright, pancreas mildly bulky but likely normal. Previous serum amylase and lipase were normal. Her GRBS was 86 mg/dl. BP was 110/70 mmHg.

January 2025:

- **Jan 4:**
  - **Symptoms:** Patient feels **abdomen cramp and indigestion** after eating nuts and sprouts. Symptoms started 30 minutes after eating nuts and sprouts: **pain and feeling fullness of belly**.
  - **Discussions/Recommendations:** Advised sharing images of food plates before eating. A diet plan link (Harvard plate proportion) was shared. Noted that the proportion of grains in a shared plate was more than fruits and vegetables; advised equal proportion. Advised to continue Metformin 500mg after every meal.
  - **Interventions Implemented:** Patient reported abdominal cramps after nuts and sprouts. Patient is vegetarian. Patient took nuts and sprouts at 8:30 am. Patient ate

lunch at 11 am and dinner at 7 pm. Patient reported proportions of food items. Patient followed the recommended diet plan.

- **Jan 7:**
    - **Symptoms:** Since 2 days, feels **both side upper abdomen pain** after taking food and moving. Pain stays for a long time, starts 15-20 minutes after food, and continues for about 3 hours minimum. No pain on empty stomach. After breakfast feels **uneasiness in abdomen, vomiting tendency, acidity, and indigestion**.
    - **Discussions/Recommendations:** Noted that pain after food indicates slow intestinal movement. Advised to **take a walk for abdominal uneasiness**. Asked if she can take Dompan or others.
    - **Interventions Implemented:** Patient reported pain characteristics. Patient asked about medication for uneasiness/indigestion. Patient took only half cup veg soup for dinner on Jan 10.
- **Jan 12:**
    - **Symptoms:** Since yesterday evening, suffered with **vomitings** even after dinner.
    - **Results:** Feels a little better.
- **Jan 13:**
    - **Discussions/Recommendations:** Advised to share entire plate image and use a scale to estimate quantity.
    - **Interventions Implemented:** Patient shared image. Patient reported homemade ragi biscuits (no maida, atta, sugar).
- **Jan 19 (Sunday):**

- **Symptoms:** Feeling **very weak and headache**. Headache started after 12 pm and continued. Feels **very uneasiness, dizziness, and eyes feeling dark**. Has been feeling dizziness and headache continuously since after 2 pm.
- **Discussions/Recommendations:** Plan for Sunday: Fasting and 2-hour post-meal sugars, hourly BP readings. Asked about Bisoprolol dose. Can make Bisoprolol half from now on. For dizziness, **Phenargan 25 mg every 8 hours** recommended. For headache, **Paracetamol 650 every 6 hours for 1 day** recommended.
- **Interventions Implemented:** Fasting sugar 118. 9 am BP 157/89, 2-hour post-lunch sugar 141, BP 124/52, Pulse 59. After tiffin (3 pm) took 1/2 tab Metformin, 2-hour sugar 130. 8:45 pm BP 105/48. At 7:45 pm BP 105/60, completed dinner, took Metformin 1/2 after dinner. Took Metformin 1/2 tab. Morning took bisoprolol 2.5 mg. 2 hours after dinner sugar 142.

- **Jan 20:**
  - **Symptoms:** Experiencing **dizziness and headache since yesterday**.
  - **Interventions Implemented:** Took Phenargan 25 mg every 8 hours for dizziness and Paracetamol 650 every 6 hours for 1 day for headache.
- **Jan 21:**
  - **Results:** BP readings: 117/76 (PR89), 109/66 (PR 80), 103/51 (PR 84), 103/40 (PR 86).
- **Jan 22:**
  - **Results:** BP 169/99 at 14:42, later resolved to 112/72.

