

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/301601718>

# Results of an Italian survey on teleradiology

Article *in* La radiologia medica · April 2016

DOI: 10.1007/s11547-016-0640-7

CITATION

1

READS

55

8 authors, including:



**Francesca Coppola**

Policlinico S.Orsola-Malpighi

14 PUBLICATIONS 49 CITATIONS

[SEE PROFILE](#)



**Roberto Grassi**

Second University of Naples

343 PUBLICATIONS 3,834 CITATIONS

[SEE PROFILE](#)



**Francesco Lassandro**

AORN Ospedali dei Colli

56 PUBLICATIONS 578 CITATIONS

[SEE PROFILE](#)



**Daniele Regge**

Università degli Studi di Torino

264 PUBLICATIONS 2,966 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



Advancement of knowledge on Interstitial Lung Diseases (ILDs) [View project](#)



Computer Aided Diagnosis for lung cancer [View project](#)

All content following this page was uploaded by [Francesca Coppola](#) on 25 April 2016.

The user has requested enhancement of the downloaded file. All in-text references [underlined in blue](#) are added to the original document and are linked to publications on ResearchGate, letting you access and read them immediately.

## Results of an Italian survey on teleradiology

Francesca Coppola<sup>1</sup> · Corrado Bibbolino<sup>2</sup> · Roberto Grassi<sup>3</sup> · Luisa Pierotti<sup>4</sup> · Roberto Silverio<sup>5</sup> · Francesco Lassandro<sup>6</sup> · Emanuele Neri<sup>7</sup> · Daniele Regge<sup>8</sup>

Received: 7 February 2016 / Accepted: 5 April 2016  
© Italian Society of Medical Radiology 2016

### Abstract

**Objectives** The aim of this study is to present the results of the Italian survey on teleradiology (TR).

**Methods** Two radiologists created an online electronic survey using the Survey Monkey web-based tool. The questionnaire was then improved by suggestions from a multi-disciplinary group of experts. In its final form, the survey consisted of 19 multiple-choice questions. Space was left below each question for participants to add their personal comments. Members of Italian Society of Medical Radiology (SIRM) were given 2 weeks to perform the survey.

**Results** A total of 1599 radiologists, corresponding to 17 % of all SIRM radiologists, participated into the online

survey. As a result, 62 % of participants have a positive opinion on teleradiology, while 80 % including 18 % with a negative opinion believe that teleradiology will have a future. 55 % of responders ( $n = 874$ ) use teleradiology in their clinical practice. The majority of users adopt intramural teleradiology for coverage of emergencies (47 %), of night and weekend shifts (37 %) or to even out distribution workload (33 %). Most responders still show concern on the use of teleradiology. In particular, they think that teleradiology is too impersonal (40 %), and that it is responsible for insufficient communication with the referring clinician (39 %).

**Conclusions** The majority of Italian radiologists are favorable to teleradiology. However, they have concerns that teleradiology may further reduce communication with the referring clinician and patient.

✉ Francesca Coppola  
francesca.coppola@aosp.bo.it

<sup>1</sup> Radiology Unit, Department of Diagnostic Medicine and Prevention, S. Orsola Malpighi Hospital, 15, Albertoni Street, 40138 Bologna, Italy

<sup>2</sup> SNR Foundation, Via Farini 62, 00185 Rome, Italy

<sup>3</sup> Radiology Unit, Department of Medicine and Surgery, Magrassi-Lanzara, Second University of Naples, Naples, Italy

<sup>4</sup> Medical Physics Unit, Sant'Orsola-Malpighi Hospital, Bologna, Italy

<sup>5</sup> User Co-Chair IHE-Italy, Servizio di Radiologia, Misericordia Hospital, Azienda USL Toscana Sud Est, Grosseto, Italy

