Interest of including trauma photography in the picture archiving and communication system of a teaching hospital

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Abstract

Digital imaging is a daily practice in traumatology. Such photographs should remain confidential. However, there is a need for objectivity concerning the circumstances and clinical follow-up for trauma patients. This paper describes how to conserve these photographs within the picture archiving and communication system (PACS) safely as regards identity and confidentiality. A computer converts the photographs into DICOM files. The DICOM image is associated to a reconciliation layer, validated by the physician in charge, and then included in the hospital PACS. This improves transmission from one medical team to another, both initially and after the accident if an expert medical opinion is required. The literature has demonstrated the value of photographs in modern medicine, but the technical and legal challenges are many. They enhance the computerized medical records. Identification, confidentiality and integration in the PACS are obstacles that we have now overcome.

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1. Introduction

Digital imaging is part of the everyday diagnostic toolbox in traumatology. Our daily teamwork with the medicalized ambulance service (service d'aide médicale urgent [SAMU]), A&E, ICU and theater can no longer consist in sharing only X-rays: soft-tissue lesions are critical to multiple trauma management [1–3]. The ease of taking photographs in the age of the smartphone extends the scope of multidisciplinary team meetings, where photographs tracking lesion evolution improve decision-making [4,5]. Such photographs have been deemed confidential, and never shared among the medical community. Our computerized medical files did not include this evidence, for technical, ethical and organizational reasons. Such objective information concerning the circumstances of the accident, intra-operative findings and clinical evolution, however, is needed.

The present study sought to describe a procedure for including photographs taken by the various agents involved in traumatology in a teaching hospital's picture archiving and communication system (PACS), reliably, reproducibly and confidentially.

2. Technical description

Photographs taken by a physician are transmitted by secure email to a coordinator (IT officer, a full-time orthopedics consultant). Taken on the scene of the accident, they testify to the violence of the trauma (Fig. 1). IC physicians and traumatologists use the photographs to guide treatment (Fig. 2). The infectologist follows up lesion progression in the acute or chronic phase (Fig. 3). The forensic physician who has been called in also contributes to the photographic record describing the circumstance of the accident (Fig. 4).

A computer with dedicated software transforms the digital photographs into a DICOM file. The coordinator validates the images to be conserved (in real time, within three minutes) and an orthopedic medical secretary crops the image to ensure anonymity and finalizes the inclusion of the image (<500 Ko) in the PACS; this is time-consuming (15 minutes per patient) in the short-term. An image access number is created within the PACS then linked to the “permanent patient ID” (identifiant patient permanent [IPP]) and current “patient episode”. A “reconciliation layer”, associating photograph and ID, is mandatory, under the charge of the physician, and the author of the photograph and any comments (orientation or exact time) can be noted on an input mask. The image is then accessible within the hospital’s information system (système d’information hospitalier [SIH]), in the right file for the right patient.
Photographs are stored indefinitely, like radiographs. No identification error has been found in two years, for more than 300 files, but would require renewed manual reconciliation should it occur.

Our registration with the French data protection commission (Commission nationale de l'informatique et des libertés [CNIL]; n° 178, modified) specifies that photographs may be taken at the accident scene or on arrival at the hospital.

Inclusion of anonymous images in the hospital network has to be rigorously conducted, as the patient’s identity is fundamental, as is medical confidentiality. The involvement of the hospital’s IT department is indispensable to constructing a reliable and sustainable protocol.

The medical team present at the scene of an accident is never the same team that will manage the patient in ICU or theater, and transmission, even when in writing, may be inadequate. The literature shows that photographs improve communication between physicians [4–6]. Data-bases already exist, in Nice (France), in dermatology and plastic surgery, but they are strictly confidential and hermetically sealed. It would be preferable to be able to share relevant photographs, to better understand the circumstances of the accident and the treatment options.
In France, dermatologists [7] monitor melanomas on dermatoscopy (600 files) and hand surgeons file photographs taken during rehabilitation (7046 patients) [8]. We were not able to find examples of image sharing between specialties in hospital traumatology.

In the international literature, benefit has been demonstrated with respect to wounds and dermatology for photography [9–11] and for the severity scores used in soft tissue assessment [1–3]. The complexity of our procedure is due to the IT system, which accommodates more than 300 secure software packages. The hospital’s IT and legal departments constructed a simple, secure and fully self-contained procedure based on a single computer without open access, one secretary and a surgeon. The procedure is time-consuming (1–2 hours per week) and not automated, medical validation being manually confirmed. Three to five relevant photographs are processed per week. The initial one is the most interesting, but subsequent images will be conserved if they impact treatment. The objective is to enhance patient records without unduly diluting them or overloading the PACS. There are no extra costs, as the imaging department already produces several thousands of images per day to be stored in the PACS, making our contribution insignificant.

From the legal point of view, the images are confidential. Appeal-Court judge Krajcman’s 2012 ruling [12] made a distinction between photographs taken for therapeutic reasons, which are not allowed to be shared, and the data protection legislation, which includes a right of access to images under article 9 of the French Civil Code and article L.1110-4 of the Public Health Code.

The photographs in question here are assimilated to items of medical records as defined by article R.1112-2 of the Public Health Code: individual consent is not required as the context is one of saving lives (article 7.2 of Law no 78–17), although supplying some information to the patient can avoid subsequent legal proceedings.

The psychological impact for the patient is unaffected by digitization, as trauma photographs have already been printed out for inclusion in the patient’s “paper file” since 2007.

In conclusion, including photographs in the computerized medical file can intuitively be expected to improve understanding in multiple trauma care. The hospital promoted the technical development of the project, being easily persuaded by the ratio between therapeutic benefit and negligible cost. It also enables both patient and institution to defend themselves if an expert medical opinion is required, as is almost systematic in traumatology, where initial injury and sequelae are often judged several years after the accident.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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