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Quality of life measurement in teledermatology. Position statement of the European Academy of Dermatology and Venereology Task Forces on Quality of Life and Patient Oriented Outcomes and Teledermatology

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Teledermatology, quality of life, measurement, treatment

Conflict of interest

AYF is joint copyright owner of the DLQI. Cardiff University receives royalties from use of the DLQI: AYF receives a share under standard university policy. AB had royalties for publications: Practical Psychodermatology Wiley 2014 and Psychodermatology in clinical practice Springer 2021; consulting fees from Abbvie, Almirall, Eli Lilly, Galderma, Novartis, Pfizer, UCB, Leo Pharma, Janssen, Sanofi; travel bursary from UCB and Abbvie. JCS received honorarium from AbbVie, Leo Pharma, Novartis, Sanofi-Genzyme, Vifor, Trevi, UCB, Janssen-Cilag, Eli-Lilly, Pierre-Fabre. Other authors reported no conflicts of interests.

Data availability statement:

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Abstract

Many events, including the COVID-19 pandemic, have accelerated the implementation of teledermatology pathways within dermatology departments and across healthcare organisations. Quality of Life (QoL) assessment in dermatology is also a rapidly developing field with a gradual shift from theory to practice. The purpose of this paper organized jointly by the European Academy of Dermatology and Venereology (EADV) Task Force (TF) on QoL and Patient Oriented Outcomes and the EADV TF on Teledermatology is to present current knowledge about QoL assessment during the use of teledermatology approaches, including data on Health Related (HR) QoL instruments used in teledermatology, comparison of influence of different treatment methods on HRQoL after face-to-face and teledermatology consultations, and to make practical recommendations concerning the assessment of QoL in teledermatology.

The EADV TFs made the following position statements: teledermatologic communications can be used to monitor the clinical course of chronic conditions and patients' QoL and to follow-up the treatment response; HRQoL assessment may be an important part in most of teledermatology activities; HRQoL assessment may be easily and effectively performed during teledermatology consultations. It is especially important to monitor HRQoL of patients with chronic skin diseases during lockdowns or in areas where it is difficult to reach a hospital for face-to-face consultation; regular assessment of HRQoL of patients with skin diseases during teledermatology consultations may help to monitor therapy efficacy and visualize individual patient's needs; management of chronic skin diseases using teledermatology methods showed comparable effects on HRQoL improvement with face-to-face consultations but most patients prefer face-to-face consultations; the dermatology-specific HRQoL instrument the Dermatology Life Quality Index (DLQI) is the HRQoL instrument most frequently used in teledermatology and a simple DLQI app is available in seven languages; it is important to develop apps for dermatology-specific HRQoL instruments for use in children and for disease-specific instruments.

Introduction

Teledermatology can be defined as the practice of dermatology remotely. It uses digital technology to exchange clinical information and images to support patient care.¹

Teledermatology was originally developed to supply a diagnostic program and/or therapeutic management to patients living at a distance or to elderly patients who were unable to travel (i.e. telediagnosis, telecare), where face-to-face consultations were impossible to organize. It was then extended for use in research as well as for educational purposes. Teledermatology can be used in the diagnosis and monitoring of different skin diseases.^{2,3} It can be used to support all stages of the patient journey, ranging from self-care and community management to triage to the correct hospital service, tertiary care, and long-term monitoring and follow-up. Many events, including the COVID-19 pandemic, have accelerated the implementation of teledermatology pathways within dermatology services and across healthcare organisations worldwide.¹

Quality of Life (QoL) assessment in dermatology is also a rapidly developing field with a gradual shift from theory to practice.⁴ Teledermatologic consultation can be a valuable tool to monitor the QoL of patients affected by chronic skin diseases and who may require monitoring.^{5,6} Where short follow-up times for visits would be impossible for these patients due to logistic or age reasons, the use of teledermatology consultations may guarantee continuity of care, ensuring better disease management and, consequently, reducing the impairment of Health Related (HR) QoL. Teledermatology consultations were particularly important during the COVID-19 pandemic, not only for investigating and managing skin disease but also because of their possible beneficial effect on HRQoL.^{7,8} A 2015 literature review stated that teledermatology interventions do result in improved QoL, and those changes correlate with improvements in disease severity and clinical course.⁹

The purpose of this paper, organized jointly by the European Academy of Dermatology and Venereology (EADV) Task Force (TF) on QoL and Patient Oriented Outcomes and the EADV TF on Teledermatology, is to present current knowledge about QoL assessment during the use of

teledermatology approaches, including data on HRQoL instruments used in teledermatology, comparison of the influence of different treatment methods on HRQoL after face-to-face and teledermatology consultations, and to make practical recommendations concerning the assessment of QoL in teledermatology.