<sup>6</sup> Monaldi Hospital, Via Leonardo Bianchi, 80131 Naples, Italy

<sup>7</sup> Department of Translational Research, University of Pisa, UO Radiodiagnostica 1-AOUP, Edificio 30A, Via Paradisa 2, 56124 Pisa, Italy

<sup>8</sup> Department of Surgery Science, University of Torino, Candiolo Cancer Institute, Strada Prov. 142, Km 3,95, Candiolo, 10060 Pisa, Italy

**Keywords** Teleradiology · Italian survey · Insourcing · Outsourcing · Picture archiving communication systems

### Introduction

In the recent update of the white paper of the European Society of Radiology *Teleradiology (TR)* is defined as “the exchange of radiological images and patient-related data between geographically different locations for purposes of primary interpretation, expert consultation and/or clinical review by digital transmission” [1]. TR is part of a largest effort of the European Community (EC), with an aim of improving the quality of the health system and of reducing healthcare costs [2]. Implementation of high speed information technology (IT) highways, the availability and low costs of large data storage facilities, and the diffusion of picture, archiving and communication systems (PACS)

is rapidly closing the technological gap and favoring the implementation of TR. However, PACS technology is unevenly distributed in the EC. According to the e-Health Benchmarking III report of the European Commission, PACS availability is highest in Northern Europe (i.e., >95 % of health facilities have one) while it is still scarcely distributed in some Southern EC countries [3].

Shortage of radiologists and geographical concerns (i.e., large distances between healthcare facilities, low population density areas and adverse climatic conditions) are the main drivers of TR demand. In many Northern European countries, TR has become part of the regular workflow for purposes of workload balancing or to provide remote, off-hour radiological coverage, for emergency readings and to a lesser extent for subspecialty readings [4, 5]. In the past decade, several national and international commercial TR providers have emerged in Europe, facilitating the outsourcing of diagnostic readings [4, 6, 7]. On the opposite, in Southern European TR is still in its infancy possibly due to the technological gap, to the larger availability of radiologists in some countries and to the more restrictive legislation and guidelines [8]. However, the market analysts are expecting a growing demand for non-invasive diagnostic imaging that could lead to an increased usage of TR in the coming years [1, 2].

According to a recent European Survey, most radiologists look favorably at TR as it allows improved collaboration between peers, can be used to organize radiologists' workload, thus improving the quality and efficiency of radiological services, especially, those of rural and underserved areas [2, 9]. On the opposite, European radiologists are concerned that TR will inevitably reduce communication with the referring clinician and with the patient. Other important concerns are related to quality control, safety issues and the risk that business oriented TR models might undercut national tariffs [9]. In this context, Italy stands out as the country with the second lowest number of inhabitants per radiologist and with one of the most careful and patient centered TR guidelines [8].

In June 2014, the Italian Society of Medical Radiology (SIRM) promoted an online survey to gain information on the IT infrastructure of healthcare facilities throughout its territory and on the current usage of TR. Italian radiologists were also asked give their opinion and to point out advantages and limitations of TR. The aim of this study is to present the results of the survey.

## Materials and methods

Two radiologists (FC, DR) created an online electronic survey using the Survey Monkey web-based tool [10]. The first draft of the questionnaire was sent to a multidisciplinary

group of experts for review. All proposed changes were discussed and introduced in the draft if consensus between experts was reached. In its final form, the survey consisted of 19 multiple-choice questions ("Appendix"). Space was left below each question where participants could add their personal comments.

The first set of questions was aimed at collecting information on the geographical location, age, institution and working position of radiologists. The second section included questions on the working environment of radiologists, i.e., whether a PACS system was present in their institution, if digital signature was adopted, etc. Radiologists were then asked to answer to a third set of questions, related to their experience with TR only if they were actually participating, in some form, to a TR project. The final set of question was designed to understand more in depth the opinion of the interviewed on TR. Multiple answers were allowed in five questions. All 19 questions are laid out in the "Appendix".

