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USO DE IMÁGENES TÉRMICAS POR PROFESIONALES DE ENFERMERÍA: UNA HERRAMIENTA VALIOSA

USE OF THERMAL IMAGES BY NURSING PROFESSIONALS: A VALUABLE TOOL

USO DE IMAGENS TÉRMICAS POR PROFISSIONAIS DE ENFERMAGEM: UMA FERRAMENTA DE VALOR

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Resumen

El objetivo de este texto fue describir las posibilidades del uso de imágenes térmicas en la práctica de enfermería. Las imágenes térmicas se obtienen utilizando cámaras infrarrojas que capturanlaradiación emitida por lapiel. Las imágenes térmicas se pueden usar para identificar personas con alta temperatura (fiebre), la prevención del desarrollo de una úlcera por presión (PU) en individuos hospitalizados, el monitoreo clínico de pacientes postoperatorios para trombosis venosa profunda, el monitoreo de la temperatura de lapiel de la cicatriz quirúrgica para evitar la necrosis y buscar signos y síntomas de flebitis e infiltración. En este sentido,este autor recomienda el uso de imágenes térmicas por profesionale de enfermería que trabajan en el campo de la salud pública u hospitalaria. La adquisición de este tipo de equipos para su uso en servicios de enfermería es bastante factible, ya sea en unidades de cuidados intensivos, unidades de cuidados intermedios o incluso en unidades de hospitalización postoperatorias.

Palabras clave: enfermeras practicantes, termografía, diagnóstico por imágenes

Abstract

The aim of this text was to describe the possibilities of thermal image usage in nursing practice. Thermal images are obtained using infrared cameras that capture the radiation emitted by the skin. Thermal images can be used to identify people with high temperature (fever), to prevention of developing a pressure ulcer (PU) in hospitalized individuals, to the clinical monitoring of postoperative patients for deep vein thrombosis, to monitoring the skin temperature of the surgical scar to avoid necrosis and to search for signs and symptoms of phlebitis and infiltration. In this sense, this author recommends the use of thermal images by nursing professionals who work in the field of public or hospital health. The acquisition of this kind of equipment for use in nursing services is quite feasible, whether in intensive care units, intermediate care units or even in postoperative inpatient units.
Keywords: Nurse Practitioners, Thermography, Diagnostic Imaging

Resumo

O objetivo deste texto foi descrever as possibilidades de utilização da imagem térmica na prática de enfermagem. As imagens térmicas são obtidas por meio de câmeras infravermelhas que captam a radiação emitida pela pele. As imagens térmicas podem ser utilizadas para identificar pessoas com temperatura elevada (febre), para prevenção do desenvolvimento de úlcera por pressão (UP) em indivíduos hospitalizados, para acompanhamento clínico de pacientes em pós-operatório de trombose venosa profunda, para monitoramento da temperatura cutânea da cicatriz cirúrgica para evitar necrose e para procurar sinais e sintomas de flebite e infiltração. Nesse sentido, este autor recomenda a utilização de imagens térmicas por profissionais de enfermagem que atuam na área de saúde pública ou hospitalar. A aquisição desse tipo de equipamento para uso em serviços de enfermagem é bastante viável, seja em unidades de terapia intensiva, cuidados intermediários unidades ou mesmo em unidades de internação pós-operatória.

Palavras-chave: Enfermeiros, Termografia, Diagnóstico por Imagem

Use of Thermal Images by Nursing professionals: a valuable tool

Physical examination is a routine procedure for healthcare professionals. The nurse performs the physical examination daily, often more than once a day. Several technologies have been added to the nurse's daily routine, bringing more speed, safety, and precision in the evaluations performed by this professional(1).

Medical images analysis provides useful information for the diagnosis and monitoring of several diseases. The thermal image is one kind of image that has been used in medical environment with great results(2).

In 2020, the world witnessed the spread of Corona Virus Disease 2019 (COVID-19), forcing the World Health Organization (WHO) to recognize it as a pandemic. In this worldwide effort to curb the transmission of this microorganism, several countries (Brazil, China, USA, among others) have used thermal image monitoring in areas with a high circulation of people, such as airports, ports, and bus stations. This procedure aimed to identify people with high temperature (fever), which is known as one of the main symptoms of COVID-19 infection(3).This usage of thermal images is a good example of how this tool can be used to support protocols of interest to public health.

Although recurrently using of thermal images in some areas of medical science, few studies have been found on the application of it to the nursing field. In this sense, the aim of this text was to describe the possibilities of thermal image usage in the nursing practice.