February 2025:

- **Feb 1:**

    - **Symptoms:** Feeling better but **headache continuing**.
- **Feb 2:**
    - **Symptoms:** At 8 am, feels **very weak**. BP 85/59, PR 94. After 3 minutes of standing, BP was 80/50.
    - **Discussions/Recommendations:** Noted sugars are very well controlled.
    - **Interventions Implemented:** Fasting sugar 123. Before breakfast took Glimepiride 1mg. After breakfast took 1/2 tab Metformin 500. 2 hours after breakfast sugar 128. Lunch at 3 pm. After lunch took 1/2 tab Metformin 500. 2 hours after lunch sugar 92, later 104.
    - **Results:** Sugars were well controlled.
- **Feb 3:**
    - **Symptoms:** When riding in a car, auto, or bike, feels like **everything inside the stomach is shaking, and there's a feeling of dizziness**. This didn't happen before. During yoga, there's a lot of **pressure**. Feels **very weak, has no energy**, when BP is low, vision goes completely **dark and feels dizzy**. Sometimes mentions feeling a lot of **pressure in the chest**.
    - **Discussions/Recommendations:** Advised that for long distances, should get off a few kilometers earlier and walk.
- **Feb 8:**
    - **Symptoms:** Has had a **fever again since yesterday** (99.4-100 F), with a bit of **discomfort in the stomach**. Muscles in the **hand are quite painful and stiff**.
    - **Discussions/Recommendations:** Advised to check temperature every four hours, also check BP and sugar.

- **Feb 9:**
    - **Symptoms:** Stiffness in hand slightly improved with activity. Pain with **stiffness on her tennis elbow** (lateral epicondylolagia) since last 2-3 days. Pain gets worse when cleans room, carries weight, or cooks. Resolves with rest. Finds relief with Tennis elbow band.
    - **Discussions/Recommendations:** Noted that tennis elbow can resolve spontaneously, non-operative treatments help. Added a Physiatrist expert to the group for suggestions on activity modification. Advised using the hand with "palm up" for a couple of months. Reduction of **Glimepiride to 0.5mg from tomorrow** recommended, repeating sugars similarly next week.
    - **Interventions Implemented:** Fasting sugar 112 mg/dl, BP 116/78 mmHg. Before lunch took Glimepiride 1mg 1/2 tab. After lunch took Metformin 500mg 1/2 tab. 2 hours after lunch sugar 121mg/dl. After tiffin (3:05 pm) took Metformin 500mg 1/2 tab, 2 hours after tiffin sugar 112mg/dl. After dinner took Metformin 500mg 1/2 tab, post dinner sugar 90mg/dl. Patient reported specific activities aggravate pain and relief with rest/band.
- **Feb 10:**
    - **Interventions Implemented:** Took 0.5mg Glimepiride before meal and 250mg Metformin after meal.
    - **Results:** BP 90/60, after standing 92/58.
- **Feb 14:**

- **Discussions/Recommendations:** Asked PA to share documents regarding corneal dystrophy, onset of visual symptoms, diagnosis date, previous symptoms, serial vision evaluation documents, and deidentified ophthal evaluations.
- **Interventions Implemented:** PA confirmed diagnosis in 2018, described symptoms, confirmed blurred vision since 2017, described daily difficulties, confirmed dry eyes since childhood, use of eye drops, headache/migraine/vomiting history, and eye hemorrhage history.

March 2025:

- **Mar 2:**
  - **Symptoms:** Sugar monitor not working properly.
  - **Discussions/Recommendations:** Hoped monitor can be repaired; asked about age and warranty. Suggested switching to CGM. Asked for sugar at 9 PM and next day fasting and 2 hours after breakfast.
  - **Interventions Implemented:** Tiffin completed at 2:30 pm, took Metformin 500 in 1/2tab. Dinner at 7 pm.
  - **Results:** 2 hours after tiffin sugar level 234mg/dl. 2 hours after dinner sugar level 167mg/dl.
- **Mar 3:**
  - **Discussions/Recommendations:** Asked PA to share deidentified lateral view images of arm and abdomen for case report (phenotype description). Noted that if patient maintains her current phenotype (muscles in arm, abdominal fat), diabetes can be reversed easily. Noted weight loss is not always good (muscle loss), but

paet loss (abdominal fat loss) is good and visible. Asked for previous lateral view photos for comparison.