All invited radiologists were members of the Italian Society of Medical Radiology (SIRM). Each radiologist was sent a personal email from the president of the College of Informatics by SIRM with an invitation to participate into the survey, which was accessible through an email link. Each individual could fill the survey form only once. Two reminders were sent, respectively, after 1 week from the survey's opening and on the final day. The survey remained online for approximately 2 weeks, from June 20 until July 7. Survey Monkey statistical tools were used for the analysis of the quantitative data [11].

## Results

### Population characteristics

One thousand five hundred ninety-nine of the 9662 members of the SIRM (17 %) participated into the survey. Thirty-one percent of participants were 56–65 years old; 26 % where 46–56 years old; 22 % where 36–45 years old; 17 % where 25–35 years old. Only 4 % of participating radiologists had more than 65 years. The majority of responders were from the northern Italy (43 %); central and southern Italy followed with a response rate of 30 and 27 %, respectively. Overall, 79 % of responders were employed in a public hospital and 21 % in a private institution. Participants into the survey were either academic or directors of radiology units in 29 % of cases; only 8 % were residents.

### Teleradiology infrastructure

Eighty-nine percent of responders had a PACS available in their working environment; no difference in PACS

**Table 1** Recapitulated requirements that responders considered important for implementation of TR (total number of responders 816, multiple choices allowed)

Statement	Responders that consider the statement important (%)
1. Clinical data and patient's images should be available only to the reporting radiologist	261 (32 %)
2. Patient should be informed at the time of imaging that his images will be reported by a radiologist through a TR service and should give written consent	225 (28 %)
3. Correspondence between images received by the reporting radiologist and patient sensitive data should be verified	316 (39 %)
4. Technical protocols from the site that performs the examinations are periodically verified	160 (20 %)
5. Quality control of transmitted images should be performed, assuring no loss of information occurs with image compression (lossless)	177 (22 %)
6. Clinical request specifying the indications to the exam should always be available	482 (59 %)
7. Patient clinical data and previous imaging studies should always be available for comparison	558 (68 %)

**Table 2** Summarizes the usage of TR in Italy (total number of responders 896, multiple choices allowed)

Statement	Responders (%)
1. TR is used to report examinations performed in the Institution where I work (remote management procedures of intra-company deferrable urgent/emergency)	424 (47 %)
2. For reporting of examinations performed in the facility where I work (remote management procedures intra hospital)	298 (33 %)
3. As part of regular workflow in the institute where I work (outsourcing)	110 (12 %)
4. For a second or expert opinion from a colleague with another sub-specialty	194 (22 %)
5. For a second opinion from a colleague with a different specialty (for example a neurosurgeon)	143 (16 %)
6. For online multidisciplinary meetings	44 (5 %)
7. On a temporary basis (staff shortages, holidays and illness)	60 (7 %)
8. For night and week-end coverage	334 (37 %)
9. For double reading (for example mammography)	63 (7 %)
10. For research or teaching purposes	47 (5 %)
11. Other	79 (9 %)

distribution was observed between private and public practices. Sixty-five percent of participants (65 %) adopted digital signature at the time of the survey. Of the 1551 radiologists that replied to the specific question in the survey, 702 (45 %) did not use TR in their clinical practice. Of the remaining, 737 (48 %) adopted TR in-hospital on dedicated workstations, 137 (9 %) worked from home and 92 (6 %) on mobile devices (note that multiple answers were allowed for this question).

The large majority of users (75 %) sent their report through a direct connection with the radiology information system (RIS). In reverse, patient's clinical information was obtained with a direct connection with RIS in 53 % of cases; by phone in 27 %; by fax in 8 %; through a dedicated platform in 7 %, by e-mail in 4 % and by instantaneous messaging in the remaining 1 %. Table 1 lists the requirements that the responding radiologists consider important for implementation of TR.

