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Sir,
Intraocular pressure measurement and goldmann calibration. An eye opening review of practice in United Kingdom

The accurate measurement of intraocular pressure (IOP) is necessary for management of glaucoma and other ocular diseases. Recent studies have reinforced the importance of raised IOP as the main risk factor for the progression of glaucoma.^{1–4} Several methods are employed in clinical practice for measuring IOP, however Goldmann applanation tonometry is the most reliable and accurate method in clinical practice. The tonometer must be correctly calibrated to ensure accurate IOP measurement. There is little data available regarding the recommended frequency of Goldmann calibration. Suggestions by several independent authors range from checking calibration before every session⁵ to an arbitrary annual or bi-annual check.⁶

In order to address this matter we sent out postal questionnaires to all 905 ophthalmology consultants registered with the Royal College of Ophthalmologists (RCO) in the UK. We enquired about the current method employed for measuring IOP and investigated the current and ideal practice for checking Goldmann calibration and the individual(s) responsible for this task.

Our survey had a response rate of 45.6% (413 out of 905). Goldmann tonometry was reported to be used by 99%, hand held contact tonometry (perkins and tonopen) by 55.7% and non-contact methods by 3.1% of the responders. Trans-tarsal tonometry (TDGc-01 tonometer) was used by 0.5% of the responders only in cases where other methods were impossible (eg paediatric cases or corneal pathology). Goldmann tonometry was reported to be used as the sole method for measuring IOP by 58.2% (240/413) of the responders and 41.8% (173/413) stated they used multiple techniques already mentioned.

Personnel involved in measuring IOP included doctors, nursing staff and health care assistants. Goldmann tonometry was used by all the doctors, two-thirds of the nursing staff and half of the health care assistants (HCA's). Handheld tonometry was more popular amongst HCA's (88%) and nursing staff (58.3%) in comparison to doctors (18%).

According to the consultants, the individuals responsible for checking Goldmann calibration were mainly doctors (47.2%). Nearly a third (29.7%) of the responsible individuals were service engineers and a fifth (18.8%) allied health care professionals (nurses, orthoptists and HCA's). However one-fifth (19.3%) of the responders were unaware who was responsible.

When asked, who should shoulder the responsibility for Goldmann calibration ideally, almost half (47.5%) of the responders felt that doctors should but more responders felt other health care professionals could be involved.

(Allied health care professionals (36.8%), service engineers (39.9%) and 1.2% had no opinion).

The manufacturer of the most commonly used Goldmann tonometer (Haag-Streit, Switzerland)⁷ recommends that Goldmann calibration checks to be performed before every clinic. The most popular routines for the current frequency of checking Goldmann calibration (Appendix 1) were annually (18.6%), one monthly (17.4%) and weekly (13.8%). Only in 6.1% of responders stated that the calibration was checked before every clinic. But significantly 39.3% (356 out of 905) of the consultants stated that calibration was not routinely checked.

Regarding the ideal routine for checking Goldmann calibration, most favoured either a weekly (30.3%) or 3 monthly (24.9%) routine. Only 11.4% felt it should be checked before every clinic while 2.2% thought it should only be checked in the event of an abnormal reading and 1.5% had no opinion about it.

Several factors play an important role to explain the disparity between manufacturer's recommendation and the current or even ideal practice for Goldmann calibration checks. These include the pressures of time in busy clinics, missing calibration bars, unawareness to the need of checking calibration frequently and inability to carry out Goldmann calibration.

Although the response rate to our survey was rather low at 45.6% nonetheless we have demonstrated that from over 400 responders, about 20% did not know who was responsible for Goldmann calibration and up to 40% stated calibration was not routinely checked.

Furthermore 58% of the consultants felt that Goldmann tonometer calibration checks should be done more often with more involvement of other health care professionals.

We recommend that a responsible individual(s) to be designated to ensure the accuracy of Goldmann tonometer in clinics. The frequency of Goldmann calibration checks should be adhered to as closely as possible to manufactures recommended guidelines depending on the local resources.

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Appendix 1

Intraocular pressure measurement and calibration national survey

Thank you for sparing the time to participate in this questionnaire.

All entries are anonymous.

We would encourage you to answer as honestly as possible (you can choose more than two options where appropriate).

Question 1	Who usually measures the intraocular pressure and what method(s) are employed?			
	Goldmann	Tonopen	Trans Tarsal	Non Contact
Consultant				
Registrar				
Senior House Officer				
Other e.g. Staff Grade				
Nurse				
Health Care Assistant				

Question 2	How often is the calibration checked on your Goldmann tonometer?
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- ☐ Before every clinic
- ☐ Every day
- ☐ Once a week
- ☐ Once a month
- ☐ Once a year
- ☐ Not routinely
- ☐ Other:.....

Question 3 **Who checks the calibration?**

- ☐ Servicing Engineer
- ☐ Orthoptist
- ☐ Nurse
- ☐ Senior House Officer
- ☐ Registrar/Staff Grade
- ☐ Consultant
- ☐ Other:.....

Question 4 **What are your opinions regarding how often the Goldmann calibration should be checked?**

- ☐ Only after an abnormal result
- ☐ Before every clinic
- ☐ Daily
- ☐ At least once a week
- ☐ At least once every 3 months
- ☐ At least once every 6 months
- ☐ At least annually.
- ☐ Other:.....

Question 5 **Who should check the Goldmann calibration?**

- ☐ Servicing Engineer
- ☐ Health Care Assistant
- ☐ Nurse
- ☐ Orthoptist
- ☐ The attending doctor
- ☐ Other:.....

Thank you for your time and patience!!

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Sir,
Circumferential epithelial defect at flap margins in patient with adenoviral conjunctivitis and previous LASIK

Laser *in situ* keratomileusis (LASIK) is an increasingly popular procedure for the treatment of myopia, astigmatism, and hyperopia. With time, the corneal flap created will adhere to the posterior stromal bed but the interface and flap remain at risk of complications, including diffuse lamellar keratitis (DLK) and traumatic dislocation, for many years following the procedure.^{1–3} We describe a patient who presented with viral conjunctivitis and a large epithelial defect at the flap margins 2 years following uncomplicated LASIK.

Case report

A 34-year-old man presented with a 1 week history of redness and watering of both eyes, associated with discomfort and blurred vision. The symptoms had initially started in the right eye and then spread to the left within days. He had undergone uncomplicated LASIK