Pressures of everyday life

Bill Harvey tries out a novel way of measuring intraocular pressure over a period of time on *Optician* editor Chris Bennett

How many times have you measured an average IOP of 20mmHg at the end of a busy clinic day and assumed this was within a normal range?

Strictly speaking we are all fully aware that one single tonometry reading (or averaged reading if using a non-contact technique) is not adequate. Intraocular pressure is known to vary throughout the day and variation outside that expected may indicate a tendency towards disease. Normal daily variation is typically 5mmHg, at a peak some time around waking in the morning and a low point in the late afternoon/early evening (Figure 1). It is thought that variation greater than 5mmHg may indicate ocular hypertension or glaucoma and diurnal variation of greater than 10mmHg is considered pathological.

It is standard practice to record the time of day next to an IOP reading to help put the measurement in context. Furthermore, it may be seen that the patient with 20mmHg IOP at the end of the day may spend significant time during the day above the 'NICE cut-off' point of 21mmHg. Such patients should be assessed at least one more time, including at the start of the day's clinic. In practice is this always done?

Continuous monitoring of IOP over 24 hours or longer is known as phasing, and until recently has required hospital attendance. However, a new instrument has recently been launched (and is currently under trial) aimed at allowing a patient to self monitor their IOP over any given period.

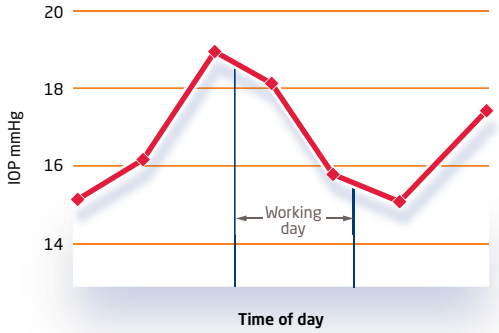

Figure 1 Intraocular pressure varies throughout the day

Figure 2 Two guides above and below the orbit help position the instrument correctly

The iCare ONE tonometer is a variation on the familiar iCare rebound tonometer familiar to many readers, especially those undertaking domiciliary testing. Rebound tonometry is interesting as it relies on the measurement of a probe being bounced off the unanaesthetised cornea at a rate found to be proportional to the intraocular pressure. Despite some initial misgivings, studies have repeatedly found rebound tonometry to compare favourably with contact and non-contact techniques (see, for example, *Optician* 16.01.09).

iCare ONE

The iCare ONE is a hand-held unit into which a probe is inserted and then held in front of one's own eye (Figure 2). Two guides above and below the orbit help position the instrument at the correct distance. Pressing the button fires the probe and, as with the normal iCare, there is little to let you know of any corneal contact. Errors in alignment or distance are signalled by a red LED light, while acceptable readings are signalled by a yellow light (and a leeway of 3mmHg between readings is allowed before outliers are marked). Repeated readings are

taken until a longer beep lets the user know that the process is finished. This can be done for each eye as many times as needed as the unit stores the data internally. A rubber eye cup is included to help position the instrument, but I found this was cumbersome and none of the trial patients used it.

Once the trial is over, a simple USB link allows the data to be downloaded to the software. The iCare link software is a free download from the iCare website and allows input of data from the iCare ONE and also the new iCare Pro unit (to be reviewed in a future issue).

Editorial input

The unit itself gives reasonable repeatability and I found it easy to use. Instructing patients in practice and giving them ample opportunity to practise before being sent away with the unit is essential.

All patients benefit from being told to maintain a good distance fixation point and to keep both eyes open at all times. It is also helpful to pre-set the adjustable supports yourself to set the unit at the appropriate eye-to-instrument distance for each individual patient.

I decided to let *Optician* editor Chris Bennett loose with the instrument over a weekend to see what results we could get. Figure 3 shows the results for a two-day phasing trial.

The variation is normal but out of synch with the expected diurnal pattern. Inter-eye difference is not significant but there is some fluctuation of results indicating error perhaps more than IOP variation. However, some concerns were raised over use of the unit.

As Bennett himself states: 'Having been shown how to use the instrument, it all seemed pretty straightforward so the initial tutorial is essential. Once home, the first thing I tried was getting one of the disposable heads out of its carrier. I had to give up on the first one as I couldn't separate the two halves [of the sterile sleeve]; subsequent ones were easier but not simple. That could be an issue for anyone with dexterity or visual problems as could inserting the probe into the unit.

'Once primed, the next issue was lining the machine up to take readings. I found it was too far away from my eye so I adjusted it. That might also be best carried out in the tutorial as I was worried I may have made it too close.

