BASELINE FUNCTIONAL REQUIREMENTS

FOR AI SERVICE PERFORMANCE

(approved by an academic task force of the Moscow Center for Diagnostics & Telemedicine, Protocol No. 1/2022 dated February 28, 2022)

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GLOSSARY

BDR	–	Baseline diagnostic requirements for AI service performance
URIS	–	Unified Radiological Information Service
ESUVV	–	Unified Notification System for External Interactions
AI	–	Artificial Intelligence
AI service	–	A service based on artificial intelligence (computer vision) technology
CV	–	Computer Vision
CT	–	Computed Tomography
MMG	–	Mammography
MRI	–	Magnetic Resonance Imaging
XR	–	X-Ray
AI/CV Experiment	–	The Experiment on the use of innovative technologies in the field of computer vision for the analysis of medical images and further use in the healthcare system of Moscow.
DICOM	–	Digital Imaging and Communications in Medicine (DICOM), a format for storing medical images obtained as a result of the study
SR	–	Structure Report, a format for storing structured data in the DICOM format

1. BRIEF DESCRIPTION OF THE SUBJECT MATTER

The extensive introduction of AI-based technologies into various aspects of human life requires coordination efforts to channel the AI development, particularly, through the standard-setting. These activities are carried out by international institutions and, at the industry level, by organizations with sufficient expertise.

The standards guide a development and implementation of individual AI systems by providing developers with specific guidelines that address the reliability and design. This helps to create a product that meets the needs of the industry and the end user.

Implementation of the standards recognized by the developers, experts, and governments generates higher confidence in AI, enables integration of AI with existing business processes and allows to create a common cybersecurity and quality management environment. AI has a potential to shape the market and boost the development of new technologies.

1.1. Problem statement

The AI/CV Experiment 2020 in Moscow identified a gap that needs to be bridged for the good of the industry, i.e., a lack of the common approach to reporting AI service results in the real-world radiology workflow.

1.2. Purpose

This guideline constitutes a set of mandatory requirements for AI service operation in the URIS environment of the city of Moscow. The applicable legislation dictates that compliance with these requirements is a prerequisite for the adoption of AI in the routine practice by radiologists and clinicians.

2. REQUIREMENTS FOR THE DELIVERABLES

AI service deliverables:

1) Kafka message to the Unified Notification System for External Interactions (“ESUVV”) that enables prioritization of studies in the radiology worklist (triage);

2) a text report in the DICOM SR format, based on which an electronic medical record can be generated[1];

3) an additional series of images containing the results of the study processing by the AI service.

2.1. General requirements for the study processing

The original series containing diagnostic images cannot be altered by the AI service during the study processing.

For all modalities (except for Chest PF/XR and MMG), when choosing an image/series to be analyzed by the AI service, it is necessary to display the target organ in the image/series in full

[1] the Procedure for organizing the healthcare document management system in the form of electronic medical records was approved by the Order of the Ministry of Health of the Russian Federation No. 947n of September 7, 2020 “On approving the Procedure for organizing the healthcare document management system in terms of medical record keeping in the form of electronic documents”.

(Appendix 1) and choose a series depending on the window (W/L) and slice thickness (Appendix 2). If the target organ is not fully displayed, the AI service should generate an error message ("Series error").

In case of Chest PF/XR and MMG, a study displaying only a part of the target organ or featuring an incorrect positioning can be processed by AI provided that DICOM SR informs about such incomplete coverage. If a study contains several images in the same plane, all images that meet the requirements of Annexes 1 and 2 must be processed and made available with one DICOM SR (for each image the AI results must be stored in the "Details" section).

Possible technical defects on Chest PF/XR and MMG: wrong area of interest, incorrect positioning, removable and unremovable artifacts from foreign bodies, incorrect image capturing parameters.

Error for linear and volumetric measurements cannot deviate for more than 5% from the expert labelling. To measure angular values, a deviation of less than 2 degrees is considered acceptable.

2.2. Requirements for the Kafka Message

A general probability of finding reported in the Kafka message is a value in range between 0 and 100. The results provided by comprehensive AI services must contain the probability for each type of the target finding as per the clinical task.

The probability of finding for the entire study and each target disorder is mandatory for all the studies processed by the AI service. A list of all available parameters that can be reported in the Kafka message is given in Appendices 3–6. This additional information is necessary to evaluate the diagnostic accuracy of the AI service.

At the same time, the additional series and DICOM SR must contain a probability of the finding in the range from 0.00 to 1.00.

The finding parameters must be reported as morphometry measurements and the finding stage/grade according to a commonly accepted classification (see the BDR).

2.3. Requirements for the text description (DICOM SR)

AI deliverables must contain a DICOM SR file regardless of the presence or absence of a target finding. To correctly upload additional series in URIS, follow the requirements specified in Appendix 7. The structure of the DICOM SR protocol is the same for all AI services and modalities; the order of keys in DICOM SR cannot be altered. The structure of the DICOM SR report is shown in Figure 1:

Figure 1 – DICOM SR structure

The DICOM SR protocol provided by a comprehensive AI service must contain a probability of a target finding or a notification that the threshold has been exceeded. A comprehensive AI service is expected to deliver only one DICOM SR protocol regardless of the number of designated clinical tasks. The structure of DICOM SR report for comprehensive AI services:

- **modality:** type of the study modality;
- **region of interest:** anatomical region of interest;
- **study UID:** *study UID in URIS;*
- **date and time of AI service report:** *date and time of AI service report;*
- **"This report was generated using an artificial intelligence algorithm"** (a mandatory notification);
- **"Academic purpose only"** (a mandatory notification);
- **service name:** name of the AI service;
- **service version:** version number of the AI service:
- **AI service function:** clinical tasks assigned to the AI service;
- **technical specifications:** slice thickness and the number of slices in the study;
- **report:** for each target finding: labelling colour, image annotation, type of finding, probability of the target finding, finding grade (if applicable);
- **conclusion:** text of the conclusion for each target finding;
- **details of findings:** images of findings or slices with findings (if observed);
- **user manual:** information about AI service operation; description of the designated clinical task; description of how the findings should be displayed and labelled.

The "Report" section should contain information similar to the radiology report on the finding to generate an electronic medical record in the information system. Depending on the modality, the AI report should contain data listed in the respective section of Appendix 8.

The "Conclusion" section should contain information similar to the medical conclusion about the finding to generate an electronic medical record in the information system. Depending on the modality, the AI conclusion should contain data listed in the respective section of Appendix 9.

The "Finding details" section – if a pathological finding is detected this section should contain the following information:

- images of findings or slices with the findings;
- type of pathological findings;
- size of findings.

The "User manual" section should contain a list of the target pathologies detected by the AI service and the legend.

2.4. Requirements for the additional series of images

AI service should deliver the study processing result as a single additional series. The additional series should be presented in the SOPClass 1.2.840.10008.5.1.4.1.1.7 format.

A comprehensive AI service is expected to deliver an only instance of an additional series regardless of the number of designated clinical tasks.

For the studies containing several original series, the AI service should deliver a processed series of thin slices used to diagnose the target pathology.

A name of the additional series must contain the names of the AI service and the Experimental setup / target pathology. Recommended format: "service name_*line of Experiment/target pathology*" See Appendix 12 for the recommended codes that represent the Experimental setups and target pathologies.

The additional series name should be in the 0008,103E tag (Series Description).

The brightness and contrast settings (Window W/L), as well as image resolution of the additional series must not differ from the originals. Otherwise, in case of distortions, DICOM SR should contain a message that the additional series is not of diagnostic quality.

All series of images including the additional series must contain the following:

– textual non-overlaid warning "Academic purpose only", embedded into the image;

– name of the AI service. AI service name should be in the 0008,0080 tag (Institution Name); it can also be embedded into the image;

– version of the AI service performing the study processing. AI service version should be in the 0008,1040 tag (Institutional Department Name); it can also be embedded into the image (optional);

– date and time of the study processing. The study processing date should be in the 0008,0022 tag (Acquisition Date) in YYYYMMDD format. The study processing time should be in the 0008,0032 tag (Acquisition Time) in HHMMSS format.

In the absence of abnormalities, the additional series must contain the following message: "Target pathology is not detected". In this case, the additional series can be made of a single image.

A number of images in the additional CT, LDCT and MRI series should be no less than that in the original series processed by the AI service (except for the diagnosis of compression fractures and bone density measurement).

The functionality should allow to synchronize the additional series and the original series. See Appendix 10 for the tags required for the correct series synchronization.

Images in the series containing pathological findings should be labelled at the ScrollBar (a separate visualization bar for series level viewing in the additional series).

In presence of pathological findings, the additional series should annotate and report them in accordance with the requirements specified in Appendix 11.

To correctly upload additional series in URIS, follow the requirements specified in Appendix 7.

2.5. Procedural risks

It is acceptable when the AI service cannot process a study. In this case, it should return a unique identifier of the study and an error message from Table 1 with a corresponding description.

Table 1 – Error classification

Error message	**Description**	**Ownership**
"Server unavailable"	DICOM loading error: connection is lost or the server is not responding	NOT on the side of the AI service
"Incorrect number of images"	The number of delivered images is different from expectations	NOT on the side of the AI service
"Modality error"	A modality in DICOM does not match the modality in the Kafka message and is not supported by the service	NOT on the side of the AI service
"Series error"	The study contains no series that can be processed by the AI service	NOT on the side of the AI service
"Tag error"	Tags required by the AI service are missing or incorrect	NOT on the side of the AI service

“Body part error”	A body part in the DICOM file does not match the body part in the Kafka message and is not supported by the AI service	NOT on the side of the AI service
“Image error”	The AI service failed to identify what is shown in the DICOM file (unrecognized objects, missing images, etc.)	NOT on the side of the AI service
“Other”	Other error that requires clarification from the AI service	NOT on the side of the AI service
“Processing error”	The AI service failed to process the study due to an internal error	On the side of the AI service
“SOPClass error”	SOPClass in DICOM files is not supported by the AI service	On the side of the AI service
“Passed”	The service failed to process a study due to the heavy workload	On the side of the AI service

3. DOCUMENTATION REQUIREMENTS

The formats, structure, and content of the documentation, as well as the extension of the functional requirements will be determined by specialists of the Research and Practical Clinical Center for Diagnostics and Telemedicine Technologies of the Moscow Healthcare Department during the AI/CV Experiment.

Appendix 1

TARGET ORGANS

Table 1 – Target organs

	Modality	Region of interest	Target pathology	Target organ
1	CT	Chest	COVID-19	Lungs
2			Pulmonary emphysema	Lungs
3			Malignant neoplasms	Lungs
4			Free pleural fluid (effusion)	Pleural cavity
5			Enlarged intrathoracic lymph nodes (lymphadenopathy)	Lungs, mediastinum
6			Pulmonary tuberculosis	Lungs
7			Sarcoidosis	Lungs
8			Bronchiectatic disease	Lungs
9			Compression fracture of vertebral bodies	Thoracic and lumbar vertebrae
10			Ischaemic heart disease (Coronary calcium)	Coronary arteries
11			Ischemic heart disease (paracardial fat)	Heart area
12			Enlarged ascending and descending thoracic aorta	Thoracic aorta
13			Dilation of the pulmonary trunk	Pulmonary trunk
14			Impairment of lung airness	Lungs
15			Adrenal gland lesions	Adrenal glands
16			Focal lesions in chest bones	Vertebrae, ribs, breastbone, shoulder blades, collarbones
17			Rib/s fracture	Ribs
18		Abdomen	Kidney stones	Kidneys, urinary tract
19			Liver lesions	Liver
20			Renal lesions	Kidneys
21			Adrenal gland lesions	Adrenal glands
22			Compression fracture of vertebral bodies	Thoracic and lumbar vertebrae
23			Dilated abdominal aorta	Abdominal aorta
24			Gallbladder stones	Gallbladder

	Modality	Region of interest	Target pathology	Target organ
25			Routine liver measurements	Liver
26			Routine kidney measurements	Kidneys
27			Routine measurements of spleen and pancreas	Spleen, pancreas
28			Focal lesions in the abdominal and pelvic bones	Vertebrae, pelvic bones, sacrum, tailbone, thighbones
29	CT	Brain	Ishemic stroke	Brain
30			Intracranial hemorrhage	Brain
31			Routine measurements of the brain	Brain
32	XR/PF	Chest	12 disease groups	Lungs, mediastinum, ribs
33	XR	Musculoskeletal system	Fracture	Tubular bones
34			Arthrosis	Knee joint, hip joint
35			Flat foot	Foot
36			Fracture of vertebral bodies	Cervical spine, thoracic spine, lumbosacral spine
37			Osteochondrosis	Cervical spine, thoracic spine, lumbosacral spine
38			Scoliosis	Thoracic spine, lumbosacral spine
39			Spondylolisthesis	Cervical spine, lumbosacral spine
40		Head	Sinusitis	Paranasal sinuses
41	MMG	Breast	Breast cancer	Breasts
42	MRI	Brain	Multiple sclerosis	Brain
43			Intracranial neoplasms	Brain
44			Routine measurements of the brain	Brain
45		Cervical spine	Protrusions and hernias of the intervertebral discs, spinal stenosis	Cervical spine
46			Focal lesions in the vertebrae	Cervical spine
47		Thoracic spine	Protrusions and hernias of the intervertebral discs, spinal stenosis	Thoracic spine
48			Focal lesions in the vertebrae	Thoracic spine

	Modality	Region of interest	Target pathology	Target organ
49		Lumbosacral spine	Protrusions and hernias of the intervertebral discs, spinal stenosis	Lumbosacral spine
50			Focal lesions in the vertebrae	Lumbosacral spine
51		Knee joint	Chondromalacia	Knee joint
52		Lesser pelvis (f)	Routine measurements of the uterus	Uterus, ovaries
53		Lesser pelvis (m)	Routine measurements of the prostate gland	Prostate gland

Appendix 2

SERIES SELECTION

Series selection algorithm:
1. Select the priority series with a specified slice thickness.
2. Window assessment (W/L). If the selected series cannot be displayed in the target window, display the results in a suitable window*.

