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Topical Corticosteroid Misuse on the Face: A Cross-sectional and Twelve Month Recovery Cohort

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Abstract — Topical corticosteroid (TCS) misuse on the face has emerged as a major public health concern in South Asian dermatology, driven by easy over-the-counter availability of potent agents, widespread marketing of combination products promoted as 'fairness creams' or all-purpose skin treatments, and gaps in pharmacy dispensing regulation. We conducted a cross-sectional and 12-month longitudinal study of 248 patients presenting with iatrogenic facial dermatoses attributable to TCS misuse at a tertiary dermatology service. Clobetasol propionate (class I) was the most commonly identified causative agent (33.1% of cohort), followed by betamethasone valerate (22.6%) and combination TCS-antimicrobial products (16.9%). Persistent erythema (78.6%), steroid-induced rosacea-like dermatitis (62.4%), and telangiectasia (54.2%) were the most common clinical features. Following structured TCS withdrawal, complete clinical recovery at 12 months was achieved by 158 patients (63.7%), with major predictors of recovery including shorter duration of TCS use, lower-potency agent, single rather than combination products, structured dermatologist supervision, and adjunctive emollient or calcineurin inhibitor use. The findings support regulatory restriction of OTC potent TCS availability and structured public education on appropriate topical steroid use.

Keywords — *Topical Corticosteroid; Iatrogenic Dermatitis; Steroid-Induced Rosacea; Perioral Dermatitis; Skin Atrophy; Over-The-Counter; Pharmacy Regulation.*

1. Introduction

Topical corticosteroids represent one of the most useful and widely prescribed classes of agents in dermatology, but their value depends critically on appropriate selection, application technique, and duration. Misuse defined as use of an inappropriately potent agent, application to unsuitable sites (face, intertriginous areas, mucosa), prolonged duration without specialist supervision, or application for inappropriate indications produces a recognised spectrum of iatrogenic dermatoses with substantial clinical and psychosocial burden. Facial TCS misuse is particularly consequential because the skin of the face is thin, well vascularised, and visible, with consequences that affect appearance, self-image, and social functioning (Jha, Kumar, & Neha, 2026; Yatish, Khatoon, & Kumar, 2026; Kumar, Sharma, & Gupta, 2026). Several features of South Asian dermatology practice have made facial TCS misuse a particular regional concern. Potent and super-potent topical corticosteroids including clobetasol propionate (the most potent commercially available class I agent) are widely available over the counter at retail pharmacies, despite formal prescription-only regulatory status. Combination products containing TCS with antifungals, antibacterials, and other agents are heavily marketed for indications ranging from acne to fungal infections to general 'skin brightening'. Direct consumer marketing through pharmacy promotion, traditional media, and increasingly social media has driven substantial demand, particularly for skin-lightening or fairness applications (Jenifer et al., 2025; Catherine, Gupta, Gopi, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine, & Velmurugan, 2025). Clinical and regulatory responses include several professional initiatives, public awareness campaigns, and regulatory amendments restricting combination products. Whether these efforts have meaningfully changed the presentation patterns, severity, or trajectory of TCS-induced dermatoses remains an important operational question. We undertook a cross-sectional and 12-month longitudinal study at our tertiary dermatology service to characterise presentation patterns, causative agents, sources of supply, and recovery trajectories with structured management (Bhatnagar, Kumar, & Shivam, 2026; Yatish, Khatoon, & Kumar, 2026).

2. Methods

We conducted a cross-sectional and 12-month longitudinal study at the dermatology service of a tertiary medical centre between January 2022 and December 2023. Inclusion required (a) clinical diagnosis of TCS-induced facial dermatosis confirmed by experienced dermatologists; (b) documented history of facial TCS application for at least 4 weeks; (c) age 12 years or older; and (d) willingness to undergo structured TCS withdrawal with 12-month follow-up. Exclusion criteria included other primary causes of facial inflammation (lupus, dermatomyositis,

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autoimmune disease), simultaneous systemic corticosteroid use, and inability to commit to follow-up. The final cohort comprised 248 patients. Comprehensive documentation included causative agent (by verbatim product name, active ingredient, potency class, and combination components), duration of use, frequency of application, source of supply (prescription, pharmacy OTC, online, family/friend recommendation, advertising), indication for which TCS was originally applied (acne, fungal infection, melasma, fairness, other), prior specialist consultation, and any concurrent topical or systemic therapy.