Methods

Members of the EADV TFs on QoL and Patient Oriented Outcomes and Teledermatology were invited to participate. A literature search was performed using the PubMed database, which was searched from the beginning to March 2023 using the key word combination: “teledermatology, quality of life”. All publications written in English or those having English abstracts were considered.

Exclusion criteria:

- Review articles, guidelines, protocols
- Studies without HRQoL assessment
- Studies without teledermatology

Identified review articles were searched for important additional references. The remaining publications were analyzed in detail and the QoL instruments used in teledermatology were listed.

Results

From the 52 articles identified in the literature search, 33 were excluded based on the exclusion criteria, leaving 19 publications for the further analysis. Three generic, five dermatology-specific and one atopic dermatitis-specific HRQoL instruments were used in these studies.^{6,7,10-26} The Dermatology Life Quality Index (DLQI) was used in 15 studies. Other instruments were used once or twice (Figure 1).

Effect of teledermatology on HRQoL

Patients attending teledermatology clinics at two rural hospitals in Jordan were interviewed at their initial visit and after eight weeks.¹¹ The mean Short Form (SF)-8 score increased significantly and the mean DLQI score decreased significantly ($p < 0.005$) indicating that there had been an improvement in patients' HRQoL. However, the DLQI mean score change (3.5) did not reach the minimal important difference (MID) of 4 points.²⁷

High-need patients with psoriasis sent clinical images, together with some relevant clinical information, via mobile phones every 12 weeks to dermatologists, who then gave treatment instructions. The DLQI scores greatly decreased over the 12-week period, indicating better patient QoL at the end of the study. At week 0, the median DLQI score was 15.5 (range 4–28), indicating that their psoriasis had a “very large effect on their life”: at week 6, the median score was 8.5 (range: 0–17), indicating a “moderate effect” and at week 12, the median score was 5.0 (range: 0–30) indicating a “small effect” on their life.¹²

In a study of psoriasis, patients assigned to an intervention group received an educational program, attended visits on weeks 0, 12, 24, 36, and 60, and had access to a study app. Patients in the control group only attended the visits. A significant reduction in the mean DLQI was observed in the control group (from 8.5 ± 8.5 at baseline to 3.7 ± 4.1 at week 60) and in the intervention group (from 7.9 ± 7.6 to 4.4 ± 5.5). There was no significant difference between the patients who used the eHealth Smartphone App and those who didn't. However, reduction in DLQI scores was higher than MID only in control group.¹³

Daily text messages, providing reminders and educational tools, were sent for 12 weeks to a group of another 20 patients with psoriasis. A matched control group of 20 patients with psoriasis did not receive the text messages. Both groups had similar scores for Psoriasis Area and Severity Index (PASI), Self-Administered (SA) PASI, Body Surface Area (BSA), Physician Global Assessment (PGA) and DLQI at baseline. However, after 12 weeks the intervention

group had significantly ($P < 0.05$) reduced disease severity and improved HRQoL, with lower values of PASI, SAPASI, BSA, PGA and DLQI compared to the control group.¹⁴

Comparison of the efficacy of face-to-face consultations and teledermatology

Patients being referred to a dermatology clinic were randomly assigned to store and forward teledermatology (digital images and a standardized history) or conventional face-to-face consultations and were followed up for nine months. Among the 392 patients who met the inclusion criteria and were randomized, 326 completed the allocated intervention and were included in the analysis. Patients in both randomization groups demonstrated a clinically significant improvement in Skindex-16 scores from baseline, with no significant difference by randomization group, at both three and nine months. Compared with the conventional consultation process, store and forward teledermatology did not result in a statistically significant difference in HRQoL measured by Skindex-16 at 3 or 9 months after referral.¹⁵