Table 2.1 – Series selection

Modality	Region of interest	Target pathology	Window selection (W/L)	Slice thickness**
CT	Chest	COVID-19	Lung window	≤3 mm. Priority is given to the minimum thickness
		Malignant neoplasms of the lungs	Lung window	
		Compression fracture of vertebral bodies	Soft tissue	
		Free pleural fluid (effusion)	Soft tissue	
		Ischaemic heart disease (Coronary calcium)	Soft tissue	
		Thoracic aortic aneurysm and measurement of the thoracic aorta diameter	Soft tissue	
		Dilation of the pulmonary trunk and measurement of the pulmonary trunk diameter	Soft tissue	
		Enlarged intrathoracic lymph nodes (lymphadenopathy)	Soft tissue	
		Pulmonary emphysema	Lung	
		Pulmonary tuberculosis	Lung	
		Sarcoidosis	Lung	

Modality	Region of interest	Target pathology	Window selection (W/L)	Slice thickness**
		Bronchiectatic disease	Lung	
		Ischemic heart disease (paracardial fat)	Soft tissue	
		Impairment of lung airness	Lung	
		Adrenal gland lesions	Soft tissue	
		Focal lesions in chest bones	Bone	
		Rib/s fracture	Bone	
CT	Brain	Intracranial hemorrhage	Brain	≤5 mm. Priority is given to the minimum thickness
		Ishemic stroke	Brain	
		Routine measurements of the brain	Brain	
	Abdomen	Kidney stones	Bone	≤3 mm. Priority is given to the minimum thickness
		Adrenal gland lesions	Soft tissue	
		Liver lesions		
		Renal lesions		
		Compression fracture of vertebral bodies	Soft tissue	
		Abdominal aortic aneurysm and measurement of the abdominal aorta diameter	Soft tissue	

Modality	Region of interest	Target pathology	Window selection (W/L)	Slice thickness**
		Gallbladder stones	Soft tissue	
		Routine liver measurements	Soft tissue	
		Routine kidney measurements	Soft tissue	
		Routine measurements of spleen and pancreas	Soft tissue	
		Focal lesions in the abdominal and pelvic bones	Bone	
XR	Chest	Pleural effusion, pneumothorax, focal opacity, infiltration/consolidation, dissemination, cavity, atelectasis, calcification/calcified pulmonary nodule, mediastinal widening, cardiomegaly, cortical bone fracture, consolidated fracture	Frontal view	
	Wrist joint	Fracture	Two views	
	Shoulder joint	Fracture	Frontal view	
	Hip joint	Arthrosis	Frontal view	
		Fracture	Frontal view	
	Knee joint	Arthrosis	Frontal view	

Modality	Region of interest	Target pathology	Window selection (W/L)	Slice thickness**
	Ankle joint	Fracture	Two views	
	Foot	Longitudinal flat foot	Lateral view	
		Transverse flat foot	Frontal view	
	Head	Sinusites	Frontal view	
	Spine	Fracture of vertebral bodies	Lateral view	
		Osteochondrosis	Two views	
		Scoliosis	Frontal view	
		Spondylolisthesis	Lateral view	
MMG	Breast	Breast cancer	Two views	
MRI	Brain	Multiple sclerosis	Axial T2 Axial FLAIR Contrast-enhanced T1 In case axial FLAIR is unavailable, processing the sagittal FLAIR series is possible	Post-contrast series: ≤2 mm. Non-contrast series: ≤5 mm, with the priority given to the minimum thickness
		Intracranial neoplasms	Contrast-enhanced T1 – all planes + FLAIR in all planes	
		Routine measurements	Axial T2 + Axial T2 FLAIR + T1 sagittal Sagittal T2 FLAIR (in absence of Axial T2 FLAIR)	

Modality	Region of interest	Target pathology	Window selection (W/L)	Slice thickness**
	Cervical spine	Protrusions and hernias of the discs, spinal stenosis	Sagittal T2-WI + axial T2-WI	≤4 mm. Priority is given to the minimum thickness
		Focal lesions in the vertebrae	Sagittal T2-WI + sagittal T2-WI + sagittal T2 STIR *Post-contrast sagittal T1 (if available)	≤4 mm. Priority is given to the minimum thickness
	Thoracic spine	Protrusions and hernias of the discs, spinal stenosis	Sagittal T2-WI + axial T2-WI	≤4 mm. Priority is given to the minimum thickness
		Focal lesions in the vertebrae	Sagittal T2-WI + sagittal T2-WI + sagittal T2 STIR *Post-contrast sagittal T1 (if available)	≤4 mm. Priority is given to the minimum thickness
	Lumbosacral spine	Protrusions and hernias of the discs, spinal stenosis	Sagittal T2-WI + axial T2-WI	≤4 mm. Priority is given to the minimum thickness
		Focal lesions in the vertebrae	Sagittal T2-WI + sagittal T2-WI + sagittal T2 STIR *Post-contrast sagittal T1 (if available)	≤4 mm. Priority is given to the minimum thickness
	Knee joint	Chondromalacia	Axial PD FS Sagittal PD FS Coronal PD FS	≤4 mm. Priority is given to the minimum thickness
	Lesser pelvis	Routine measurements of the uterus	Sagittal T2 + axial T2	≤4 mm. Priority is given to the minimum thickness
		Routine measurements of the prostate gland	Sagittal T2 + axial T2	≤4 mm. Priority is given to the minimum thickness

Modality	Region of interest	Target pathology	Window selection (W/L)	Slice thickness**
* https://radiopaedia.org/articles/windowing-ct ** Dalrymple N. C. et al. Price of isotropy in multidetector CT // Radiographics. – 2007. – Vol. 27. – №. 1. – P. 49–62				

Appendix 3

DATA FOR KAFKA MESSAGE

Table 3.1 – Data for Kafka message

Clinical task solved by AI service in accordance with the baseline diagnostic requirements **Modality**	**Key description***	**Value**	**Comment**	**JSON key**	**Example of data output**
All the Experimental setups	Study UID	Text		studyIUID	
				aiResult	
	UID of additional series set by AI			seriesIUID	
	Presence of a finding	true or false		pathologyFlag	
	General probability of a finding in the entire study	Integer number in the range of 0–100		confidenceLevel	
	AI service model number			modelId	
	AI service version			modelVersion	
	Report	Text		report	
	Conclusion	Text		conclusion	
				dateTimeParams	
	Time of study download start from PMM (Product Model Management)	ISO 8601 format[2]		downloadStartDT	
	Time of study download end from PMM	ISO 8601 format[2][2] выше		downloadEndDT	
	Time of study processing start by AI	ISO 8601 format		processStartDT	
	Time of study processing end by AI	ISO 8601 format		processEndDT	

[2] Time format YYYY-MM-DDThh:mm:ss.sss+hhmm

Detection of CT signs consistent with COVID-19 (coronavirus) lung involvement **Chest CT**				ct_covid	
	Probability of COVID-19 lung involvement	Integer number in the range of 0–100		ct_covid_conf_level	
	Degree of involvement: CT-0	Integer number in the range of 0–100		ct_covid_ct0	
	Degree of involvement: CT-1	Integer number in the range of 0–100		ct_covid_ct1	
	Degree of involvement: CT-2	Integer number in the range of 0–100		ct_covid_ct2	
	Degree of involvement: CT-3	Integer number in the range of 0–100		ct_covid_ct3	
	Degree of involvement: CT-4	Integer number in the range of 0–100		ct_covid_ct4	
	Percentage of COVID-19 lung involvement (left lung)	Integer number in the range of 0–100		ct_covid_left	
	Percentage of COVID-19 lung involvement (right lung)	Integer number in the range of 0–100		ct_covid_right	
Emphysema extent **Chest CT**				ct_emphysema	
	Probability of emphysema	Integer number in the range of 0–100		ct_emphysema_conf_level	
	Percent emphysema in both lungs	Integer number in the range of 0–100		ct_emphysema_both	
	Percent emphysema (left lung)	Integer number in the range of 0–100		ct_emphysema_left	
	Percent emphysema (right lung)	Integer number in the range of 0–100		ct_emphysema_right	

Table 3.1 (continued)

Detection of CT signs consistent with malignant neoplasm in the lungs **Chest CT**				ct_lc	
	Probability of the signs of a malignant neoplasm in the entire study	Integer number in the range of 0–100		ct_lc_conf_level	
	Average size of the neoplasm, mm	Text	Specified format	ct_lc_average_size	#1: 6 mm; #2: 6 mm; #3: 7 mm; #4: 9 mm
	Volume (mm^3) of a pulmonary nodule	Text	Specified format	ct_lc_volume	#1: 101 mm^3; #2: 117 mm^3; #3: 200 mm^3; #4: 294 mm^3
Detection of LDCT signs consistent with malignant neoplasm in the lungs **Chest LDCT**				ldct_cancer	
	Presence of lung cancer signs in the entire study	Integer number in the range of 0–100		ldct_cancer_conf_level	
	Diameter of each detected pulmonary nodule	Text	Specified format	ldct_cancer_size	#1: 6 mm; #2: 6 mm; #3: 7 mm; #4: 9 mm
	Diameter of each detected pulmonary nodule, mm^3	Text	Specified format	ldct_cancer_volume	#1: 101 mm^3; #2: 117 mm^3; #3: 200 mm^3; #4: 294 mm^3
	Lung-RADS 0	Integer number in the range of 0–100		ldct_cancer_rads0	
	Lung-RADS 1	Integer number in the range of 0–100		ldct_cancer_rads1	
	Lung-RADS 2	Integer number in the range of 0–100		ldct_cancer_rads2	
	Lung-RADS 3	Integer number in the range of 0–100		ldct_cancer_rads3	
	Lung-RADS 4A	Integer number in the range of 0–100		ldct_cancer_rads4a	
	Lung-RADS 4B	Integer number in the range of 0–100		ldct_cancer_rads4b	

Detection and localization of compression vertebral fractures with a degree of vertebral body deformity of over 25% according to the Genant semi-quantitative scale, grades 2–3 **Chest CT**				ct_genant	
	Probability of at least one vertebra with over 25 % height loss	Integer number in the range of 0–100		ct_genant_conf_level	
	Listing the localizations of all vertebrae with height loss over 25% indicating the degree of compression	Text	Specified format	ct_genant_degree	ZZ: XX
	Suspected osteoporosis as per the ACR 2018, ISCD 2019 criteria	Text	Specified format	ct_genant_acr	
	Measurement of the mineral density (or HU) of the cancellous bone of Th12–L3 vertebral bodies indicating the vertebra index	Text	Specified format	ct_genant_hu	ZZ: XXX
Detection of free pleural fluid (effusion) **Chest CT**				ct_pleural	
	Probability of pleural effusion	Integer number in the range of 0–100		ct_pleural_conf_level	
	Effusion volume (left lung), ml	Integer number		ct_pleural_volume_left	
	Effusion volume (right lung), ml	Integer number		ct_pleural_volume_right	
	Mean effusion density (left lung), HU	Integer number		ct_pleural_density_left	
	Mean effusion density (right lung), HU	Integer number		ct_pleural_density_right	
Detection of enlarged intrathoracic lymph nodes (lymphadenopathy) **Chest CT**				ct_lymphadenopathy	
	Probability of enlarged lymph nodes	Integer number in the range of 0–100		ct_lymphadenopathy_conf_level	
	Size of the largest lymph node, mm	Integer number		ct_lymphadenopathy_size	
	Calcified intrathoracic lymph nodes	Text	Specified format	ct_lymphadenopathy_calcification	Example: Presence
	Classification of lymph nodes as per IASLC	Text	Specified format	ct_lymphadenopathy_iaslc	Example: #1: IASLC 3p

Table 3.1 (continued)

Detection of bronchiectasis **Chest CT**				ct_bronchiectasis	
	Probability of bronchiectasis	Integer number in the range of 0–100		ct_bronchiectasis_conf_level	
	Broncho-arterial ratio	Number		ct_bronchiectasis_ratio	
Detection of CT signs consistent with pulmonary tuberculosis **Chest CT**				ct_tuberculosis	
	Probability of tuberculosis	Integer number in the range of 0–100		ct_tuberculosis_conf_level	
Paricardial fat volume **Chest CT**				ct_paracardial	
	Probability of paricardial fat ≥ 200 ml	Integer number in the range of 0–100		ct_paracardial_conf_level	
	Paracardial fat volume, ml	Integer number		ct_paracardial_volume	
	Mean paracardial fat density, HU	Integer number		ct_paracardial_density	
Coronary calcium score **Chest CT/ LDCT**				ct_agatston	
	Probability of coronary calcium	Integer number in the range of 0–100		ct_agatston_conf_level	
	Numerical value of the Agatston score	Integer number		ct_agatston_number	
	CAC-DRS 0	Integer number in the range of 0–100		ct_agatston_drs0	
	CAC-DRS 1	Integer number in the range of 0–100		ct_agatston_drs1	
	CAC-DRS 2	Integer number in the range of 0–100		ct_agatston_drs2	
	CAC-DRS 3	Integer number in the range of 0–100		ct_agatston_drs3	
	LM	Integer number		ct_agatston_lm	
	LAD	Integer number		ct_agatston_lad	
	LCx	Integer number		ct_agatston_lcx	
	RCA	Integer number		ct_agatston_rca	

Table 3.1 (continued)

Dilation of ascending and descending thoracic aortas **Chest CT/ LDCT**				ct_aorta_chest	
	Probability of aortic dilation according to one of the signs (see the signs of pathology)	Integer number in the range of 0–100		ct_aorta_chest_conf_level	
	Largest diameter of the ascending aorta along the short axis, mm	Integer number		ct_aorta_chest_ascending	
	Largest diameter of the descending aorta along the short axis, mm	Integer number		ct_aorta_chest_descending	
	Calcifications in the thoracic aorta walls	Text	Specified format	ct_aorta_chest_calcification	Example: Absence
Dilation of the pulmonary trunk **Chest CT/ LDCT**				ct_trunk	
	Probability of the pulmonary trunk dilation of over 28 mm	Integer number in the range of 0–100		ct_trunk_conf_level	
	Largest diameter of the pulmonary trunk along the short axis, mm	Integer number		ct_trunk_max	
Detection of sarcoidosis **Chest CT**				ct_sarcoidosis	
	Probability of sarcoidosis	Integer number in the range of 0–100		ct_sarcoidosis_conf_level	
	Sarcoidosis stage I	Integer number in the range of 0–100		ct_sarcoidosis_stage1	
	Sarcoidosis stage II	Integer number in the range of 0–100		ct_sarcoidosis_stage2	
	Sarcoidosis stage III	Integer number in the range of 0–100		ct_sarcoidosis_stage3	
	Sarcoidosis stage IV	Integer number in the range of 0–100		ct_sarcoidosis_stage4	

