



Review Article

# Mobile applications for the implementation of patient-reported outcome measures in skin allergies

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## ABSTRACT

Chronic spontaneous urticaria (CSU), angioedema (AE), and atopic dermatitis (AD) are some of the common recurrent dermatological conditions that seriously affect the quality of life in patients through wheals, itching, and swelling unpredictably. Patient-reported outcome measures (PROMs) are standardized tools used to assess disease activity and the quality of life from the patient's perspective. However, these instruments are usually underutilized in clinical settings due to various reasons such as time constraints and logistical challenges. The objective of the study is to assess and describe mobile applications that incorporate PROMs for skin allergy monitoring and management, focusing on features, usability, and clinical utility. A qualitative descriptive analysis of five selected mobile apps that integrated validated PROMs for CSU, AE, or AD, which were publicly available at major app stores, with supporting documentation or published literature, was performed. The mobile app rating scale (MARS) framework was used to appraise the apps, considering ratings found in app stores, user feedback, and literature reviews. Among the five applications evaluated, namely Target My Hives, UrCare, SymTrac, HAE TrackR, and CRUSE, there was considerable variability in how PROMs were integrated into features that support symptom tracking and facilitate interaction between patients and clinicians. Key aspects are summarized in a comparative table, followed by a narrative analysis highlighting strengths in engagement and limitations in automation. The review is based on secondary data, with no direct user testing; gaps in app design, regulatory compliance, and electronic health record integration were noted. Mobile applications with PROMs hold promise for improving care in skin allergy but need further clinical validation, advances in accessibility, and interoperability.

**Keywords:** CRUSE, HAE TrackR, Patient-reported outcome measures, Patient-reported outcome measures Apps, SymTrac, Target My hives, UrCare

## INTRODUCTION

Chronic spontaneous urticaria (CSU), angioedema (AE), and atopic dermatitis (AD) are dermatological diseases characterized by a fluctuating clinical course and substantial impairment of quality of life.<sup>[1,2]</sup> Management and monitoring of these diseases usually need to be performed in the long term. Standard clinical measures may not detect daily variations in symptoms; therefore, patient-reported outcome measures (PROMs) represent a potentially helpful complement to clinical assessment.<sup>[3]</sup>

PROMs are questionnaires completed by the patients themselves to report health status, functional limitations, and symptom burden. Validated tools such as the urticaria activity score (UAS), urticaria control test (UCT), urticaria severity score, chronic urticaria QoL questionnaire, AE QoL questionnaire, and AE activity score give information to the clinician on disease severity and treatment response.<sup>[4-10]</sup>

Despite their value, PROMs are grossly underutilized due to time constraints, administrative burden, and lack of electronic health records (EHR) integration. Such limitations

are overcome with mobile apps that allow remote data entry, real-time tracking, and data sharing.<sup>[11,12]</sup> Indeed, several studies have shown interest in such tools among CSU patients and suggest the potential to reduce the clinical workload.<sup>[13,14]</sup> This review examines five apps with a focus on PROM integration, their features, and clinical relevance.

## MATERIALS AND METHODS

This qualitative review was based on a systematic search of major app stores, namely Google Play, Apple App Store, PubMed, and gray literature, identifying tools targeting CSU, AE, or AD with integrated PROMs. Of these, five mobile applications were selected.

### Inclusion criteria

The apps were chosen based on the following:

1. Explicit PROM incorporation, such as UAS7 or UCT.
2. Commonly used, validated, and referred to in published peer-reviewed articles.<sup>[2,14-18]</sup>
3. A downloadable application.

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4. Evidence of clinical utility through documentation or studies.
5. A focus on patient self-monitoring.

The exclusion involved apps that were general health trackers without specific PROMs for skin allergies. Five apps met the inclusion-exclusion criteria: Target My Hives, UrCare, SymTrac, HAE TrackR, and CRUSE.

The evaluation was by means of the mobile app rating scale (MARS), which evaluates engagement, functionality, aesthetics, and information quality on a 5-point scale.<sup>[19]</sup> Further information collected includes app store ratings (when accessible), download estimates, user reviews, and compliance with standards such as ISO/IEC 25010 for software quality. This was a descriptive, non-interventional study using secondary data; no human subjects were involved.

### Study design

This descriptive review aimed at assessing the integration of PROM in mobile apps and their utility in the management of CSU, AE, and AD gave emphasis on mHealth frameworks regarding usability and clinical efficacy.

### RESULTS

The five apps were evaluated based on their integration of PROMs, symptom tracking capability, user interface, and overall clinical utility [Table 1].<sup>[13,20-23]</sup> Applying the MARS framework, average scores ranged from 3.2-4.5, reflecting moderate-to-high usability, with strengths identified in functionality but gaps in the areas of engagement for sustained use. According to the app store data, popularity varied: CRUSE boasts more than 20,000 downloads and a rating of 5.0 from limited reviews, while others, such as HAE TrackR, had a positive qualitative feedback but fewer quantifiable metrics. The hives-specific version of SymTrac received mixed user reports on performance; Target My Hives and UrCare had limited app store presence, indicating poor distribution or niche use.

