

Patient Safety Tip of the Week

December 17, 2024

Can AI Prevent Ophthalmological Surgery Errors?

Ophthalmological surgery is generally quite safe. But occasionally things go wrong. We've seen cases where a procedure is performed on the wrong patient or wrong eye and cases where the wrong intraocular lenses (IOL's) are implanted. In fact, it was after a case in the mid-1990's in which 2 consecutive patients received the wrong intraocular lenses that we actually developed one of the first surgical timeout protocols. New York State a year later adopted the protocol almost verbatim and Joint Commission's Universal Protocol followed shortly thereafter with most of the same features.

Tabuchi et al. recently evaluated an AI-based system for potential patient and surgical material verification system in ophthalmology ([Tabuchi 2024](#)). Their AI-based surgery safety system integrates three main components: facial recognition, surgical laterality verification and IOL authentication. It uses data from the electronic medical record plus the patient's facial photograph for authentication.

Using an iPad mini, a dedicated circulating nurse manages the AI authentication process, carrying it throughout the authentication sequence: facial recognition at the entrance, followed by surgical laterality and IOL authentication inside the operating room. The user interface is intuitive, with clear instructions and immediate feedback. Each authentication is initiated with a single tap, and the system provides real-time guidance for optimal image capture. Devices connect to the hospital network via secure Wi-Fi, enabling immediate data synchronization and verification results. The system does not replace the WHO Surgical Safety Checklist, but rather works in conjunction with it.

They analyzed 18,767 cases in the pre-implementation period and 18,762 in the post-implementation period. There were more actual errors in the post-implementation period (5 errors post-implementation vs. 1 pre-implementation). However, far more near-misses were identified in the post-implementation period (30 near misses post-implementation vs. 9 pre-implementation). Of those 30 near-misses, there were four cases of incorrect left-right drape placement and 26 cases of IOL preparation mistakes.

The authors attribute the discrepancy between pre-implementation and post-implementation error reporting (1 vs 5 cases) to improved detection rather than an actual increase in errors.

There were implementation challenges and also some authentication failures due to substandard image quality. The authors also did an economic analysis and found that the AI-based system offers significant economic advantages.

The authors note that an initial learning curve and resistance highlight the importance of thorough training and change management strategies when adopting any new technologies. Having good systems does not guarantee that errors will be avoided. For example, they noted a case where a physician disregarded both the timeout procedure and the AI.

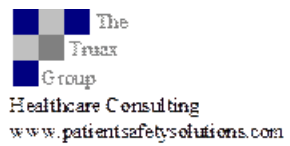
Though this was a single-center study, the authors note that a smaller validation study at another hospital showed similar authentication rates and perfect post-authentication accuracy, supporting their findings. This is a promising technology and system. It will be interesting to see if results can be replicated at other sites. Given the high volume of ophthalmological surgery cases in the world, an easy-to-use and economically viable intervention like this could make ophthalmological surgery even safer.

Some of our previous patient safety columns involving ophthalmology issues:

June 5, 2007	“Patient Safety in Ambulatory Surgery”
March 11, 2008	“Lessons from Ophthalmology”
June 8, 2010	“Surgical Safety Checklist for Cataract Surgery”
June 2012	“Tailored Timeouts for Ophthalmologists”
May 20, 2014	“Ophthalmology: Blue Dye Mixup”
September 2014	“Another Blue Dye Eye Mixup”
May 17, 2016	“Patient Safety Issues in Cataract Surgery”
December 5, 2017	“Massachusetts Initiative on Cataract Surgery”
September 14, 2021	“Wrong Eye Injections”
January 25, 2022	“More on Dental Patient Safety Issues”

References:

Tabuchi H, Ishitobi N, Deguchi H, et al. Large-scale observational study of AI-based patient and surgical material verification system in ophthalmology: real-world evaluation in 37,529 cases. *BMJ Quality & Safety* 2024; Published Online First: 29 November 2024 <https://qualitysafety.bmj.com/content/early/2024/11/29/bmjqs-2024-018018>



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