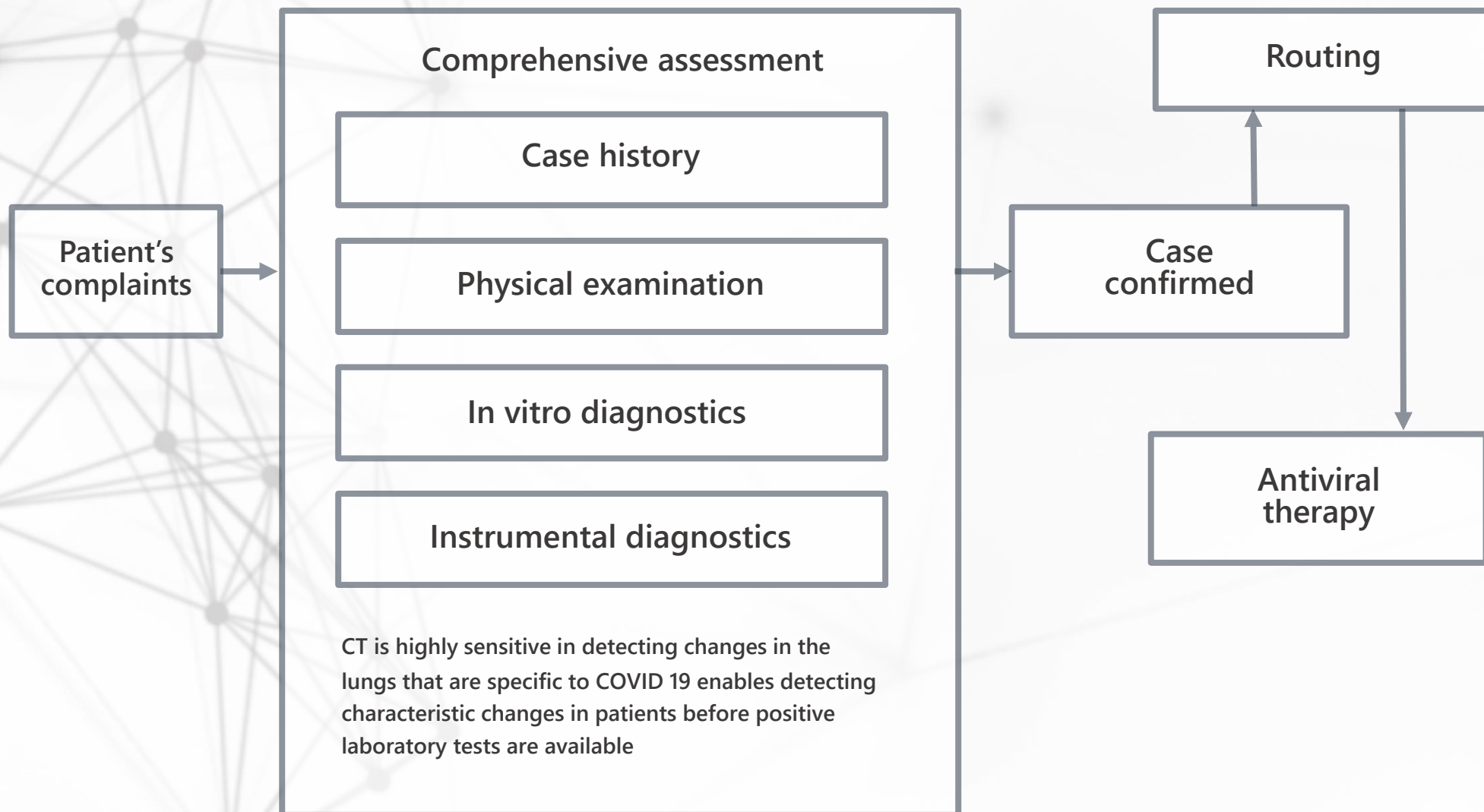


# DESCRIPTION, RECOMMENDATION & STATISTICS SYSTEM

For AI-aided Diagnostics of COVID-19  
New Corona Virus Infection



## Factors that influence efficacy of Covid diagnostics

Limitations of instrumental diagnostics methods, speed of decision making, quality of initial diagnostics

## Objectives

1. Cut down labor inputs and turnaround time for a diagnostic radiology specialist to issue a report
2. Obtain formalized description and a standardized instrumental diagnostics report of thoracic examinations
3. Issue precise recommendations on further patient routing