Table 3.1 (continued)

Detection of signs consistent with the impairment of lung airness **Chest CT**				ct_lung_pneumo	
	Probability of lung airness impairment	Integer number in the range of 0–100		ct_lung_pneumo_conf_level	
Detection of signs consistent with the focal lesions in the chest bones **Chest CT**				ct_chest_skeleton	
	Probability of focal lesions in the chest bones	Integer number in the range of 0–100		ct_chest_skeleton_nodule _conf_level	
	Mean density of the focal lesions	Integer number		ct_chest_skeleton_nodule_hu	
	Diameter of abnormality the size of 5 to 10 mm, mm	Integer number		ct_chest_skeleton_nodule_lin	
	Linear dimensions (long and perpendicular short axes; vertical) for abnormality the size of >10 mm, mm	Integer number		ct_chest_skeleton_nodule_lin2	
Detection of CT signs consistent with rib fracture **Chest CT**				ct_rib_fracture	
	Probability of signs of rib fracture	Integer number in the range of 0–100		ct_rib_fracture_conf_level	
	Fracture site (rib number)	Text		ct_rib_fracture_local	
	Degree of diastasis	Integer number		ct_rib_fracture_diast	

Table 3.1 (continued)

Detection of signs of urolithiasis **Abdominal CT**				ct_urinary	
	Probability of the presence of radiodense urinary calculi	Integer number in the range of 0–100		ct_urinary_conf_level	
	Size of the calculus / the largest calculus (maximum) in the right kidney, mm	Integer number		ct_urinary_rk_max_size	
	Size of the calculus / the largest calculus (perpendicular to the maximum calculus) in the right kidney, mm	Integer number		ct_urinary_rk_additional_size	
	Size of the calculus / the largest calculus (vertical) in the right kidney, mm	Integer number		ct_urinary_rk_vertical_size	
	Mean density of the calculus / the largest calculus in the right kidney, HU	Integer number		ct_urinary_rk_density	
	Size of the calculus / the largest calculus (maximum) in the left kidney, mm	Integer number		ct_urinary_lk_max_size	
	Size of the calculus / the largest calculus (perpendicular to the maximum calculus) in the left kidney, mm	Integer number		ct_urinary_lk_additional_size	
	Size of the calculus / the largest calculus (vertical) in the left kidney, mm	Integer number		ct_urinary_lk_vertical_size	
	Mean density of the calculus / the largest calculus in the left kidney, HU	Integer number		ct_urinary_lk_density	
	Size of the calculus / the largest calculus (maximum) in the right ureter, mm	Integer number		ct_urinary_ru_max_size	

Table 3.1 (continued)

	Size of the calculus / the largest calculus (perpendicular to the maximum calculus) in the right ureter, mm	Integer number		ct_urinary_ru_additional_size	
	Size of the calculus / the largest calculus (vertical) in the right ureter, mm	Integer number		ct_urinary_ru_vertical_size	
	Mean density of the calculus / the largest calculus in the right ureter, HU	Integer number		ct_urinary_ru_density	
	Size of the calculus / the largest calculus (maximum) in the left ureter, mm	Integer number		ct_urinary_lu_max_size	
	Size of the calculus / the largest calculus (perpendicular to the maximum calculus) in the left ureter, mm	Integer number		ct_urinary_lu_additional_size	
	Size of the calculus / the largest calculus (vertical) in the left ureter, mm	Integer number		ct_urinary_lu_vertical_size	
	Mean density of the calculus / the largest calculus in the left ureter, HU	Integer number		ct_urinary_lu_density	
	Size of the calculus / the largest calculus (maximum) in the bladder, mm	Integer number		ct_urinary_bl_max_size	
	Size of the calculus / the largest calculus (perpendicular to the maximum calculus) in the bladder, mm	Integer number		ct_urinary_bl_additional_size	
	Size of the calculus / the largest calculus (vertical) in the bladder, mm	Integer number		ct_urinary_bl_vertical_size	
	Mean density of the calculus / the largest calculus in the bladder, HU	Integer number		ct_urinary_bl_density	

Table 3.1 (continued)

Detection of signs consistent with the focal lesions in the skeleton bones **Abdominal CT**				ct_abdomen_skeleton	
	Probability of focal lesions in the bones	Integer number in the range of 0–100		ct_abdomen_skeleton_nodule _conf_level	
	Mean density of the focal lesion	Integer number		ct_abdomen_skeleton_nodule_hu	
	Diameter of abnormality the size of 5 to 10 mm, mm	Integer number		ct_abdomen_skeleton_nodule_lin	
	Linear dimensions (long and perpendicular short axes; vertical) for abnormality the size of >10 mm, mm	Text. Размеры через ;		ct_abdomen_skeleton_nodule_lin2	
Detection of liver lesions **Abdominal CT**				ct_liver_cancer	
	Probability of liver lesions	Integer number in the range of 0–100		ct_liver_cancer_conf_level	
	Localization of the lesions by lever lobe (right or left)	Text		ct_liver_cancer_lobe	Example: Right lobe
	Maximum lesion density (for lesions of ≥ 5 mm), HU	Text		ct_liver_cancer_max_density	Example: #1: 9 HU; #2: 31 HU
	Minimum lesion density (for lesions of ≥ 5 mm), HU	Text		ct_liver_cancer_min_density	Example: #1: 4 HU; #2: 28 HU
	Maximum size / diameter of the lesion, mm	Text		ct_liver_cancer_long_size	Example: #1: 42 mm; #2: 50 mm
	Size of the lesion (perpendicular to the maximum size), mm	Text		ct_liver_cancer_additional_size	Example: #1: 28 mm; #2: 40 mm
	Mean liver density, HU	Integer number		ct_liver_cancer_density	
	Size of the lesion (vertical), mm	Text		ct_liver_cancer_vertical_size	Example: #1: 35 mm; #2: 49 mm

Detection of CT signs consistent with gallbladder stones **Abdominal CT**				ct_bladder_stones	
	Probability of stones in the gallbladder	Integer number in the range of 0–100		ct_bladder_stones_conf_level	
	Integer number for the largest stone diameter	Integer number		ct_bladder_stones_max	
	Number of stones	Integer number		ct_bladder_stones_n	
Detection of CT signs consistent with renal lesions **Abdominal CT**				ct_kidneys_lesion	
	Probability of renal lesions	Integer number in the range of 0–100		ct_kidneys_lesion_conf_level	
	Size of each lesion (maximum), mm	Integer number		ct_kidneys_lesion_max_size	
	Localization of the lesions by organ (right or left kidney)	Text		ct_kidneys_lesion_rol	Example: Left kidney
	Maximum lesion density (for lesions of ≥ 5 mm), HU	Text		ct_kidneys_lesion_max_density	Example: #1: 9 HU; #2: 31 HU
	Minimum lesion density (for lesions of ≥ 5 mm), HU	Text		ct_kidneys_lesion_min_density	Example: #1: 4 HU; #2: 28 HU
	Maximum size / diameter of the lesion, mm	Text		ct_kidneys_lesion_long_size	Example: #1: 42 mm; #2: 50 mm
	Size of the lesion (perpendicular to the maximum size), mm	Text		ct_kidneys_lesion_additional_size	Example: #1: 28 mm; #2: 40 mm
	Size of the lesion (vertical), mm	Text		ct_kidneys_lesion_vertical_size	Example: #1: 35 mm; #2: 49 mm
Measuring the abdominal aorta dilation **Abdominal CT**				ct_aorta_abdomen	
	Probability of dilated abdominal aorta	Integer number in the range of 0–100		ct_aorta_abdomen_conf_level	
	Largest diameter of the abdominal aorta, mm	Integer number		ct_aorta_abdomen_max	
	Calcifications in the abdominal aorta walls	Text	Specified format	ct_aorta_abdomen_calcification	Example: Absence

Table 3.1 (continued)

Detection of adrenal lesions **Abdominal CT** **Chest CT**				ct_adrenal	
	Probability of adrenal lesions	Integer number in the range of 0–100		ct_adrenal_conf_level	
	Axial size of the largest mass in left adrenal gland along the short axis, mm	Integer number		ct_adrenal_la_lesion_max_size	
	Axial size of the largest mass in right adrenal gland along the short axis, mm	Integer number		ct_adrenal_ra_lesion_max_size	
	Size of the left adrenal gland body along the short axis (thickness), mm	Integer number		ct_adrenal_la_body_size	
	Size of the medial limb of the left adrenal gland along the short axis (thickness), mm	Integer number		ct_adrenal_la_medial_size	
	Size of the lateral limb of the left adrenal gland along the short axis (thickness), mm	Integer number		ct_adrenal_la_lateral_size	
	Size of the right adrenal gland body along the short axis (thickness), mm	Integer number		ct_adrenal_ra_body_size	
	Size of the medial limb of the right adrenal gland along the short axis (thickness), mm	Integer number		ct_adrenal_ra_medial_size	
	Size of the lateral limb of the right adrenal gland along the short axis (thickness), mm	Integer number		ct_adrenal_ra_lateral_size	

Table 3.1 (continued)

Detection and localization of compression vertebral fractures with a degree of vertebral body deformity of over 25% according to the Genant semi-quantitative scale, grades 2–3 **Abdominal CT**				ct_comp_fracture	
	Probability of at least one vertebra with over 25 % height loss	Integer number in the range of 0–100		ct_comp_fracture_conf_level	
	Listing the localizations of all vertebrae with height loss over 25% indicating the degree of compression	Text		ct_comp_fracture_localization	
	Measurement of the mineral density (or HU) of the cancellous bone of Th12–L3 vertebral bodies indicating the vertebra index Suspected osteoporosis as per the ACR 2018, ISCD 2019 criteria	Text		ct_comp_fracture_hu	
Automation of routine liver measurements (dimensions, liver density, choledochus diameter, portal vein diameter) **Abdominal CT**				ct_liver	
	Vertical dimension of the right liver lobe	Integer number		ct_liver_right_lobe_a	
	Anteroposterior dimension of the right liver lobe	Integer number		ct_liver_right_lobe_b	
	Transverse dimension of the right liver lobe	Integer number		ct_liver_right_lobe_c	
	Mean density of the liver parenchyma	Integer number		ct_liver_hu	
	Maximum diameter of the common bile duct	Integer number		ct_liver_bile_duct	
	Portal vein diameter	Integer number		ct_liver_portal	

Automation of routine kidney measurements (kidney size, pelvicalyceal system size) **Abdominal CT**				ct_kidney	
	A position of the upper edge of each kidney in relation to the vertebral body	Text		ct_kidney_vert	
	Length of the left kidney	Integer number		ct_kidney_r_a	
	Width of the left kidney	Integer number		ct_kidney_r_b	
	Length of the right kidney	Integer number		ct_kidney_l_a	
	Width of the right kidney	Integer number		ct_kidney_l_b	
	Smallest thickness of right kidney parenchyma	Integer number		ct_kidney_r_parenchyma	
	Smallest thickness of left kidney parenchyma	Integer number		ct_kidney_l_parenchyma	
	Largest dimensions of the right renal pelvis in the axial plane, mm	Integer number		ct_kidney_r_pelvis_ax	
	Largest dimensions of the right renal pelvis in the frontal plane, mm	Integer number		ct_kidney_r_pelvis_fr	
	Largest dimensions of the left renal pelvis in the axial plane, mm	Integer number		ct_kidney_l_pelvis_ax	
	Largest dimensions of the left renal pelvis in the frontal plane, mm	Integer number		ct_kidney_l_pelvis_fr	
Automation of routine measurements of spleen and pancreas (size, density of the spleen and pancreas) **Abdominal CT**				ct_spleen	
	Spleen length	Integer number		ct_spleen_a	
	Spleen width	Integer number		ct_spleen_b	
	Spleen height	Integer number		ct_spleen_c	
	Head of the pancreas	Integer number		ct_spleen_head	
	Body of the pancreas	Integer number		ct_spleen_body	
	Tail of the pancreas	Integer number		ct_spleen_tail	

Table 3.1 (continued)

