

◆ 원 저 ◆

의료용 임상 모니터의 휘도 균일성 측정 방법 분석

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Brightness uniformity measurement analysis of the medical clinical monitoring

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Abstract

병원에서 사용되는 임상용 모니터의 관리는 중요하다. 모니터의 기본적 관리는 휘도이며, 휘도에서도 균일도가 가장 먼저 관리되는 대상이다. 특히 LCD 모니터인 경우 균일도에 문제가 모니터의 교체주기와 일치하는 경우가 많다.

휘도에 대한 평가는 여러 가지가 존재하지만, 본 연구에서는 AAPM TG18에 따라 TG18-UNL10, TG18-UNL80을 이용하여 휘도의 균일도를 조사하였다. 이 조사과정에서 측정값 중 가장 높은 수치를 기준으로 나머지 값의 편차를 구하는 방법과 평균값을 이용하여 측정값의 편차를 구하는 방법 두 가지를 사용하였으며, 두 가지 방법의 유의성을 알아보고자 휘도의 편차 변화량 즉, 균일도를 측정하였다. 휘도 균일도의 정량평가는 향후 모니터의 관리에 가장 큰 영향을 미치는 인자로서 측정기간 중 변화량은 매우 적게 나타났다. 따라서 본 연구에서 제시된 최대, 최소값의 편차나 평균값의 상대 편차값 모두 유의한 결과를 얻을 수 있었다.

Key works : Brightness, Brightness uniformity, AAPM, TG18-UNL10, TG18-UNL80

I. INTRODUCTION

Recent, Hospital of the clinical monitor used in LCD (Liquid Crystal Display) monitor the account for the most part¹⁾. Problems with the uniformity of the brightness of the LCD. Means that the brightness uniformity of the light source with the same luminance value. Brightness is a measure of light intensity radiated from the display monitor. In other words, the intensity of light as a visual stimulus given to humans to feel and brightness corresponds reasonably, the light-emitting surface, says the brightness of the subject and lighting. It defines this as a luminance(cd/m²) on one side.

In the monitor reading which is used in the clinical brightness it is most important. In fact, LCD monitors, the brightness is not uniform. Therefore, the difference between the brightness value and the luminance value of the center corner of the monitor exists. Therefore, the medical monitor must maintain a uniform brightness throughout the image quality technology.^{2),3)} These technical problems than for the management of the clinical monitoring checks the uniform brightness. It is used by management as index of the monitor brightness.

In this study, we present a method for observing the uniformity of brightness by irradiating the shift amount of the luminance and the brightness of a year and to verify the observation method.

II. MATERIAL AND METHOD

The monitor used in this test were enrolled the Barco Coronis 5MP (MFGD-5421) 2011 Year of the product. The total monitor 2, the measurement period is measured for a total of 24 times 2nd times from June 2014 to May 2015 1 year was measured uniformity of the brightness. Luminance meter was used for Minolta LS-100. AAPM

TG18-UNL10, TG18-UNL80 displays two patterns were measured in full-screen by the center and four corners, the brightness of a total of 5 places⁴⁾.

Based on the maximum value of the brightness obtained for the relative deviation of the measured value to find out how the amount of change and obtaining an average value of the 5 locations to obtain a variation in the brightness value of the luminance, by two and to obtain the uniformity of the brightness⁵⁾.

Formula to obtain the maximum brightness difference $200 \times (L_{max} - L_{min}) / (L_{max} + L_{min})$, and $(L_{max} - L_{avg}) * (1 / L_{avg}) * 100 - (L_{min} - L_{avg}) * (1 / L_{avg}) * 100 = (L_{max} - L_{min}) * (1 / L_{avg}) * 100$ to obtain an expression using the average value (Avg). Figure 1. AAPM TG18-UNL 10 was used in this experiment, TG18-UNL80 a pattern.



fig 1. AAPM TG18-UNL10, TG18-UNL80 Pattern

III. RESULT

Clinical luminance uniformity of the LCD monitor is up, how to obtain the maximum brightness value by using a minimum value and comparing the method of obtaining the deviation from the average value of the luminance variation that is, it exhibited a uniformity. Were investigated for the brightness difference measuring monitor 5 parts, the amount of change in brightness was not a big difference. However, Uniformity Survey method using the average point

is easy to analyze the figures is explained by a little smaller range. Figure 2 is a graph showing the measured value and the brightness variation.

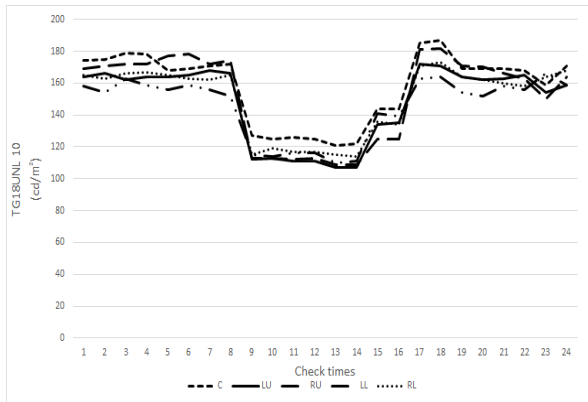


fig 2. Changes in AAPM TG18-ULN10 Pattern

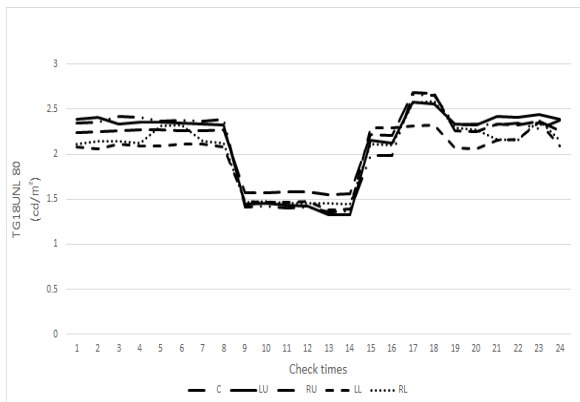


fig 3. Changes in AAPM TG18-ULN80 Pattern

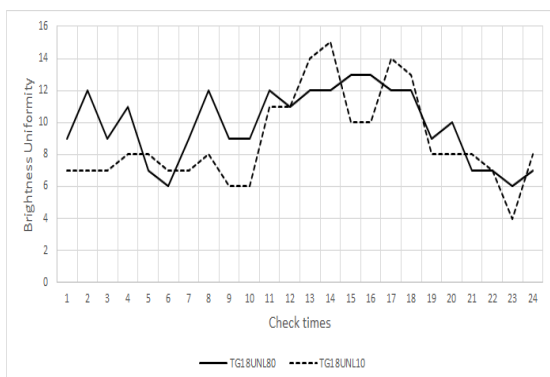


fig 4. Change in the brightness uniformity

IV. CONCLUSION

Brightness uniformity of the clinical measurement is monitored to obtain a variation in the remaining values, based on the measured value and the highest brightness obtaining the deviation of the measured value by using the average value by using the two were evaluated for uniformity of brightness.

Management monitors brightness of the clinical and the direct relationship between life and of the monitor, it is very important in management.

Brightness uniformity using quantitative evaluation was AAPM TG18-UNL 10, TG18-UNL 80, respectively to measure the value of the black brightness and the white brightness was expressed uniformity. Quantitative evaluation of the brightness uniformity is very sensitive to changes in value as the factor has the greatest effect on the control of the next monitor. Thus was obtained a significant result, all the deviation values of relative deviation and the average value presented in this study.

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