### Usage of teleradiology

Usage of TR is summarized in Table 2. Of the 874 responding radiologists (55 %) that used TR in their clinical practice, the majority adopted an *intra-mural solution*—they report examinations from a Radiology Unit located either within the same hospital or in a different hospital but of property of the same institution—for emergency calls (47 %), for night and weekend coverage (37 %) or to even out distribution workload (33 %). Only 12 % of responders adopt an *extra-mural option*, i.e., where the interpreting radiologist is working for another company, not affiliated to the institution that is providing the examinations [1]. Outsourcing is adopted more frequently by private institutions than in public hospitals (28 vs 9 %).

Approximately half of responders working with TR receive requests for a second opinion, mainly for the following reasons: examinations of any kind (24 %),

**Table 3** Summarizes the advantages of teleradiology in the opinion of responders

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion	Total n° of responders
Possibility to discuss cases in a collaborative network	53 (3.6 %)	60 (4 %)	72 (4.8 %)	758 (50.9 %)	503 (33.8 %)	44 (3 %)	1490
Greater efficiency and improved radiological services	146 (9.9 %)	239 (16.2 %)	109 (7.4 %)	587 (39.7 %)	374 (25.3 %)	22 (1.5 %)	1477
Better distribution of the workload throughout the organization	199 (13.7 %)	334 (22.9 %)	206 (14.1 %)	411 (28.2 %)	262 (17.9 %)	44 (3 %)	1456
Improved communication with referring clinicians	1801 (2.4 %)	307 (21.1 %)	156 (10.7 %)	515 (35.4 %)	262 (18 %)	33 (2.3 %)	1453
Profession is now more attractive for young newcomers	216 (15.1 %)	326 (22.8 %)	307 (21.5 %)	317 (22.2 %)	173 (12.1 %)	91 (6.4 %)	1430
It is useful to reduce costs	119 (8.1 %)	447 (30.6 %)	190 (13 %)	358 (24.5 %)	293 (20 %)	53 (3.6 %)	1460
There aren't particular advantages of the use of teleradiology	356 (25.2 %)	619 (43.7 %)	138 (9.7 %)	161 (11.4 %)	102 (7.2 %)	39 (2.8 %)	1415

**Table 4** Shows opinions about disadvantages of teleradiology

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion	Total
Insufficient integration of patient history/previous studies	85 (5.7 %)	418 (28.3 %)	68 (4.6 %)	580 (39.2 %)	305 (20.6 %)	21 (1.4 %)	1477
Insufficient communication with referring clinicians	65 (4.4 %)	394 (26.8 %)	119 (8 %)	578 (39.3 %)	292 (19.8 %)	24 (1.6 %)	1472
Too impersonal, no contact with radiographer and radiologist	67 (4.5 %)	282 (19 %)	157 (10.6 %)	552 (37.2 %)	406 (27.4 %)	18 (1.2 %)	1482
Too impersonal, no contact with patient	61 (4.1 %)	212 (14.1 %)	141 (9.4 %)	610 (40.6 %)	461 (30.7 %)	16 (1.1 %)	1501
Insufficient quality assessment	95 (6.6 %)	452 (31.4 %)	241 (16.8 %)	360 (25 %)	196 (13.6 %)	93 (6.5 %)	1437
Involves complex logistics	88 (6.2 %)	394 (27.9 %)	253 (17.9 %)	412 (29.2 %)	165 (11.7 %)	99 (7 %)	1411
Technology is too unstable/insecure	160 (11.1 %)	537 (37.2 %)	183 (12.7 %)	349 (24.2 %)	145 (10 %)	69 (4.8 %)	1443

neuroradiology consultancies (17 %), evaluation for interventional radiology procedures (13 %), and pediatric radiologist's consultancies (4 %). On the opposite, approximately half of responders send out request for a second opinion for the following reasons: neuroradiology consultancies (30 %); examination of any kind if particularly complex (18 %), evaluation for interventional radiology procedures (8 %) or for pediatric radiology examinations (5 %).