Detection of acute ischemic stroke and its ASPECTS score **Head CT**				ct_stroke	
	Probability of acute ischemic stroke areas	Integer number in the range of 0–100		ct_stroke_conf_level	
	ASPECTS	Integer number in the range of 0–10		ct_stroke_aspects0	
	ASPECTS not applicable	Integer number: 0 or 100		ct_stroke_aspects	0 – the score is applicable 100 – the score is not applicable
Detection of hemorrhage and its automatic volume calculation in ml or cm³ **Head CT**				ct_brain	
	Probability of hemorrhage	Integer number in the range of 0–100		ct_brain_conf_level	
	Epidural (EDH)	Integer number in the range of 0–100		ct_brain_edh	
	Subdural (SDH)	Integer number in the range of 0–100		ct_brain_sdh	
	Subarachnoid (SAH)	Integer number in the range of 0–100		ct_brain_sah	
	Intracerebral (intracerebral hemorrhage)	Integer number in the range of 0–100		ct_brain_ih	
	Hemorrhage volume in ml or cm³	Text		ct_brain_volume	
Automation of routine measurements (ventriculometry, displacement of median structures,				ct_brain_sizes	
	Value of the transverse dislocation, if present (mm)	Integer number		ct_brain_sizes_disloc	
	VCR 1	Integer number		ct_brain_sizes_vkk1	
	VCR 2	Integer number		ct_brain_sizes_vkk2	
	VCR 3	Integer number		ct_brain_sizes_vkk3	

measurement of the craniovertebral junction) **Head CT**	Width of the 3rd ventricle	Integer number		ct_brain_sizes_3ventr	
Detection and localization of (at least 7) signs consistent with the priority disease **Chest XR**				dx	
	General probability of a finding in the study	Integer number in the range of 0–100		dx_conf_level	
	Probability of a finding in the entire study. Pleural effusion	Integer number in the range of 0–100		dx_conf_level_pleural	
	Probability of a finding in the entire study. Pneumothorax	Integer number in the range of 0–100		dx_conf_level_pneumothorax	
	Probability of a finding in the entire study. Nodular opacity	Integer number in the range of 0–100		dx_conf_level_blackout	
	Probability of a finding in the entire study. Infiltration / consolidation	Integer number in the range of 0–100		dx_conf_level_infiltration	
	Probability of a finding in the entire study. Dissemination	Integer number in the range of 0–100		dx_conf_level_dissemination	
	Probability of a finding in the entire study. Cavity	Integer number in the range of 0–100		dx_conf_level_cavity	
	Probability of a finding in the entire study. Atelectasis	Integer number in the range of 0–100		dx_conf_level_atelectasis	
	Probability of a finding in the entire study. Calcification/calcified pulmonary nodule	Integer number in the range of 0–100		dx_conf_level_calcification	
	Probability of a finding in the entire study. Mediastinum widening	Integer number in the range of 0–100		dx_conf_level_dilatation	
	Probability of a finding in the entire study. Cardiomegaly	Integer number in the range of 0–100		dx_conf_level_cardiomegaly	

	Probability of a finding in the entire study. Cortical bone fracture	Integer number in the range of 0–100		dx_conf_level_cortical	
	Probability of a finding in the entire study. Consolidated fracture	Integer number in the range of 0–100		dx_conf_level_fracture	
Detection of signs (at least one) consistent with bone fracture **MSS XR**				dx_fracture	
	Probability of the presence of X-ray signs (at least one) consistent with bone fracture	Integer number in the range of 0–100		dx_fracture_conf_level	
	Level of diastasis of the bone fragments	Text		dx_fracture_diastasis	
Detection of radiologic signs (at least one) consistent with arthrosis of the joints **MSS XR**				dx_arthrosis	
	Probability of the presence of the indicated radiologic signs (at least one) in the study.	Integer number in the range of 0–100		dx_arthrosis_conf_level	
	No arthrosis on the right	Integer number in the range of 0–100		dx_arthrosis_absence_right	
	No arthrosis on the left	Integer number in the range of 0–100		dx_arthrosis_absence_left	
	arthrosis stage 1 on the right	Integer number in the range of 0–100		dx_arthrosis_stage1_right	
	arthrosis stage 1 on the left	Integer number in the range of 0–100		dx_arthrosis_stage1_left	
	arthrosis stage 2 on the right	Integer number in the range of 0–100		dx_arthrosis_stage2_right	
	arthrosis stage 2 on the left	Integer number in the range of 0–100		dx_arthrosis_stage2_left	
	arthrosis stage 3 on the right	Integer number in the range of 0–100		dx_arthrosis_stage3_right	
	arthrosis stage 3 on the left	Integer number in the range of 0–100		dx_arthrosis_stage3_left	

Table 3.1 (continued)

Detection of radiological signs (at least one) consistent with deforming arthrosis of the hip **MSS XR**				dx_hip_arthrosis	
	Probability of target pathology	Integer number in the range of 0–100		dx_hip_arthrosis_conf_level	
	Value of the joint space on X-ray	Integer number		dx_hip_arthrosis_joint_space	
	Probability of osteophytes	Integer number in the range of 0–100		dx_hip_osteophytes_conf_level	
	Severity of the signs according to the classification (arthrosis stages 1-3)	Integer number		dx_hip_arthrosis_stage	
	Probability of aseptic necrosis	Integer number in the range of 0–100		dx_hip_necrosis_conf_level	
Detection of radiological signs (at least one) consistent with the fracture of the shoulder joint bones **MSS XR**				dx_brachial_fracture	
	Probability of the signs of target pathology	Integer number in the range of 0–100		dx_brachial_fracture_conf_level	
	Level of diastasis of the bone fragments	Integer number		dx_brachial_diastasis	
Detection of radiological signs (at least one) consistent with the fracture of the hip joint bones **MSS XR**				dx_hip_fracture	
	Probability of the signs of target pathology	Integer number in the range of 0–100		dx_hip_fracture_conf_level	
	Level of diastasis of the bone fragments	Integer number		dx_hip_diastasis	

Table 3.1 (continued)

Detection of radiological signs (at least one) consistent with the fracture of the ankle joint bones **MSS XR**				dx_ankle_fracture	
	Probability of the signs of target pathology	Integer number in the range of 0–100		dx_ankle_fracture_conf_level	
	Level of diastasis of the bone fragments	Integer number		dx_ankle_diastasis	
Detection of reduced pneumatization / opacity of the paranasal sinuses **Head XR**				dx_sinusitis	
	Probability of sinusitis in each sinus	Number		dx_sinusitis_conf_level	
	Localization of findings	Text		dx_sinusitis_localization	
	Calculating the opacified area as a percentage of the total area of the sinus (for each sinus with abnormal content)	Text		dx_sinusitis_area	
Detection of signs (at least one) consistent with transverse flat foot **MSS XR**				dx_flat_foot	
	Probability of the signs of transverse flat foot, incl. its grade	Integer number in the range of 0–100		dx_flat_foot_conf_level	
	Longitudinal arch angle	Integer number		dx_flat_foot_angl	
	Longitudinal arch height	Integer number		dx_flat_foot_hight	
	Probability of H.Valgus signs	Integer number in the range of 0–100		dx_flat_foot_valgus_conf_level	
	H.Valgus stage	Integer number		dx_flat_foot_valgus_stage	
	Intermetatarsal angle	Integer number		dx_flat_foot_intertarsal_angle	
	Angle of deviation of the big toe	Integer number		dx_flat_foot_1_angle	

Detection of signs (at least one) consistent with the longitudinal flat foot in the lateral plane **MSS XR**				dx_flatfoot	
	Probability of the presence of the indicated radiologic signs (at least one) consistent with the flat foot in the study.	Integer number in the range of 0–100		dx_flatfoot_conf_level	
	Longitudinal arch angle, stage I–III on the right	Integer number		dx_flatfoot_arch_height_right	
	Longitudinal arch angle, stage I–III on the left	Integer number		dx_flatfoot_arch_height_left	
	Longitudinal arch height, stage I–III on the right	Integer number		dx_flatfoot_arch_angle_right	
	Longitudinal arch height, stage I–III on the left	Integer number		dx_flatfoot_arch_angle_left	
	No flat foot on the right	Integer number in the range of 0–100		dx_flatfoot_absence_right	
	No flat foot on the left	Integer number in the range of 0–100		dx_flatfoot_absence_left	
	Flat foot grade 1 on the right	Integer number in the range of 0–100		dx_flatfoot_degree1_right	
	Flat foot grade 1 on the left	Integer number in the range of 0–100		dx_flatfoot_degree1_left	
	Flat foot grade 2 on the right	Integer number in the range of 0–100		dx_flatfoot_degree2_right	
	Flat foot grade 2 on the left	Integer number in the range of 0–100		dx_flatfoot_degree2_left	
	Flat foot grade 3 on the right	Integer number in the range of 0–100		dx_flatfoot_degree3_right	
	Flat foot grade 3 on the left	Integer number in the range of 0–100		dx_flatfoot_degree3_left	

Table 3.1 (continued)

Detection of the signs of osteoporosis: detection and localization of compression vertebral fractures with a degree of height loss of over 25% as well as the radio density measurements of vertebral bodies **Spine XR**				dx_comp_fracture	
	Probability of at least one vertebra with over 25 % height loss	Integer number in the range of 0–100		dx_comp_fracture_conf_level	
	List of vertebrae numbers with over 25 % height loss, indicating the degree of compression as a fractional number rounded to two decimal places	Text	Example: (Th12:34,54 ; L2:56,23)	dx_comp_fracture_localization	ZZ: XXX
	List of all vertebrae numbers excluding those mentioned above with over 25 % height loss and the radio density (HU) for Th11–L4 vertebrae	Text	Example: (Th11;87,45 ; L1:98,32; L3: 103.23)	dx_comp_fracture_localization1	
	Separately – indicate a of the degree of hight loss for the vertebra with the highest degree of deformity	Text	Example (56,23)	dx_comp_fracture_degree	
	Separately – indicate the mean density for Th11–L4	Text	Example (93,33)	dx_comp_fracture_average	
	Indicate the mean density for L1–L4	Text	Example (10,77)	dx_comp_fracture_density	
	Where the AI service uses binary classification, it is possible to add more parameters, such as “probability of finding” calculated as a number in range between 0 to 1 that allow to detect the probability of compression fracture in a given patient with more accuracy	Text		dx_comp_fracture_other	

Detection of signs consistent with osteochondrosis in the frontal and/or sagittal plane **Spine XR**				dx_osteochondrosis	
	Probability of the X-ray signs consistent with osteochondrosis in the study	Integer number in the range of 0–100		dx_osteochondrosis_conf_level	
	A. 1. Disc height reduction (as compared to the above disc). 2. Spondylolisthesis. 3. Marginal osteophytes. 4. Subchondral osteosclerosis	Text		dx_osteochondrosis_type	
Detection of signs consistent with scoliosis in the frontal plane **Spine XR**				dx_scoliosis	
	Probability of the X-ray sign A in the study	Integer number in the range of 0–100		dx_scoliosis_conf_level	
	Grade I	Integer number in the range of 0–100		dx_scoliosis_degree1	
	Grade II	Integer number in the range of 0–100		dx_scoliosis_degree2	
	Grade III	Integer number in the range of 0–100		dx_scoliosis_degree3	
	Grade IV	Integer number in the range of 0–100		dx_scoliosis_degree4	
Detection of signs consistent with spondylolisthesis in the sagittal plane **Spine XR**				dx_spondylolisthesis	
	Probability of the X-ray signs consistent with spondylolisthesis in the study	Integer number in the range of 0–100		dx_spondylolisthesis_conf_level	
	Grade I	Integer number in the range of 0–100		dx_spondylolisthesis_degree1	
	Grade II	Integer number in the range of 0–100		dx_spondylolisthesis_degree2	
	Grade III	Integer number in the range of 0–100		dx_spondylolisthesis_degree3	
	Grade IV	Integer number in the range of 0–100		dx_spondylolisthesis_degree4	

Detection and localization of findings consistent with breast cancer **MMG**				mmg	
	Probability of breast cancer (C50) signs in the entire study	Integer number in the range of 0–100		mmg_conf_level	
	BI-RADS 0 (right)	Integer number in the range of 0–100		mmg_rads0_right	
	BI-RADS 1 (right)	Integer number in the range of 0–100		mmg_rads1_right	
	BI-RADS 2 (right)	Integer number in the range of 0–100		mmg_rads2_right	
	BI-RADS 3 (right)	Integer number in the range of 0–100		mmg_rads3_right	
	BI-RADS 4 (right)	Integer number in the range of 0–100		mmg_rads4_right	
	BI-RADS 5 (right)	Integer number in the range of 0–100		mmg_rads5_right	
	BI-RADS 0 (left)	Integer number in the range of 0–100		mmg_rads0_left	
	BI-RADS 1 (left)	Integer number in the range of 0–100		mmg_rads1_left	
	BI-RADS 2 (left)	Integer number in the range of 0–100		mmg_rads2_left	
	BI-RADS 3 (left)	Integer number in the range of 0–100		mmg_rads3_left	
	BI-RADS 4 (left)	Integer number in the range of 0–100		mmg_rads4_left	
	BI-RADS 5 (left)	Integer number in the range of 0–100		mmg_rads5_left	
	PGMI (right)	Text		mmg_pgmi_right	
	PGMI (left)	Text		mmg_pgmi_left	
	ACR (right)	Text		mmg_acr_right	
	ACR (left)	Text		mmg_acr_left	
	Percent probability that the finding will be classified as a malignant neoplasm	Text		mmg_malignancy	#1:XX, #6: XX

	Percent probability that the finding will be classified as a benign neoplasm	Text		mmg_benign	#1:XX, #6: XX
	Percent probability that the finding will be classified as suspicious calcifications	Text		mmg_calcification	#1:XX, #6: XX
	Percent probability that the finding will be classified as pathological lymph nodes	Text		mmg_lymph	#1:XX, #6: XX
	Percent probability that the finding will be classified as skin thickening	Text		mmg_thickening	#1:XX, #6: XX

Table 3.1 (continued)

Detection of multiple sclerosis **Brain MRI**				mri_sclerosis	
	Probability of multiple sclerosis	Integer number in the range of 0–100		mri_sclerosis_conf_level	
	Total number of demyelination foci on non-contrast series	Text		mri_sclerosis_sum	
	Number of contrast-enhanced foci	Text		mri_sclerosis_sum_contrast	
	Volume of demyelination foci in each site (juxtacortical and subcortical, periventricular, infratentorial)	Text		mri_sclerosis_volume	
Detection and localization of intracranial neoplasms (extracerebral, intracerebral) **Brain MRI**				mri_brain	
	Probability of the MRI sign in the entire study	Integer number in the range of 0–100		mri_brain_conf_level	
	Number of the intracranial neoplasms on T2-WI	Text		mri_brain_sum	
	Number of the intracranial neoplasms on post-contrast T1-WI	Text		mri_brain_sum_contrast	
	Size of each neoplasm along two axes on T2 FLAIR and post-contrast T1-WI	Text		mri_brain_size	
	Volume of each neoplasm on T2 FLAIR and post-contrast T1-WI	Text		mri_brain_volume	

Table 3.1 (continued)

