Elara 900 white paper series – ergonomics

User experience and usability evaluation report – examiner and patient ergonomics data from pre-launch pilot evaluations with a new type of slit lamp.

This white paper was created by Haag-Streit in June 2026. The patient comfort evaluation was conducted internally at Haag-Streit USA, Mason, OH. Pilot-phase reports were conducted in collaboration with independent clinical sites. All data are held on file by Haag-Streit AG.

Key takeaway points

- The introduction of the Haag-Streit Elara 900 slit lamp saw the implementation of a redesigned ergonomic concept. As routine slit lamp biomicroscopy can lead to neck, shoulder & upper-limb strain, the Elara 900 was developed based on the hypothesis that inclined eyepieces could improve examiner posture. Optimized control-element placement & motorized height adjustment were also introduced to enhance overall examination comfort during daily use
- Pre-launch pilot evaluations were conducted to assess the ergonomic improvements for the examiner compared with conventional slit lamps
- Results consistently show that the Elara 900 improves posture and provides greater comfort during routine use. Examiners rate the Elara 900 as more ergonomic than traditional systems
- An internal evaluation of patient comfort favored the Elara 900, showing higher ratings for overall comfort, perceived space, handle positioning & ease of positioning. This suggests that the redesigned headrest and interface improve the patient experience during routine examinations.

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Background

Slit lamp biomicroscopy remains one of the most frequent and posture-sensitive examination tasks in ophthalmology. It combines close visual work, repetitive device adjustment, and prolonged static positions around an interface that must also remain stable for focus while supporting comfortable use over extended periods. This makes slit lamp ergonomics clinically relevant not only for occupational health but also for examination quality, workflow continuity, and user acceptance.[1-8]

The broader scientific literature on ergonomics is clear on the scale of the problem. In a survey comparing eye care physicians with General Practitioners (GPs), neck pain was reported more often by eye-care providers (46% vs 21%), as were hand/wrist pain (17% vs 7%) and lower-back pain (26% vs 9%).[2]

In the US ophthalmologist survey by Schechet et al., two-thirds of respondents reported occupation-related musculoskeletal pain. Neck pain was the most common pain location, reported by 70% of respondents. The same paper noted that adjustable slit lamp chairs and tables, as well as angulated eyepieces, are among the ergonomic measures recommended to reduce strain in clinic.[3]

Objective and semi-objective studies reinforce the same theme. Wasserman et al. found that 79% of participating eye-care professionals reported frequent neck pain and concluded that slit lamp posture promotes forward head position. An ergonomic risk study done by Morrison et al., using the Rapid Entire Body Assessment (REBA), reported a medium to high average REBA score of 4.59 during slit lamp examinations in residents, consistent with a meaningful ergonomic risk signal of developing musculoskeletal disorders (MSDs). Schall et al. showed that a more ergonomic examination setup could incorporate inclined oculars, adjustable elbow support, and a wider tabletop. These measures could reduce exposure to sustained, non-neutral neck and shoulder postures. Ratzlaff et al. also point out that ergonomics training alone can improve slit lamp positioning metrics.[4-7]

These findings impacted Elara 900's design. Rather than seeking to improve individual features, Elara 900 was designed as a complete ergonomic system. Several key components of the device have been redesigned with potential examiner and patient experience improvements.

Examiner-focused design elements of Elara 900

- A centralized control architecture reduces the need for repeated reaching & changes in hand-position
- The motorized height & magnification adjustments reduce the force required for repetitive device adjustments
- The 20° inclination of the eyepieces supports a more natural head & neck position
- A spacious headrest & optional patient handles are designed to improve the patient experience.

The ergonomic improvements had to undergo clinical evaluation to assess their impact on both the examiner and patient.

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Objective

The primary objective of this white paper is to assess whether the ergonomic redesign of the Elara 900 improves overall examiner comfort during routine slit lamp biomicroscopy compared with conventional slit lamp systems. Attention is given to the combined effect of the inclined eyepieces, the redesigned placement of control elements, and the motorized height adjustment, as these features were developed to reduce repetitive reaching, awkward neck flexion, and strain on the shoulders, arms, and hands during examination.