Clinical assessment used standardised photography in defined lighting, Investigator Global Assessment (IGA) of facial severity, documentation of specific features (erythema, telangiectasia, atrophy, hypertrichosis, perioral dermatitis pattern, hypopigmentation, hyperpigmentation, secondary infection patterns), DLQI for quality-of-life impact, and structured psychosocial assessment. All patients underwent structured TCS withdrawal with education on the time course of expected withdrawal reactions and the importance of avoiding restart.

Supportive measures included regular emollient application (twice daily minimum), gentle non-soap cleansing, structured sun protection, and avoidance of irritants. Adjunctive therapy was individualised: topical calcineurin inhibitors (tacrolimus 0.03-0.1% or pimecrolimus 1%) for inflammation-predominant presentations, low-dose oral doxycycline for rosacea-like features, and tinted sunscreens for cosmetic camouflage during recovery. Follow-up was at 4, 8, 12, 24, and 52 weeks with structured documentation

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2.1 Outcomes and Analysis

Primary outcomes were time to substantial improvement (defined as ≥50% reduction in IGA score) and complete clinical recovery at 12 months. Secondary outcomes included quality of life trajectory, recurrence of TCS use during follow-up, persistent atrophy or telangiectasia, psychological wellbeing, and patient-reported satisfaction with management. Statistical analysis used Kaplan-Meier estimation for time-to-event outcomes and multivariable logistic regression for predictors of complete recovery.

3 Results

3.1 Cohort Characteristics and Causative Agents

Causative TCS agent distribution is shown in Figure 1. Clobetasol propionate (a class I super-potent agent) was the most commonly identified causative agent in 82 patients (33.1%), followed by betamethasone valerate (class III) in 56 (22.6%). Combination products (typically TCS with antifungal or antibacterial agents, marketed for 'skin infection' indications) accounted for 42 cases (16.9%). The dominant pattern of class I and class III agents reflects both the wider availability of potent products and patients' typical preference for agents producing rapid initial visible improvement.

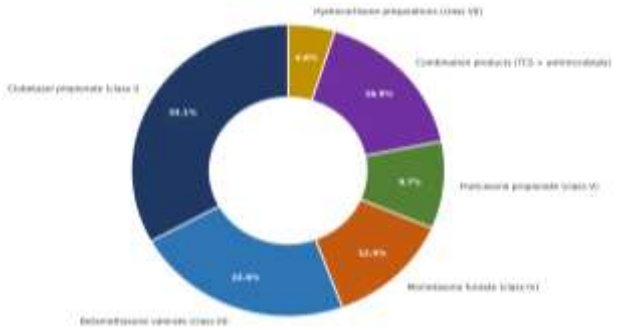

Fig. 1: Causative topical corticosteroid agents in iatrogenic facial dermatoses

Table 1. Baseline characteristics of the cohort (n=248)

Characteristic	Value
Age, mean (SD), years	27.4 (9.8)
Female sex, n (%)	178 (71.8)
Age 12-17 years, n (%)	42 (16.9)
Age 18-29 years, n (%)	118 (47.6)
Age 30-44 years, n (%)	78 (31.5)
Age ≥45 years, n (%)	10 (4.0)
Skin phototype IV-V predominant, n (%)	202 (81.5)
Education ≥12 years, n (%)	178 (71.8)
Currently employed/student, n (%)	202 (81.5)
Initial indication: acne or pimples, n (%)	82 (33.1)
Initial indication: skin lightening / fairness, n (%)	52 (21.0)
Initial indication: melasma or pigmentation, n(%)	42 (16.9)
Initial indication: presumed fungal infection, n (%)	32 (12.9)
Initial indication: general 'skin treatment', n (%)	40 (16.1)
Duration of TCS use, median (IQR), months	12 (6-24)
Duration ≤6 months, n (%)	78 (31.5)
Duration 6-24 months, n (%)	98 (39.5)
Duration >24 months, n (%)	72 (29.0)
Daily application frequency ≥2, n (%)	158 (63.7)
Source: pharmacy OTC purchase, n (%)	138 (55.6)
Source: family/friend recommendation, n (%)	62 (25.0)
Source: original physician prescription (with extension), n (%)	32 (12.9)
Source: online platform, n (%)	16 (6.5)
Multiple TCS agents used (over time), n (%)	68 (27.4)
Concurrent traditional remedy use, n (%)	52 (21.0)
Prior specialist consultation, n (%)	42 (16.9)
IGA score at presentation, mean	3.2
DLQI at presentation, mean	16.4