Under physiological conditions, the human body has the ability to maintain its internal temperature constant and symmetrical between the body dimensions, through automatic adjustment of production and heat loss. Thus, the use of thermography in the field of medicine has been growing, with studies on various diseases in which the skin temperature may reflect some abnormality, with inflammation or disturbances in the blood circulation(2). Thermal images can assist in the diagnosis and monitoring of various health situations, such as breast cancer, muscle injuries (4), bone injuries(5), neurological problems(6), chronic pain(7), obesity (8) and diabetic foot(9), among others.

Signs of inflammation are generally subtle and may not be easily identified by healthcare professionals. The human sensitivity to detect temperature variation by touch is around 2.0°C. With the use of thermal images, it is possible to observe large body areas with high precision of skin temperature values when compared to the evaluation by hand contact(10). It is known that a local increase in temperature is usually associated with inflammatory processes. On the other hand, in conditions where blood perfusion is reduced (ischemia), the skin temperature may decrease, especially in the extremities, like showed in Figure 1a (feet) and Figure 1b (hands).

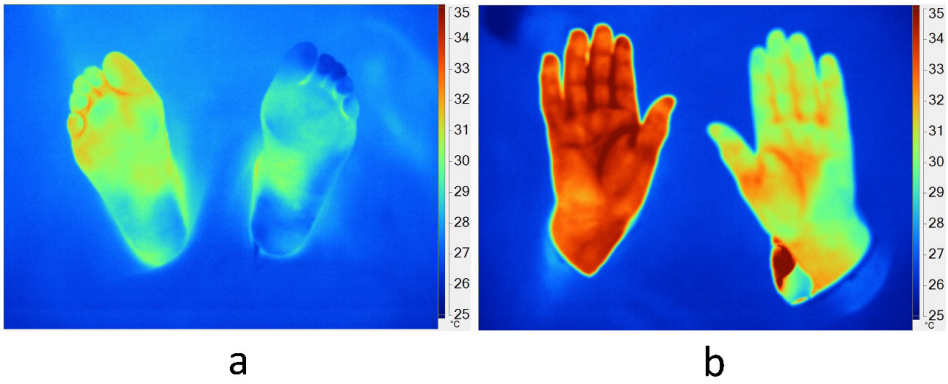

Figure 1. (a) Feet with a diabetic patient with an important thermal asymmetry, and (b) Hands an important thermal asymmetry.

Thermal images are obtained using infrared cameras that capture the radiation emitted by the skin. The advantages of using this tool are: low cost, noncontact, do not emit ionizing radiation, and are portable(2).

Some authors investigated the values of skin temperature in different body areas of hospitalized individuals without the risk of developing a pressure ulcer (PU), in the surgical unit. They established skin temperature mean values according to body regions to be used as a reference for hospitalized patients, in order to use this information as a clinical parameter to monitoring the developing a pressure ulcer. The increase in skin temperature in 1–2 °C lead to an increase of 3.12 points in Odds Ratio (OR) for UP, in adult intensive care patients(11).

Another application for thermal images by nursing professionals is the clinical monitoring of postoperative patients for Deep Vein Thrombosis. Considering that one of the symptoms of deep vein thrombosis is the increase in the temperature of the site distal to the thrombus, a thermal image easily allows the comparison of the skin temperature of the body regions normally affected by this problem and the contralateral comparison, identifying the magnitude of the thermal asymmetry and its clinical importance(12). Even in patients in the postoperative period, monitoring the skin temperature of the surgical scar can help to prospectively determine whether an area of the skin will evolve into necrosis. Regardless of the skin temperature, negative capillary replacement is significantly asso-

ciated with skin necrosis. Patients with lower temperatures at the scar boundaries compared to the adjacent skin may experience skin necrosis within 7 to 14 days(13).

Nursing professionals routinely assess the peripheral venous catheters (PVCs) site for signs and symptoms of phlebitis and infiltration. PVCs are the most frequently used devices in hospitalized patients and the thermal image is useful for detecting PVC site complications(14).

Based on the evidence presented previously, this author recommends the use of thermal images by nursing professionals who work in the field of public or hospital health, with direct application in the identification of people with high temperature (fever), prevention of developing a pressure ulcer (PU) in hospitalized individuals, in the clinical monitoring of postoperative patients for deep vein thrombosis, in the monitoring the skin temperature of the surgical scar, and to search for signs and symptoms of phlebitis and infiltration.

Regarding the cost of infrared cameras, there are currently low-cost cameras with a thermal resolution that allows their clinical use. These cameras can be found on the market with prices ranging from $ 300 to $ 600. In this sense, the acquisition of this kind of equipment for use in nursing services is quite feasible, whether in intensive care units, intermediate care units or even in postoperative inpatient units.

Finally, there is the message that it is necessary for nurses to take ownership of existing technologies, like the capture of thermal images, and more, it is necessary for nurses to be ahead and participate in the process of developing their own technologies to improve care to patients.

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