Automation of routine measurements (ventriculometry, displacement of median structures, measurement of the craniovertebral junction, changes in white matter, intracranial measurements) **Brain MRI**				mri_brain_sizes	
	Value of the transverse dislocation, if present (mm)	Integer number		mri_brain_sizes_disloc	
	VCR 1	Integer number		mri_brain_sizes_vkk1	
	VCR 2	Integer number		mri_brain_sizes_vkk2	
	VCR 3	Integer number		mri_brain_sizes_vkk3	
	Width of the 3rd ventricle	Integer number		mri_brain_sizes_3ventr	
	displacement of the cerebellar tonsils in relation to the foramen magnum (mm)	Integer number		mri_brain_sizes_tonsils_level	
	downward displacement of the cerebellar tonsils	Integer number		mri_brain_sizes_tonsils_stage	
	White matter hyperintensities (WMHs), grades	Integer number		mri_brain_sizes_hyperintensity_stage	
	Volume of WMH sites (total)	Integer number		mri_brain_sizes_hyperintensity_vol	
	Intracranial volume	Integer number		mri_brain_sizes_intracranial_vol	
	Brain volume	Integer number		mri_brain_sizes_vol	
	Volume of intracranial cerebrospinal fluid	Integer number		mri_brain_sizes_liquor_vol	
Detection of signs consistent with the focal lesions in the cervical spinal cord **Cervical spine MRI**				mri_vert_cr_nodule	
	Signs of focal changes in MRI appearance of the vertebrae	Integer number in the range of 0–100		mri_vert_cr_nodule_conf_level	
	Anteroposterior diameter of the focal changes in MRI appearance of the vertebrae	Integer number		mri_vert_cr_nodule_level_a	
	Transverse	Integer number		mri_vert_cr_nodule_level_b	
	Vertical	Integer number		mri_vert_cr_nodule_level_c	
	presence/absence of contrast fluid	Integer number	0 or 1	mri_vert_cr_contrast	

Table 3.1 (continued)

Detection and localization of MRI signs (at least one) consistent with degenerative changes in the cervical discs on sagittal and axial T2-WI **Cervical spine MRI**				mri_vert_cr_stenosis	
	Probability of the MRI sign in the entire study	Integer number in the range of 0–100		mri_vert_cr_stenosis_conf_level	
	Anteroposterior diameter of the protruded discs in sagittal planes (mm)	Integer number		mri_vert_cr_stenosis_level	
	Dural sac measurements	Integer number		mri_vert_cr_dural_sac_level	
Detection and localization of MRI signs (at least one) consistent with degenerative changes in the thoracic discs on sagittal and axial T2-WI **Thoracic spine MRI**				mri_discs_damage	
	Probability of the MRI sign in the entire study	Integer number in the range of 0–100		mri_discs_damage_conf_level	
	Anteroposterior diameter of the protruded discs in sagittal planes (mm)	Integer number		mri_discs_damage_level	
	Dural sac measurements	Integer number		mri_discs_dural_sac_level	
Detection of signs consistent with the focal lesions in the thoracic spinal cord **Thoracic spine MRI**				mri_vert_br_nodule	
	Signs of focal changes in MRI appearance of the vertebrae	Integer number in the range of 0–100		mri_vert_br_nodule_conf_level	
	Anteroposterior diameter of the focal changes in MRI appearance of the vertebrae	Integer number		mri_vert_br_nodule_level_a	
	Transverse	Integer number		mri_vert_br_nodule_level_b	
	Vertical	Integer number		mri_vert_br_nodule_level_c	
	presence/absence of contrast fluid	Integer number	0 or 1	mri_vert_br_contrast	

Detection and localization of MRI signs (at least one) consistent with degenerative changes in the lumbosacral discs on sagittal and axial T2-WI **Lumbosacral spine MRI**				mri_spine	
	Probability of the MRI signs consistent with degenerative changes in the lumbosacral discs in the entire study	Integer number in the range of 0–100		mri_spine_conf_level	
	Anteroposterior diameter of the protruded discs in sagittal planes (mm)	Text		mri_spine_disk	
	Anteroposterior diameter of the dural sac in axial planes	Text		mri_spine_canal_size_axial	
	Frontal diameter of the dural sac in axial planes	Text		mri_spine_canal_size_front	
	Anteroposterior diameter of the dural sac in sagittal planes	Text		mri_spine_canal_size_sagittal	
	Area of the subdural cavity at the disc level in axial planes	Text		mri_spine_canal_area	

Table 3.1 (continued)

Detection of signs consistent with the focal lesions in the lumbosacral spinal cord **Lumbosacral spine MRI**				mri_vert_ls_nodule	
	Signs of focal changes in MRI appearance of the vertebrae	Integer number in the range of 0–100		mri_vert_ls_nodule_conf_level	
	Anteroposterior diameter of the focal changes in MRI appearance of the vertebrae	Integer number		mri_vert_ls_nodule_level_a	
	Transverse	Integer number		mri_vert_ls_nodule_level_b	
	Vertical	Integer number		mri_vert_ls_nodule_level_c	
	presence/absence of contrast fluid	Integer number	0 or 1	mri_vert_ls_contrast	
Detecting signs consistent with the areas of cartilage breakdown (chondromalacia) along the articular surfaces of the knee and the patellofemoral joint **Knee joint MRI**				mri_knee_joint_chondromalacia	
	Probability of chondromalacia in the study.	Integer number in the range of 0–100		mri_knee_joint_chondromalacia_conf_level	
	Depth of the cartilage defect	Integer number		mri_knee_joint_chondromalacia_depth	
	Two linear dimensions of the cartilage defect (1)	Integer number		mri_knee_joint_chondromalacia_level_1	
	Two linear dimensions of the cartilage defect (2)	Integer number		mri_knee_joint_chondromalacia_level_2	
	Chondromalacia grading	Integer number		mri_knee_joint_chondromalacia_stage	
Automated routine measurements of the prostate gland (dimensions) **Lesser pelvis MRI**				mri_prostate	
	Sagittal (anteroposterior)	Integer number		mri_prostate_level_1	
	Frontal (transverse)	Integer number		mri_prostate_level_2	
	Vertical (longitudal)	Integer number		mri_prostate_level_3	
	Volume, cm^3	Integer number		mri_prostate_vol	

Table 3.1 (continued)

Automated routine measurements of the uterus (corpus and cervix: position, dimensions, displacements) **Lesser pelvis MRI**				mri_uterus	
	Uterus position version and flexion	Text		mri_uterus_position	
	Linear dimensions of corpus and cervix (longitudal, transverse and vertical / anteroposterior)	Text		mri_uterus_level	
	Endometrium: thickness, signal homogeneity, regularity of the endometrial border, presence of inclusions and artefacts, signal intensity	Text		mri_uterus_endometrium_level	
	Junctional area: thickness, contours, homogeneity and intensity of the signal, inclusions	Text		mri_uterus_tz_level	
	Myometrium: thickness, contours, homogeneity and intensity of the signal, inclusions	Text		mri_uterus_myometrium_level	
	Absent uterus: message about the absence of the target organ	Text		mri_uterus_present	
	Ovaries: length, width and height (mm), inclusions and their MRI appearance	Text		mri_ovaries_level	
* Fields displaying the degree of damage may provide continuous (example: CT0 – 10, CT1 – 20, CT2 – 60, CT3 – 7, CT4 – 3) or discrete (example: CT2 – 100) probability distribution (the latter may apply if the AI service is capable of definitively identifying the degree of damage).					

Appendix 4

AI SERVICE MESSAGE FORMAT IN THE DICOMREPORTNOTIFY TOPIC


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}
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Appendix 5

AI SERVICE MESSAGE FORMAT IN THE PUMCONSUMERERROR TOPIC


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   "aiResult": {
      "modelId": 1000,
      "error":"case of error",
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         "downloadEndDT": "<dateTime>"
      }
   }
}
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Appendix 6

AI SERVICE MESSAGE FORMAT FOR THE ORIGINALDICOMSENDERNOTIFY TOPIC


```
{
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 "modelId":1000,
 "studyDate":"2020-04-02T18:30:17 03:00",
 "researchParams":{
  "modalityTypeCode":"CT",
  "anatomicalAreasCode":["CHEST"],
  "ageGroup":"ADULT"
 }
}
```

Appendix 7

REQUIREMENTS FOR FILLING OUT DICOM TAGS

The number of characters in the tags (0020,000E) and (0008,0018) must not exceed 64. If the OriginalSeriesUID length exceeds 56 characters, it must be shortened to 56 characters and ended with a suffix using a mask from the table below.

Table 7.1 – Requirements for filling out DICOM tags

Key	Key description	DICOM Tag	Tag description
Series number	Series mask {OriginalSeriesUID}.{modelId}.{addId}	0020,000E	Series Instance UID
Inventory number	The value is taken from the original study	0008.0050	Accession Number
Patient number	The value is taken from the original study	0010.0020	Patient ID
Issuer of Patient ID	The value is taken from the original study	0010.0021	Issuer of Patient ID
Sequence number	The value is taken from the original study	0040.2017	Filler Order Number / Imaging Service Request
Series name	Contains the name of AI service. Should match the service name in DICOM SR.	0008,103E	Series Description
Modality	Corresponds to the original study modality	0008.0060	Modality
Service name		0008.0080	Institution Name
Software version		0008.1040	Institutional Department Name
Date of test		0008.0022	Acquisition Date
Time of test		0008.0032	Acquisition Time
Probability of a finding in the study		0008.1070	Operators' Name

Appendix 8

REQUIREMENTS FOR THE CONTENT OF THE "REPORT" SECTION OF DICOM SR

Table 8.1 – Requirements for the content of the "Report" section of DICOM SR

Modality	Target pathology	Report must contain
All	**All**	– Localization of findings ("Region of interest in the target organ"); – measurement of findings ("Volume _____ – ___", finding type, measurement units (ml, %, mm)).
Chest CT	COVID-19	– Percentage of lung tissue involvement for each lung ("Pulmonary parenchymal involvement: __% of the right lung, __% of the left lung").
	Change in lung airness	– Probability of lung airness impairment – Site localization by side (left or right) and lobe
	Malignant neoplasms of the lungs	– Probability of a pathological pulmonary nodule; – mean size (mm) of each nodule (through to 4 nodules; in presence of ≥ 5 nodules whose mean diameter is ≥ 6 mm the largest one must be measured); – volume of each nodule (through to 4 nodules; in presence of ≥ 5 nodules whose mean diameter is ≥ 6 mm the largest one must be measured);
	Malignant neoplasms of the lungs according to LDCT	– Probability of the signs of a malignant neoplasm in the entire study – volume (mm^3) of each pulmonary nodule; – mean size (mm) of each pulmonary nodule; – classification of the pulmonary nodules using Lung-RADS (v.1.1)
	Dilation of ascending and descending thoracic aorta	– Probability of aortic dilation according to one of the signs; – largest diameter of the ascending aorta, mm; – largest diameter of the descending aorta, mm; – (optional) calcifications in the aorta walls
	Dilation of the pulmonary trunk and measurement of the pulmonary trunk diameter	– probability of the pulmonary trunk dilation – largest diameter of the pulmonary trunk, mm
	Ischaemic heart disease (Coronary calcium)	– Probability of coronary calcium – Agatston score – CAC-DRS category depending on the severity of the calcification

Modality	Target pathology	Report must contain
	Ischemic heart disease (paracardial fat)	– Probability of paracardial fat, volume ≥ 200 ml – Paracardial fat volume, ml – Mean paracardial fat density, HU
	Pulmonary emphysema	– Probability of emphysema – Numerical value of the percent emphysema in both lungs and each lung separately; – Localization of findings
	Free pleural fluid (effusion)	– Probability of pleural effusion – Volume of pleural effusion in ml or cm^3 for each lung – Mean effusion density in HU for each lung
	Enlarged intrathoracic lymph nodes (lymphadenopathy)	– Probability of enlarged lymph nodes – Size of the largest lymph node, mm – (Optional) Calcified intrathoracic lymph nodes – (Optional) Classification of lymph nodes as per IASLC
	Pulmonary tuberculosis	– Probability of signs of tuberculosis – Localization of findings
	Sarcoidosis	– Probability of signs of sarcoidosis – Localization of findings – Classification of the detected changes by the disease stage
	Bronchiectatic disease	– Probability of bronchiectatic disease – Broncho-arterial ratio

Modality	Target pathology	Report must contain
	Compression fracture of vertebral bodies	– Localization of vertebrae with a degree of vertebral compression deformity (the ratio of the lowest height of the vertebral body in the anterior, middle or posterior part to the greatest height of another part of the vertebral body) over 25% (“Measurement of the loss of vertebral body(ies) height: ‘vertebra number’ – ‘compression degree, %’”) – (optional) measurement of the bone mineral density (mg/mL) or radio density (HU) of the cancellous bone of Th12–L3 vertebral bodies indicating the vertebra number (“Measurement of the reduction in the cancellous bone density of the vertebral body(ies): ‘vertebra number’ – ‘radio density, HU’”)* – (optional) suspected osteoporosis as per the ACR 2018, ISCD 2019 criteria – (optional) differential diagnostics of the compression fractures and wedge deformities of the vertebral bodies. * Bone mineral density or radio density are not measured for vertebrae with height loss greater than 25%.
	Focal lesions in the vertebrae	– Probability of focal lesions in the bones – Localisation of the focal lesion indicating the bone name – Mean density of the focal lesion – Linear dimensions of the focal lesion (long and perpendicular short axes), mm – (Optional) vertical size of the focal lesion the size of > 10 mm, mm
	Rib/s fracture	– Probability of signs of rib fracture – Localization of the fracture site (rib number, a side – left/right, a third – anterior/lateral/posterior) – Degree of diastasis
Abdominal CT	Urolithiasis	– Presence of radiodense urinary calculi; – Numerical value of the size of the calculus / the largest calculus in axial plane for each organ of the urinary system (maximum and perpendicular short axis), mm; – Mean density of the calculus / the largest calculus in axial plane for each organ of the urinary system, HU; – (Optional) numerical value of the vertical size of the calculus in sagittal or coronal planes