#### Perceived advantages, disadvantages and threats of teleradiology

Sixty-two percent of participants into the survey had a positive opinion on TR while 80 % including 18 % with a negative opinion, are convinced that TR will have a future. Those already using TR have a better opinion of

it (68 %) with respect to radiologists that are not using TR in their clinical practice (53 %). Radiologists working in private practices on average have a higher opinion of TR (72 %) with respect to radiologists working in public institutions (59 %). Academic radiologists and Directors of Radiology Units were generally more positive on TR (70 %) with respect to radiologists working in other positions (60 %). Perceived advantages and disadvantages of TR are summarized in Tables 3 and 4, respectively. Main concerns of participants into the survey relate to fear of losing control over their business (63 % of responders), instability in the job market and in radiologists' income (63 % of responders), reduced quality of reports (47 % of responders), loss of radiological skills (47 %), a negative effect on resident's training (34 %) and slow speed in communicating the results of an urgent examination (33 %) (Table 5).

**Table 5** Summarizes the possible threats and dangers of teleradiology

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	No opinion	Total
Radiologists could lose control of their business	90 (6 %)	371 (24.6 %)	87 (5.8 %)	595 (39.5 %)	339 (22.5 %)	23 (1.5 %)	1505
Instability of jobs and/or income for radiologist	61 (4.1 %)	309 (20.9 %)	121 (8.2 %)	599 (40.6 %)	326 (22 %)	61 (4.1 %)	1477
Loss of quality radiological reports	107 (7.2 %)	520 (34.8 %)	118 (7.9 %)	402 (26.9 %)	312 (20.9 %)	34 (2.3 %)	1493
Danger of missing urgent pathology	165 (11.2 %)	675 (46 %)	110 (7.5 %)	326 (2.2 %)	148 (10 %)	43 (2.9 %)	1467
Negative effect on training of residents	120 (8.2 %)	563 (38.5 %)	182 (12.4 %)	316 (21.6 %)	180 (12.3 %)	101 (6.9 %)	1462
Loss of radiological skills	155 (10.5 %)	603 (40.7 %)	116 (7.8 %)	341 (23 %)	220 (14.9 %)	45 (3 %)	1480

## Discussion

In this large Italian survey, 62 % of radiologists participating into the survey have a positive opinion of TR, and 80 % are convinced that it will have a future. Radiologists value most the possibility to discuss cases in a collaborative network to improve the efficiency of the radiological service and to reduce costs.

Approximately, half of radiologists participating into the survey use TR in their clinical practice, in the large majority of cases as an intra-mural solution. With this form of TR the presence of at least one radiologist must be guaranteed within the hospital facility; health personnel must comply with the newly published Italian guidelines [12].

Outsourcing is rare in Italy (Table 2) [8] and is mainly adopted in private practice. This somewhat conservative approach is in contrast with the northern European and North American vision of TR where outsourcing appears to be far more common [13–18]. There are several possible reasons for these differences. First, Italy has a very high population density and the highest number of radiologists per inhabitant after Denmark [19]. This may well reduce the need for extra-mural TR. Second, Italy has adopted the restrictive guidelines of the Istituto Superiore di Sanità on the implementation of TR, which is allowed in outsourcing only for screening examinations such as mammography, as it requires double reading [8]. Italian guidelines allow routine intra-mural TR between different locations if these are within the same radiological unit and within the same hospital, or between radiology units or departments of the same Institution. TR is allowed between different hospitals only for emergency studies if one of the facilities does not have radiologist on duty or on call due to the small number of performed examinations [8]. It has been recently debated on whether technologist may be allowed to perform conventional radiograms without contrast media injection to outpatients with the prescription of the general practitioner, without the radiologist being present in the health facility to justify the examination and to obtain informed consent. In a recent lawsuit, the judge ruled that justification of each

