

Dry Eye Severity Tool

Evidence-Based Assessment for Singapore Optometrists

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Evidence Base:	TFOS DEWS II 2017 Asia Dry Eye Society Guidelines
Local Context:	Singapore Climate, Humidity & Patient Demographics
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Purpose & Scope

This tool provides Singapore optometrists with a structured, evidence-based framework for diagnosing and grading dry eye disease (DED) severity. Grading follows a consistent 5-level system: Grade 0 (Healthy) through Grade 4 (Very Severe). All scoring tables — OSDI, DEQ-5, TBUT, staining, Meibomian gland assessment, and Schirmer — are mapped to the same Grade 0–4 scale. Use alongside clinical judgment; it does not replace comprehensive eye examination.

Severity Classification at a Glance — Grade 0 (Healthy) to Grade 4 (Very Severe)

Grade 0 (Healthy)	Grade 1 (Mild)	Grade 2 (Moderate)	Grade 3 (Severe)	Grade 4 (Very Severe)
OSDI 0–12	OSDI 13–22	OSDI 23–32	OSDI 33–42	OSDI ≥43

Overall DED grade = most severe finding across ALL parameters. Grade 0 = no dry eye disease detected.

1. SYMPTOM ASSESSMENT QUESTIONNAIRES

1.1 Ocular Surface Disease Index (OSDI)

The OSDI is the gold-standard validated questionnaire for dry eye symptom quantification (Schiffman et al., 2000). It comprises 12 items scored 0–4. Score = (sum × 25) ÷ number of items answered. Range: 0–100. Scores map directly to Grade 0–4.

#	Question (past week)	Score 0–4
1	Eyes sensitive to light?	
2	Eyes feel gritty?	
3	Painful or sore eyes?	
4	Blurred vision?	
5	Poor vision?	
6	Reading?	
7	Driving at night?	
8	Working with computer / ATM?	
9	Watching TV?	
10	Windy conditions?	
11	Places with low humidity (malls, MRT, offices)?	
12	Areas that are air-conditioned?	
TOTAL OSDI SCORE		

OSDI Score — DED Grade 0–4 Mapping

OSDI Score	DED Grade	Interpretation
0–12	Grade 0 (Healthy)	No dry eye disease; routine review
13–22	Grade 1 (Mild)	Symptoms present; lifestyle modification advised
23–32	Grade 2 (Moderate)	Clinical intervention warranted
33–42	Grade 3 (Severe)	Significant impact on quality of life
≥43	Grade 4 (Very Severe)	Urgent management; consider specialist referral

1.2 Dry Eye Questionnaire – 5 Items (DEQ-5)

A rapid 5-item screen validated for clinical practice (Chalmers et al., 2010). Score maps to DED Grade 0–4 as shown below. Score ≥12 also suggests Sjögren's syndrome screening.

Question	Frequency (0–4)	Intensity (0–5)
Discomfort (watery, burning, stinging, dryness, irritation, grittiness)		
Dryness		
Eye watering / tearing		N/A
Pain		
Vision problems (blurring, fluctuating)		N/A
DEQ-5 Total (Discomfort freq + Discomfort int + Dryness freq + Dryness int + Watering freq)		

DEQ-5 Score — DED Grade 0–4 Mapping

DEQ-5 Score	Grade 0 (Healthy)	Grade 1 (Mild)	Grade 2 (Moderate)	Grade 3 (Severe)	Grade 4 (Very Severe)
Score Range	<6	6–9	10–13	14–16	≥17

DEQ-5 ≥12: Consider Sjögren's syndrome screening regardless of grade.

2. CLINICAL SIGNS ASSESSMENT

2.1 Tear Film Break-Up Time (TBUT / NIBUT)

TBUT (fluorescein): Instil preservative-free fluorescein, ask patient to blink once, then measure time to first break under cobalt-blue illumination. Repeat ×3, record mean. NIBUT (non-invasive): Preferred when available; avoids fluorescein-induced reflex tearing. Both are mapped to DED Grade 0–4.

Measurement	Result	Interpretation	DED Grade
TBUT (fluorescein)	≥10 s	Normal	Grade 0 (Healthy)
TBUT (fluorescein)	5–9 s	Borderline	Grade 1 (Mild)
TBUT (fluorescein)	3–4 s	Reduced	Grade 2 (Moderate)
TBUT (fluorescein)	1–2 s	Significantly reduced	Grade 3 (Severe)
TBUT (fluorescein)	<1 s	Critically reduced	Grade 4 (Very Severe)
NIBUT (mean, Keratograph)	≥7.8 s	Normal	Grade 0 (Healthy)
NIBUT (mean, Keratograph)	5–7 s	Borderline	Grade 1 (Mild)
NIBUT (mean, Keratograph)	3–4 s	Reduced	Grade 2 (Moderate)
NIBUT (mean, Keratograph)	<3 s	Severely reduced	Grade 3–4 (Severe–VS)
First NIBUT	≥11.0 s	Normal	Grade 0 (Healthy)
First NIBUT	<11.0 s	Unstable tear film	Grade 1–4 (see matrix)