In a Spanish study of 450 patients randomly assigned to face-to-face or teledermatology consultations, baseline HRQoL, measured by Skindex-29 and 5-level EuroQol-5 Dimensions index (EQ-5D-5L), was significantly worse in patients in the face-to-face group. After six months, HRQoL improvement in both groups was detected but without statistically significant differences between the groups.⁶

In another study of outpatient dermatology patients, over six months 50% of participants were treated in an ambulant setting and the other 50% used mainly teledermatology. In the teledermatology group between the baseline and the end of the study the DLQI score improved in 20% of the patients, stayed the same in 53% and deteriorated in 27%. In the ambulant setting (comparator) group the DLQI improved in 46%, was unchanged in 7% and deteriorated in 47%.¹⁶

In a study of melasma in farmworkers, DLQI scores were compared between those with and those without melasma, and between those treated using face-to-face consultations and those using teledermatology. There was no significant difference in DLQI scores between the groups.¹⁷

HRQoL was measured in adult and pediatric patients with atopic dermatitis either receiving direct-access online care or receiving care in person. Between baseline and 12 months, the mean within-group reduction in DLQI score in the online group was 4.1 ± 2.3 ; for the in-person group, the within-group reduction was 4.8 ± 2.7 . Reduction in DLQI scores was higher than MID in both groups. The mean within-group difference in Children's Dermatology Life Quality Index (CDLQI) score in the online group was 4.7 ± 2.8 and for the in-person group, the difference was 4.9 ± 3.1 . The mean within-group difference in physical component score (PCS) and mental component score (MCS) SF-12 scores in the online group was 6.5 ± 3.8 and 8.6 ± 4.3 ; and for the in-person group the mean differences were 6.8 ± 3.2 and 9.1 ± 3.8 , respectively. The difference in the change in DLQI, CDLQI, SF-12 PCS, and SF-12 MCS scores between the two groups was 0.72 (95% confidence interval [90% CI], -0.97 to 2.41), 0.23 (90% CI, -2.21 to 2.67), 0.34 (90% CI, -1.16 to 1.84), and 0.51 (90% CI, -1.11 to 2.13), respectively. Adult and pediatric AD patients receiving direct-access online care had equivalent QoL outcomes to those seen in person.¹⁸

In a randomized controlled equivalency trial patients with psoriasis were randomly assigned to receive online or in-person care. Functional impairment and depression were assessed at baseline and at 3-monthly intervals using the EQ-5D-5L and Patient Health Questionnaire-9. The online care model was equivalent to in-person care in reducing functional impairment and depressive symptoms in patients with psoriasis.¹⁹

In a study by Chambers et al.²⁰ 64 participants with psoriasis were randomized to receive follow-up care either in-office or online over a 24-week period. Patients randomized to the online group underwent standardized training on capturing high-quality digital images of their psoriatic skin

and transmitting these images and clinical history to a dermatologist securely. The dermatologist then performed asynchronous, online evaluation and provided recommendations directly to patients. DLQI scores improved during the study period in both groups, with no significant difference in scores between the two groups.

In a study by Armstrong et al.²¹ psoriatic patients were randomly assigned to either online (n = 148) or in-person interventions (n = 148), stratified by site and disease severity. The total DLQI and Skindex-16 scores gradually became less in both groups over 12 months. In the online group, the unadjusted mean decline in the total Skindex-16 score from baseline across follow-up visits was 9.02 ± 20.67 . In the in-person group, the mean decline from baseline across follow-up visits was 10.55 ± 23.50 . The DLQI scores declined from the baseline in both groups, showing improvement in QoL. In the online group, the unadjusted mean decline from baseline across follow-up visits was 1.64 ± 4.34). In the in-person group, the mean decline from baseline across follow-up visits was 1.18 ± 4.77 . These mean score changes do not reach the MID for the DLQI of 4 points.