## Design goal

To create a tool that improves efficacy of radiologist's work

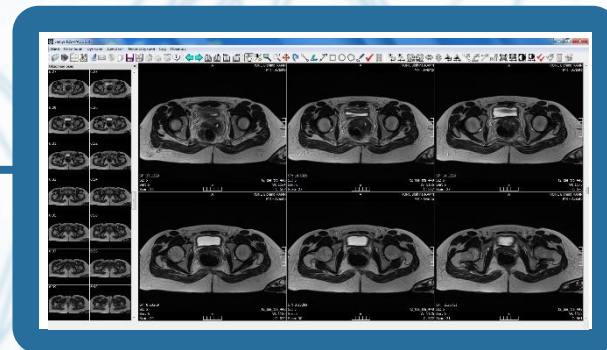
## Problems solved

Sequential description and assessment of changes found in thoracic organs, with present COVID 19 infection symptoms

Formalization of findings in the form of a protocol report, with determination of the type and quantitative extent of lung damage, assessment of probability of coronavirus pneumonia

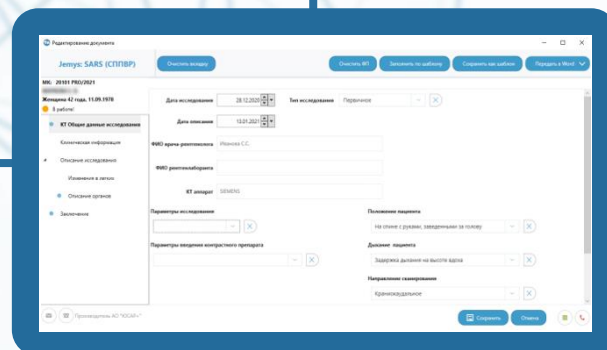
Software – JEMYS: Radiological Digital Information System with Image Archiving Module (Version 4.0.)

Software – JEMYS: DICOM – Image Capture, Processing and Storage Server 4.0.)



Software – JEMYS:  
TELEMEDICINE with  
decision-making support  
system used in the course  
of analysis of X-ray images  
in DICOM format

AI Neural Network  
Algorithm Module



Software – JEMYS: TELEMEDICINE (Version 4.0.1.), consisting of:  
Process core of a medical tele consultation system  
Medical tele consultation system workstation

- Decision making support system for healthcare professionals
- CT images show over 90% accuracy in detecting various stages during the development of pneumonia
- AI technology helps radiology specialists to improve diagnostics efficacy
- Significantly shorter image description time
- Reduces the number of medical errors
- Comprehensive solution which includes PACS viewer, formalized protocol and AI neural network algorithm module
- Ability to obtain the second opinion
- Seamless integration with healthcare data systems



**Жемус: SARS (СППВР)**

МК: 20101 PRO/2021

Женщина 42 года, 11.09.1978

Дата исследования: 28.12.2020

Дата описания: 13.01.2021

ФИО врача-рентгенолога: Иванова С.С.

ФИО рентгенолаборанта:

КТ аппарат: SIEMENS

Дата исследования: 28.12.2020 00:00 ID: 0000 000000

Дата описания: 13.01.2021 Номер МК: 20101 PRO

Аппарат: Ф.И.О. пациента:

Ф.И.О. врача рентгенолога: Дата рождения пациента: 11.09.1978

Ф.И.О. рентгенолаборанта:

**Описание вирусной пневмонии SARS**

**Общие данные исследования** Положение пациента - на спине с руками, заведенными за голову. Задержка дыхания на высоте вдоха. Направление сканирования - краниокаудальное. Методика сканирования: стандартное сканирование. Алгоритм реконструкции стандартный.

**Изменения в легких**

Двустороннее уплотнение лёгочной ткани по-типу "матового стекла":

В лёгких, симметрично с обеих сторон, с преобладанием в верхних отделах определяются участки уплотнения лёгочной ткани по типу "матового стекла".

Жидкость в правой плевральной полости не определяется. Жидкость в левой плевральной полости не определяется. Изменение плевры не выявлено.

Мягкие ткани грудной стенки не изменены. Подмышечные, подлопаточные и надключичные лимфатические узлы не увеличены. Костно - деструктивных изменений в зоне исследования не выявлено.

Мягкие ткани грудной стенки не изменены.

Подмышечные, подлопаточные и надключичные лимфатические узлы не увеличены.

Костно-деструктивных изменений в зоне исследования не выявлено.

**ЗАКЛЮЧЕНИЕ:**

КТ-1 лёгкая степень поражения лёгочной ткани (поражение =<25% паренхимы лёгких). Жидкость в плевральных полостях не выявлена. Рекомендуется КТ ОГК с внутривенным контрастированием для уточнения характера и распространённости образования.

Врач \_\_\_\_\_

Formalized Protocol consists of:

- a set of attributes that allow to describe core clinical findings, CT examination results, medical report;
- a text editor which uses entered information to create a printed protocol form.