A secondary objective is to evaluate whether the redesigned patient interface, including the more spacious headrest and patient handles, improves patient positioning, perceived space, and overall examination comfort. The evaluation therefore focuses on clinically relevant ergonomic dimensions in daily practice: examiner posture, neck and upper-limb comfort, ease of handling, patient stability, and ease of positioning.

To investigate these hypotheses, exploratory usability and pilot-phase evaluations were conducted in 2025 to draw real-world data from both examiner and patient-focused evaluations.

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Methods

This white paper is an exploratory evidence synthesis from four different clinical sites, which were all part of the pre-launch pilot phase lasting several months, focusing on examiner results. The results include examiner questionnaires and supportive published literature.

A complementary patient-focused evaluation assessed comfort and positioning, comparing the Elara 900 with the BQ 900 in a controlled cross-over design (n=40). [9-13]

Pre-launch pilot phase report evidence base

Source	Setting	n
Internal patient comfort study	Controlled cross-over comparison on patient experience, Haag-Streit USA	40
Pilot-phase report Dr. Ribeiro	Prospective examiner comparison after one month of routine use	10
Pilot phase report Dr. Gensheimer	Prospective examiner comparison after one month of outpatient use	7
Pilot phase report Dr. Auffarth	Prospective examiner comparison after several months of routine use	20
Pilot phase report Dr. Kugelberg	Prospective examiner comparison after several months of routine use	5

Table 1 Internal & pilot phase report evidence base used for the ergonomics white paper

The primary areas of interest were overall examiner comfort, examiner posture and neck comfort, and perceived force reduction from motorized controls. Secondary feedback covered perceived space for patients, pressure sensation during examination, and ease of patient positioning.

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Results

Examiner-focused clinical results

One of the clearest examiner-side signals comes from Dr. Ribeiro's prospective comparison. All 10 participants reported that the combined effect of the ergonomic redesign had a very positive or somewhat positive effect on examiner posture. The same study also reported uniformly improved patient setup and comfort through the more spacious headrest, an operationally relevant point because examiner ergonomics and patient alignment are tightly linked during slit lamp use.[9]

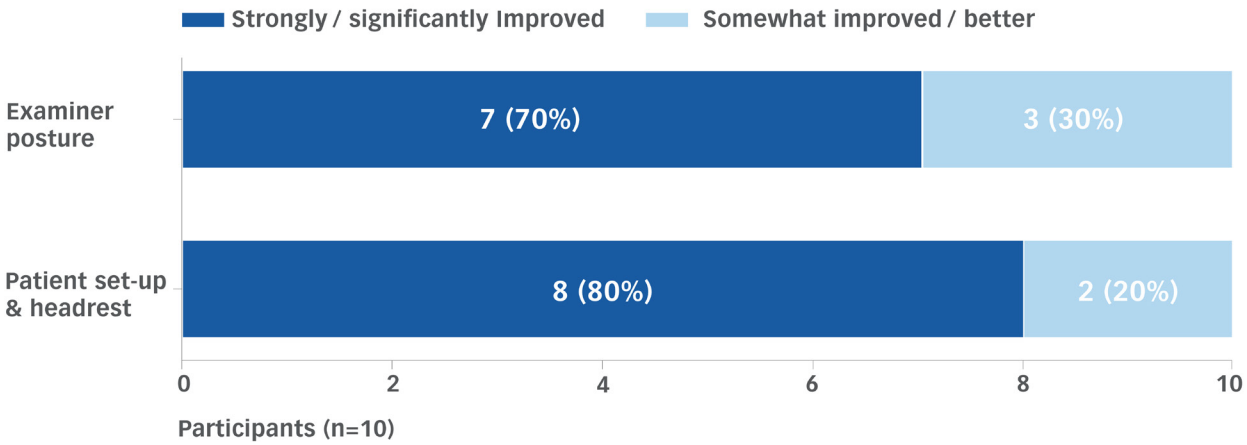

Figure 1 Perceived effect of the combined ergonomic redesign in Dr Ribeiro's routine-use study (n=10). The underlying questionnaire evaluated the overall redesign package, including inclined eyepieces, motorized functions, magnification control & headrest redesign