individual X ray examination is under the sole responsibility of the radiologist [20]. A legislative solution is being sought to solve the above reported conflicting positions. Third, language barriers probably represent a limitation to cross-border implementation. Finally, if supported by adequate IT infrastructure, the prevailing opinion in this survey is that insourcing could actually bring about an improvement in communication between imaging doctor, patient and referring clinician. Accordingly, the Italian radiologist feels that the most important advantage of TR is the possibility of working in a collaborative network and contextually his major point of concern is that it is too impersonal and that the contact with the patient and referring clinician may be lost. This is a point of major concern also for radiologists in other countries. Indeed, the European Society of Radiology (ESR) and the American College of Radiologist ACR white papers state that “patients are the primary focus; first and foremost, all TR relationships should be patient centred” [18, 21, 22] and that the Royal College of Radiologists (RCR) similarly affirms that the “optimum radiology service is one provided locally where radiologists can maintain a regular dialogue with both referrers and those acquiring the images, only in this model can patients benefit fully from the integration of imaging into the pathway of care” [23–25]. Italian radiologists seem to believe that the optimum radiology service is one provided locally where radiologists can maintain a regular dialogue with both referrers and those acquiring the images; only in this model can patients benefit fully from the integration of imaging into the pathway of care. However, they also believe that there are circumstances in which TR can be beneficial, most significantly when seeking a specialist second or subspecialty expertise opinion or for peripheral disadvantaged areas or disaster.

There is a significant methodological limitation to this study as only 17 % of radiologists of the SIRM responded to the survey. Individuals responding to the questionnaire might have been more motivated to answer because of their personal interests or because more knowledgeable on IT. For this reason, it is not possible to affirm that the results

of this survey reflect the opinion of the entire Italian radiological community.

In conclusion, the majority of responders are in favor of TR and believes that it will have a future. In Italy, insourcing is adopted in the large majority of cases for coverage of emergency on nights and weekend shifts. Second or subspecialty opinion is another common application of TR.

### Compliance with ethical standards

**Conflict of interest** The authors do not have any competing interest to be disclosed.

**Ethical approval** This article does not contain any studies with human participants performed by any of the authors.

## Appendix

Appendix shows all 19 questions with answers of the survey

### 1. In which region do you work?

Abruzzo	1.89 %
Basilicata	0.50 %
Calabria	3.09 %
Campania	6.80 %
Emilia Romagna	9.76 %
Friuli Venezia Giulia	2.02 %
Lazio	12.47 %
Liguria	3.90 %
Lombardia	15.99 %
Marche	2.77 %
Molise	0.38 %
Piemonte	5.73 %
Puglia	6.49 %
Sardegna	1.89 %
Sicilia	7.43 %
Toscana	8.82 %
Trentino Alto Adige	1.51 %
Umbria	1.57 %
Valle d' Aosta	0.44 %
Veneto	6.55 %

### 2. What age group do you belong in?

25–35 years old	16.96 %
36–45 years old	22.09 %
46–55 years old	25.76 %
56–65 years old	30.82 %
Over 65	4.37 %

### 3. What is the site of your main professional activity?

Public hospital	64.35 %
-----------------	---------

### 3. What is the site of your main professional activity?

Private hospital	10.19 %
University hospital	12.06 %
Research institute	2.26 %
Private diagnostic centre	11.15 %

### 4. What is your professional degree?

Radiology resident	7.95 %
Consultant radiologist self employed (libero professionista)	15.70 %
Radiologist with fixed term managerial position (incarico dirigenziale a tempo determinato)	6.16 %
Radiologist with basic managerial position (incarico dirigenziale di natura professionale di base)	28.87 %
Radiologist with managerial position with high specialization (incarico dirigenziale di natura professionale elevate)	13.05 %
Radiologist director of simple unit (incarico di direzione di struttura semplice)	11.72 %
Radiologist director of complex unit (incarico di direzione di struttura complessa)	13.51 %
University researcher	0.86 %
Professor associate (professore associato)	0.99 %
Professor (professore ordinario)	1.19 %