In a study of children with psoriasis, short-contact dithranol cream was started if topical corticosteroids with or without calcipotriene had failed, or if patients had moderate-to-severe psoriasis (PASI score around 10 and/or a CDLQI score around 10). Patients were allowed to choose between regular day care or day care with telemedicine. QoL was measured with the CDLQI. In the first week all patients were seen for four days at the day care centre; thereafter visits were scheduled two times per week. From the second week, the telemedicine group replaced one visit per week by a scheduled video call. Between the visits, patients treated themselves daily at home. The PASI, CDLQI and demographic characteristics did not differ significantly between the two groups. A significant mean change in CDLQI score of -5.1 was found (-4.1 for regular day care vs. -6.1 for telemedicine, $p = 0.25$).²²

A randomized controlled cost-effectiveness study showed that monitoring remotely (“E-health”) for follow-up of patients with atopic dermatitis is as effective as standard face-to-face care with regard to QoL and severity of disease.²³

Tele dermatology and AI

A “virtual assistant”, that connects patients with healthcare professionals through online medical consultations, was assessed to determine whether use of this could improve patients’ HRQoL. Its use in psoriatic patients led to significant improvement in the mean DLQI score (4.4 ± 4.9 at baseline and 2.8 ± 5.1 at the end of the study, $p=0.04$).²⁴

Satisfaction with tele dermatology

A survey investigated the level of satisfaction of patients who had received dermatological advice via telephone during the COVID-19 pandemic. Patients with higher disease burden, as measured by the DLQI, experienced lower satisfaction with the telephone consultations ($p = 0.042$). Most patients preferred traditional face-to-face medical consultations to telephone consultations.²⁵

Patients reporting high impairment of their HRQoL, as measured by the DLQI, were more likely to prefer a face-to-face encounter with a dermatologist than patients experiencing low impairment of their QoL.²⁶

Tele dermatology and psychological help

Psychological video consultations led to a significant HRQoL improvement measured by the DLQI (from 4.4 ± 3.9 at baseline to 1.6 ± 2.5 at week four) in 23 patients suffering from chronic skin conditions during the COVID-19. However this study had no comparison group.⁷

Tele dermatology, HRQoL and COVID-19 pandemic

A multicenter prospective study of atopic dermatitis patients with facial involvement who had started to wear masks >6 hours per day because of the COVID-19 pandemic was organised. Patients were evaluated by two board-certified dermatologists at baseline and after one month using teledermatology consultations. Both DLQI and Eczema Area and Severity Index (EASI) scores increased during the time period ($p < 0.0001$). Changes in DLQI were not influenced by age, Body Mass Index (BMI), and gender, mask type used and AD therapy.¹⁰

Discussion

The majority of studies identified in this review demonstrate no difference in HRQoL impairment between patients treated face-to-face or treated remotely. This provides some confidence in continuing to use and develop remote methods of routine dermatology care and advice.

A systematic review that studied outcome measurement instruments used in randomized controlled trials of teledermatology conducted between 2008 and 2018 concluded that the most frequently used instrument was the DLQI.²⁸ Our literature review has also shown that the DLQI is the most frequently used QoL instrument in teledermatology. A simple DLQI app is available in seven languages (reference <https://www.cardiff.ac.uk/medicine/resources/quality-of-life-questionnaires/dermatology-life-quality-index>). It has been demonstrated that the DLQI delivered and completed electronically is completed and scored in an equivalent way to the paper version.²⁹ This raises the prospect of being able to simply gain QoL scores to inform clinical decision taking in remote consultations.

Use of the DLQI app is of course not limited to its possible use in teledermatology and it may be used during face-to-face consultations. It is important that further apps be developed to facilitate the use of other validated dermatology-specific HRQoL instruments, such as for those used in children with skin diseases (CDLQI³⁰⁻³² and InToDermQoL³³⁻³⁶) and for disease-specific instruments.

Detailed recommendations on treatment goals and changes of treatment approaches, based on HRQoL questionnaire scores with a validated banding system (as for the DLQI), may be an important and promising approach that can be used not only face-to-face but also to enhance teledermatology consultations.³⁷

Nearly all patients with immune-mediated inflammatory and allergic skin diseases can be vaccinated with the registered COVID-19 vaccines^{38,39} and current data seem to confirm the safety and efficacy of COVID-19 vaccination in patients undergoing biological treatments.^{40,41} During the pandemic it was unclear to what extent teledermatology could effectively fulfill the different needs of those patients with skin disease who were on biological treatments and who needed to avoid face-to-face consultations. Patients on biological treatments usually have severe quimp and such patients, with more impaired HRQoL, prefer face-to-face consultations.^{25,26} Itch and pain have many consequences for patients with skin disease,⁴² also resulting in more impaired HRQoL that in turn may lead to a high preference for face-to-face consultations.