Prof. Auffarth's Heidelberg University Hospital evaluation supports the same direction of effect. Across 20 completed questionnaires, 70% of users described Elara 900 as the more ergonomic slit lamp compared to a Haag-Streit BQ 900 and 30% were unable to choose between the two devices; no respondent selected the traditional comparator as more ergonomic. Mean neck-comfort scores were slightly higher with Elara 900 (3.66/5) than with the traditional slit lamp (3.40/5) and motorized control elements were also rated as reducing the force required compared to the traditional slit lamp (3.66/5).[10]

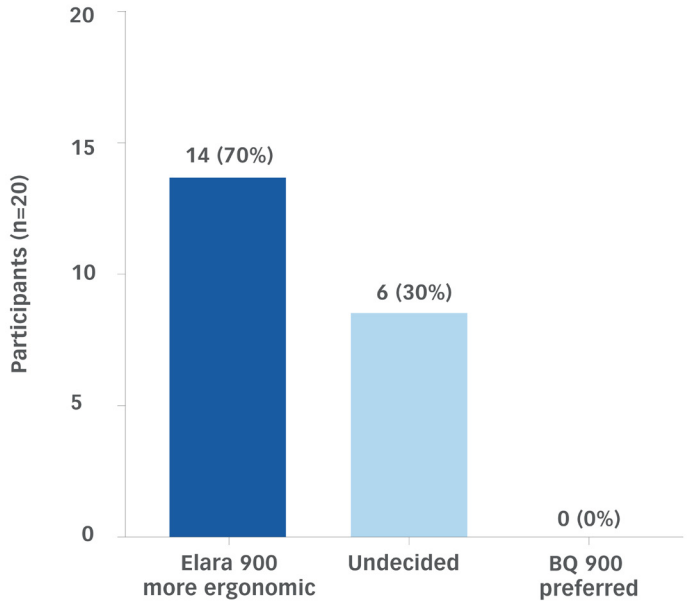

Figure 2: Comparative findings from the Heidelberg University Hospital report (n=20) with 14 examiners preferring the overall ergonomics on the Elara 900 compared to the BQ 900 by Haag-Streit

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Examiner-side corroboration from the other two sites was directionally positive but more nuanced. In the pilot phase report by Dr. Gensheimer, New Hampshire (n = 7), five of seven users rated examiner ergonomics the same or better with Elara 900; two of seven rated it as worse. Free-text comments praised reduced hand movement and better access to "presets" and imaging, while also noting that inclined oculars were not immediately ideal for every user. Dr. Kugelberg, Stockholm states in her report that all faculty users reported to enjoy the new slit lamp and to feel comfortable with the ergonomics and imaging features after longer exposure.[12,13]

Patient-focused results on positioning & comfort

A Haag-Streit internally conducted comparison (n=40) in Mason, USA produced a dataset which evaluates results on patient positioning and comfort comparing Elara 900 with the BQ 900. Positive ratings favored Elara 900 over BQ 900 across all four patient-facing domains assessed: overall comfort (33 vs 13), perceived space (30 vs 17), handle positioning (38 vs 7), and ease of positioning (36 vs 17). These are large absolute differences and align closely with the qualitative observations documented.[11]