### 5. Do you use digital signature in your Institute?

Yes	65.38 %
No	32.02 %
Occasionally	2.60 %

### 6. How are radiological images stored in your Institute?

On a analog archive	5.73 %
Each diagnostic modality has its own archive	5.02 %
On a PACS system	17.64 %
On PACS of the Department	48.16 %
On PACS of 2 or more health facilities	23.05 %
On PACS; Images and clinical data are accessible from electronic health records	8.11 %

### 7. Where do you usually use Teleradiology?

I don't use teleradiology (if you answer yes go directly to question 15)	45.26 %
Within hospital on a dedicated workstation	47.52 %
At home	8.83 %
Everywhere using a mobile	5.93 %

## 8. Which application do you use for Teleradiology?

Same application utilized for other radiological activities	87.40 %
'Stand alone' application only for teleradiological activities	8.21 %
'Add on' application of reporting system with specific added functions	4.39 %

## 9. What are the reasons of the use of teleradiology? (Table 2)

For reporting of examinations performed in the company where I work (remote management procedures of intra-company deferrable urgent/emergency)	47.32 %
For reporting of examinations performed in the facility where I work (remote management procedures intra hospital)	33.26 %
As part of regular workflow in the institute where I work (outsourcing)	12.28 %
For a second or expert opinion from a colleague with another sub-specialty	21.65 %
For a second opinion from a colleague with a different specialty (for example a neurosurgeon)	15.96 %
For online multidisciplinary meetings	4.91 %
On a temporary basis (staff shortages, holidays and illness)	6.70 %
For night and week-end coverage	37.28 %
For double reading (for example mammography)	7.03 %
For research or teaching purposes	5.25 %
Other	8.82 %

## 10. What are the disciplines for which is required a second opinion in your Institute?

We receive second opinion requests for every kind of examination	24.37 %
Neuroradiological consults	17.05 %
For pediatric examinations	4.23 %
For evaluation of interventional procedures	13.04 %
In out Institute we do not receive second opinion requests	48.74 %
Other	6.52 %

## 11. What are the disciplines for which do you usually ask a second opinion?

We ask a second opinion for every kind of examination if particularly complicated	17.94 %
For neuroradiological examination	30.21 %

## 11. What are the disciplines for which do you usually ask a second opinion?

For pediatric examination	4.63 %
For evaluation of interventional procedures	7.99 %
We don't ask second opinions to other Institute	51.39 %

## 12. How do you usually receive patient's clinical informations?

By telephone	26.78 %
By fax	7.82 %
By e mail	4.37 %
By instant messaging software (ex. Viber, Whatsapp)	1.03 %
By direct connection with RIS	52.64 %
Utilizing a dedicated platforms	7.36 %

## 13. How do you usually send the examination's report?

By telephone	4.30 %
By fax	5.58 %
By e mail	6.28 %
By instant messaging software (ex. Viber, Whatsapp)	0.58 %
By direct connection with RIS	74.77 %
Utilizing a dedicated platforms	8.49 %

## 18. In conclusion do you think that teleradiology could be an advantage or a disadvantage for radiologist?

Yes, I am enthusiastic, I think that teleradiology could be an advantage for radiologist	10.03 %
Yes, I am generally favorable	51.86 %
No, I am generally unfavorable	18.31 %
No, I am absolutely unfavorable, I think that teleradiology is a disadvantage for radiologist	11.53 %
I don't know, I am not convinced	8.27 %

## 19. Do you think that teleradiology could have a future?

Absolutely not	2.08 %
No	3.89 %
I don't know	14.01 %
Yes	58.63 %
Absolutely yes	21.40 %

## References

1. [European Society of Radiology \(ESR\) \(2014\) ESR white paper on teleradiology: an update from the teleradiology subgroup. Insights Imaging 5:1–8](#)
2. [Ranschaert ER, Barneveld Binkhuysen FHB \(2012\) European teleradiology now and in the future: results of an online survey. Insights Imaging 4:93–102](#)