    - **Interventions Implemented:** Fasting sugar 95mg/dl. Lunch with rice and cooked vegetables, took Metformin 500 1/2 tablet after lunch, post lunch sugar 126mg/dl. Ate puri, aloo sabji, apple, lime at 14:02 hrs. Patient reported weight 46kg, upper waist 30", middle portion 32". Patient shared previous lateral view photos.
    - **Results:** 2 hrs after tiffin sugar level 172mg/dl. This was noted as not high compared to other patients. Changes in phenotype were visible in shared photos.

- **Mar 7:**
    - **Symptoms:** After a gap of few weeks, has **upper abdominal pain**. Lot of **discomfort, couldn't sleep, felt feverish, throat completely choked, abdominal pain**.
    - **Results:** Feeling better later in the day.
- **Mar 8:**
    - **Symptoms: Severe cough developed, along with stomach, chest and head pain**. Nose blocked, chest congestion. Unable to sleep. Difficult when lying on bed, better sitting. **Sweating** is there.
    - **Discussions/Recommendations:** Symptoms appear due to **gastro esophageal reflux (GERD)**. Simple preventive tactics recommended: **Elevate the head of the bed by 6 to 9 inches**. Shared Mayo Clinic link on GERD.
    - **Interventions Implemented:** Reported symptoms.
    - **Results:** BP 92/60 (PR 92), after standing 100/59 (PR 98).
- **Mar 9:**

    - **Symptoms: Fever down to 100 F** but still has **body aches, headache, and severe cough**. Cough not subsiding, feels stuck.
    - **Discussions/Recommendations:** Can take **paracetamol six hourly**. Can take **water vapor** if cough feels stuck. Noted patient history linking throat pain and high sugar level as possibly related, substantiated that internal medical inflammations can exacerbate hyperglycemia.
    - **Interventions Implemented:** Fasting blood sugar 109mg/dl, BP 108/74, PR 90. Lunch at 10:30 am. Before lunch took 1/2 Glimepiride 1mg, after lunch took 1/2 tab metformin. 2 hours after lunch sugar 177. After lunch took bisoprolol 2.5 mg around 10 am/10:30 am. After tiffin (puffed rice) took metformin 500 in 1/2tab, 2 hours later sugar 119mg/dl, BP 126/76, PR 96. 2 hours after dinner sugar 120.
- **Mar 12:**
    - **Results:** Patient's weight has come down to 45kg.
- **Mar 15:**
    - **Symptoms:** Indigestion problem since morning. Asked if blood sugar will increase if she eats rice 3 times.
    - **Discussions/Recommendations:** No, sugar depends on what she eats tomorrow. Rice or cereal is not bad for diabetes if consumed in the correct proportion. Advised the Harvard plate proportion for meals.
    - **Interventions Implemented:** Ate rice and vegetables due to indigestion.
- **Mar 16:**
    - **Symptoms:** In the morning, BP 89/57, felt **very weak, eyes getting dark**. After standing, BP 90/49. Eye symptoms: Looks like **episcleritis**, happened quite a few

times before. Eye problem used to happen suddenly before it started, eye pressure would increase, slight touch caused eye to move. Feels **heaviness, slight pain, uneasiness to open eyes**, left eye looking small (sentence incomplete). Tennis elbow (lateral epicondylolagia) is a current term for her pain.

- **Discussions/Recommendations:** Need not take BP medicine in this situation. Episcleritis noted, discussed frequency. Asked if any eye drop would suggest for relief.
- **Interventions Implemented:** Fasting sugar 105mg/dl, BP 109/65. Took Glimepiride 1mg 1/2tab before lunch. Took Metformin 500 1/2 tab after 2 hours of lunch. After 2 hours sugar 111. Currently on 0.5mg Glimepiride once daily. Post dinner sugar 141mg/dl, took Metformin 250mg. Before lunch took Glimepiride 1mg in 1/2tab. After lunch Metformin 500mg 1/2tab, 2 hours after lunch sugar 123. After tiffin took Metformin 500in 1/2Tab, 2 hours later sugar 148 (tiffin at 3:30 pm). After dinner took Metformin 500 1/2tab, 2 hours later sugar 142.

