# Eliminating inefficiencies
## AND NEVER-EVENTS IN CATARACT SURGERY

Ensuring correct intraocular lens selection is a labour-intensive process fraught with risk and the potential for human error. Queensland surgeon DR MATTHEW RUSSELL explains how new software has transformed cataract safety and workflow at his practice.

Incorrect intraocular lens (IOL) implantation is one of the most dreaded incidents for any cataract surgeon, exacerbated by the patient's inability to comprehend such a critical and avoidable error.

Intricate diagnostic tools, multiple data points, small font, complex formulae, print outs and manual transcription provide the ingredients for potential never-events, and explain why cataract surgery carries the greatest risk of inserting the wrong implant than any other procedure.

Such errors may occur at any stage from the decision to operate, to implantation, but are almost universally due to a breakdown in safety protocols.

In 13 years of private practice Dr Matthew Russell, an Australian surgeon with significant experience with toric and multifocal IOLs, has only encountered one such incident when a typo for the IOL power resulted in a 2.0 D refractive surprise for the patient.

"Other than a serious complication during cataract surgery, it is one of the most dreaded things. But the problem with an IOL selection error is that it's very difficult for the patient to comprehend how it could have ever happened," Russell, the founder and director of OKKO Eye Specialists Centre, which has

three sites in Queensland, says.

"That was a long time ago and we have continually sought to refine and improve our processes. But that comes at an enormous cost. Having two team members simultaneously checking transcription in every step within our clinic and then a further check pre-op takes a lot of administrative time. And even with those checks in place, it was still possible to find small errors occurring at that final check."

Such events are also stressful for the ophthalmologist. A review of claims to the NHS Litigation Authority in the UK found cataract care to be the largest share of litigation in ophthalmology and awarded the highest total damages.

Despite rigorous checking processes, no system is immune from errors when humans intervene. And the issue becomes even more complex when implanting toric IOLs with several more potential error sources and time-consuming steps.

For years, Russell has yearned for a system that overcomes the burdens of checking procedures, while almost completely eliminating the risk of manual transcription errors and toric axis misalignment.

Since 2019, his clinics have been among a few worldwide to pilot the new Zeiss EQ Workplace, which then became available in Australia in May 2020, with 12 sites now using the technology.

Dr Matthew Russell, OKKO Eye Specialists Centre.

The latest addition to the Zeiss cataract suite, the software is a digital surgical planning tool that allows seamless, automated data access and transfer.

According to Russell, it's had a transformative impact on safety and practice efficiency. Working across three sites, he can also access patient data and surgery plans from any location on multiple devices.

"Spending less time worrying about the possibility of an error and being able to make a selection that I know is going to be the one that turns up in the operating room when I'm with the patient gives me tremendous peace of mind," he says.

### ELIMINATING RISK

Traditionally for Russell, the moment fraught with the most risk was when his support staff would take the lens selection print out and manually type the data into other systems to inform the day surgery of the selected IOL and order the lens from the supplier.

Now, with EQ Workplace, the information from diagnostics to operating room is effectively shut off from human intervention.

To explain how it works, Russell says measurements taken from the IOLMaster and other devices such as keratometer and wavefront aberrometer are transferred to the cloud and presented together on his customised desktop computer using Zeiss Forum. The biometry data is also pre-populated for automatic IOL calculations.

With the patient sitting next to him, Russell can then go through the IOL selection process.

"And once that plan is approved, from there we automatically send a PDF to order the implant, and that same PDF goes to the day surgery. There is almost zero-risk of transcription errors, with no other humans involved in the process. And because we are ticking a box directly to select the IOL, there is no typing involved, that information is immutable, it can't be changed," he says.

"Furthermore, any business has the pressure of limited staff resources, and so it's great to know that our staff aren't spending numerous hours with processes that are almost invisible to the ophthalmologist and practice managers – they can now spend more time in patient-fronting roles."

Importantly, the open platform doesn't discriminate against IOL manufacturer, allowing the surgeon to select any preferred lens.

From there, Russell uses the Zeiss EQ Mobile app. It's essentially an extension of EQ Workplace that allows him to transfer his surgical planning information from his central data management point (the cloud) at his main practice to be accessed by a remote device.

In his case this it is an iPad he takes into the theatre. But it also means he can amend a patient's plan – such as the use of an alternative IOL – later down the track from any location.

Once in the theatre, his iPad – through EQ Workplace and EQ Mobile – connects with his microscope and Zeiss Callisto eye, which is a computer-assisted cataract surgery system. When starting surgery all relevant patient and IOL information, as well as assistant functions for the surgery (rhexis, incisions and target axis for toric IOLs), are already pre-set.