Modality	Target pathology	Report must contain
	Liver lesions	– Probability of liver lesions – Localization of the lesions by liver lobe (right or left) – Lesion density in HU (for lesions of ≥ 5 mm): minimum, maximum; – Diameter of the lesion whose size ranges between 5 to 10 mm; linear dimensions in mm (long and perpendicular short axis) of the lesions > 10 mm in size – Mean liver density, HU – Vertical linear size of the lesion, mm
	Renal lesions	– Probability of signs of renal lesions on native CT scans – Localization of the lesions by organ (right or left kidney) – Lesion density in HU (for lesions of ≥ 5 mm): minimum, maximum; – Diameter of the lesion whose size ranges between 5 to 10 mm; linear dimensions in mm (long and perpendicular short axis) of the lesions > 10 mm in size – (optional) vertical linear size of the lesion, mm
	Adrenal gland lesions	– Probability of an adrenal gland lesion – Axial size of the largest adrenal gland lesion (if any) along the short axis, mm – (optional) thickness of adrenal body and limbs, mm
	Dilated abdominal aorta	– Probability of dilated abdominal aorta – Largest diameter of the abdominal aorta, mm – (optional) calcifications in the aorta walls

Modality	Target pathology	Report must contain
	Compression fracture of vertebral bodies	– Localization of vertebrae with a degree of vertebral compression deformity (the ratio of the lowest height of the vertebral body in the anterior, middle or posterior part to the greatest height of another part of the vertebral body) over 25% (“Measurement of the loss of vertebral body(ies) height: ‘vertebra number’ – ‘compression degree, %’”) – (optional) measurement of the bone mineral density (mg/mL) or radio density (HU) of the cancellous bone of Th12–L3 vertebral bodies indicating the vertebra number (“Measurement of the reduction in the cancellous bone density of the vertebral body(ies): ‘vertebra number’ – ‘radio density, HU’”)* – (optional) suspected osteoporosis as per the ACR 2018, ISCD 2019 criteria – (optional) differential diagnostics of the compression fractures and wedge deformities of the vertebral bodies. – * Bone mineral density or radio density are not measured for vertebrae with height loss greater than 25%.
	Gallbladder stones	– Probability of stones in the gallbladder – Integer number for the largest stone diameter, mm – Number of stones
	Routine liver measurements	– Vertical anteroposterior and transverse dimensions of the right liver lobe, mm – Mean density of the liver parenchyma, HU – Maximum diameter of the common bile duct, mm – Portal vein diameter, mm
	Routine kidney measurements	– Position of the vertebral body in relation to the upper edge of each kidney – Length, width and thickness of each kidney, mm – Largest dimensions of each renal pelvis in the axial and frontal planes, mm – Smallest thickness of kidney parenchyma
	Routine measurements of spleen and pancreas	– Length, width and height of the spleen – Transverse dimensions of the head, body and tail of the pancreas
	Focal lesions in the vertebrae	– Probability of focal lesions in the bones – Localisation of the focal lesion indicating the bone name – Mean density of the focal lesion – Linear dimensions of the focal lesion (long and perpendicular short axes), mm – (Optional) vertical size of the focal lesion the size of > 10 mm, mm

Modality	Target pathology	Report must contain
Head CT	Intracranial hemorrhage	– Type of hemorrhage (“Type of hemorrhage – __”, epidural, subdural, subarachnoid, or intracerebral); – Hemorrhage volume in ml or cm^3 – (optional) detection of skull fractures
	Ishemic stroke	– Detection of acute Ishemic stroke areas – ASPECTS score; – (optional) post-stroke changes and vascular lesions (location and volume)
	Routine measurements	– Distance of the transverse dislocation (mm) – VCR 1, VCR 2, VCR 3, width of the 3rd ventricle, mm – Downward displacement of the cerebellar tonsils in relation to the foramen magnum, mm – Degree of downward displacement of the cerebellar tonsils
Head XR	Sinusitis	– Probability of the signs of sinusitis – Localization of findings – Calculating the opacified area as a percentage of the total area of the sinus – Presence of changes in the sinus walls
Chest XR	Various lung pathologies pleural effusion, pneumothorax, focal opacity, infiltration/consolidation, dissemination, cavity, atelectasis, calcification/calcified pulmonary nodule, mediastinal widening, cardiomegaly, cortical bone fracture, consolidated fracture	– Probability of signs of the pathology from the list above – Probability of each radiologic sign – Localisation and definitive identification of all findings

Modality	Target pathology	Report must contain
	Pulmonary tuberculosis	– type (lesion, calcification, dissemination, miliary lesions, round mass, cavity in the lung) and localization of pathological findings (side, lobe plane), digital identification, number (single, multiple)
	Pneumonia, purulent and necrotic conditions	– presence of the condition in the entire study (probability, differential diagnosis) semiotics – localization of pathological findings (side, lobe plane)
	Hydrothorax	– presence of the condition in the entire study (probability, differential diagnosis) semiotics – localization of pathological findings (side) – level (number of the highest rib on the posterior segment of which the fluid level is projected), optional)
	Pneumothorax	– probability of the condition in the entire study, semiotics (for example, “collection of air is observed”) – localization of pathological findings (side)
	Atelectasis	– presence of the condition in the entire study (probability, differential diagnosis) semiotics – localization of pathological findings (side, lobe plane)
	Pulmonary masses	– Type and localization of pathological findings (side, lobe plane)
	Cardiomegaly	– presence of the condition in the entire study (probability) semiotics – Cardiothoracic ratio (0-1)
	Mediastinal disease	– presence of the condition in the entire study (probability, differential diagnosis) – type (pneumomediastinum, widening) and localization of pathological findings (part of the mediastinum)
	Rib/s fracture	– presence of the condition in the entire study (probability), disease-specific terms – localization of pathological findings (side, rib number) – displacement (optional)
	Sternum fracture	– presence of the condition in the entire study (probability), disease-specific terms – displacement (optional)
MSS XR	Arthrosis	– Radiological signs in the entire study – localisation of the signs in the entire study – grading the abnormal findings (arthrosis stages 1-3)

Modality	Target pathology	Report must contain
	Fracture	– Detecting radiological signs of a fracture – localisation of the findings – (optional) quantitative estimation of the bone fragment diastasis
	Longitudinal flat foot	– Detecting flat foot in X-ray study – foot height, indicating foot side, if possible (“Longitudinal arch height – __ mm”); – angle of the longitudinal arch, indicating foot side, if possible (“Longitudinal arch angle – __ deg.”);
	Transverse flat foot	– Probability of signs of transverse flat foot – Probability of signs of Hallux Valgus – Intermetatarsal angle, angle of deviation of the big toe, flat foot stage
	Fracture of vertebral bodies	– Presence of at least one vertebra with over 25 % height loss – Listing the localizations of all vertebrae with height loss over 25% – (optional) indicate the degree of height loss
	Osteochondrosis	– Signs of osteochondrosis – Localisation of the findings – List of findings
	Scoliosis	– Signs (probability) of scoliosis – localisation of the findings – deformity angles of the spinal axis (absolute values and/or scoliosis grade); – direction of the scoliosis curve; – in case of two oppositely directed C-shaped scoliosis - the conclusion must contain the following phrase “S-scoliosis and the measurement of angular deformity to the right and to the left”
	Spondylolisthesis	– Signs of spondylolisthesis – localisation of the findings – direction of displacement; – vertebral displacement degree (absolute values and/or degree of displacement)
MMG	breast cancer	– Detection and localization of findings that indicate the presence of breast cancer in the entire study; – BI-RADS 0–2 score, (“BI-RADS _”, 0 – findings typical for BI-RADS 3–5 (ACR 2013 classification); – probability of malignancy (“Probability of malignancy __”)

Modality	Target pathology	Report must contain
Brain MRI	Intracranial neoplasms	– Signs of intracranial neoplasms in CNS; – number of findings – Localization of findings with regard to the brain structures (“extracerebral”, “intracranial”) – Localization of findings with regard to the brain lobe (for intracranial) / region (for extracerebral) – frontal, temporal, parietal, occipital; – volume of each finding on T2 FLAIR and post-contrast T1; – linear dimensions of each finding along two axes on T2 FLAIR and post-contrast T1; – (optional) for each finding – changes in lesion sizes over time compared with the previous MRI (if available) on T2 FLAIR and post-contrast T1
	Multiple sclerosis	– Multiple sclerosis foci; – distinguishing the demyelination foci in each affected region using a color scheme: juxta- and subcortical, periventricular, infratentorial – number of foci in total and in each affected region; – number of contrast-enhanced foci (if there are series with contrast enhancement); – (optional) present the following information as a spreadsheet/color diagram: 1) total volume of demyelination foci, cm^3; 2) volume of demyelination foci by affected regions, cm^3; – volume of contrast-enhanced foci
	Routine measurements	– displacement of the cerebellar tonsils in relation to the foramen magnum (mm) – Degree of downward displacement of the cerebellar tonsils (number 0–3) – VCR 1, VCR 2, VCR 3, width of the 3rd ventricle, mm – Value of the transverse dislocation, if present (mm) – White matter hyperintensities (WMHs), grades – Volume of WMH sites (total) – Volumes of brain and intracranial cerebrospinal fluid – (optional) segmentation of the white and grey matters

Modality	Target pathology	Report must contain
Cervical spine MRI	Protrusions and hernias, spinal stenosis	– Detecting and localizing the dorsal disc protrusions (“Dorsal disc protrusion __”, C4–C5, C5–C6, etc.); – Anteroposterior diameter of the protruded discs in sagittal planes (“Size – __ mm”); – anteroposterior and frontal areas of the dural sac in axial planes; anteroposterior area of the dural canal in sagittal planes (“Dural sac area in axial planes __x__ mm, and in sagittal planes – __ mm”); – Area of the subdural cavity at the disc level (“Area of the subdural cavity – __ mm^2 at __”, C4–C5, C5–C6, etc.)
	Focal lesions in the bone	– Probability of signs of focal lesions in MRI appearance of the bones – Localisation of the focal lesion indicating the vertebra name – Anteoposterior, transverse and vertical diameters of vertebral body lesions, mm – Presence/absence of contrast fluid in the focal lesions (where post-contrast series are available)
Thoracic spine MRI	Protrusions and hernias, spinal stenosis	– Detecting and localizing the dorsal disc protrusions (“Dorsal disc protrusion __”, Th1–Th2, Th2–Th3, etc.); – Anteroposterior diameter of the protruded discs in sagittal planes (“Size – __ mm”); – anteroposterior and frontal areas of the dural sac in axial planes; anteroposterior area of the dural canal in sagittal planes (“Dural sac area in axial planes __x__ mm, and in sagittal planes – __ mm”); – Area of the subdural cavity at the disc level (“Area of the subdural cavity – __ mm^2 at __”, Th1–Th2, Th2–Th3, etc.)
	Focal lesions in the bone	– Probability of signs of focal lesions in MRI appearance of the bones – Localisation of the focal lesion indicating the vertebra name – Anteoposterior, transverse and vertical diameters of vertebral body lesions, mm – Presence/absence of contrast fluid in the focal lesions (where post-contrast series are available)

Modality	Target pathology	Report must contain
Lumbosacral spine MRI	Protrusions and hernias, spinal stenosis	– Detecting and localizing the dorsal disc protrusions (“Dorsal disc protrusion __”, L1–L2, L2–L3, etc.); – Anteroposterior diameter of the protruded discs in sagittal planes (“Size – __ mm”); – anteroposterior and frontal areas of the dural sac in axial planes; anteroposterior area of the dural canal in sagittal planes (“Dural sac area in axial planes __x__ mm, and in sagittal planes – __ mm”); – Area of the subdural cavity at the disc level (“Area of the subdural cavity – __ mm^2 at __”, L1–L2, L2–L3, etc.)
	Focal lesions in the bone	– Probability of signs of focal lesions in MRI appearance of the bones – Localisation of the focal lesion indicating the vertebra name – Anteoposterior, transverse and vertical diameters of vertebral body lesions, mm – Presence/absence of contrast fluid in the focal lesions (where post-contrast series are available)
Knee joint MRI	Chondromalacia	– Probability of chondromalacia in the study. – Depth of the cartilage defect – Two linear dimensions of the cartilage defect – Chondromalacia grading
Lesser pelvis MRI	Routine measurements of the uterus	– Uterus position version and flexion – Location of the uterus (lateroversion) – Linear dimensions of corpus and cervix (longitudal, transverse and vertical / anteroposterior) – Endometrial thickness – Thickness of the junctional area – Myometrial thickness – Absent uterus: message about the absence of the target organ – (optional) ovaries: length, width and height, mm
Lesser pelvis MRI	Routine measurements of the prostate gland	– Dimensions of the prostate gland: sagittal (anteroposterior), frontal (transverse), vertical (longitudinal), mm – Volume of the prostate gland, cm^3

Appendix 9

REQUIREMENTS FOR THE CONTENT OF THE "CONCLUSION" SECTION OF DICOM SR

Table 9.1 – Requirements for the content of the "Conclusion" section of DICOM SR

Modality	Target pathology	Conclusion must contain
All	All	– Probability of target pathology ("Pathology probability – __"); – localization of findings ("Region of the target organ"); – measurement of findings ("Volume _____ – ___", type of the finding, measurement units – ml, %, mm). – pathology grade/stage ("__grade/stage")
Chest CT	COVID	– Probability of COVID-19; – Percentage of lung tissue involvement for each lung ("Pulmonary parenchymal involvement: __% of the right lung, __% of the left lung"); – grading pathological changes according to the CT 0–4 classification ("Severity: CT – _", 1 – percentage of pulmonary involvement for either lung: 0 – 25 %, 2 – 25–50 %, 3 – 50–75 %, 4 – 75–100 % – based on the largest value).
	Change in lung airness	– Probability of lung airness impairment – Site localization by side (left or right) and lobe
	Malignant neoplasms of the lungs	– Probability of signs of a malignant neoplasm of the lungs – volume (mm^3) and mean size (mm) for each malignant nodule
	Malignant neoplasms of the lungs according to LDCT	– probability of a malignant neoplasm in the entire study; – volume (mm^3) and mean size (mm) for each pulmonary nodule; – classification of the pulmonary nodules using Lung-RADS (v.1.1)
	Dilation of ascending and descending thoracic aorta	– Probability of aortic dilation according to one of the signs; – the largest diameter of the ascending and descending aortas along a short axis ("Ascending aorta – __ mm, descending aorta – __ mm"); – notification about the ascending aorta dilation (diameter between 40 and 49 mm inclusive), if present – (optional) calcifications in the aorta walls