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3.2 Clinical Features at Presentation

Clinical features at presentation are shown in Figure 2. Persistent erythema (a hallmark of TCS-induced facial dermatitis) was present in 78.6% of patients. Burning or stinging sensation reported on attempting to discontinue TCS a feature suggestive of physiological dependence was present in 68.4%. Steroid-induced rosacea-like dermatitis, telangiectasia, skin atrophy, and hypopigmentation patches were each present in over 40% of patients. Less common but characteristic features included hypertrichosis, acneform eruption, perioral dermatitis pattern, striae, and tinea incognito (where underlying fungal infection had been masked by anti-inflammatory TCS effect). The clinical heterogeneity reflects both the variable causative agents and the varying duration and pattern of misuse (Jha, Kumar, & Neha, 2026; Kumar, Gautam, & Maitiy, 2026).

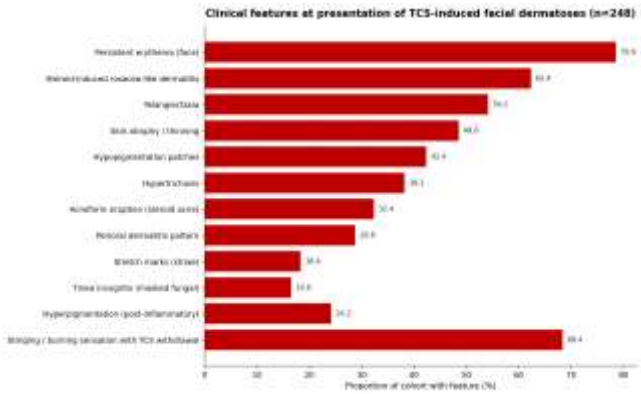

Fig.2: Clinical features at presentation

Table 2. Presenting features by causative TCS class

Feature	Class I-II (n=82)	Class III-IV (n=88)	Class V-VII (n=36)	Combination products (n=42)
Persistent erythema, n (%)	78 (95.1)	68 (77.3)	20 (55.6)	32 (76.2)
Telangiectasia, n (%)	58 (70.7)	42 (47.7)	8 (22.2)	26 (61.9)
Skin atrophy, n (%)	58 (70.7)	38 (43.2)	6 (16.7)	18 (42.9)
Hypopigmentation, n (%)	48 (58.5)	32 (36.4)	8 (22.2)	18 (42.9)
Hypertrichosis, n (%)	42 (51.2)	32 (36.4)	6 (16.7)	16 (38.1)
Steroid-induced rosacea, n (%)	58 (70.7)	58 (65.9)	12 (33.3)	26 (61.9)
Striae (stretch marks), n (%)	22 (26.8)	16 (18.2)	2 (5.6)	6 (14.3)
Tinea incognito, n (%)	12 (14.6)	12 (13.6)	8 (22.2)	10 (23.8)
Mean IGA score	3.4	3.0	2.6	3.2
Mean DLQI score	18.2	15.4	13.2	17.4

3.3 Recovery Trajectory

Time to substantial clinical improvement following structured TCS withdrawal is shown in Figure 3. Recovery trajectory differed substantially by duration of TCS misuse. Patients with short-duration use (≤6 months) showed rapid improvement, with approximately 65% achieving substantial improvement by 3 months. Medium-duration users (6-24 months) showed slower improvement with approximately 50% achieving substantial improvement by 6 months. Long-duration users (>24 months) showed the slowest recovery with substantial improvement in only about 30% by 6 months and 50% by 12 months. The pattern demonstrates that earlier intervention produces faster recovery, supporting active case identification rather than passive presentation-driven care (Bhatnagar, Kumar, & Shivam, 2026; Jha, Kumar, & Neha, 2026; Yatish, Khatoon, & Kumar, 2026).