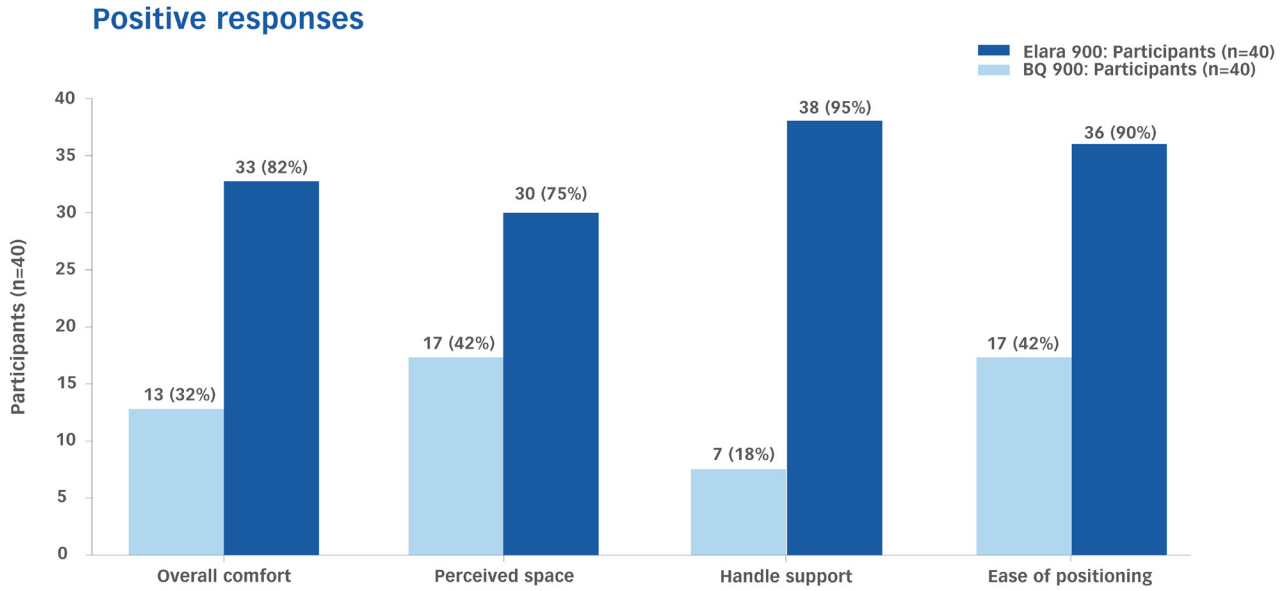

Figure 3: Positive response share by domain in the internal patient-comfort comparison. A total of 40 respondents were asked to rate the ergonomic performance of the Elara 900 & BQ 900 in four categories. Each bar shows the positive scores achieved per device. Positive responses correspond to somewhat/very comfortable, somewhat/very spacious, well/very well positioned & easy/very easy positioning

Upper body pressure-related discomfort also improved in direct comparison, although less decisively than the other patient metrics. No or minimal pressure was reported in 37 of 40 Elara 900 examinations versus 32 of 40 BQ 900 examinations. Moderate or high pressure was reported in 3 of 40 Elara 900 examinations versus 8 of 40 BQ 900 examinations. Elara 900 improved the interface substantially but did not eliminate all geometry-related discomfort across all anatomies.[11]

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Distinct headrest comfort improvements on larger body frame patient subgroup