Modality	Target pathology	Conclusion must contain
	Dilation of the pulmonary trunk	– Probability of the pulmonary trunk dilation of over 28 mm – Largest diameter of the pulmonary trunk along the short axis, mm
	Ischaemic heart disease (Coronary calcium)	– Probability of coronary calcium – Agatston score – score depending on the intensity of coronary calcium (CAC-DRS 0, CAC-DRS 1, CAC-DRS 2, CAC-DRS 3)
	Ischemic heart disease (paracardial fat)	– Probability of paricardial fat ≥ 200 ml – Paracardial fat volume, ml – (optional) mean paracardial fat density, HU
	Pulmonary emphysema	– Probability of signs of emphysema – percent emphysema in both lungs and separately for each lung (“left lung:__%”, “right lung:__%”, “total:__%”)
	Free pleural fluid (effusion)	– Probability of pleural effusion – effusion volume in ml for each lung (“left lung:__ml”, “right lung:__ml”); – mean effusion density in HU for each lung (“left lung:__HU”, “right lung:__HU”);
	Enlarged intrathoracic lymph nodes (lymphadenopathy)	– Probability of enlarged lymph nodes – Size of the largest lymph node along a short axis, mm – (optional) calcified intrathoracic lymph nodes (“Calcified nodes are present” / “Calcified nodes are absent”) – (optional) classification of lymph nodes as per IASLC
	Pulmonary tuberculosis	– Probability of signs of tuberculosis – localisation of the findings
	Sarcoidosis	– Probability of signs of sarcoidosis – Localization of findings – Disease stage
	Bronchiectatic disease	– Probability of bronchiectasis – Broncho-arterial ratio

Modality	Target pathology	Conclusion must contain
	Compression fracture of vertebral bodies	– Probability of a pathological finding – degree of compression deformity of the vertebral body as per Genant classification for the most deformed vertebra (Genant 2 = 25-39%, Genant 3 = ≥40%); – (optional) signs of osteoporosis based on the mineral density of the Th12-L3* vertebral bodies; – (optional) differential diagnostics of the compression fractures and wedge deformities of the vertebral bodies; – (optional) indication of suspected osteoporosis as per the ACR 2018, ISCD 2019 criteria * Bone mineral density (or HU) is not measured for vertebrae with height loss greater than 25%.
	Focal lesions in the vertebrae	– Probability of focal lesions in the bones – Localisation of the focal lesion indicating the bone name – Mean density of the focal lesion – Linear dimensions of the focal lesion (long and perpendicular short axes), mm – (Optional) vertical size of the focal lesion the size of > 10 mm, mm
	Rib/s fracture	– Probability of signs of rib fracture – Localization of the fracture site (rib number, a side – left/right, a third – anterior/lateral/posterior)
Abdominal CT	Gallbladder stones	– Probability of stones in the gallbladder – Integer number for the largest stone diameter, mm – Number of stones
	Routine liver measurements	– Vertical anteroposterior and transverse dimensions of the right liver lobe, mm – Mean density of the liver parenchyma, HU – Maximum diameter of the common bile duct, mm – Portal vein diameter, mm
	Routine kidney measurements	– Position of the vertebral body in relation to the upper edge of each kidney – Length, width and thickness of each kidney, mm – Largest dimensions of each renal pelvis in the axial and frontal planes, mm – Smallest thickness of kidney parenchyma
	Routine measurements of spleen and pancreas	– Length, width and height of the spleen – Transverse dimensions of the head, body and tail of the pancreas

Modality	Target pathology	Conclusion must contain
	Urolithiasis	– Probability of radiodense urinary calculi – size of the calculus / the largest calculus in axial plane for each organ of the urinary system (“long axis__mm”, “short axis__mm”) – mean density of the calculus / the largest calculus in axial plane for each organ of the urinary system, HU; – (optional) vertical linear size of the calculus / the largest calculus in axial plane for each organ of the urinary system, mm
	Liver lesions	– Probability of liver lesions – diameter of the lesion whose size ranges between 5 to 10 mm; linear dimensions in mm (long and perpendicular short axis) of the lesions > 10 mm in size – (for the lesions ≥5mm in size) minimum and maximum density of lesions in HU (“minimum lesion density __HU”, “maximum lesion density __HU”); – localization of each lesion, by liver lobe (“right lobe”/“left lobe”); – mean liver density, HU – (optional) vertical linear size of the lesion, mm
	Renal lesions	– Probability of renal lesions – diameter of the lesion whose size ranges between 5 to 10 mm; linear dimensions in mm (long and perpendicular short axis) of the lesions > 10 mm in size – (for the lesions ≥5mm in size) minimum and maximum density of lesions in HU (“minimum lesion density __HU”, “maximum lesion density __HU”); – localization of each lesion, by organ (“right kidney”/“left kidney”); – (optional) vertical linear size of the lesion, mm – for each kidney
	Adrenal gland lesions	– Probability of an adrenal gland lesion – Size of the largest lesion along a short axis, mm – (optional) thickness of adrenal body and limbs, mm (“body __mm”, “lateral limb__mm”, “medial limb__mm”) – for each adrenal gland
	Dilated abdominal aorta	– Probability of dilated abdominal aorta of ≥ 25 mm; – Largest diameter of the abdominal aorta along a short axis, mm – notification about the abdominal aorta dilation (diameter between 25 and 49 mm inclusive), if present – (optional) calcified abdominal aorta walls (“Calcifications are present” / “Calcifications nodes are absent”)

Modality	Target pathology	Conclusion must contain
	Compression fracture of vertebral bodies	– Probability of a pathological finding – degree of compression deformity of the vertebral body as per Genant classification for the most deformed vertebra (Genant 2 = 25-39%, Genant 3 = ≥40%); – (optional) signs of osteoporosis based on the mineral density of the Th12-L3* vertebral bodies; – (optional) differential diagnostics of the compression fractures and wedge deformities of the vertebral bodies; – (optional) indication of suspected osteoporosis as per the ACR 2018, ISCD 2019 criteria * Bone mineral density (or HU) is not measured for vertebrae with height loss greater than 25%.
	Focal lesions in the vertebrae	– Probability of focal lesions in the bones – Localisation of the focal lesion indicating the bone name – Mean density of the focal lesion – Linear dimensions of the focal lesion (long and perpendicular short axes), mm – (Optional) vertical size of the focal lesion the size of > 10 mm, mm
Head CT	Intracranial hemorrhage	– Probability of hemorrhage; – Type of hemorrhage (“Type of hemorrhage – __”, epidural, subdural, subarachnoid, or intracerebral); – Hemorrhage volume in ml or cm^3 – (optional) detection of skull fractures
	Ishemic stroke	– Detection of acute ischemic stroke areas; – ASPECTS score (0–10), in case middle cerebral artery (MCA) circulation is affected; – (optional) post-stroke changes and vascular lesions (location and volume)
	Routine measurements	– Distance of the transverse dislocation (mm) – VCR 1, VCR 2, VCR 3, width of the 3^{rd} ventricle, mm – Downward displacement of the cerebellar tonsils in relation to the foramen magnum, mm – Degree of downward displacement of the cerebellar tonsils

Modality	Target pathology	Conclusion must contain
Chest XR	Various lung pathologies: pleural effusion, pneumothorax, focal opacity, infiltration/consolidation, dissemination, cavity, atelectasis, calcification/calcified pulmonary nodule, mediastinum widening, cardiomegaly, cortical bone fracture, consolidated fracture	– Probability of signs of the pathology from the list above – Probability of each radiologic sign – localisation and identification of the findings
	Pulmonary tuberculosis	– presence of the condition in the entire study (probability, differential diagnosis), disease-specific terms
	pneumonia, purulent and necrotic conditions	– presence of the condition in the entire study (probability, differential diagnosis), disease-specific terms – localization of pathological findings (side, lobe plane)
	hydrothorax	– presence of the condition in the entire study (probability, differential diagnosis), disease-specific terms – localization of pathological findings (side)
	pneumothorax	– presence of the condition in the entire study (probability), disease-specific terms – localization of pathological findings (side)
	Atelectasis	– presence of the condition in the entire study (probability, differential diagnosis), disease-specific terms – localization of pathological findings (side, lobe plane)
	Pulmonary masses	– presence of the condition in the entire study (probability, differential diagnosis), disease-specific terms – localization of pathological findings (side, lobe plane)

Modality	Target pathology	Conclusion must contain
	Cardiomegaly	– presence of the condition in the entire study (probability), disease-specific terms – Cardiothoracic ratio (0-1)
	Mediastinal disease	– presence of the condition in the entire study (probability, differential diagnosis) – type (pneumomediastinum, widening) and localization of pathological findings (part of the mediastinum)
	Rib/s fracture	– presence of the condition in the entire study (probability), disease-specific terms – localization of pathological findings (side, rib number) – displacement (optional)
	Sternum fracture	– presence of the condition in the entire study (probability), disease-specific terms – displacement (optional)
Head XR	Sinusitis	– Probability of signs of sinusitis; – Localization of findings – opacified area as a percentage of the total area of the sinus Changes in the sinus walls
MSS XR	Arthrosis	– Radiological signs in the entire study – localisation of the signs in the entire study – severity of the identified changes (arthrosis degree 1-3)
	Fracture	– Radiological signs of a fracture – localisation of the findings – (optional) quantitative estimation of the bone fragment diastasis
	Longitudinal flat foot	– Probability of radiologic signs of the longitudinal flat foot; – Flat foot grade – probability
	Transverse flat foot	– Probability of signs of transverse flat foot – Probability of signs of Hallux Valgus – Intermetatarsal angle, angle of deviation of the big toe, flat foot stage
	Fracture of vertebral bodies	– Probability of at least one vertebra with over 25 % height loss – List of all vertebrae with height loss over 25%; – (optional) indicate the degree of height loss
	Osteochondrosis	– Probability of signs of osteochondrosis

Modality	Target pathology	Conclusion must contain
	Scoliosis	– Probability of signs of scoliosis; – direction of the scoliosis curve; – localisation of the findings – deformity angles of the spinal axis (absolute values and/or scoliosis grade); – in case of two oppositely directed C-shaped scoliosis - the conclusion must contain the following phrase “S-scoliosis and the measurement of angular deformity to the right and to the left”
	Spondylolisthesis	– Probability of signs of spondylolisthesis; – localisation of the findings – direction of displacement; – measurement of vertebral displacement degree (degree of displacement)
MMG	breast cancer	– Probability of signs of breast cancer in the entire study; – BI-RADS 0–2 score, (“BI-RADS _”, 0 – findings typical for BI-RADS 3–5 (ACR 2013 classification); – probability of malignancy (“Probability of malignancy __”)
Brain MRI	Intracranial neoplasms	– Signs of intracranial neoplasms in CNS; – number of findings – Localization of findings with regard to the brain structures (“extracerebral”, “intracranial”) – Localization of findings with regard to the brain lobe (for intracranial) / region (for extracerebral) – frontal, temporal, parietal, occipital; – (optional) changes of the findings’ sizes over time (if any for each finding) compared with the previous MRI (if available) on T2 FLAIR and post-contrast T1
	Multiple sclerosis	– Probability of demyelination foci; – total number of foci; – number of contrast-enhanced foci (if there are series with contrast enhancement);

Modality	Target pathology	Conclusion must contain
	Routine measurements	– displacement of the cerebellar tonsils in relation to the foramen magnum (mm) – Degree of downward displacement of the cerebellar tonsils (number 0–3) – VCR 1, VCR 2, VCR 3, width of the 3rd ventricle, mm – Value of the transverse dislocation, if present (mm) – White matter hyperintensities (WMHs), grades – Volume of WMH sites (total) – Volumes of brain and intracranial cerebrospinal fluid – (optional) segmentation of the white and grey matters
Thoracic spine MRI	Protrusions and hernias, spinal stenosis	– Detecting and localizing the dorsal disc protrusions (“Dorsal disc protrusion __”, Th1–Th2, Th2–Th3, etc.); – Anteroposterior diameter of the protruded discs in sagittal planes (“Size – __ mm”); – anteroposterior and frontal areas of the dural sac in axial planes; anteroposterior area of the dural canal in sagittal planes (“Dural sac area in axial planes __x__ mm, and in sagittal planes – __ mm”); – Area of the subdural cavity at the disc level (“Area of the subdural cavity – __ mm^2 at __”, Th1–Th2, Th2–Th3, etc.)
	Focal lesions in the bone	– Probability of signs of focal lesions in MRI appearance of the bones – Localisation of the focal lesion indicating the vertebra name – Presence/absence of contrast fluid in the focal lesions (where post-contrast series are available)
Cervical spine MRI	Protrusions and hernias, spinal stenosis	– Detecting and localizing the dorsal disc protrusions (“Dorsal disc protrusion __”, C4–C5, C5–C6, etc.); – Anteroposterior diameter of the protruded discs in sagittal planes (“Size – __ mm”); – anteroposterior and frontal areas of the dural sac in axial planes; anteroposterior area of the dural canal in sagittal planes (“Dural sac area in axial planes __x__ mm, and in sagittal planes – __ mm”); – Area of the subdural cavity at the disc level (“Area of the subdural cavity – __ mm^2 at __”, C4–C5, C5–C6, etc.)
	Focal lesions in the bone	– Probability of signs of focal lesions in MRI appearance of the bones – Localisation of the focal lesion indicating the vertebra name – Presence/absence of contrast fluid in the focal lesions (where post-contrast series are available)