- **Mar 19:**
  - **Discussions/Recommendations:** Ophthalmologist's clinical findings from Disha noted: Diagnosis of Left corneal opacity with epithelial changes (likely Meesmann's dystrophy) and right cornea with epithelial changes and iris Lisch nodule. Impression: Meesmann's epithelial dystrophy with left corneal opacity (post PTK), right iris Lisch nodule. Rule out Neurofibromatosis Type 1. Confirmed corneal dystrophy diagnosis is entirely clinical. Asked PA to deidentify and share printed prescription.

- **Mar 21:**
    - **Results:** BP 113/57, PR 90.
- **Mar 23:**
    - **Symptoms:** Has not taken BP medicine for last 6 days.
    - **Interventions Implemented:** Fasting blood sugar 94mg/dl. 7 am BP 122/82. Lunch at 10:30. Before lunch took Glimepiride 1mg in 1/2Tab, after lunch took metformin 500 in 1/2 tab. After dinner took metformin 500 in 1/2tab.
    - **Results:** After 2 hours of lunch sugar level 129. After 2 hours of dinner sugar level 96.
- **Mar 25:**
    - **Symptoms:** Patient will reach shortly. Patient feels **very weak with darkness of eyes, slight pain in shoulder and arms**. Thinks the BP machine is not working.
    - **Discussions/Recommendations:** Advised to wait in OPD and will be admitted. Reviewed in OPD. Found **divarication of recti along with a suspected small parietal hernia** at the right hypochondrium on abdominal examination. Planned ultrasound. Review BP instrument and glucometer with ward devices. Ophthalmologist stated corneal dystrophy is not very significant, looks normal, retina normal, field test normal. PTK just ablates tissue, no specimen. Need pre-PTK slit lamp images or visual acuity data. Asked to collect visual acuity data before PTK. Asked to check BP from multiple electronic machines at the same time. Noted breakfast needs to be more substantial.
    - **Interventions Implemented:** Patient reached OPD. BP checked by ward machine (150/90 mmHg vs patient's 103/62, PR 89 at the same time). Patient took roasted

makhana in the morning. Ate Idly with chutney and sambar for breakfast. At 7:45 pm BP checked by ward machine (140/70) and own machine (112/69) with 1-2 minute gap.

- **Results:** Patient's BP 90/60 on OPD review. Differences noted between ward and patient's BP readings. Differences noted between ward and patient's glucometer readings (fasting 122 vs 145, post-lunch 152 vs 172). Later BP readings started matching (110/80 vs 103/64, 110/70 vs 110/69). Glucometer values not matching. Sugar level increasing, 2 hours after dinner 194.

April 2025:

- **Apr 8:**
  - **Symptoms: Fever has come along with body ache and headache**. Severe body and headache even after taking paracetamol. Abdomen pain looks like previous after taking paracetamol, so stops paracetamol. At night, temperature over 102F with severe pain. Feeling very weak. **Increasing severe muscle cramp**. Again **fever along with headache, nose burning sensation and body ache**.
  - **Discussions/Recommendations:** Advised to take **paracetamol 650**. Monitor temperature 4 hourly. As long as she can eat, she should be fine.
  - **Interventions Implemented:** Stopped BP medicine since last 20 days as per doctor's advice. BP 135/84 (PR 97), after standing 123/81 (PR 91). Patient took paracetamol 650. Took methi mouri water, normal water, raw mango sherbat for muscle cramp. No paracetamol taken yesterday.

    - **Results:** Fever 100F, at night over 102F. No fever on Apr 10, feeling better. Still some discomfort, believes will be fine. Fever 100F again on Apr 11. Muscle cramp felt better after remedies.