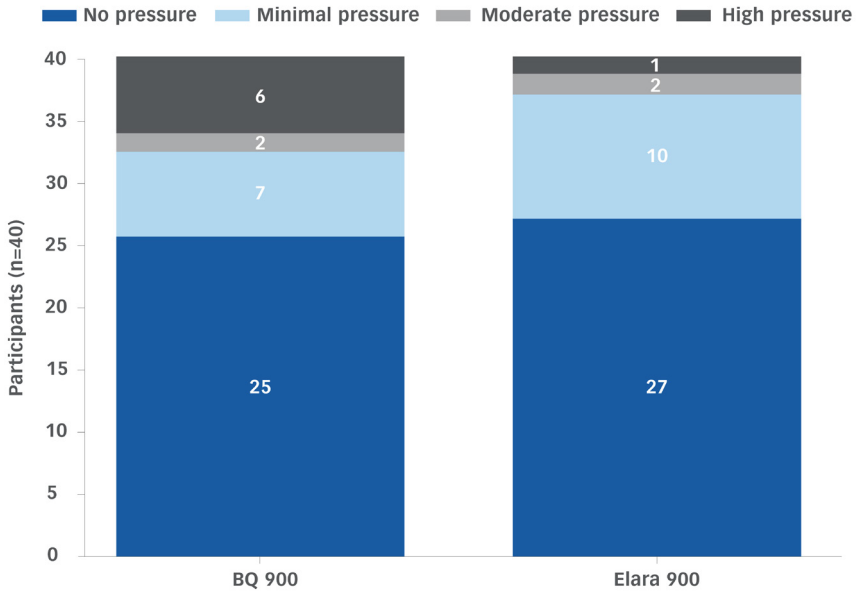

Figure 4: Upper body pressure profile in the internal patient-comfort comparison (n=40). Patients benefit from no to minimal pressure improvements when comparing the Elara 900 vs BQ 900

An exploratory sub-group review of the dataset suggests that the spacious-headrest advantage may become more visible in larger body frames. Weight was used as an available proxy for body frame size in this dataset; future evaluations could incorporate abdominal girth for a more complete characterization. Among participants weighing at least 230 lb (~104 kg) (n=10), positive comfort ratings were 90% with Elara 900 versus 20% with BQ 900, and positive perceived-space ratings were 90% versus 40%. This signal should be interpreted cautiously because of the small subgroup size, but it aligns with the field observations recorded as well.[11]

Figure 5: Direct comparison of the headrest-angle & chest-contact issue identified in certain anatomies during ergonomic evaluation

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Discussion

The findings from the pilot phase reports assessing examiner improvements are clinically plausible when viewed against the published ergonomics literature. Wasserman et al. showed that slit lamp posture promotes forward head position, and Schall et al. found that ergonomic improvements including inclined oculars can indeed reduce exposure to sustained, non-neutral neck and shoulder postures. Together, these studies provide a credible biomechanical rationale for why Elara 900 might feel easier to use even before any long-term injury endpoint can be measured.[4,5]

The component logic of Elara 900 also fits the pattern seen across the multi-site evaluation. Inclined eyepieces plausibly reduce cervical flexion demand during examination. Centralized controls and one-hand interactions reduce repeated reaching and hand-position changes. Motorized height adjustment reduces the effort associated with frequent vertical repositioning.

On the patient side, a wider headrest and better-positioned handles appear to make the device feel less constrictive and easier to approach.[11]

The literature also suggests that equipment redesign and user behavior are complementary rather than competing strategies. In other words, better equipment can help, but training, setup habits, and adaptation time still matter.[6,7]

The available data consistently indicate that Elara 900 reduces perceived ergonomic burden in slit lamp examination and improves the human-device interface for both examiner and patient. The evidence does not yet support a stronger claim such as a quantified reduction in musculoskeletal injury risk, nor does it support precise ranking of which feature contributes most to the observed benefit.[2-13]

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Limitations

The present data are exploratory and intended to provide supportive, rather than definitive, evidence. Most endpoints were subjective, sample sizes were limited, comparators differed by site, and adaptation periods were heterogeneous. The patient-comfort dataset was collected with internal staff participants rather than routine clinical patients, although care was taken to exclude those directly involved in Elara 900 development.[9-13]

Examiner-side outcomes also reflected the whole ergonomic package rather than isolated features, which means the current data cannot determine how much of the signal should be attributed specifically to eyepiece inclination, to centralized controls, or to motorized height adjustment. Objective posture or muscle-load measurements such as craniovertebral angle, Electromyography (EMG), Rapid Upper Limb Assessment (RULA), or Rapid Entire Body Assessment (REBA) were not captured in the Elara pilot phase studies.[4-7,9-13]

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Conclusion

The current evidence suggests that Elara 900 represents a meaningful ergonomic advance in slit lamp biomicroscopy. Elara 900 appears to improve examiner comfort and patient positioning by combining inclined ocular geometry, motorized device adjustments and a more centralized operating concept with repositioned device control elements.

The strongest patient-side signals are the large, repeated advantages in comfort, perceived space, handle support, and ease of positioning from the internal cross-over dataset.[9-13]

Follow-up evaluations could include multicenter studies with objective posture metrics and longer adaptation windows.[1,4-10]

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