Educational information, virtual assistance and psychological help by means of telemedicine technologies may not be a substitute for regular face-to-face consultations but rather serve as beneficial additions: HRQoL assessment may be a valuable part of these technologies. In another review it was shown that telemedicine is as effective as traditional face-to-face care in terms of improvement of patient QoL and reduction of disease severity, but with the advantage of substantial cost-saving.⁴³

The principles of HRQoL instrument selection for their use in in teledermatology are similar to those recommendations previously presented by the EADV TF on QoL and Patient Oriented Outcomes.⁴⁴⁻⁶⁰

Position statements:

- Teledermatologic communications can be used to monitor the clinical course of patients with chronic conditions and patients' QoL and to follow-up treatment response.
- Teledermatology encompasses several different activities and HRQoL assessment may be an important integral part of several of them.
- HRQoL assessment may be easily and accurately performed during teledermatology consultations. It is especially important to monitor HRQoL of patients with chronic skin diseases during lockdowns or in situations where it is difficult to reach a hospital for face-to-face consultation.
- Regular assessment of HRQoL of patients with skin diseases during teledermatology consultations may help to monitor the effectiveness of this type of care delivery and may help to highlight the needs of individual patient.
- Management of chronic skin diseases using teledermatology methods shows comparable effects on HRQoL improvement to that of face-to-face consultations, but most patients prefer face-to-face consultation.
- The DLQI, a dermatology-specific HRQoL instrument, is the most frequently used HRQoL instrument in teledermatology research studies and a simple DLQI app is available in seven languages.
- It is important that apps are developed to facilitate the use both of dermatology-specific HRQoL instruments for use in children and of disease-specific instruments.

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References

1. Hunt WTN, Charman C. Teledermatology. Chapter 6 in *Dermatology Training: The Essentials* (editors Chowdhury MMU, Griffiths TW, Finlay AY). Oxford: Wiley-Blackwell, 2022.
2. Pasquali P, Romero-Aguilera G, Moreno-Ramírez D. Teledermatology before, during, and after the COVID-19 pandemic. *Actas Dermosifiliogr (Engl Ed)* 2021;**112**:324-329.
3. Tognetti L, Fiorani D, Russo F et al. Teledermatology in 2020: past, present and future perspectives. *Ital J Dermatol Venerol* 2021;**156**:198-212.
4. Chernyshov PV. The Evolution of Quality of Life Assessment and Use in Dermatology. *Dermatology* 2019;**235**:167-174.
5. Jiang SW, Flynn MS, Kwock JT et al. Quality and Perceived Usefulness of Patient-Submitted Store-and-Forward Teledermatology Images. *JAMA Dermatol* 2022;**158**:1183-1186.
6. Lopez-Liria R, Lopez-Villegas A, Valverde-Martinez MA et al. Comparative Analysis of Quality of Life of Patients with Dermatological Problems: Teledermatology Versus Face-to-Face Dermatology. *Healthcare (Basel)* 2022;**10**:2172.
7. Marasca C, De Rosa A, Fabbrocini G, et al. Psychological teleconsultations in patients suffering from chronic skin diseases during the COVID-19 era: a service to improve patients' quality of life. *J Dermatolog Treat* 2022;**33**:1736-1737.
8. Moscarella E, Pasquali P, Cinotti E, Tognetti L, Argenziano G, Rubegni P. A survey on teledermatology use and doctors' perception in times of COVID-19. *J Eur Acad Dermatol Venereol* 2020;**34**:e772-e773.
9. Whited JD. Quality of life: a research gap in teledermatology. *Int J Dermatol* 2015;**54**:1124-1128.
10. Damiani G, Finelli R, Kridin K et al. Facial atopic dermatitis may be exacerbated by masks: insights from a multicenter, teledermatology, prospective study during COVID-19 pandemic. *Ital J Dermatol Venerol* 2022;**157**:505-509.