2.2 Ocular Surface Staining

Fluorescein staining assesses corneal and lid margin integrity using the Oxford grading scale (0–3). Oxford Grade 0 maps to DED Grade 0 (Healthy); Oxford Grade 1 maps to DED Grade 1 (Mild); Oxford Grade 2 maps to DED Grade 2 (Moderate); Oxford Grade 3 with or without filaments maps to DED Grade 3–4 (Severe–Very Severe). Allow 2–3 minutes after instillation under cobalt-blue illumination.

Region	Dye	Oxford 0 → Grade 0	Oxford 1 → Grade 1	Oxford 2 → Gr 2 / Oxford 3 → Gr 3–4
Cornea (central)	Fluorescein	0 dots	1–5 dots	6–30 dots (Gr2) / >30 or filaments (Gr3–4)
Cornea (peripheral)	Fluorescein	0 dots	1–5 dots	6–30 dots (Gr2) / >30 dots (Gr3–4)
Lid-margin	Fluorescein	Absent	<2 mm	2–4 mm (Gr2) / >4 mm (Gr3–4)

DED Grade 0 = Oxford 0 | Grade 1 = Oxford 1 | Grade 2 = Oxford 2 | Grade 3–4 = Oxford 3 ± filaments

2.3 Meibomian Gland Assessment

Meibomian gland dysfunction (MGD) is the leading cause of dry eye in Singapore (~70% of DED patients). MGD Grade 0–3 maps to DED Grade 0–4 as labelled in the column headers below.

Parameter	MGD Gr 0 → DED Gr 0	MGD Gr 1 → DED Gr 1	MGD Gr 2 → DED Gr 2	MGD Gr 3 → DED Gr 3–4
Meibum quality (central 5 glands)	Clear fluid	Cloudy fluid	Granular / turbid	Inspissated / no expression
Gland expressibility	All 5 expressible	3–4 expressible	1–2 expressible	None expressible
Meibography dropout	0–25%	26–50%	51–75%	>75%
Lid margin thickening	None	Mild	Moderate	Severe / keratinised
Lid margin vascularity	Normal	Telangiectasia	Moderate	Severe engorgement

2.4 Tear Volume – Schirmer Test

Schirmer I (without anaesthesia) assesses reflex + basal secretion. Schirmer II (with anaesthesia) assesses basal secretion only — more specific for aqueous deficiency. Results are mapped to DED Grade 0–4.

DED Grade	Schirmer I (no anaes.)	Schirmer II (with anaes.)	Interpretation
Grade 0 (Healthy)	≥10 mm / 5 min	≥6 mm / 5 min	Normal secretion; no treatment
Grade 1 (Mild)	6–9 mm / 5 min	4–5 mm / 5 min	Borderline; monitor & educate
Grade 2 (Moderate)	3–5 mm / 5 min	2–3 mm / 5 min	Reduced; initiate treatment
Grade 3 (Severe)	1–2 mm / 5 min	≤1 mm / 5 min	Severely reduced; escalate therapy
Grade 4 (Very Severe)	≤1 mm / 5 min	0 mm / 5 min	Critical; urgent specialist referral

Note: Schirmer has low sensitivity (~25%); useful when positive. Consider phenol-red thread test as alternative.

3. INTEGRATED SEVERITY GRADING MATRIX

Assign the OVERALL grade as the most severe finding across all parameters. Grade 0 = Healthy (no dry eye disease). A single finding at Grade 3 or 4 in any domain elevates the overall classification accordingly. All parameters use the same Grade 0–4 scale.

Parameter	Grade 0 (Healthy)	Grade 1 (Mild)	Grade 2 (Moderate)	Grade 3 (Severe)	Grade 4 (Very Severe)
Symptoms					
OSDI score	0–12	13–22	23–32	33–42	≥43
DEQ-5 score	<6	6–9	10–13	14–16	≥17
Symptom frequency	None	Some of time	Half of time	Most of time	All of time
Tear Film					
TBUT (fluorescein)	≥10 s	5–9 s	3–4 s	1–2 s	<1 s
NIBUT (mean)	≥7.8 s	5–7 s	3–4 s	1–2 s	Immediate
Ocular Surface					
Oxford staining grade	0	I	II	III	III + filaments
Corneal staining	0 dots	1–5 dots	6–30 dots	≥31 dots	Filaments
MGD / Lids					
MGD grade	0	1	2	3	3 + no expression
Meibum quality	Clear	Cloudy	Granular	Inspissated	No expression
Gland dropout	0–25%	26–50%	51–75%	>75%	>75% + sx
Tear Volume					
Schirmer I	≥10 mm	6–9 mm	3–5 mm	1–2 mm	≤1 mm
Tear meniscus ht.	≥0.25 mm	0.2–0.24 mm	0.15–0.19 mm	0.1–0.14 mm	<0.1 mm