3. Deloitte and Ipsos Belgium (2011) eHealth Benchmarking III SMART 2009/0022 Final Report. 1–274. [http://ec.europa.eu/information\\_society/eeurope/i2010/docs/benchmarking/ehealth\\_benchmarking\\_3\\_final\\_report.pdf](http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/ehealth_benchmarking_3_final_report.pdf). Accessed 23 Jan 2012
4. Ross P, Sepper R, Pohjonen H (2010) Cross-border teleradiology—experience from two international teleradiology projects. *Eur J Radiol* 73:20–25
5. Benjamin M, Aradi Y, Shreiber R (2010) From shared data to sharing workflow: merging PACS and teleradiology. *Eur J Radiol* 73:3–9
6. European Society of Radiology 2009 (2010) The future role of radiology in healthcare. *Insights Imaging* 1:2–11
7. Dixon AK, FitzGerald R (2008) Outsourcing and teleradiology: potential benefits, risks and solutions from a UK/European perspective. *J Am Coll Radiol* 5:12–18
8. Rapporti ISTISAN, Roma, October–December 2010
9. Rylands-Monk F (2011) France acts on teleradiology to ensure ethics and quality. <http://www.auntminnieeurope.com/index.aspx?sec=sup&sub=ris&pag=dis&ItemID=605119>. Accessed 14 July 2013
10. Survey Monkey web-based survey tool. <https://www.surveymonkey.com>. Accessed June 2014
11. [http://help.surveymonkey.com/articles/en\\_US/kb/How-to-analyze-results](http://help.surveymonkey.com/articles/en_US/kb/How-to-analyze-results)
12. <http://www.gazzettaufficiale.it/eli/id/2015/11/09/15A08299/>
13. Rosenberg C, Langner S, Rosenberg B, Hosten N (2011) Medizinische und rechtliche Aspekte der Teleradiologie in Deutschland. *Rofo* 183:804–811
14. Levin DC, Rao VM (2011) Outsourcing to teleradiology companies: bad for radiology, bad for radiologists. *J Am Coll Radiol* 8:104–108
15. Ross P (2011, September) Pros and cons of international teleradiology services. Presentation held at MIR annual scientific meeting, Nice
16. Barneveld Binkhuysen FH, Ranschaert ER (2011) Teleradiology: evolution and concepts. *Eur J Radiol* 78:205–209
17. Lienemann B, Hodler J, Luetolf M, Pfirrmann CWA (2005) Swiss teleradiology survey: present situation and future trends. *Eur Radiol* 15:2157–2162
18. Silva E, Breslau J, Barr RM, Liebscher LA et al (2013) ACR white paper on teleradiology practice: a report from the task force on teleradiology practice. *J Am Coll Radiol* 10(8):575–585
19. Investing in the clinical radiology workforce—the quality and efficiency case March 2012; Royal College of Radiologists
20. Marlia: sentenza e percorso; <http://www.radiologiamedica.org>
21. Ranschaert ER, Boland GW, Duerinckx AJ, Barneveld Binkhuysen FH (2015) Comparison of European (ESR) and American (ACR) white papers on teleradiology: patient primacy is paramount. *J Am Coll Radiol*. 12(2):174–182
22. Directive 2011/24/EU of the European Parliament and of the Council of 9 March 2011 on the application of patients' rights in cross-border healthcare (2011). *OJL* 88:45–65
23. The Royal College of Radiologists (2012) The regulation of teleradiology. A position statement by the Royal College of Radiologists. The Royal College of Radiologists, London
24. The Royal College of Radiologists (2012) Standards for the communication of critical, urgent and unexpected significant radiological findings, 2nd edn. The Royal College of Radiologists, London
25. The Royal College of Radiologists (2011) Standards and recommendations for the reporting and interpretation of imaging investigations by non-radiologist medically qualified practitioners and teleradiologists. The Royal College of Radiologists, London