11. Al Quran HA, Khader YS, Ellauzi ZM, Shdaifat A. Effect of real-time teledermatology on diagnosis, treatment and clinical improvement. *J Telemed Telecare* 2015;**21**:93-99.
12. Frühauf J, Schwantzer G, Ambros-Rudolph CM et al. Pilot study on the acceptance of mobile teledermatology for the home monitoring of high-need patients with psoriasis. *Australas J Dermatol* 2012;**53**:41-46.
13. Domogalla L, Beck A, Schulze-Hagen T, Herr R, Benecke J, Schmieder A. Impact of an eHealth Smartphone App on the Mental Health of Patients With Psoriasis: Prospective Randomized Controlled Intervention Study. *JMIR Mhealth Uhealth* 2021;**9**:e28149.
14. Balato N, Megna M, Di Costanzo L, Balato A, Ayala F. Educational and motivational support service: a pilot study for mobile-phone-based interventions in patients with psoriasis. *Br J Dermatol* 2013;**168**:201-205.
15. Whited JD, Warshaw EM, Edison KE et al. Effect of store and forward teledermatology on quality of life: a randomized controlled trial. *JAMA Dermatol* 2013;**149**:584-591.
16. Eber EL, Arzberger E, Michor C, Hofmann-Wellenhof R, Salmhofer W. Mobile teledermatology in the treatment of chronic ulcers. *Hautarzt* 2019;**70**:346-353.
17. Pichardo R, Vallejos Q, Feldman SR et al. The prevalence of melasma and its association with quality of life in adult male Latino migrant workers. *Int J Dermatol* 2009;**48**:22-26.
18. Kornmehl H, Singh S, Johnson MA, Armstrong AW. Direct-Access Online Care for the Management of Atopic Dermatitis: A Randomized Clinical Trial Examining Patient Quality of Life. *Telemed J E Health* 2017;**23**:726-732.
19. Young PM, Chen AY, Ford AR, Cheng MY, Lane CJ, Armstrong AW. Effects of online care on functional and psychological outcomes in patients with psoriasis: A randomized controlled trial. *J Am Acad Dermatol* 2023;**88**:364-370.
20. Chambers CJ, Parsi KK, Schupp C, Armstrong AW. Patientcentered online management of psoriasis: a randomized controlled equivalency trial. *J Am Acad Dermatol* 2012;**66**:948-953.

21. Armstrong AW, Ford AR, Chambers CJ et al. Online care versus in-person care for improving quality of life in psoriasis: a randomized controlled equivalency trial. *J Investig Dermatol* 2019;**139**:1037-1044.
22. Oostveen A, Beulens C, van de Kerkhof P, de Jong E, Seyger M. The effectiveness and safety of short-contact dithranol therapy in paediatric psoriasis: a prospective comparison of regular day care and day care with telemedicine. *Br J Dermatol* 2014;**170**:454-457.
23. van Os-Medendorp H, Koffijberg H, Eland-de Kok PC et al. E-health in caring for patients with atopic dermatitis: a randomized controlled cost-effectiveness study of internet-guided monitoring and online self-management training. *Br J Dermatol* 2012;**166**:1060-1068.
24. Roca S, Almenara M, Gilaberte Y et al. When Virtual Assistants Meet Tele dermatology: Validation of a Virtual Assistant to Improve the Quality of Life of Psoriatic Patients. *Int J Environ Res Public Health* 2022;**19**:14527.
25. Stadler PC, Senner S, Frey S, Clanner-Engelshofen BM et al. Tele dermatology in times of COVID-19. *J Dermatol* 2021;**48**:620-624.
26. Williams TL, Esmail A, May CR, Griffiths CE, Shaw NT, Fitzgerald D et al. Patient satisfaction with tele dermatology is related to perceived quality of life. *Br J Dermatol* 2001;**145**:911-917.
27. Basra MK, Salek MS, Camilleri L, Sturkey R, Finlay AY. Determining the minimal clinically important difference and responsiveness of the Dermatology Life Quality Index (DLQI): further data. *Dermatology* 2015;**230**:27-33.
28. Chow A, Soon C, Smith HE, Apfelbacher CJ. Outcome Measurements Used in Randomized Controlled Trials of Tele dermatology: A Systematic Mapping Review. *Acta Derm Venereol* 2019;**99**:1210-1217.
29. Campbell N, Ali F, Finlay AY, Salek SS. Equivalence of electronic and paper-based patient-reported outcome measures. *Qual Life Res* 2015;**24**:1949-1961.

