



Digital Radiography Reject Analysis in Dutch Hospitals

Preliminary Results

Harmen Bijwaard^{1,2} [harmen.bijwaard@rivm.nl], Ischa de Waard – Schalkx¹, Sandra Noij²,

¹ National Institute for Public Health and the Environment (RIVM)

² Inholland University of Applied Sciences (InhU)

Introduction

In the past decades Dutch radiology departments have shifted from conventional to digital radiography. In digital imaging, it is easier to remake an image and delete the previous one(s). From a radiation protection perspective every additional image carries a radiation risk for the patient and should be avoided when possible.

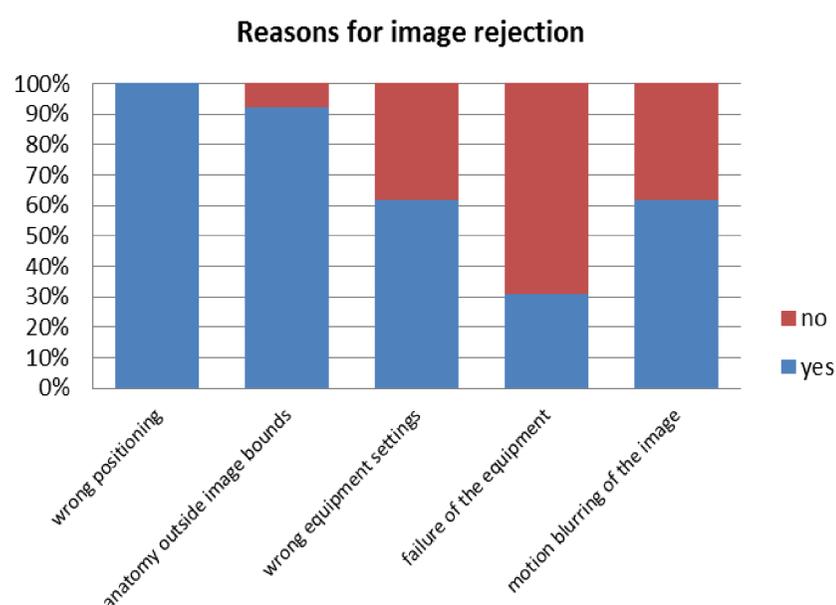
In the time of conventional imaging, films that could not be used for diagnostic purposes (and were rejected) were collected. The rejected films were analyzed and recommendations for improvements in imaging were made to avoid the same mistakes in the future. A similar analysis of digital images can be complex but several software tools have become available for this purpose. The Dutch Healthcare Inspectorate asked the National Institute for Public Health and the Environment (RIVM) to investigate the current state of reject analyses in digital imaging. RIVM conducted this study in collaboration with Inholland University of Applied Sciences.

Methods

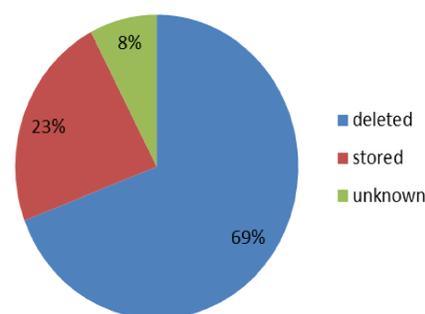
To investigate the current state of the art a literature study was conducted and a questionnaire was set up. Questions included the frequency of reject analyses, the procedures and the software tools used, the amount of rejected images and the registration of these. The questionnaire was used for guidance during interviews with quality managers at radiology departments in 13 Dutch hospitals. These 13 hospitals constitute a small indicative sample of the approximately 80 hospital conglomerates present in the Netherlands.

Results

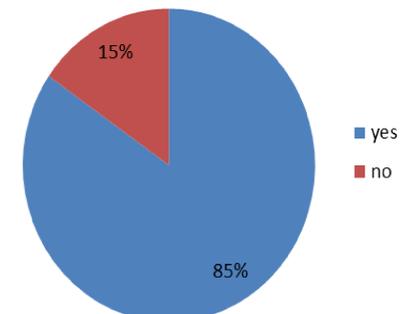
Participating hospitals report that on average 0.7 % of all images is rejected. In most cases this concerns bulky imaging for which poor positioning is often the reason for rejection. In 70% of the hospitals the rejected images are not stored. In 85% of the hospitals a sample of the rejected images is analyzed, but only four hospitals (30%) perform an analysis of all rejected images. Most hospitals (77%) are aware of sophisticated software for reject analysis, but for financial reasons only 8% use it.



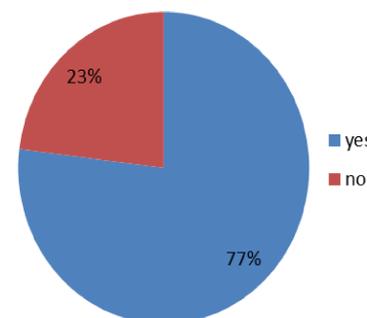
Destiny of rejected images



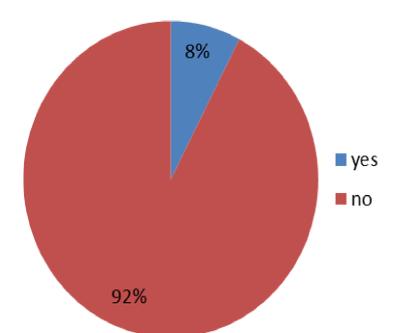
Evaluation of rejected images



Awareness of reject analysis software



Use of reject analysis software



Discussion

The reported reject rate of 0.7% is low compared to other studies. For example, Foos et al. (2009) report 4-5%, Hoffman et al. (2015) 11%, Jones et al. (2011) 8-10 %, Lau et al. (2004) 1-2%, and Lin et al. (2016) 5%. However, in this study the reject rate is self-reported and participation of hospitals was voluntarily.

Images that were often rejected were bulky images of knees and back of elderly patients for which the positioning is more difficult. Fortunately, this imaging incurs low radiation doses to the patient and radiation risks decrease with age.

Even though many rejected images are deleted and reject analysis software is seldom used, most hospitals do analyze a sample of the rejected images. Furthermore, all hospitals indicate that actions are undertaken to reduce the number of rejected images.

For CT, angiography and fluoroscopy, registration and analysis of rejected images is less common than for standard radiography. For these modalities images are rejected less often, but the doses incurred are relatively high.

Take home message

The 13 interviews with radiology departments throughout the Netherlands constitute a small sample from the approximately 80 hospital conglomerates in the country. These preliminary results indicate that few radiology departments still carry out reject analyses. Software tools that are available for such an analysis of digital images seem to be only used sporadically. For radiation protection purposes it is recommended that radiology departments put more effort in collecting rejected images for educational purposes and to avoid similar mistakes in the future.