

Assessment of Compliance and Impact of the COVID-19 RSNA Recommendations on Radiology Departments: A French Survey

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Conflicts of interest are listed at the end of this article.

See also the editorial by Tuite in this issue.

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Radiology departments faced a pressing need for complex modifications to their organizational workflow during the COVID-19 crisis in order to manage the ongoing pandemic. To support this point, in March 2020 the RSNA published a series of principles issued from an expert panel (1). The aim of this study was to evaluate whether these principles were followed during the first epidemic peak and to what extent.

Materials and Methods

A retrospective study, which was approved by the local institutional review board and registered on ClinicalTrials.gov (identifier: NCT04339686), was conducted in June 2020 on the period from March 16 to April 12, 2020. A survey was sent to 40 French radiology departments that were selected to reflect the types of hospitals (ie, university hospitals, general hospitals, and private center) and disease incidences across France (low, moderate, and high), which ranged from eight to 34 per 10 000 people according to the national health care authorities (2). The survey, detailed in Tables E1 and E2 (online), included principles proposed by the RSNA (1). For internal validity, the survey was initially randomly sent to three centers (one university hospital, one general hospital, and one private center) and was modified to incorporate the comments received during the first step. The new version was then approved by an external scientific committee. Results from the first step were subsequently excluded from the final analysis. For external validity, possible discrepancies between answers were excluded. An adherence rate less than or equal to 50% was considered insufficient. In addition to the RSNA principles, the availability of negative pressure rooms for CT or chest radiographic examinations and examination room disinfecting time were surveyed. Because the study was not derived from random selection, all statistics were descriptive only. Statistical analysis was performed using R (version 3.6.2, The R Foundation). Quantitative variables were expressed as means (normal) or medians (skewed). Type 1 error was .05.

Results

Of the 40 centers surveyed, 38 responded (95%). Tables 1 and 2 show the demographic data and adherence rates for each item, respectively. All participating centers (100%, 38 of 38) adapted their organization during the COVID-19 crisis, with 86% (33 of 38) referencing the RSNA principles for guidance. The adherence rate was good for seven of the 10 items (70%). Three items did not reach 50% of adherence: a dedicated COVID-19 device for US,

Table 1: Responding Center Demographics

Characteristic	Value (n = 38)
Disease incidence	
Low	8 (21)
Moderate	15 (39)
High	15 (39)
Responding center category	
University hospital	13 (34)
General hospital	13 (34)
Private center	12 (32)
Presence of an intensive care unit at the center	
Yes	29 (76)
No	9 (24)
No. of radiologists practicing at the center	
≤5	5 (13)
6–10	12 (32)
11–15	10 (26)
16–20	4 (11)
>20	7 (18)
Dedicated thoracic imaging unit	
Yes	10 (26)
No	28 (74)

Note.—Data are numbers of centers, with percentages in parentheses. Low incidence was defined as less than 12 per 10 000 people; moderate, from 13 per 10 000 people to 22 per 10 000 people; and high, 23 per 10 000 people or more.

radiographic, and MRI examinations, access to remote radiology interpretation, and a dedicated radiographer team.

Discussion

All surveyed centers modified their practices during the COVID-19 pandemic. While it is difficult to state whether such modifications were supported only by the RSNA principles, they were the most widely known.

Three of those principles were less frequently applied. First, the number of centers using remote reading increased insufficiently. This could be explained by a lack of time to mobilize the required resources. Second, while dedicated CT scanners for patients with COVID-19 were frequently deployed, this was not the case with dedicated devices for US, radiography, and MRI. CT was widely used to explore COVID-19 pneumonia and commonly preferred to chest radiography. As previously reported, centers with at least two CT scanners

Table 2: Compliance with RSNA Principles in Participating Radiologic Centers

RSNA Recommendations (Priorities and Responses) and Related Criteria	Value (n = 38)
Modified institutional practices during COVID-19 crisis*	
Yes	38 (100)
No	0 (0)
Source of information*	
RSNA guidelines	33 (86)
French National Radiological Society	30 (80)
French Health Authorities	22 (57)
Generalist Health Magazine	7 (18)
Implementation of standard operating procedures for radiologic imaging and procedures for patients with or suspected of having COVID-19	
Patients suspected of having COVID-19	35 (92)
Patients with COVID-19	26 (68)
Performance of imaging at a specific location	
Dedicated at least one device for patients with or suspected of having COVID-19	29 (76)
CT	23 (61)
US	17 (45)
Radiography	14 (37)
MRI	5 (13)
Central coordination for COVID-19 preparedness in messaging between hospital infection control and the radiology department	
Use of standardized hospital protocols for room decontamination	
Yes	38 (100)
Receiving ICU recommendations for room decontamination	35 (92)
No	0 (0)
Room disinfecting time (min)*	
0–5	3 (8)
6–10	10 (26)
11–15	14 (37)
>15	11 (29)
Improved capability for remote interpretation	
Access to remote interpretation before the epidemic	14 (37)
Remote interpretation implementation during the epidemic	5 (13)
Screening for COVID-19 at the time of scheduling, at hospital entrances, and at radiology front desks	
Screening for COVID-19 before performing interpretation	31 (82)
Training of all employees to follow infection control protocols and use PPE	
Training of radiographers to follow COVID-19 procedures	28 (74)
Centralization of PPE supplies to prevent shortages	
Prevention of PPE supplies shortage	36 (95)
Using negative pressure room for CT and/or chest radiographic examinations*	
Yes	0 (0)
No	38 (100)

Note.—Except where indicated, data are numbers of centers, with percentages in parentheses. ICU = infection control unit, PPE = personal protective equipment.

* Items are related to, but not part of, the initial RSNA principles (1) used as reference.

dedicated one of them to patients with COVID-19 (3). In addition, some US examinations were converted into CT examinations to limit the amount of time spent and contact between staff and infected patients. Third, a COVID-19-trained staff designated to work exclusively with infected patients was frequently not available. Indeed, reorganization of the entire radiography staff around a single disease can be challenging considering that other activities, such as emergency (4) and oncologic care (5), must be maintained.

To conclude, while substantial modifications to radiology department organization and workflow were applied to face the COVID-19 pandemic, factors such as remote reading, dedicated devices, and team training need to be improved in the event of another outbreak.

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References

1. Mossa-Basha M, Meltzer CC, Kim DC, Tuite MJ, Kolli KP, Tan BS. Radiology Department Preparedness for COVID-19: *Radiology* Scientific Expert Review Panel. *Radiology* 2020;296(2):E106–E112.
2. Géodes - Santé publique France - Indicateurs : cartes, données et graphiques. https://geodes.santepubliquefrance.fr/#c=indicator&f=0&i=covid_hospit.hosp&s=2020-03-24&t=a01&view=map2. Accessed May 4, 2020.
3. Herpe G, Naudin M, Léderlin M, et al. COVID-19 impact assessment on the French radiological centers: a nationwide survey. *Eur Radiol* 2020;30(12):6537–6544.
4. Vissio E, Falco EC, Scozzari G, et al. The Adverse Impact of the COVID-19 Pandemic on Abdominal Emergencies: A Retrospective Clinicopathological Analysis. *J Clin Med* 2021;10(22):5254.
5. Cavallo JJ, Forman HP. The Economic Impact of the COVID-19 Pandemic on Radiology Practices. *Radiology* 2020;296(3):E141–E144.