- **Apr 11:**
    - **Symptoms: Throat completely choked and discomfort for swallowing**.
    - **Discussions/Recommendations:** Paracetamol will work here too. If abdomen pain starts after paracetamol, can avoid medication. Advised to **do gargle with hot water and have black tea**.
- **Apr 12:**
    - **Symptoms:** After taking paracetamol, **abdomen pain starts**. Paracetamol doesn't suit her. **Can't swallow, severe pain in throat**. Feels **constant irritation, watering in right eye**, same symptoms of conjunctivitis.
    - **Discussions/Recommendations:** Advised to avoid medication, take hot water, hot black tea with ginger, boiled daal juice. Try **betadine gargles**. Check for drops last prescribed by Ophthal in her case report.
    - **Interventions Implemented:** Takes paracetamol in the afternoon.
- **Apr 13:**
    - **Symptoms:** Fasting Sugar level 144mg/dl. On the higher side. Past history: **throat pain and high Sugar level is related**. Gargle with Betadine, hot water drinking not working, very painful, can't swallow. Now has 100F. Sugar level 204mg/dl. **Severe throat pain since last night, burning sensation in ears, eyes red and painful, whole face is swollen**. BP and sugar level increasing. Paracetamol not helping. Same problem happened with long train journeys in the

past (2015, 2018, 2021, 2023, 2024, 2025), especially March/May. Might be due to long journey and heat wave. Doesn't want to take antibiotics again, feels weak.

- **Discussions/Recommendations:** Noted fasting sugar is on the higher side. Confirmed glimepiride 0.5mg was taken. Noted the observation linking throat pain and high sugar as good and possibly related, explained inflammation can exacerbate hyperglycemia. Asked when taking breakfast with the tablet. Confirmed she takes glimepiride at usual time (10:30 am). Asked about paracetamol use frequency. Can search case report for similar episode recovering with Paracetamol alone. Asked about glimepiride and metformin timing with high sugar reading. Noted many episodes of fever, eye redness, sore throat in case report for PA to review.
- **Interventions Implemented:** Fasting Sugar level 144mg/dl. Took glimepiride 0.5 before breakfast yesterday. Not taking breakfast now (9:14 am), takes nuts and black tea, regular breakfast at 10:30 am. BP 130/84 PR 123. Sugar level 204mg/dl. Took paracetamol once after breakfast around 10:30 am. Experienced similar problems after past long journeys, had to take Clavam 625 except in 2025. 2 hours post dinner sugar 148mg/dl, BP 124/83 after taking metformin 500 in half tab.

- **Apr 15:**
  - **Symptoms:** Feeling more better. No taste in mouth, everything feels bitter, sweating a lot. Feeling very weak but improving gradually.

- **Discussions/Recommendations:** Asked if recent Ophthal evaluation in Mumbai was shared. CR said no. PA said will try but can't deidentify. CR offered to deidentify if sent to their number.
- **Interventions Implemented:** Patient reported symptoms. Patient had to force herself to work yesterday due to work pressure.

- **Apr 25:**
  - **Symptoms:** Patient and her daughter have been experiencing **a lot of hair fall** (almost 1/3 gone) since last September. Asks about using specific herbal products (Rubodex Hair Oil, Shampoo, Forte Tablet) for hair fall.
  - **Discussions/Recommendations:** Herbal products cannot be reviewed by the experts here, only products with scientific trials. Asked if they changed bath water or checked Vit.D level. Shared information that significant hair fall in another patient was explained by androgen excess. Discussed methods for evaluating and measuring hair loss (daily hair counts, wash test etc.). Shared info on Vitamin D levels and potential for over-testing/overtreatment in India.
  - **Interventions Implemented:** Haven't checked Vit.D level recently, haven't changed bath water since September. Hairfall count 20 today (not significant according to one expert), previously average 3-4. Patient had acne problem previously (cured last year). No male pattern hair distribution. Father and grandfather have baldness.
  - **Results:** Androgen excess suggested as explanation for hair loss.
- **Apr 27:**

- **Interventions Implemented:** After lunch took metformin 500 in half tab. Lunch included Rice, Dal, bitter gourd pakoda, sabji.
- **Results:** 2 hours after lunch sugar level 159. BP 113/77, after standing 117/76.

