Effect of Sterilization Methods on the Reliability of the ICare Rebound Tonometer

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Abstract

Purpose. To determine if cleansing and reuse of probes affected the reliability of the ICare tonometer.

Methods. ICare tonometry was performed with sterilization performed via alcohol swabs between patients.

Results. No statistically significance change was found when cleaning the probe.

Conclusion. The statistical tests obtained from the data do not show a statistical difference between the three groups and in fact show great reliability between the groups.

ICare Accuracy Readouts	
P (*blinking*)	The standard deviation of the recorded measurements is greater than normal
P- (*line down*)	The standard deviation of the recorded measurements has a slightly greater value than normal, but the effect on the result is unlikely to be relevant. New measurement not needed.
P- (*line middle*)	The standard deviation of the different measurements is significantly greater than normal, but the effect on the result is most likely irrelevant. New measurement if IOP is over 19 mmHg.
P- (*line bottom*)	The standard deviation of the recorded measurements is great, and the effect on the result is relevant. New measurement is recommended.

Fig 1 Icare Accuracy Readouts

Introduction

A multitude of alternative devices are available that can IOP; an one of the most popular and widely used is the ICare rebound tonometer. It is a relatively easy to use handheld device that measures intraocular pressure. The ICare system operates on the rebound tonometry concept, in which a projectile, known as a probe, is accelerated at the cornea with a known force. Once in contact with the cornea the probe rebounds from the cornea back into the machine, which calculates the intraocular pressure by the force with which the probe rebounds.

A drawback to the device is the cost to replace the rebound probe after each use. This study determined whether the probe could be cleansed and reused without sacrificing accuracy.

Methods

Icare tonometry was performed on subjects with the rebound probe being wiped with an alcohol swab 25 times after the first measurement, and another 25 times after the second measurement, and then a final measurement.

The data was compiled and then analyzed; looking for trends in the results.

Group	Means	Standard deviation	Sample Size
Initial measurement	15.71	1.02	50
After 25 alcohol swabs	15.96	0.94	50
After 50 alcohol swabs	15.95	0.94	50

Fig 2 Raw Data

Results

The Cronbach's Alpha was 0.967, this value indicates a high degree of consistency between the means of the initial measurements, the measurements obtained after 25 disinfections, and the measurements obtained after 50 disinfections.[1] This means the the three groups of measurements were consistent with one another.

The mean and standard deviation of the nine measurements obtained on each subject were calculated. A two-tailed T-test performed on the data revealed that no statistically significant change in IOP measurements occurred after disinfection with the alcohol swab.

Group Comparisons	p value	95% confidence interval
Initial measurement vs. after 25 alcohol swabs	0.2055	-0.6393 to 0.1393
Initial measurement vs. after 50 alcohol swabs	0.2241	-0.6293 to 0.1493

Fig 3 Results

Discussion

From a cost efficiency standpoint this study shows that the ICare tonometer probes can be disinfected with alcohol and reused on multiple patients without affecting the reliability of the measurement which could reduce practitioners cost.

In previous studies, the risk of infection due to reused probes was determined and found to be very minimal.[2] Disinfection should be used between patients, and according to this study need not be feared to affect IOP measurements.

References

1. Tavakol M and Dennick R. Making sense of Cronbach's Alpha. Int J Med Educ 2011;2:53–55.

2. Briesen S, Schwering MS, et al. Minimal cross-infection risk through ICare rebound tonometer probes: a useful tool for IOP-screenings in developing countries. Eye 2009;24:1279–83.