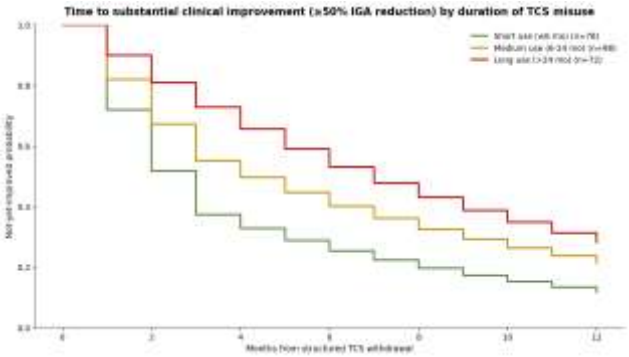

Fig.3: Time to substantial clinical improvement by duration of TCS misuse

Table 3. Recovery and persistence outcomes at 12 months

Outcome	Short use (n=78)	Medium (n=98)	Long (n=72)
Complete recovery (IGA 0/1), n (%)	68 (87.2)	62 (63.3)	28 (38.9)
Substantial improvement (≥50% IGA), n (%)	78 (100.0)	88 (89.8)	52 (72.2)
Persistent erythema at 12 mo, n (%)	6 (7.7)	22 (22.4)	32 (44.4)
Persistent telangiectasia, n (%)	4 (5.1)	18 (18.4)	28 (38.9)
Persistent atrophy, n (%)	2 (2.6)	14 (14.3)	32 (44.4)
Restarted TCS during follow-up, n (%)	2 (2.6)	8 (8.2)	18 (25.0)
DLQI at 12 months, mean	2.8	5.6	9.4
Patient satisfaction (1-10), mean	8.4	7.4	6.2
Required psychological support, n (%)	6 (7.7)	22 (22.4)	38 (52.8)
Cosmetic procedure required at 12 mo, n (%)	2 (2.6)	8 (8.2)	18 (25.0)

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3.1 Predictors of Complete Recovery

Multivariable logistic regression identified ten independent predictors of complete clinical recovery at 12 months. Shorter duration of TCS use, lower-potency agents (class V-VII), single rather than combination products, structured dermatologist supervision, adequate moisturiser use, and adjunctive topical calcineurin inhibitor use each predicted favourable outcome. Class I (clobetasol) misuse, combination product use, and self-procurement from pharmacy or online sources each predicted poorer outcomes both because of the specific agents involved and because of the patterns of misuse associated with informal procurement. Structured education and dermatologist supervision emerge as the strongest modifiable protective factors (Vettriselvan, Ramya, et al., 2026; Bhatnagar, Kumar, & Shivam, 2026; Yatish, Khatoon, & Kumar, 2026).

Table 4. Supply sources, regulatory observations, and educational outcomes

Domain	Value
Patients aware of TCS in original product, n (%)	98 (39.5)
Patients understanding 'steroid' terminology, n (%)	138 (55.6)
OTC purchase reported despite prescription-only status, n (%)	138 (55.6)
Pharmacy provided written warning or counsel, n (%)	12 (4.8)
Combination product purchased without prescription, n (%)	32/42 (76.2)
Online platform purchase without prescription, n	16
Patient-reported cost saving as reason for OTC purchase, n	82
Used product for ≥3 indications (off-label scope creep), n	68
Family member's TCS used (shared product), n	42
Initial improvement noted before harm emerged, n (%)	198 (79.8)
Recognised harm before specialist presentation, n (%)	158 (63.7)
Mean time from recognising harm to seeking care, months	6.4
Completed structured TCS education programme, n (%)	182 (73.4)
Education improved understanding of risk, n (%)	178/182 (97.8)
Reported recommending caution to family/friends, n (%)	158/182 (86.8)
Tele-dermatology used during follow-up, n (%)	68 (27.4)
Engaged with dermatology QI feedback survey, n (%)	148 (59.7)