All evaluated applications support PROM-based symptom tracking, allowing patients to record symptoms such as itching and swelling using validated scales, with generated outputs including graphs to facilitate data visualization. Target my hives has comprehensive community support and is suited to building emotional resilience, but its inputs are largely manual, which may deter users; it scored the lowest on MARS engagement at 3.0. The clinician dashboard feature increases interactivity in UrCare but scores lower on aesthetics, 3.5, as the design is very basic. SymTrac facilitates objective tracking through photo comparison. However, users' reports of performance issues are reflected in its lower MARS score. HAE TrackR is an AE-specific tracker but has now expanded to CSU, allowing secure, patient-owned data, hence high ratings for functionality at 4.5. CRUSE, developed

with endorsement from UCARE, excels for information quality, scoring 4.8, since validated PROMs are provided and access is multilingual, though adherence to use remains variable.

Critically, these apps align with digital health frameworks by promoting self-efficacy, but lack AI-driven automation, limiting clinical efficacy in resource-constrained settings.

### DISCUSSION

Measurement of PROMs has been highly recommended as a means of treatment in chronic dermatologic conditions, including CSU, AE, and AD.<sup>[2,4]</sup> Mobile apps digitalize these tools to address identified challenges such as inconsistent documentation and difficulties with integration into EHRs, and help in management [Figure 1].<sup>[11-14]</sup> The reviewed apps included validated PROMs (e.g., UAS7 and UCT) promoting real-time monitoring and self-management, as seen in CRUSE and SymTrac.<sup>[13,21]</sup> They can help determine the efficacy of treatments such as omalizumab, a monoclonal antibody used in refractory CSU.<sup>[23,24]</sup> Most inflammatory skin disorders lack validated biomarkers for diagnosis and disease monitoring. The use of mobile-assisted PROM helps the physician to deliver a tailor-made approach to the patients by assessing proper disease, severity, control, and quality of life in patients with skin allergies.

Beyond tracking, these platforms enhance patient engagement by including features such as medication reminders, visual analytics, symptom photography, remote monitoring, and personalized treatment plans [Figure 2]. Apps such as SymTrac and HAE TrackR allow patients to upload images of skin lesions, providing clinicians with objective insights into symptom evolution. In addition, community forums in apps such as Target My Hives offer emotional support and shared coping strategies, which are essential given the psychological toll of chronic skin allergies.<sup>[19,25]</sup>

However, there are still some critical gaps that persist: Manual inputs are leading to user fatigue, as evidenced by a <4.0 MARS engagement score for most apps. Privacy concerns, though, general data protection regulation compliance in some, for example, HAE TrackR, requires strong regulations.<sup>[14]</sup> Digital inequality restricts access, while low bandwidth and multilingual needs are the designer's concerns.<sup>[26]</sup> Compared to frameworks such as ISO/IEC 25010, apps fare averagely for usability but very poorly in interoperability with EHRs, which hampers wide diffusion. Future developments should implement the use of AI for predictions, integration with wearables, and clinical trials for validation. In conclusion, these applications revolutionize care but do need standardization to fully realize their potential.

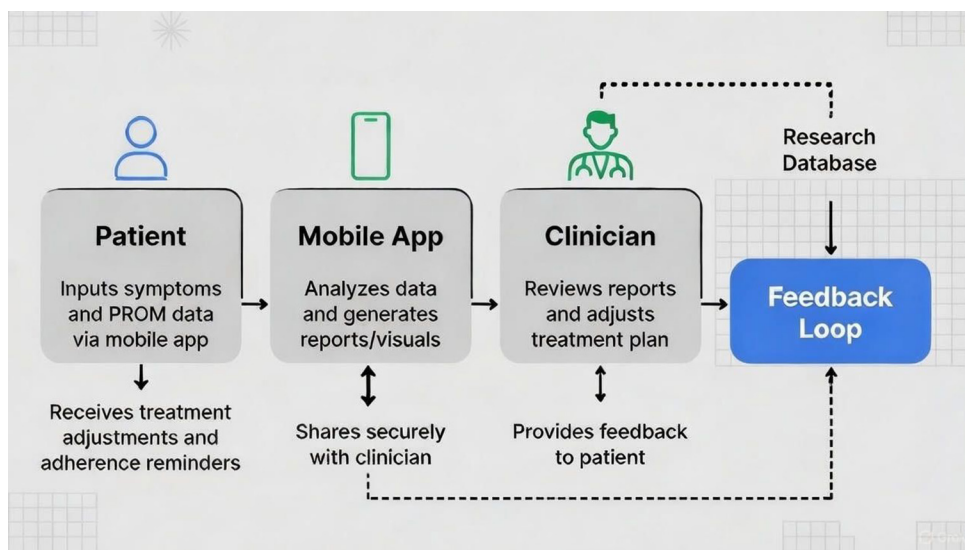
### Limitations

This review is based on secondary sources that do not involve direct clinical trials or interviews with patients

