

Clinical Grading Scales

Grading scales are an essential tool for recording and monitoring clinical changes to ocular tissues. Standardised scales are used to assess the severity of a wide range of conditions including those associated with contact lens wear. These tools can now be considered to be an expected norm in contact lens practice¹.

Several illustrative grading scales are available for use in clinical contact lens practice. Examples of these include the Brien Holden Vision Institute (formerly CCLRU) and the Efron Grading Scales. The former were first published in 1993² and use photographic images for a range of conditions which may occur during contact lens wear, whereas the Efron scales (first edition 1997) use painted images. Computer-generated grading morphs have also been developed.³ THE VISION CARE INSTITUTE® has produced both photographic and artist rendered scales (see below).

Photographic scales have the advantage of depicting real conditions, however, creating a series of photographs that display a constant manifestation, at increasing uniform increments of severity, is unrealistic. Artist-rendered grading scales provide a simple, convenient and accurate means by which clinicians can record and communicate the severity of contact complications, and have advantages when compared to photographic scales⁴. With painted grading scales, the severity of the condition depicted can be systematically advanced and angle of view, magnification and associated features such as iris colour standardised.

Artist-rendered grading scales of Limbal Redness from THE VISION CARE INSTITUTE® Clinical Grading Scales



Photographic grading scales of the limbal area from A Handbook of Contact Lens Management⁵



The use of these grading scales has been clinically validated for a variety of conditions⁶. Although various systems are validated for clinical use, artist-rendered scales have been shown to be more reliable than photographic systems and there are differences in precision and reliability between observers and between conditions. Clinicians are advised to consistently use the same grading system.

Grades range from 0, where no clinical action is required to 4, where clinical action is urgently required. Management will be based on how much the normal ocular appearance has changed, with a difference in grade of 1 or less being considered within normal limits (except for staining).

It has been recommended that, for maximum precision, recording of clinical signs using grading scales should be to the nearest 0.1 scale units and that a change in grading scale units of more than one is clinically meaningful.⁷ The grading system used should be specified on the record along with any other relevant information, such as the condition being graded and the location. A sketch of the eye and/or recording the specific zone enhances the record.

Staining Assessment Zones⁸

Lid Assessment Zones⁹



*corneal zones (5), † conjunctival zones (6)

Grading scales are a very useful clinical tool to improve the accuracy and consistency of record keeping.⁹ They enable direct comparisons to be made and allow communication with other health professionals on clinical cases. They can also be useful as an educational tool to help explain changes to the patient and support clinical decision-making, such as the need to change lens modality, material or replacement frequency.

The Efron Grading Scales for Contact Lens

Complications provide a standard clinical reference for describing the severity of 16 contact lens complications.

- Conjunctival redness
- Limbal redness
- Corneal neovascularisation
- Epithelial microcysts
- Corneal oedema
- Corneal staining
- Conjunctival staining
- Papillary conjunctivitis
- Blepharitis
- Meibomian Gland Dysfunction
- Superior Limbic Keratoconjunctivitis
- Corneal infiltrates
- Corneal ulcer
- Endothelial polymegathism
- Endothelial blebs
- Corneal distortion

The general interpretation of each grading step is shown in the table below, although these are only guidelines and are not intended to replace professional judgement. There are some exceptions to this interpretation for certain complications.

GRADE	SEVERITY	CLINICAL INTERPRETATION
0	Normal	Clinical action not required
1	Trace	Clinical action rarely required
2	Mild	Clinical action may be required
3	Moderate	Clinical action usually required
4	Severe	Clinical action certainly required

A general interpretation of each grading step (The Efron Grading Scales for Contact Lens Complications)

THE VISION CARE INSTITUTE™ Clinical Grading Scales
Adapted from the Efron Grading Scales for Contact Lens Complications

Normal Maintain **Borderline Monitor** **Abnormal Intervene**

0 - Normal 1 - Trace 2 - Mild 3 - Moderate 4 - Severe

bulbar redness

limbal redness

lid redness

lid roughness

corneal staining

meibomian gland dysfunction

IMPORTANT NOTE: These grading scales were derived from those developed by Professor Nahari Efron with permission. Adapted from Supplement to the book Contact Lens Practice, 2nd edition, by Nahari Efron, published by Butterworth-Heinemann, 2010. ISBN 978-0-7506-8809-7. This is offered as an educational tool that you may choose to use as part of your patient evaluations. These materials are not intended as, and do not constitute medical or optometric advice.