4 Discussion

Across 248 patients with TCS-induced facial dermatoses, three observations stand out. First, super-potent and potent agents (class I-III) accounted for the majority of causative products, despite formal regulation as prescription-only items, reflecting failures in pharmacy dispensing oversight. Second, the heterogeneous clinical spectrum from acute steroid-induced rosacea to chronic atrophy and telangiectasia reflects both the variable duration of misuse and the multiple pathophysiological mechanisms involved in TCS-induced dermatosis. Third, structured TCS withdrawal with appropriate adjunctive therapy produces meaningful recovery in the majority of patients, with shorter duration of prior misuse being the strongest predictor of complete recovery (Jha, Kumar, & Neha, 2026; Kumar, Gautam, & Maitiy, 2026; Bhatnagar, Kumar, & Shivam, 2026; Yatish, Khatoon, & Kumar, 2026).

4.1 Regulatory and Public Education Implications

The findings have direct implications for regulatory policy. Despite TCS products being classified as prescription-only medicines in formal regulatory frameworks, 55.6% of our cohort reported successful OTC purchase from retail pharmacies. The gap between formal classification and enforcement represents a public health challenge that warrants attention through pharmacy regulation reform, structured pharmacist education, and consumer-facing labelling requirements. Online platforms accounting for a small but growing share of supply (6.5% in our cohort) present additional regulatory challenges (Selvi et al., 2026; Jenifer et al., 2025; Vettriselvan, 2025; Vinodh, Subramani, & Vettriselvan, 2026). Patient education programmes including structured rehabilitation information improve outcomes and reduce recurrence (Vettriselvan, Ramya, et al., 2026; Catherine, Gupta, Gopi, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine, & Velmurugan, 2025).

4.2 Psychosocial and Mental Health Dimensions

The cosmetic and psychosocial impact of TCS-induced facial dermatoses is substantial, particularly in young adults the predominant demographic in our cohort. The DLQI score of 16.4 at presentation indicates very large impact on quality of life, comparable to severe forms of primary inflammatory skin diseases. Psychological support during recovery was required by approximately 26% of patients, with substantially higher rates among long-duration users with persistent visible abnormalities (Sharma, Sharma, & Tyagi, 2026; Aumose, & Raj, 2026; Ashifa, 2022). For adolescents and young adults, body image disturbance, academic and occupational impacts, and disrupted social functioning warrant explicit attention with engagement with mental health services as needed. Self-leadership and emotional intelligence development support both patients and their families through recovery (Mustafa et al., 2026; Zahoor et al., 2025). Elderly support structures, while less directly relevant for this predominantly young cohort, are important for older

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affected patients (Ashifa, 2022; Rasi, & Ashifa, 2019; Natarajan et al., 2026).

4.3 Multidisciplinary Considerations

Multi-domain care extends to multiple specialties for selected patients. For severe atrophy or telangiectasia warranting cosmetic intervention, structured surgical or laser-based procedures require perioperative planning including anaesthesia, infection control, and wound healing considerations (Lal, Vaibhav, & Khursheed, 2026; Bhatnagar, Tyagi, & John, 2026; Agarwal, Kumar, & S, 2026; Singhal, Kumar, & Kataria, 2026; Gautam, Samyal,, & Chaudhary, 2026; Kumar, Kumar, & Tomer, 2026; Mishra, Choudhary, & Kumar, 2026). Postoperative care benefits from structured protocols (Kumar, Kumar, & Dhabhai, 2026; Ahluwalia, Gupta, & Chaudhary, 2026). Multimodal pain management approaches address procedure-related discomfort (Jagar, Kumar, & Yadav, 2026). For patients with comorbid systemic disease including iatrogenic hypothalamic-pituitary-adrenal axis suppression from extensive TCS absorption, growth concerns in paediatric patients, and metabolic effects multimorbidity-aware management is essential (Kumar, Sharma, & Gupta, 2026; Yatish, Khatoon, & Kumar, 2026). Bone health considerations apply particularly to patients with prolonged or extensive TCS absorption (Sahu, Sharma, & Gupta, 2026; Gupta, Gautam, & Maitiy, 2026; Rani, & Tyagi, 2026). Spinal complications, while uncommon, can occur with very extensive systemic absorption (Durgia, Kumar, & Neha, 2026). Implant-related considerations apply to selected patients with orthopaedic comorbidities (Singh, Chauhan, & Kumar, 2026; Agarwal, Khatoon, & Kumar, 2026). Sports-related skin injury patterns can complicate the differential diagnosis particularly in adolescent patients (Sehgal, Jayapriya, & Kumar, 2026). Rehabilitation principles including structured behavioural intervention and gradual return to normal skin care can be helpful (Bhatia, Shivakumar, & Kumar, 2026; Sehgal, Jayapriya, & Kumar, 2026; Lodha, Sharma, & Saraswat, 2026; Venice et al., 2026). Adaptive devices and assistive technology may be relevant for patients with severe disability from extensive skin disease (Natarajan et al., 2026). Advanced rehabilitation technology approaches inform broader philosophy (Pavithra et al., 2026; Suresh et al., 2026). Virtual reality applications offer engaging behavioural intervention particularly for adherence support (Vinodh, & Subramani, 2026).

