

## BRIEF COMMUNICATION



# Specialist nurse-led cross-linking service for Keratoconus, the Leeds experience

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Corneal collagen cross linking (CXL) is the gold standard treatment for preventing keratoconus progression. The Royal College of Ophthalmologists' Way Forward Initiative [1], has highlighted the need to upskill allied health professionals to alleviate service burden and improve patient care. At Leeds Teaching Hospitals, we successfully set up and implemented a nurse-led cross-linking service following a successful business case and approval from the Trust Lead Nurse for Workforce, the Head of Nursing for Medicines Management and Ophthalmic Governance Committee.

A competency-based training protocol comprised of theoretical knowledge and supervised practice including formal assessment was developed. Consultants vetted suitability of cross-linking cases based on set criteria as per a devised trust protocol (available upon request). Nurse-led CXL (Fig. 1) took place during sessions where an on-site consultant or fellow was present with ongoing audit results being regularly appraised. One year audit data was also presented to the Ophthalmic Governance Committee.

The following criteria were used for referral to the nurse specialist:

- 18 years of age
- Primary treatment (expanded to re-treatments after 12 months)
- Keratoconus (extended to pellucid marginal degeneration and post laser refractive surgery ectasia after 12 months)
- Corneal thickness at surgical listing of  $\geq 400$   $\mu\text{m}$  (expanded to  $\geq 375$   $\mu\text{m}$  after 12 months)
- Exclusion of severe atopes on topical steroids

A retrospective audit between February 2019 and May 2019 showed 186 of 190 patients underwent the epithelium-off accelerated CXL protocol for keratoconus. Of the 186 patients, 179 (96.2%) did not demonstrate any evidence of progression following cross-linking. 46.3% of patients experienced an improvement in visual acuity at 12 months after CXL comparable to the 53–57% seen in other studies [2, 3]. Visual acuity of 1 line was lost in 38.3%, compared to 24% of  $\geq 1$  line in other studies [2, 3]. Presumed refractive change was accountable for the 23% that lost BCVA; no corneal scarring or progression was seen or documented in these patients. No individuals lost  $\geq 2$  lines of visual acuity. Progression despite cross linking was seen in 3.8% over 38.2 months comparable to 4.8% of patients in the Cochrane review [4]. There were no episodes of microbial keratitis or any other adverse events following nurse-led CXL.

Our results have shown the successful implantation of a safe and effective nurse-led CXL service with a comparable results profile to what was found by Sykakis et al. in their 2015 Cochrane review [4]. This service has increased departmental capacity and flexibility, reducing patient waiting times for prompt treatment of progressing keratoconus. Furthermore, it has freed up senior clinicians and increased surgical capacity to target more complex procedures improving time-sensitive management of other sight-threatening diseases.

In an era of increased demand and workload, we aim to encourage others to evaluate their service, share best practice and help those without a nurse led service start safely in their units.



**Fig. 1 Corneal collagen cross-linking.** Nurse Specialist Alan Salada performing corneal collagen cross-linking on a patient.

## DATA AVAILABILITY

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

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## AUTHOR CONTRIBUTIONS

RP, AS and NS contributed to collecting data. RP, AS, AO, SA contributed to writing the report. SA, AB, DD, AM contributed to revising and reviewing the paper for publication. SA, AB, DD, AM were responsible for developing the competency-based protocol and training SA.

## COMPETING INTERESTS

The authors declare no competing interests.

## INFORMED CONSENT

Patient and clinician consent received for the use of Fig. 1.

## ADDITIONAL INFORMATION

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