Overall Grade Summary & Treatment Targets

Grade	Label	Key Features	Treatment Target
Grade 0	(Healthy)	No symptoms; normal tear film; healthy ocular surface; OSDI 0–12	Education & prevention; annual review
Grade 1	(Mild)	Mild symptoms; OSDI 13–22; TBUT 5–9 s; Oxford Gr I; minimal staining	PF lubricants + lid hygiene + ω-3 + environment
Grade 2	(Moderate)	Moderate symptoms; OSDI 23–32; TBUT 3–4 s; Oxford Gr II; MGD Gr 2	Add anti-inflammatory + IPL / thermal pulsation
Grade 3	(Severe)	Frequent symptoms; OSDI 33–42; TBUT 1–2 s; Oxford Gr III; severe MGD	CsA / lifitegrast + serum tears + punctal occlusion
Grade 4	(Very Severe)	Constant symptoms; OSDI ≥43; TBUT <1 s; filaments; no meibum expression	Systemic Tx + scleral lenses + urgent referral

4. SINGAPORE-SPECIFIC CLINICAL CONSIDERATIONS

4.1 Tropical Climate & Environmental Factors

Environmental Factor	Impact on Dry Eye	Clinical Implication
High ambient humidity (70–90% RH)	Partially protective outdoors	Symptoms may fluctuate; assess in context
Pervasive air-conditioning (22–24°C)	Marked humidity reduction indoors	Indoor environments major trigger in SG
High UV index (UVI 10–14 daily)	Ocular surface inflammation	Photoprotective lenses recommended
Urban particulate matter (PM2.5)	Conjunctival irritation	Peak PSI periods may worsen Grade
Contact lens wear (>40% urban SG)	Reduced TBUT; lipid disruption	Assess CL wear hours; switch modality PRN
Screen time (avg >9 hr/day SG)	Reduced blink rate (~50%)	Blink training; 20-20-20 rule counselling

4.2 Ethnic & Demographic Considerations

Population Group	Considerations	Relevant Adjustment
Chinese (74%)	Higher myopia → more CL wearers; LASIK DED common	Post-refractive DED protocol; Grade 1–2 common
Malay (13%)	Higher MGD prevalence; cosmetic eye practices	Lid hygiene emphasis; MGD Grade 2–3
Indian (9%)	Higher Sjögren's susceptibility; systemic autoimmune overlap	Lower threshold for ANA/RF; Grade 3–4
Elderly (>65 yr)	Androgen decline → gland atrophy; polypharmacy	Medication review; Grade 2–3 common
Paediatric (screen-related DED)	Rising prevalence; atypical presentation	DEQ-5 adapted; typically Grade 1–2

4.3 Locally Available Investigations

Investigation	Device / Location	Threshold	Notes
Tear osmolarity	TearLab; i-Pen (selected clinics)	>308 mOsm/L	Bilateral; inter-eye Δ >8 diagnostic
NIBUT / Meibography	Keratograph 5M; Sirius (major chains)	NIBUT <7.8 s	Preferred over fluorescein TBUT
LipiView / LipiScan	Selected ophthalmology centres	Gland dropout >50%	Refer if MGD Gr 3 (DED Gr 3–4)
InflammaDry (MMP-9)	Available via distributor	≥ 40 ng/mL = positive	Useful pre-CsA (Grade ≥ 2)
Anterior OCT (meniscus)	OCT units in most polyclinics	TMH <0.2 mm	Non-invasive volume estimate
Sjögren's antibodies (SS-A/B)	SNEC; NUH; TTSH labs	Via referral	If DEQ-5 ≥ 12 + systemic sx (Gr 3–4)

5. EVIDENCE-BASED MANAGEMENT ALGORITHM

Management is stepwise from Grade 0 (Healthy) through Grade 4 (Very Severe). Advance to the next step if inadequate response after 4–8 weeks. All grades receive patient education and environmental counselling.