30. Lewis-Jones MS, Finlay AY. The Children's Dermatology Life Quality Index (CDLQI): Initial validation and practical use. *Br J Dermatol* 1995;**132**:942-949.
31. Waters A, Sandhu D, Beattie P, Ezughah F, Lewis-Jones S. Severity stratification of Children's Dermatology Life Quality Index (CDLQI) scores. *Br J Dermatol* 2010;**163** (Suppl 1):121.
32. Salek MS, Jung S, Brincat-Ruffini LA et al. Clinical experience and psychometric properties of the Children's Dermatology Life Quality Index (CDLQI), 1995-2012. *Br J Dermatol* 2013;**169**:734-759.
33. Chernyshov PV, Boffa MJ, Corso R et al. Creation and pilot test results of the dermatology-specific proxy instrument: the Infants and Toddlers Dermatology Quality of Life. *J Eur Acad Dermatol Venereol* 2018;**32**:2288-2294.
34. Chernyshov PV, Suru A, Gedeon I, Derevyanko LA, Tiplica GS, Salavastru CM. Epidermolysis bullosa-specific module of the Infants and Toddlers Dermatology Quality of Life (InToDermQoL) questionnaire. *J Eur Acad Dermatol Venereol* 2019;**33**:612-617.
35. Chernyshov PV, Marron SE, Boffa MJ et al. Sensitivity to treatment and score bands of the Infants and Toddlers Dermatology Quality of Life questionnaire. *JAAD Int* 2022;**10**:61-67.
36. Chernyshov PV, Sampogna F, Pustišek N e al. Validation of the dermatology-specific proxy instrument the Infants and Toddlers Dermatology Quality of Life. *J Eur Acad Dermatol Venereol* 2019;**33**:1405-1411.
37. Marron SE, Chernyshov PV, Tomas-Aragones L. Quality-of-Life Research in Acne Vulgaris: Current Status and Future Directions. *Am J Clin Dermatol* 2019;**20**:527-538.
38. Ring J, Worm M, Wollenberg A et al. Risk of severe allergic reactions to COVID-19 vaccines among patients with allergic skin diseases - practical recommendations. A position statement of ETFAD with external experts. *J Eur Acad Dermatol Venereol* 2021;**35**:e362-e365.

39. Wack S, Patton T, Ferris LK. COVID-19 vaccine safety and efficacy in patients with immune-mediated inflammatory disease: Review of available evidence. *J Am Acad Dermatol* 2021;**85**:1274-1284.
40. Thyssen JP, Vestergaard C, Barbarot S et al. European Task Force on Atopic Dermatitis: position on vaccination of adult patients with atopic dermatitis against COVID-19 (SARS-CoV-2) being treated with systemic medication and biologics. *J Eur Acad Dermatol Venereol* 2021;**35**:e308-e311.
41. Potestio L, Martora F, Fabbrocini G, Battista T, Megna M. Safety and Efficacy of Covid-19 Vaccination in Patients Undergoing Biological Treatments for Psoriasis. *Psoriasis (Auckl)* 2023;**13**:11-18.
42. Misery L, Belloni Fortina A, El Hachem M et al. A position paper on the management of itch and pain in atopic dermatitis from the International Society of Atopic Dermatitis (ISAD)/Oriented Patient-Education Network in Dermatology (OPENED) task force. *J Eur Acad Dermatol Venereol* 2021;**35**:787-796.
43. Marasca C, Annunziata MC, Camela E et al. Teledermatology and Inflammatory Skin Conditions during COVID-19 Era: New Perspectives and Applications. *J Clin Med* 2022;**11**:1511.
44. Chernyshov PV, John SM, Tomas-Aragones L et al. Quality of life measurement in occupational skin diseases. Position paper of the European Academy of Dermatology and Venereology Task Forces on Quality of Life and Patient Oriented Outcomes and Occupational Skin Disease. *J Eur Acad Dermatol Venereol* 2020;**34**:1924-1931.
45. Chernyshov PV, Tomas-Aragones L, Augustin M et al. Position statement of the European Academy of Dermatology and Venereology Task Force on Quality of Life and Patient Oriented Outcomes on quality of life issues in dermatologic patients during the COVID-19 pandemic. *J Eur Acad Dermatol Venereol* 2020;**34**:1666-1671.