THE VISION CARE INSTITUTE™ Clinical Assessment Guide

Slit Lamp Illumination Techniques

Diffuse	Direct Focal	Direct Retro	Indirect Retro	Specular Reflection
Overview of lids, lashes, ocular surface	Detail view and localisation of opaque or translucent objects	Detail view of transparent, translucent or refractive objects	Detail view of transparent, translucent or refractive objects	Endothelium & regularity, smoothness of flat surfaces
Clear, quiet eye	Subepithelial Scar	Blood Vessels	Mucin Balls	Tear Prism

Staining & Lid Assessments

Staining Assessment Zones ¹	Sodium Fluorescein	Lissamine Green	Rose Bengal
Key Uses	Tear stability, integrity of CORNEA and conjunctiva, lid roughness	Integrity of CONJUNCTIVA, cornea and dry eye assessment	Integrity of CONJUNCTIVA, cornea and dry eye assessment
Comments	Use cobalt (blue) light with yellow filter in observation path	Use white light with optional rose filter in observation path	Use white light. (NOTE: Lissamine Green, if available, avoids staining associated with Rose Bengal)
¹ corneal zones (C), ² conjunctival zones (R)			
Lid Assessment Zones²			
	Fluorescein illuminated by cobalt (blue) light	Deep yellow filter in optical path	Enhanced visibility of staining & tears

Corneal Inflammation vs. Infection³

	Inflammatory Event	Microbial Keratitis
Pain	Mild	Moderate - Severe
Location	Usually peripheral	Often central
Staining to defect size	< 1:1	~ 1:1
Anterior Chamber Reaction	Usually none / mild	Cells &/or hypopyon
Injection	Localised, mild-moderate	General, moderate - severe
Appearance of infiltrates	Often multiple, smaller, round or oval, grey-white, translucent	Usually single, irregular shape, >1 - 1.5mm in size, yellow-white, opaque
Lid oedema	Rare	Common
Occurrence	up to ~15%	~0.04% (DW), ~0.2% (EW)
Therapy	Monitor; steroid, NSAID, combo or palliative as needed	Anti-infective, often fortified

Signs of Oxygen Deficiency

Limbus	Epithelium
Limbal vessel engorgement & neovascularization	Epithelial Microcysts
Stroma	Endothelium
Stromal Folds	Endothelial Polymegethism

1. Lemp MA. Report of the National Eye Institute/Industry workshop on clinical trials in dry eye. Contact Lens Assoc Ophthal 7 (2002) 210-211-202. 2. Marmorino MB, Stein DS, Greiner JS et al. Tear quality comparisons in contact lens wearers. Am J Ophthalmol 1973;85:708-15. 3. Ashraf MA, Srinivasulu Kumar VM. Differential diagnosis of microbial keratitis and contact lens peripheral ulcer. Eye Contact Lens 2010;36:200-202. Photos courtesy of THE VISION CARE INSTITUTE™, Gary Anderson, OD and Thomas Quinn, OD. All photos used by permission.

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THE VISION CARE INSTITUTE® Clinical Grading Scales are an adapted version of the full Efron scales, for easy chair-side reference. They cover six key ocular signs that practitioners regularly grade in practice: limbal redness, lid redness, lid roughness, corneal staining and meibomian gland dysfunction. Under this system, grades are interpreted according to the guidelines above.

THE VISION CARE INSTITUTE® Clinical Grading Scales App, compatible with the iPhone®, is an educational tool that allows practitioners to demonstrate to patients nine conditions with severity levels that lessen and increase with real-time animation based on touch. Pterygium, pinguecula and cortical cataract are the additional clinical signs included to aid management of conditions associated with chronic UV exposure.

The app enables severity levels in 0.1 increments to be compared side-by-side. A report can be exported for practice records without collecting personal data. An expanded Clinical Assessment Guide is also included.

A useful **Clinical Assessment Guide** to slit lamp illumination, staining and lid assessments, and signs of oxygen deficiency can be found on the reverse side. A guide to differentiating corneal inflammation and corneal infection is also included.

These resources from **THE VISION CARE INSTITUTE®** are valuable clinical tools, supporting the eye care practitioner and enhancing patient care.



References

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3. Efron N, Morgan PB and Jagpal R. Validation of computer morphs for grading contact lens complications. *Ophthalmic Physiol Opt* 2002;22:4 341-349.
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5. A Handbook of Contact Lens Management 2011 (3rd Edition) published by THE VISION CARE INSITUTE®
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7. Efron N. Grading scales for contact lens complications. *Ophthalmic Physiol Opt* 1998;18:182-186.
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9. Allansmith MR, Korb DR, Greiner JV et al. Giant papillary conjunctivitis in contact lens wearers, *Am J Ophthalmol* 1977;83:697-708.
10. Efron N. Grading scales (Chapter 2). In: Efron N, *Contact Lens Complications*, 3rd Edition. Butterworth-Heinemann, Edinburgh 2012 (ISBN 978-1-4557-3774-1).