'Lining the unit up for a successful reading was a problem to start with and it did take a few goes to get consistent, successful readings. Once I had the hang of it, it was very straightforward. However, there is some discomfort when you have lots of goes to get it right.'

Step forward

As an attempt to introduce a means of phasing without the need for hospital admission or expensive monitoring, I think the iCare ONE is a useful step forward. It really comes into its own with well-trained and motivated patients with good dexterity. I have some concerns, however, over the more frail and elderly being able to use the instrument without getting frustrated.

● Further information available from Mainline Optical on 01377 257752

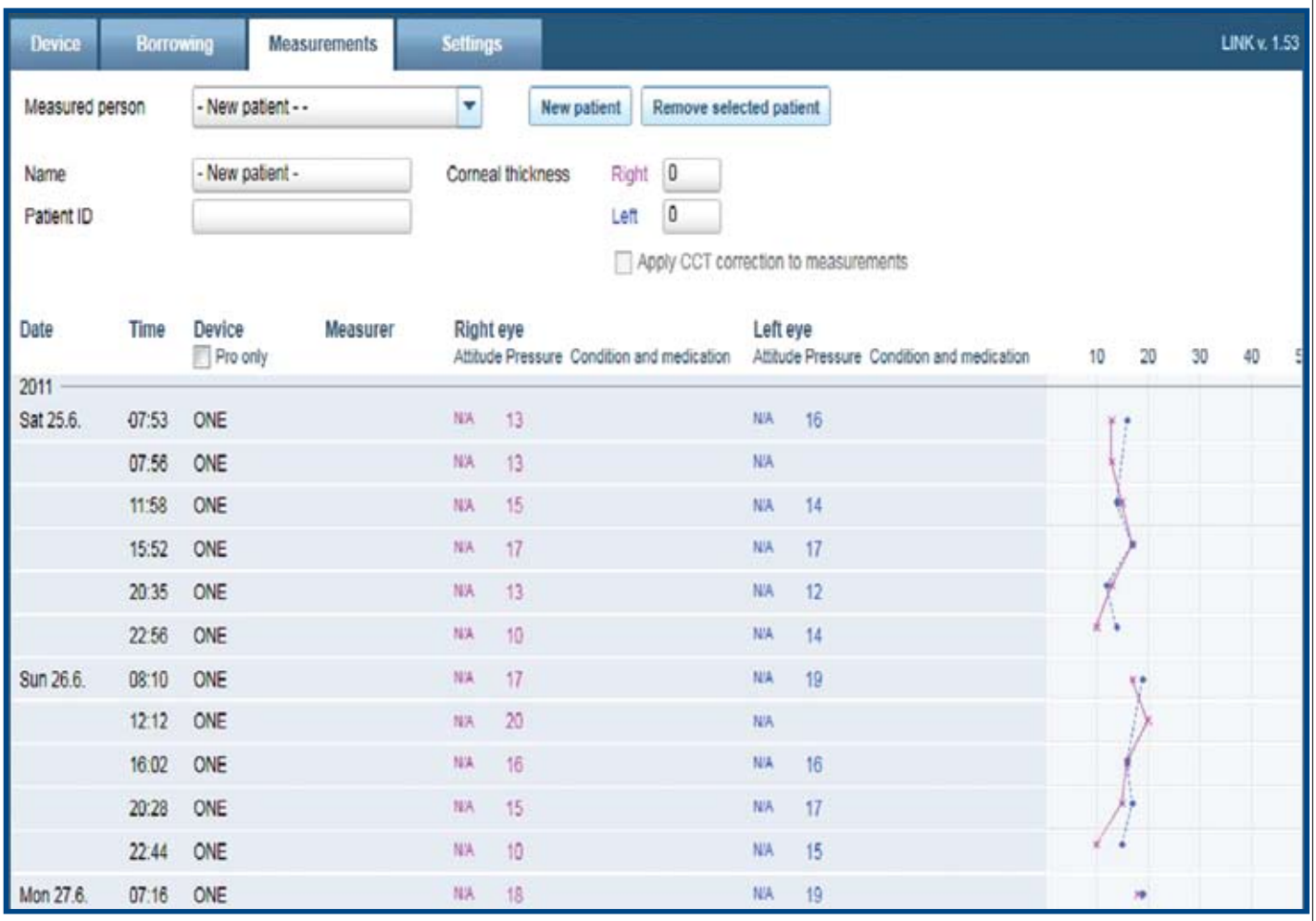

Figure 3 Results for a two-day phasing trial