Modality	Target pathology	Conclusion must contain
Lumbosacral spine MRI	Protrusions and hernias, spinal stenosis	– Probability and localization of the dorsal disc protrusions (“Dorsal disc protrusion __”, L1–L2, L2–L3, etc.); – Anteroposterior diameter of the protruded discs in sagittal planes (“Diameter – __ mm”);
	Focal lesions in the bone	– Probability of signs of focal lesions in MRI appearance of the bones – Localisation of the focal lesion indicating the vertebra name – Presence/absence of contrast fluid in the focal lesions (where post-contrast series are available)
Knee joint MRI	Chondromalacia	– Probability of chondromalacia in the study. – Depth of the cartilage defect – Chondromalacia grading
Lesser pelvis MRI	Routine measurements of the uterus	– Uterus position version and flexion – Location of the uterus (lateroversion) – Linear dimensions of corpus and cervix (longitudal, transverse and vertical / anteroposterior) – Endometrial thickness – Thickness of the junctional area – Myometrial thickness – Absent uterus: message about the absence of the target organ – (optional) ovaries: length, width and height, mm
	Routine measurements of the prostate gland	– Dimensions of the prostate gland: sagittal (anteroposterior), frontal (transverse), vertical (longitudinal), mm – Volume of the prostate gland, cm^3

Appendix 10

TAGS REQUIRED FOR SYNCHRONIZATION OF SERIES IN CT, LDCT, MRI

DICOM Tag	Tag description	Example
0018, 0050	Slice Thickness	5
0018, 5100	Patient Position	HFS
0020, 1041	Slice Location	+11.00
0020, 0020	Patient Orientation	L\P
0020, 0032	Image Position (Patient)	<-255.361\-313.9553\-824.60>
0020, 0037	Image Orientation (Patient)	<1\0\0\0\1\0>
0020, 0052	Frame of Reference UID	1.2.392.123.123.11
0020, 0013	Instance Number	1
0028, 0030	Pixel Spacing	<0.995\0.995>

Appendix 11

REQUIREMENTS FOR DISPLAYING FINDINGS IN ADDITIONAL SERIES OF IMAGES

Table 11.1

Modality	Target pathology	Displaying findings
All	All	– Consider contouring individual findings or regions/areas; – using masks is possible (contouring with colour filling); – numerical indication of findings; – Images in the series containing pathological findings should be labelled at the ScrollBar (a separate visualization bar for series level viewing in the additional series).
Chest CT	COVID	– Localization of findings (contouring/ mask)
	Change in lung airness	– Localization of findings (contouring/ mask)
	Pulmonary emphysema	– Localization of findings (contouring/ mask)
	Malignant neoplasm in the lungs	– Localization of the nodules (contouring/ mask)
	Malignant neoplasm in the lungs in LDCT	– Localization of the nodules (contouring/ mask)
	Free pleural fluid (effusion)	– Localization of the pathological findings (contouring/ mask)
	Enlarged intrathoracic lymph nodes (lymphadenopathy)	– Localization of enlarged nodules (contouring/ mask)
	Pulmonary tuberculosis	– Localization of the pathological findings (contouring)
	Sarcoidosis	– Localization of the pathological findings (contouring/ mask)
	Ischaemic heart disease (Coronary calcium)	– Localization of findings (contouring/ mask)
	Ischemic heart disease (paracardial fat)	– (optional) localization of findings (contouring/ mask)

Modality	Target pathology	Displaying findings
	Compression fracture of vertebral bodies	– Labelling (numbering) all vertebrae with height loss of ≥ 25%; – Graphical display of the vertebrae height in the anterior, middle or posterior parts (contour) for all analysed vertebrae; – Numerical value of the deformity level as % (for all vertebrae with height loss of ≥ 25%), indicating the Genant score; – Displaying the results of the AI service in sagittal or curvilinear plane built along the central axis of the spinal column; – (optional) numerical value of the bone mineral density (mg/mL) or radio density (HU) of the Th12-L3 vertebral bodies.
	Dilation of ascending and descending thoracic aorta	– diameter of the ascending aorta on each slice, mm – diameter of the descending aorta on each slice, mm – localization of findings (contouring/ mask) – (optional) curved reconstruction of the aorta (series of images)
	Dilation of the pulmonary trunk and measurement of the pulmonary trunk diameter	– diameter of the pulmonary trunk on the slice, mm – (optional) diameter of the pulmonary trunk on each slice, mm – localization of findings (contouring/ mask)
	Bronchiectatic disease	– Localization of the bronchiectatic disease (contouring/ mask)
	Focal lesions in the vertebrae	– Localization of the focal lesion (contouring/ mask)
	Rib/s fracture	– Localization of the fracture (mask) – Curved reconstruction of all ribs and spinal column on a slice (a DICOM SC image)
Abdominal CT	Urolithiasis	– Localization of findings (contouring/ mask)
	Liver lesions	– Localization of the lesions (contouring/ mask)
	Renal lesions	– Localization of the lesions (contouring/ mask)
	Adrenal gland lesions	– Localization of the adrenal gland lesion (contouring/ mask)
	Abdominal aortic aneurysm and measurement of the abdominal aorta diameter	– diameter of the abdominal aorta on each slice, mm – localization of findings (contouring/ mask)

Modality	Target pathology	Displaying findings
	Compression fracture of vertebral bodies	– Labelling (numbering) all vertebrae with height loss of ≥ 25%; – Graphical display of the vertebrae height in the anterior, middle or posterior parts (contour) for all analysed vertebrae; – Numerical value of the deformity level as % (for all vertebrae with height loss of ≥ 25%), indicating the Genant score; – Displaying the results of the AI service in sagittal or curvilinear plane built along the central axis of the spinal column; – (optional) numerical value of the bone mineral density (mg/mL) or radio density (HU) of the Th12-L3 vertebral bodies.
	Focal lesions in the vertebrae	– Localization of the focal lesion (contouring/ mask)
Head CT	Ishemic stroke	– Localization of acute Ishemic stroke areas (contouring/ mask) – (optional) detection of post-stroke changes (contouring/ mask)
	Intracranial hemorrhage	– Contouring of findings; – (optional) text outlining the finding volume; – (optional) labelling skull fracture area(s)
Chest XR	Various lung pathologies: pleural effusion, pneumothorax, focal opacity, infiltration/consolidation, dissemination, cavity, atelectasis, calcification/calcified pulmonary nodule, mediastinal widening, cardiomegaly, cortical bone fracture, consolidated fracture	– Localization of all findings (contouring)
	Pulmonary tuberculosis	– Localization of all findings (contouring/ mask)

Modality	Target pathology	Displaying findings
	Pneumonia, purulent and necrotic conditions	– Localization of all findings (contouring/ mask)
	Hydrothorax	– Localization of all findings (contouring/ mask)
	Pneumothorax	– Localization of all findings (contouring)
	Atelectasis	– Localization of all findings (contouring)
	Pulmonary masses	– Localization of all findings (contouring)
	Cardiomegaly	– Graphical display of the enlarged cardiac silhouette indicating the cardiothoracic ratio
	Mediastinal disease	– Localization of all findings (contouring)
	Rib/s fracture	– Localization of all findings (contouring)
	Sternum fracture	– Localization of all findings (contouring)
MSS XR	Longitudinal flat foot	– Graphical display of the angle and height of the foot arch and their numerical values (contouring/ mask)
	Transverse flat foot	– Graphical display of the intermetatarsal angle and the angle of deviation of the big toe (contouring/ mask)
	Fracture	– Localization of findings (contouring/ mask)
	Arthrosis	– Contouring the marginal osteophytes of articular surfaces; – contouring the zones of subchondral osteosclerosis; – contouring and filling the height of the intra-articular gap
	Fracture of vertebral bodies	– Localization of findings on x-ray images (contouring/ mask)
	Osteochondrosis	– Localization of findings (contouring)
	Scoliosis	– Localization of findings (contouring along the spinal axis in the curvature area)
	Spondylolisthesis	– Localization of findings (contouring)
Head XR	Sinusitis	– Localization of the pathological findings (contouring/ mask); – localization of changes in the sinus walls (contouring/ mask)
MMG	Breast cancer	– Localization of findings (contouring)

Modality	Target pathology	Displaying findings
Brain MRI	Intracranial neoplasms	– Contouring of all neoplasms on non-contrast series using the following colour scheme to highlight different region types: (extracerebral and intracranial); – where post-contrast T1 images are available – contouring of the intracranial neoplasms that accumulate the contrast agent (if the accumulation is homogeneous) or all areas in the intracranial neoplasms accumulating CA (if the accumulation is heterogeneous); comparison with the T2 FLAIR series in the same plane; – (optional) segmentation of the edema area on post-contrast T1 images
	Multiple sclerosis	– labelling of each finding with symbols
	Routine measurements	– WMH severity (mask)
Cervical spine MRI	Protrusions and hernias, spinal stenosis	– contouring and filling the protrusions and hernias; – annotation indicating the size of each finding, mm; – labelling of vertebral bodies
	Focal lesions in the vertebrae	– Contouring and filling the focal lesions – Labelling of vertebral bodies – Annotation indicating the size, mm;
Thoracic spine MRI	Protrusions and hernias, spinal stenosis	– contouring and filling the protrusions and hernias; – annotation indicating the size of each finding, mm; – labelling of vertebral bodies
	focal lesions in the vertebrae	– Contouring and filling the focal lesions – Labelling of vertebral bodies – Annotation indicating the size, mm;
Lumbosacral spine MRI	Protrusions and hernias, spinal stenosis	– contouring and filling the protrusions and hernias; – annotation indicating the size of each finding, mm; – labelling of vertebral bodies
	Focal lesions in the vertebrae	– Contouring and filling the focal lesions – Labelling of vertebral bodies – Annotation indicating the size, mm;
Knee joint MRI	Chondromalacia	– Contouring the changes in MRI appearance of the cartilage – Contouring the defects, the cartilage loss areas

Appendix 12

RECOMMENDED ABBREVIATIONS OF THE TARGET PATHOLOGIES AND SIGNS TO BE USED IN THE NAMES OF ADDITIONAL SERIES OF IMAGES AS PART OF THE AI/CV EXPERIMENTAL SETUPS

Table 12.1 Recommended abbreviations of the target pathologies and signs to be used in the names of additional series of images by comprehensive AI services as part of the AI/CV experimental setups

No.	Modality	Region of interest	Abbreviation
1	CT	Chest	CT-CHEST
2	CT	Abdomen	CT-ABDOMEN
3	XR	Chest	RG-CHEST

Table 12.2 Recommended abbreviations of target pathologies and signs to be used in the names of additional series of images by AI services as part of the AI/CV experimental setups

No.	Modality	Region of interest	Target pathology	Abbreviation
1	CT	Chest	COVID-19	COVID-19
2			Change in lung airness	PNEUMONIA
3			pulmonary emphysema	EMPHYSEMA
4			Malignant neoplasms of the lungs	CANCER
5			free pleural fluid	PLEV
6			intrathoracic lymph nodes	NODES
7			Pulmonary tuberculosis	TBC
8			sarcoidosis	SARC
9			bronchiectatic disease	BRONECT
10			Compression fracture of vertebral bodies	VCF
11			signs of IHD (coronary calcium)	CAC
12			signs of IHD (paracardial fat)	PCLIPOS
13			thoracic aorta diameter	T-AORTA
14			pulmonary trunk diameter	P-TRUNK
15			Adrenal gland lesions	TH-ADRENEO
16			focal lesions in chest bones	BONEMASS
17			Rib/s fracture	CT- COSTAL-FRACT
18		Abdomen	Urolithiasis	UROLITH
19			Liver lesions	LIVERNEO
20			Renal lesions	RENALNEO
21			Adrenal gland lesions	ABD-ADRENEO
22			Compression fracture of vertebral bodies	VCF
23			abdominal aorta diameter	A-AORTA
24			Gallbladder stones	GB-CONCR
25			Routine liver measurements	LIVER-MEAS
26			Routine kidney measurements	RENAL-MEAS

27			Routine measurements of spleen and pancreas	PAN-SPL-MEAS
28			focal lesions in the abdominal and lesser pelvis bones	BONEMASS
29		Brain	acute Ishemic stroke	ISCHBRAIN
30			Intracranial hemorrhage	HAEMOBRAIN
31			routine measurements of the brain	CT-BRAIN-MEAS
32	XR	Chest	various lung pathologies	RG-THORAX
33			Pulmonary tuberculosis	RG-LUNG-TBC
34			pneumonia, purulent and necrotic conditions	RG-LUNG-PNEUM
35			hydrothorax	RG-EFFUSION
36			pneumothorax	RG-THORAX-PNEUM
37			Atelectasis	RG-LUNG-ATELECT
38			Pulmonary masses	RG-LUNG-ONC
39			cardiomegaly	RG-COR
40			Mediastinal disease	RG-MEDIAST
41			Rib/s fracture	RG-COSTAL-FRACT
42			sternum fracture	RG-STERNUM-FRACT
43		Musculoskeletal system	Fracture	FRACTURE
44			Arthrosis	ARTHROS
45			Longitudinal flat foot	L-FLATFOOT
46			Transverse flat foot	T-FLATFOOT
47			fracture of vertebral bodies	RG-VERT
48			Osteochondrosis	OCHONDROS
49			Scoliosis	SCOLIOS
50			Spondylolisthesis	LISTHES
51		Paranasal sinuses	sinusites	SINUSITIS
52	MMG	Breast	breast cancer	BREAST
53	MRI	Brain	Multiple sclerosis	SDBRAIN
54			Intracranial neoplasms	NEOBRAIN
55			Routine measurements	MR-BRAIN-MEAS
56		Cervical spine	Protrusions and hernias of the discs, spinal stenosis	OCH-CERVICAL
57			focal lesions in the vertebrae	MR-BONEMASS
58		Thoracic spine	Protrusions and hernias of the discs, spinal stenosis	OCH-THORACIC
59			focal lesions in the vertebrae	MR-BONEMASS
60		Lumbosacral spine	Protrusions and hernias of the discs, spinal stenosis	OCH-LUMBAR
61			focal lesions in the vertebrae	MR-BONEMASS
62		Knee joint	Chondromalacia	CH-MALACIA
63		Lesser pelvis	routine measurements of the uterus	UTERUS-MEAS
64			routine measurements of the prostate gland	PROSTATE-MEAS