46. Finlay AY, Salek MS, Abeni D et al. Why quality of life measurement is important in dermatology clinical practice: An expert-based opinion statement by the EADV Task Force on Quality of Life. *J Eur Acad Dermatol Venereol* 2017;**31**:424-431.
47. Chernyshov PV, Zouboulis CC, Tomas-Aragones L et al. Quality of life measurement in acne. Position Paper of the European Academy of Dermatology and Venereology Task Forces on Quality of Life and Patient Oriented Outcomes and Acne, Rosacea and Hidradenitis Suppurativa. *J Eur Acad Dermatol Venereol* 2018;**32**:194-208.
48. Chernyshov PV, Tomas-Aragones L, Manolache L et al. Quality of life measurement in atopic dermatitis. Position paper of the European Academy of Dermatology and Venereology (EADV) Task Force on quality of life. *J Eur Acad Dermatol Venereol* 2017;**31**:576-593.
49. Chernyshov P, de Korte J, Tomas-Aragones L, Lewis-Jones S; EADV Quality of Life Task Force. EADV Taskforce's recommendations on measurement of health-related quality of life in paediatric dermatology. *J Eur Acad Dermatol Venereol* 2015;**29**:2306-2316.
50. Prinsen C, de Korte J, Augustin M et al. Measurement of health-related quality of life in dermatological research and practice: outcome of the EADV Taskforce on Quality of Life. *J Eur Acad Dermatol Venereol* 2013;**27**:1195-1203.
51. Sampogna F, Finlay AY, Salek SS et al. Measuring the impact of dermatological conditions on family and caregivers: a review of dermatology-specific instruments. *J Eur Acad Dermatol Venereol* 2017;**31**:1429-1439.
52. Chernyshov PV, Tomas-Aragones L, Manolache L et al. Which acne treatment has the best influence on health-related quality of life? Literature review by the European Academy of Dermatology and Venereology Task Force on Quality of Life and Patient Oriented Outcomes. *J Eur Acad Dermatol Venereol* 2018;**32**:1410-1419.

53. Chernyshov PV, Lallas A, Tomas-Aragones L et al. Quality of life measurement in skin cancer patients: literature review and position paper of the European Academy of Dermatology and Venereology Task Forces on Quality of Life and Patient Oriented Outcomes, Melanoma and Non-Melanoma Skin Cancer. *J Eur Acad Dermatol Venereol* 2019;**33**:816-827.
54. Chernyshov PV, Zouboulis CC, Tomas-Aragones L et al. Quality of life measurement in hidradenitis suppurativa: position statement of the European Academy of Dermatology and Venereology task forces on Quality of Life and Patient-Oriented Outcomes and Acne, Rosacea and Hidradenitis Suppurativa. *J Eur Acad Dermatol Venereol* 2019;**33**:1633-1643.
55. Chernyshov PV, Linder MD, Pustišek N et al. Quimp (quality of life impairment): an addition to the quality of life lexicon. *J Eur Acad Dermatol Venereol* 2018;**32**:e181-e182.
56. Finlay AY, Chernyshov PV, Tomas Aragones L et al. Methods to improve quality of life, beyond medicines. Position statement of the European Academy of Dermatology and Venereology Task Force on Quality of Life and Patient Oriented Outcomes. *J Eur Acad Dermatol Venereol* 2021;**35**:318-328.
57. Chernyshov PV, Evers AWM, Bewley A et al. Quality of life assessment in core outcome sets: A position statement of the EADV Task Force on Quality of Life and Patient Oriented Outcomes. *J Eur Acad Dermatol Venereol* 2022;**36**:20-23.
58. Chernyshov PV, Tomas-Aragones L, Finlay AY et al. Quality of life measurement in alopecia areata. Position statement of the European Academy of Dermatology and Venereology Task Force on Quality of Life and Patient Oriented Outcomes. *J Eur Acad Dermatol Venereol* 2021;**35**:1614-1621.
59. Chernyshov PV, Tomas-Aragones L, Manolache L et al. Quality of life measurement in vitiligo. Position statement of the European Academy of Dermatology and Venereology

Task Force on Quality of Life and Patient Oriented Outcomes with external experts. *J Eur Acad Dermatol Venereol* 2021;**37**:21-31.

60. Chernyshov PV, Finlay AY, Tomas-Aragones L et al. Quality of life measurement in rosacea. Position statement of the European Academy of Dermatology and Venereology Task Forces on Quality of Life and Patient Oriented Outcomes and Acne, Rosacea and Hidradenitis Suppurativa. *J Eur Acad Dermatol Venereol* 2023;**37**:954-964.

Figure 1. The frequency of use of HRQoL instruments in teledermatology