May 2025:

- **May 1:**
  - **Symptoms:** Right hand muscles feel very **weak**. Can't apply pressure for pulling or lifting.
  - **Interventions Implemented:** Patient learning muscle strengthening exercise weekly. Using 'Gen Teal' Gel at bedtime for eyes, feels cool and comfortable.
- **May 4:**
  - **Symptoms:** From last 1 week feels **neck pain**.
  - **Discussions/Recommendations:** Neck pain is unrelated to BP. Asked her to elaborate on neck pain using the PaJR history template.
  - **Interventions Implemented:** BP medicine has been stopped since 25 days. Fasting blood sugar 101, BP 97/64. Before breakfast took Glimepiride 1mg in half tab, after breakfast took metformin 500 in half tab. Lunch at 12:49 pm, after took metformin 500 in half tab. Dinner at 6:45 p.m., after took metformin 500 in half tablet.
  - **Results:** 2 hours after breakfast sugar 92. 2 hours after lunch sugar 97.
- **May 5:**
  - **Symptoms:** Since midnight, had **severe nasal congestion, headache, sore throat, intense body ache**. Felt cold even under minimum fan speed. Vision goes **dark whenever stands up**. No fever, **extreme body ache**. Whenever starts full

phase work, goes outside, travels by local train, or slight sun exposure, **same symptoms occur (severe throat pain, headache, nose congestion, body ache, eye redness with pain)**. Feels like catching cold easily ('Thanda lege jache'). Pain around eyes started last 1-1.5 month, itching inside eyes since Monday (May 5?). Happening intermittently, alternate eye, almost 2 months, 5 times.

- **Discussions/Recommendations:** Ophthal opinion: Needs oral antibiotics. Most likely internal hordeolum. Diabetic patients more prone to recurrent infection. Restrain from touching eyes.

- **May 9:**
  - **Symptoms:** Still pain in affected eye. Swelling is there. Hot compress was very painful, so didn't do it. Pain is there, discomfort, feels good if closes eye.
  - **Discussions/Recommendations:** Ophthal opinion needed if recommends antibiotics or face-to-face meeting. Patient Advocate suggests antibiotics needed due to symptoms. Web 2.0 inputs: Share fasting, 2-hour post-meal sugars for next few days till suspected hordeolum subsides. Efficacy of antibiotics doubtful in hordeolum/chalazion over eyelid hygiene and warm compresses based on current evidence ([PubMed], [PMC]). Lack of evidence doesn't imply harm but argues against routine use. Fexofenadine (patient is taking) helps with itching, useful to prevent touching. Detailed plan provided: **Record fasting and 2-hour post-meal glucose values** for several days. **Warm compresses** (10-15 mins, 3-4 times daily, gold standard) and **eyelid hygiene** recommended. Lid massage suggested. Antibiotics not recommended for uncomplicated hordeolum, reserved for cellulitis, immunocompromise, or failure after 1 week of self-care. Follow-up in

5-7 days, refer for I&D if fails to resolve, urgent eval for orbital cellulitis. @PPM4 asks for close-up photo of affected eye. @PPM4 recommends: **Warm moist fomentation**, **Zaha eye ointment (azithromycin 1%)** twice daily, **T. Clavam 625 mg twice daily for 5 days**, along with usual antacid. Ophthal expert @PPM3 analyzes image, likely internal hordeolum manifesting externally, involves meibomian gland. Management implications for internal vs external discussed (warm compresses more critical for internal, topical antibiotic less penetration for internal, oral antibiotics considered for larger/inflammatory internal/resistant). Suggested Action Now: **Begin warm compresses** (5-6 times/day), use **topical antibiotic ointment** (e.g., erythromycin) 2-3 times/day, watch for fluctuation, consider oral antibiotics if worsening/systemic signs, refer if fever/cellulitis/visual disturbance.

