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# Perception of radiology reporting efficacy by neurologists in general and university hospitals

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## ARTICLE INFORMATION

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**AIM:** To investigate how neurologists perceive the value of the radiology report and to analyse the relation with the neurologists own expertise in radiology and the level of subspecialisation of radiologists.

**MATERIALS AND METHODS:** A web-based survey was distributed to neurologists. The level of subspecialisation was assessed by the percentage of fellowship-trained radiologists and the percentage of radiologists that were members of the Dutch Society of Neuroradiology.

**RESULTS:** Most neurologists interpret all computed tomography (CT) and magnetic resonance imaging (MRI) studies themselves, and their self-confidence in making correct interpretations is high. Residents gave higher scores than neurologists for “Radiologist report answers the question” ( $p=0.039$ ) and for “Radiologist reports give helpful advice” ( $p=0.001$ ). Neurologists from university hospitals stated more frequently that the report answered their questions than neurologists from general hospitals ( $p=0.008$ ). The general appreciation for radiology reports was higher for neurologists from university hospitals than from general hospitals (8.2 versus 7.2;  $p=0.003$ ). Radiologists at university hospitals have a higher level of subspecialisation than those at general hospitals.

**CONCLUSION:** Subspecialisation of radiologists leads to higher quality of radiology reporting as perceived by neurologists. Because of their expertise in radiology, neurologists are valuable sources of feedback for radiologists. Paying attention to the clinical questions and giving advice tailored to the needs of the referring physicians are opportunities to improve radiology reporting.

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## Introduction

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Efficacy in radiology can be studied at different levels. Traditionally, radiologists focus on making correct diagnoses and trying to optimise the images they use. This

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corresponds to, respectively, level 2 (diagnostic accuracy efficacy) and level 1 (technical efficacy) in the hierarchical model as described by Thornbury *et al.*<sup>1</sup> In the last decade, the focus has shifted to the added value of radiology for the referring physician and for patient outcome. This means that radiologists should pay attention to the higher levels of that model: diagnostic thinking efficacy (level 3), therapeutic efficacy (level 4), and patient outcome efficacy (level 5). The highest level of this model is societal efficacy (level 6). At present, this impact on society is very relevant for radiologists because of limited budgets in healthcare and the trend towards value-based reimbursement instead of volume-based pricing.<sup>2,3</sup> Therefore, quality improvement and cost-effectiveness should be considered together.

The radiology report is the main communication vehicle between radiologists and referring physicians. A high-quality report is essential to be of added value for the patient and society. In order to be useful in decision-making, the content of the report should be tailored to the needs of the clinician.<sup>4</sup> The term ‘actionable reports’ fits here, as it describes a practice in which the report facilitates an action of the referring physician based on the imaging findings.<sup>5,6</sup>

The quality of the reporting practice varies with the experience of the radiologist. In double reading of chest computed tomography (CT) examination reports, subspecialised chest radiologists make more clinically important corrections than other second readers.<sup>7</sup> Lindgren *et al.* advocate reinterpretation of abdominal imaging studies by radiologists with abdominal subspecialty if any potentially important finding is reported or in patients with known or suspected cancer, trauma, and/or infection.<sup>8</sup> Both studies indicate the value of subspecialisation. At the European Congress of Radiology (ECR) in 2015, the topic “General radiologist versus subspecialist radiologist” was discussed. One of the messages from this discussion was that subspecialisation is relevant for improved patient care. The proportion of subspecialty-trained radiologists varies between institutions.<sup>9</sup> In academic and large general hospitals, dedicated teams of, for instance, fellowship-trained neuroradiologists perform all neuroradiology reporting, while in smaller hospitals less or no subspecialisation exists.<sup>10</sup>

The question is whether the perceived value of the radiology reports has a relationship with the degree of subspecialisation of the radiologist and/or with the expertise of the neurologist. The expertise of the neurologist is relevant because communication always depends both on sender and receiver.

To realise improvements in reporting, it is necessary to know how radiology reports are valued by referring physicians, as they know the value of reports for patient care. Feedback from referring physicians is not a common practice, although it may reveal useful information<sup>11</sup> in addition to peer feedback among radiologists themselves.<sup>12</sup>

Assuming that subspecialisation leads to better radiology, the present study was undertaken to assess whether this also leads to a higher perceived value of the radiology report. Even though the assessment of an opinion leads to

subjective results, it is important to assess because physicians base their decisions on patient management to a high degree on their confidence in the radiology report.

The hypotheses in the present study were (1) a higher level of specialisation of radiologists correlates with a higher perceived value of the report by referring neurologists and (2) a higher level of expertise of neurologists correlates with a lower perceived value of the report of radiologists. The purpose of the present study was to compare the value of the radiology report, as perceived by neurologists, between general hospitals and university hospitals, to relate this to the expertise of neurologists with radiology, and to identify items to improve the value of the radiologists report.

## Materials and methods

An anonymous web-based survey with both closed and open questions was developed using Google Forms. The questions were grouped into categories of “Personal information”, “Expertise in radiology”, “Confidence in reading CT and magnetic resonance imaging (MRI) examinations”, and “Opinions about the radiology reports”. The survey is provided in the Electronic Supplementary Material. The survey was part of a broader project concerning the development and implementation of feedback systems to improve radiology services,<sup>13</sup> and an international comparison of neuroradiology expertise and the availability of radiology services.

The neurology departments of two university hospitals and 13 general hospitals in the Netherlands were invited to participate by telephone. The contacts at these hospitals sent an email to all neurologists and residents in neurology in their hospital requesting the completion of the questionnaire. A reminder was sent after 2 weeks. Data collection in the general hospitals was performed in November 2014 and in the university hospitals in December 2014. Data were collected anonymously. Approval of the Medical Research Ethics Committee was not required as this survey does not fall under the scope of the Medical Research Involving Human Subjects Act.

All neurologists in both university and general hospitals were board certified and members of the Dutch Society for Neurology. Training to become a Board-registered neurologist takes 6 years. Eight university hospitals and seven large regional hospitals in the Netherlands are licensed for the full training programme, which includes a 1-year exchange internship between them. One of these seven large regional hospitals belonged to the group of 13 general hospitals in the present study, but no residents of this hospital participated. Therefore, all residents in the present study worked in the two participating university hospitals.

The level of subspecialisation in neuroradiology was determined for both the university hospitals and the general hospitals by the percentage of radiologists with a membership of the Dutch Society for Neuroradiology and the percentage of certified fellowship-trained (a 2-year

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