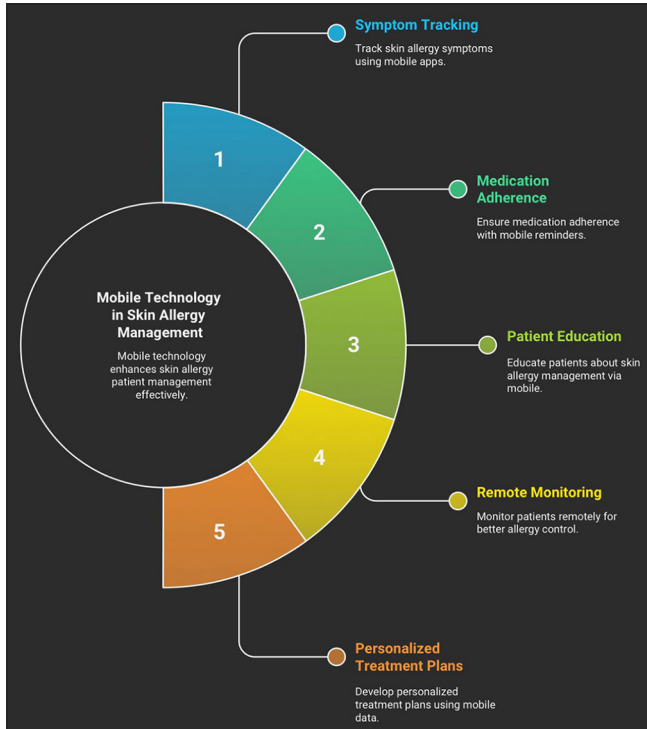
**Table 1:** Comparative overview of mobile applications integrating PROMs for skin allergy management.

App name	PROMs integrated	Key features	MARS score (average)	App store rating/downloads	Advantages	Limitations
Target my hives	UAS7, UCT	Symptom tracking, flare prediction, community forums, medication reminders, and specialist locator	3.5	N/A (Limited data)	Enhances engagement via community and supports informed decisions	Manual entry, subscription for features, and privacy are reliant on consent
UrCare	UAS7, UCT, AAS	Daily logs, treatment tracking, physician dashboard, and report generation	3.8	N/A (Niche app)	Fosters monitoring and communication enhances compliance	Digital access inequality, manual input, and limited automation
SymTrac	UAS7, UCT, USS	Photo uploads, PROM charting, and custom alerts	3.3	3.3/5 (from surveys)	Visual analytics for the assessment of treatment and ease of navigation	Glitches in the technical functioning, manual logging is required, and condition-specific limitations
HAE TrackR	AAS, AE-QoL	Attack logging, secure storage, trial compatibility, and reminders	4.2	Positive reviews (e.g., “Highly recommend”)/ Available on stores	Research-friendly, cross-platform, and GDPR compliant	Learning curve, manual entries, and privacy concerns
CRUSE	UAS7, UCT, CU-Q2oL	PROM entry, sleep/mood tracking, medication adherence, and multilingual	4.5	5.0/5 (1 review); >20,000 downloads	Doctor-patient collaboration; simple design; real-world data	Country-limited; daily input required; technical issues

This table summarizes key features of five mobile apps evaluated in this review, including integrated PROMs primary functionalities, average MARS scores, available app store metrics, main advantages, and limitations. PROMs: Patient-reported outcome measures, MARS: Mobile app rating scale, UAS: Urticaria activity score, UCT: Urticaria control test, USS: Urticaria severity score, AAS: Angioedema activity score, CU-QoL: Chronic urticaria quality of life questionnaire, AE-QoL: Angioedema quality of life questionnaire, GDPR: General data protection regulation. N/A: Not available.



**Figure 1:** Flowchart of patient-reported outcome measure (PROM)-enabled mobile app integration in allergy management-symptom and PROM data input by the patient through the app; analysis by the app, then reports/visuals created; after that, data are shared securely with the clinician. The clinician reviews and adjusts the treatment while feedback to the patient creates an ongoing monitor, with branches to research data generation and adherence reminders.



**Figure 2:** Mobile technology in skin allergy management-the infographic depicts five key roles of mobile apps in managing chronic skin allergies: (1) Symptom tracking, (2) Medication adherence, (3) Patient education, (4) Remote monitoring, and (5) Personalized treatment plans.

and might have missed real-world usability nuances. The selection of apps may miss emerging tools, and the evaluation relies on data availability, with limited quantitative metrics for some, such as Target My Hives. In design, gaps include limited automation, which increases adherence-related problems; legal risks due to different data protection legislation; and a lack of electronic health record integration, undermining seamless clinical workflows. Future studies must include user-centered testing and longitudinal outcomes.

## CONCLUSION

Patient reported outcome measures (PROMs) in mobile applications have represent a promising advancement in the management of chronic skin allergies, including chronic spontaneous urticaria, angioedema, and atopic dermatitis. These applications have the ability to track symptoms, could assist in the evaluation of PROMs, and could provide better interaction between patients and healthcare providers. However, current applications show limitations, including manual data entry, usability, and ease of accessibility regarding electronic health records. Future efforts should focus on clinical validation, using artificial intelligence for predictive analytics, ease of integration with healthcare systems, and adhering to data privacy standards.

Consequently, PROM-based mobile apps can play a critical role in patient-centered care for chronic dermatoses.

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