    - **Interventions Implemented:** Took fexofenadine 120 at night. Patient reported affected eye is the right one, photo shared. Swelling for 3 days, painful from beginning, warm compress gives relief.
    - **Results:** Completed breakfast at 10 am, took metformin 500 in half tab, 2 hours later sugar 179 mg/dl. Took Glimepiride 1mg in half tab before breakfast. After lunch took metformin 500 in half tab, 2 hours later sugar 92. After dinner took metformin 500 in half tab, 2 hours later sugar 186mg/dl. Took fexofenadine 120 after dinner.

- **May 10:**
    - **Results:** Fasting blood sugar levels 111. Explained sugar difference (lunch 92 due to Glimepiride effect, dinner 186 as effect wore off, still fair control).

- **May 15:**
    - **Symptoms:** Eye condition: **No pain but swelling**. Hot compress was very painful, so didn't do it.
    - **Interventions Implemented:** Completed antibiotic course 3 days before.
- **May 17:**
    - **Symptoms: Pain is there**, discomfort, feels good if closes eye.
    - **Discussions/Recommendations:** @PPM3 commented on the role of surgery (Incision and Currettage, Steroid Injection) for resistant stye/hordeolum, considered after 4-6 weeks of failed conservative treatment. Discussed key considerations, timing, risks, and postoperative care. @PPM3 identified the image as likely internal hordeolum manifesting externally and reiterated management suggestions (warm compresses 5-6 times/day, topical antibiotic ointment 2-3 times/day, watch for fluctuation, consider oral antibiotics if worsening).
- **May 18:**
    - **Symptoms:** After breakfast, 2 hours later sugar level 58.
    - **Discussions/Recommendations:** Noted low sugar reading (58), suggested to be careful and **stop taking Glimepiride for a few days**. She can **continue metformin immediately after all three meals** after stopping glimepiride from tomorrow. Advised to monitor response when changing meds.
    - **Interventions Implemented:** Fasting sugar 102mg/dl. Before breakfast took Glimepiride 1mg in half tab (0.5mg). After breakfast took metformin 500 in half tab. Had mango and kheera at 3pm, after that took metformin 500 in half tab. After dinner took metformin 500 in half tab.

    - **Results:** 2 hours after breakfast sugar level 58. Sugar reading 132mg/dl (time unclear). 2 hours after fruits sugar 130. 2 hours after dinner sugar 76.
- **May 19:**
    - **Discussions/Recommendations:** Confirmed to stop glimepiride and continue metformin after meals. Can restart 0.5 mg Glimepiride if necessary after checking today's sugars. Given the low sugar reading (76), advised to stop today's glimepiride and not check sugar for today.
- **May 20:**
    - **Symptoms:** Blister on eye has **burst**. A lot of **pus and blood have come out**.
    - **Interventions Implemented:** Applied Azithromycin ointment.
- **May 25:**
    - **Interventions Implemented:** Glimepiride has been stopped for the last 7 days. Fasting blood sugar level 105. BP 114/72. Patient reported potential food allergy reaction (throat/ear burning after mango). Asked about peanut consumption. Ate breakfast at 8:30 am (roti, chana, pickle).

May 28, 2025:

- **Discussions/Recommendations:** Discussion about the therapeutic uncertainty surrounding hordeolum, particularly the efficacy of oral doxycycline. Web 2.0-3.0 inputs noted no solid evidence from RCTs for routine antibiotic use in hordeolum compared to conservative care. Guidelines rely on lower-level evidence and pathophysiologic rationale when RCTs are absent. Practical recommendations reiterated: stepwise approach starting with warm compresses and hygiene, oral antibiotics only if no improvement or

systemic signs, I&D for resistant lesions. Patient counseling to emphasize compresses and avoid squeezing.

This timeline provides a structured overview of the patient's health journey, highlighting the interplay between her reported symptoms, the clinical team's assessments and recommendations, the treatments she implemented, and the resulting changes in her condition and measurements.