"At this point we then check the implant model, the power, the toric power and the axis before we begin surgery," Russell says. "We can compare what's on the screen against what we have got in our hand to double check we have selected the right lens for the patient, based on what was sent via EQ Workplace. This is now the only time in the process that a human is double checking the IOL selection."

### OVERCOMING TORIC TROUBLES

The EQ Workplace removes another potential error source involved in toric lens implantation, which has its own set of complexities.

According to Russell, the Callisto eye system has been transformative in its ability to perform markerless alignment with toric IOL surgery, negating the requirement to perform corneal marking on patients pre-operatively.

Corneal marking has inherent issues such as poor mark visibility, eye
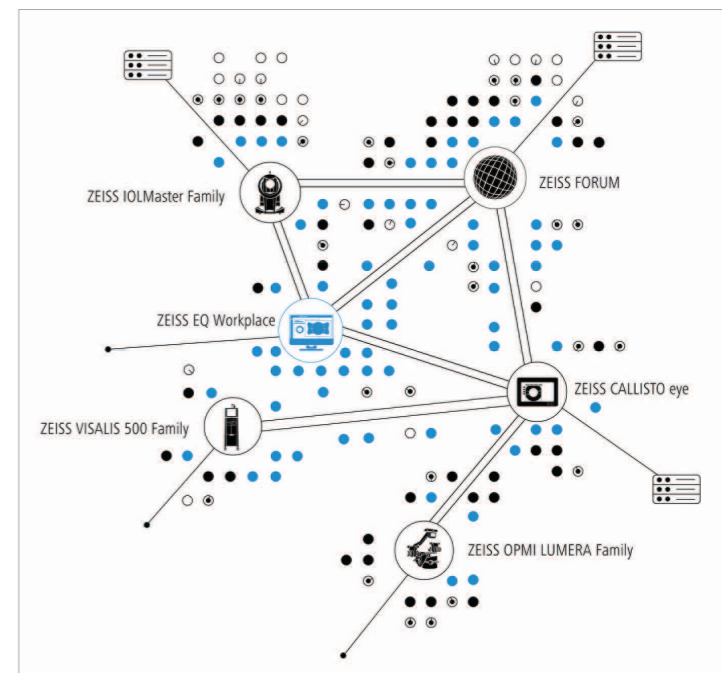


EQ Workplace is the latest addition to the Zeiss cataract suite, which passes important data between key instruments and programs in the lead up to surgery.

movements or cyclorotation. Further, it's been shown that with every single degree that a toric IOL is off-axis, its effect for reducing astigmatism is decreased by 3%.

"Since the introduction of Callisto eye we have been able to upload images of the eye to the microscope and that has been a significant time-saver, but it did involve manually having to select the toric alignment axis, which is another potential source of error, and often in theatre situations these tasks often get delegated to non-doctor staff," he explains.

"But now all of that data comes from EQ Mobile and the original plan is uploaded automatically to the scope and Callisto eye – it's pre-populated and there's no need to manually select the axis."

"With any toric IOL there are multiple steps along the way where errors may creep in, any one of those could result in an error. Or with cumulative small errors at each point, such as marking errors and so forth, it doesn't take much to create five degrees of misalignment," Russell says.

### GREATER PATIENT DEMANDS

To fully understand the benefits EQ Workplace, Russell is running a prospective study looking at the impact on efficiency in the practice, which he aims to publish.

He believes the technology's arrival has been timely, coinciding with an explosion in new multifocal and extended depth of focus IOLs during the past five years.

With advanced IOLs, the work up is more complex to ensure correct candidates and lens selection. Multifocal, EDOF and toric IOLs are also less tolerable to small errors, with residual astigmatism or spherical error of 0.5 D or more known to have a significant impact on unaided vision of patients receiving multifocals.

"With that complexity comes the growing possibility of risk for a selection error, and EQ Workplace dramatically simplifies the whole process of selecting an IOL and making that likelihood of an error almost remote," he says.

Russell believes EQ Workplace is an early example of the digital transformation of ophthalmology, changing how patient information and devices interact.

Until now, he says the use of technology like application programming interface (API) systems – code that enables different services and applications to share information with each other – has been limited in ophthalmology.

"These things are very common in business software, but EQ Workplace is an example of how digitising a process that's been traditionally manual can have an enormous positive impact on patient safety and also result in efficiency improvements in medicine," he says. ∎