DED Grade	First-Line Interventions	Second-Line / Adjuncts	Referral Trigger
Grade 0 (Healthy)	<ul style="list-style-type: none"> Annual review; no treatment required Preventive education: screen time, environment, hydration Promote ocular surface hygiene 	<ul style="list-style-type: none"> Omega-3 dietary advice Ergonomic workstation setup UV protective eyewear 	No referral needed
Grade 1 (Mild)	<ul style="list-style-type: none"> Preservative-free (PF) lubricant drops QID Lid warm compress 4 min BD Blink training; 20-20-20 rule Omega-3 supplementation (EPA+DHA ≥ 2 g/day) Humidifier / air-con filter advice 	<ul style="list-style-type: none"> LipiFlow / thermal pulsation Eyelid hygiene (Blephagel, Oust Blephadex) Dietary counselling 	Not indicated at Grade 1
Grade 2 (Moderate)	<ul style="list-style-type: none"> PF lubricant drops up to Q2H Overnight ointment (Lacrilube / Viscotears gel) Meibomian gland expression Anti-inflammatory diet; ω-3 CL wear reduction (≤ 8 hr/day) 	<ul style="list-style-type: none"> Topical cyclosporine A 0.05% (e.g. Restasis) BD Loteprednol 0.5% short course (≤ 4 wk) Intense pulsed light (IPL) therapy Serum tears (20% if refractory) 	Refractory to 2 treatment cycles
Grade 3 (Severe)	<ul style="list-style-type: none"> All Grade 2 measures Topical CsA 0.1% (Ikervis) or lifitegrast 5% Oral doxycycline 50–100 mg/day (MGD) Autologous serum tears 20–50% Punctal occlusion (reversible plugs) 	<ul style="list-style-type: none"> Scleral contact lenses Bandage SCL Consider systemic immunomodulators Amniotic membrane (Prokera / Ambio) 	Refer to ophthalmologist within 4 weeks
Grade 4 (Very Severe)	<ul style="list-style-type: none"> All Grade 3 measures Autologous serum 50–100% Scleral lenses (primary modality) Punctal occlusion (permanent if indicated) Moisture chamber spectacles 	<ul style="list-style-type: none"> Systemic pilocarpine / cevimeline Hydroxychloroquine (Sjögren's) Tarsorrhaphy (selected cases) Corneal transplant if scarring 	URGENT ophthalmology referral

Ophthalmology Referral Criteria (Singapore Context)

- Corneal ulceration, perforation risk, or persistent epithelial defect (Grade 4)
- Grade 4 DED unresponsive to 6 weeks of maximal medical therapy
- Suspected Sjögren's syndrome or other systemic autoimmune disease (Grade ≥ 3)
- Post-refractive DED (LASIK/PRK/SMILE) with OSDI >32 at 6 months (Grade ≥ 2)
- Neurotrophic keratitis (reduced corneal sensitivity + poor staining healing)
- Paediatric DED requiring immunosuppressive therapy (Grade ≥ 3)
- Filamentary keratitis unresponsive to conservative measures (Grade ≥ 3)

6. PATIENT ASSESSMENT RECORD FORM

Patient Name:		NRIC / FIN:	
DOB:		Date of Visit:	
Optometrist:		Clinic:	
Chief Complaint:			

Clinical Measurement Record — Grade 0 (Healthy) to Grade 4 (Very Severe)

Parameter (DED Grade 0–4 range)	Right Eye (OD)	Left Eye (OS)	Gr OD	Gr OS
OSDI Score → Grade 0–4 (0–12/13–22/23–32/33–42/≥43)				
DEQ-5 Score → Grade 0–4 (<6/6–9/10–13/14–16/≥17)				
TBUT / NIBUT (mean, s) → Grade 0–4 (≥10/5–9/3–4/1–2/<1 s)				
Corneal staining (Oxford) → Grade 0–4 (Oxford 0/I/II/III/IV+filaments)				
Lid-margin staining → Grade 0–4 (Absent/<2/2–4/>4 mm)				
Meibum quality (MGD grade) → Grade 0–4 (Clear/Cloudy/Granular/Inspissated/None)				
Gland dropout (%) → Grade 0–4 (0–25/26–50/51–75/>75%)				
Schirmer I (mm / 5 min) → Grade 0–4 (≥10/6–9/3–5/1–2/≤1 mm)				
Tear meniscus height (mm) → Grade 0–4 (≥0.25/0.2–0.24/0.15–0.19/0.1–0.14/<0.1)				
OVERALL DED GRADE				

Management Plan

Overall DED Grade: Grade 0 (Healthy) Grade 1 (Mild) Grade 2 (Moderate) Grade 3 (Severe) Grade 4 (Very Severe)

Treatment initiated: _____

Medications / Lubricants: _____

Procedures (IPL / LipiFlow / MGD expression): _____

Referral: Ophthalmology Rheumatology Dermatology None

Follow-up: 2 wk 4 wk 8 wk 3 months 6 months

Notes: _____

7. REFERENCES & FURTHER READING

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Disclaimer: *This tool is intended for use by registered optometrists in Singapore as a clinical aide. It does not replace professional clinical judgment, comprehensive ocular examination, or current Singapore Ministry of Health guidelines. All therapeutic interventions should be prescribed within the optometrist's scope of practice under the Optometrists and Opticians Act (Cap 213A). Drug prescribing requires collaboration with or referral to a licensed medical practitioner.*