4.4 Digital Health and Implementation

Digital health tools play substantial roles in TCS misuse management. Patient-facing apps for treatment tracking, photo monitoring, and adherence reminders during the withdrawal period support engagement (Deepa et al., 2026; Catherine, Gupta, Gopi, & Swadhi, 2025; Swadhi, Gayathri, Suresh, Catherine, & Velmurugan, 2025). Tele-dermatology consultation extends specialist reach to patients in remote areas or those unable to attend regular in-person visits (Vijayalakshmi et al., 2025; Vinodh, Subramani, & Vettriselvan, 2026). Wearable monitoring of skin physiology shows emerging promise (Deepa et al., 2026). AI-supported decision tools assist with severity grading, treatment selection, and image-based monitoring (Devi et al., 2025; Shanthi et al., 2025; Jha, Kumar, & Neha, 2026). Digital twin and predictive analytics frameworks model individual recovery trajectories (Subramani, Chillagattu, et al., 2026; Pradeepa et al., 2026). Cyber-physical infrastructure supports supply chain regulation and tracking of TCS products (Catherine, Nasrin Sulthana, et al., 2026). Educational infrastructure for training dermatologists, general practitioners, and pharmacists in appropriate TCS use is essential (Vinodh, Subramani, & Vettriselvan, 2026; Bhatnagar, Tyagi, & John, 2026). Healthcare SME and partnership models can extend dermatology access while promoting appropriate use (Vettriselvan, 2025; Vijayalakshmi et al., 2025; Jenifer et al., 2025). AI ethics and governance frameworks ensure equitable deployment (Selvi et al., 2026). Mindful technology use guidance is particularly important given social media's role in driving fairness-cream consumption (Vettriselvan, Velmurugan, et al., 2025). Quality improvement methodology applied to dermatology service pathways improves outcomes systematically (Bhatnagar, Kumar, & Shivam, 2026). Biomarker-based assessment of TCS absorption and HPA axis effects can inform individualised management (Kumar, Gautam, & Maitiy, 2026).

4.5 Limitations

Limitations include the single-centre tertiary setting which over-represents severe or complex cases referred from primary care; the reliance on patient self-report for some exposure details; the 12-month follow-up which captures early recovery but does not address very-long-term persistence of atrophy or telangiectasia; the lack of biomarker validation of TCS-induced systemic effects; and the limited representation of paediatric patients. Selection bias toward patients with insight to seek specialist care may under-represent the broader population of those still using TCS inappropriately.

5 Conclusion

Topical corticosteroid misuse on the face produced substantial clinical and psychosocial burden in this tertiary cohort of 248 patients, with class I-III agents and combination products dominating the causative profile. Structured TCS withdrawal with appropriate adjunctive therapy achieved complete clinical recovery in 63.7% by 12 months, with shorter duration of prior misuse being the

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strongest predictor of recovery. The findings support regulatory restriction of OTC potent TCS availability, structured pharmacy dispensing oversight, public education campaigns about appropriate topical steroid use, and active case identification rather than passive presentation-driven care.

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