Formalized protocol, owing to standardized data description, allows to streamline and expedite radiologist's workflow, improve the quality of X ray image description and exclude alternative interpretations.

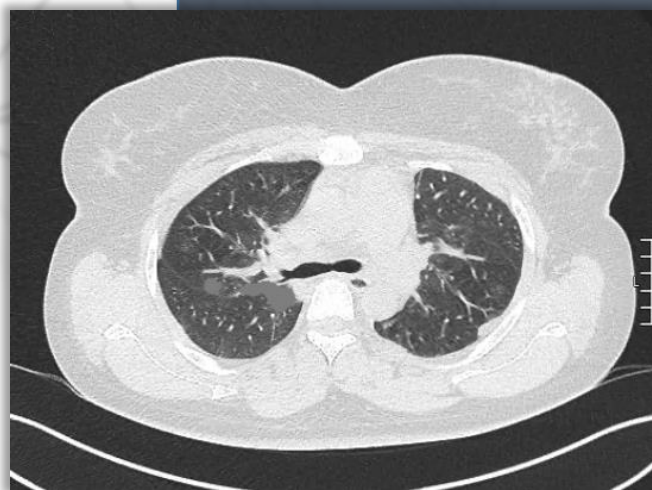
Description of a CT examination using SORS-LS system:

- accelerates radiologist's workflow processes;
- allows to describe key symptoms (ground glass area, consolidation area, pleural effusion area) and concomitant symptoms;
- Using the neural network allows to automatically assess qualitative extent of lung damage and relevant dynamic patterns, refer to recommendations when creating a report;
- allows to prepare reports covering all data entered in the protocol.

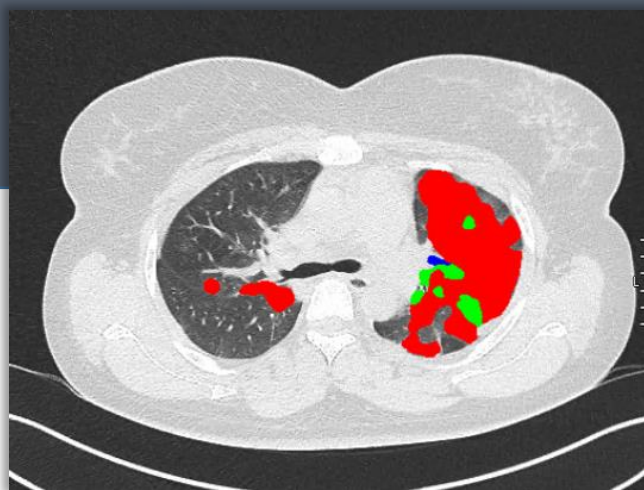
To analyze the nature and extent of lung tissue damage, an AI neural network algorithm module which was trained on a study sampling prepared by experienced radiologists was developed as a Clinical Decision Support System (CDSS).

The module will advise a physician to note a list of pathologies characteristic of viral pneumonia and described in guidelines and automatically calculate the extent of quantitative lung damage.

The module recognizes areas of ground glass, consolidation, pleural effusion, and calculate quantitative lung damage extent (in absolute terms and as a percentage of total lung capacity).



Original image



AI module system image

## Results

- Ground glass area (red color) – 523.98 cm<sup>3</sup>.
  - Consolidation area (green color) – 29.99 cm<sup>3</sup>.
  - Pleural effusion area (blue color) – 0.08 cm<sup>3</sup>.
- Damaged lung extent percentage of total lung capacity – 16%.



A health professional, working with a formalized protocol fills the following main tabs:

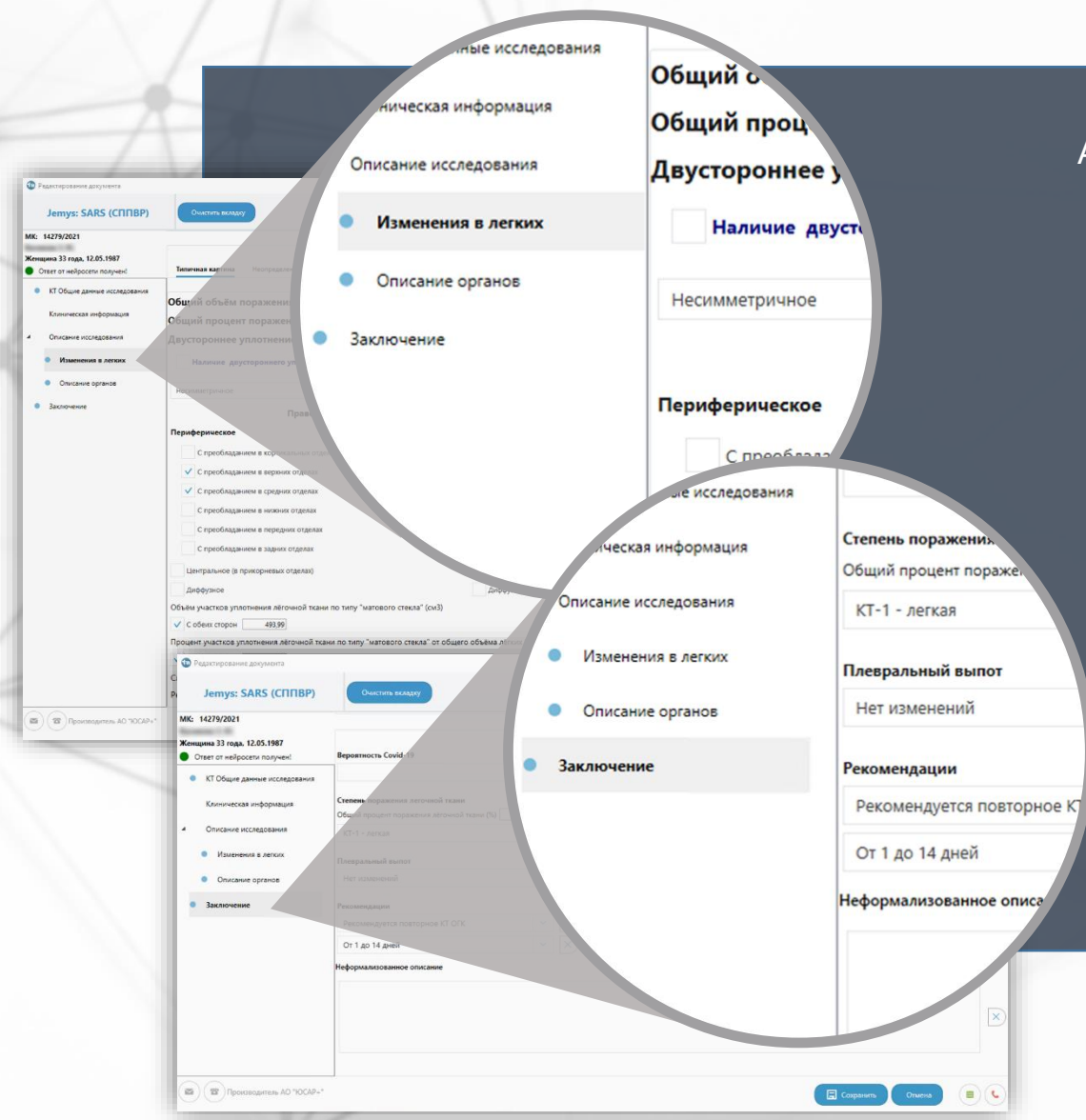
- General examination data;
- Clinical information;
- Changes in lungs;
- Description of organs;
- Conclusion.

Non-formalized fields in description of thoracic organs contain pre-selected default values that may be changed by the professional if necessary.

The image shows a multi-tabbed medical protocol form for SARS (СППВР). The form is titled 'Jemys: SARS (СППВР)' and includes a patient ID 'МК: 14279/2021' and a patient name 'Женщина 33 года, 12.05.1987'. The form is divided into several sections, each with a corresponding tab:

- Общие данные исследования** (General examination data)
- Клиническая информация** (Clinical information)
- Изменения в легких** (Changes in lungs)
- Описание органов** (Description of organs) - This tab is highlighted in a blue circle in the callout.
- Заключение** (Conclusion)

The callout also shows a preview of the 'Описание органов' section, which includes fields for 'Корни легких' (Lung roots), 'Средостение' (Mediastinum), 'Плевра и плевральные полости' (Pleura and pleural cavities), and 'Диафрагма' (Diaphragm). The 'Средостение' section contains text describing lymphatic nodes and other thoracic structures. The 'Плевра и плевральные полости' section includes a field for 'Объем жидкости в обеих плевральных полостях' (Volume of fluid in both pleural cavities) with a value of 0,08.



As a result of activities of the AI neural network module, the formalized protocol fills the fields with values of main pathologies:

- ground glass;
- consolidation;
- pleural effusion.

Depending on AI calculated damage extent, the Formalized Protocol automatically selects the quantitative extent value for lung tissue damage and sets the necessary values in the report tab.

The form data is saved and will be available for further analysis.

## YSAR+ proposes

A holistic approach aiming to improve efficacy of radiologist workflow when diagnosing new corona virus infection COVID 19.

## Structure

1. Cross integrated programs package which ensures:

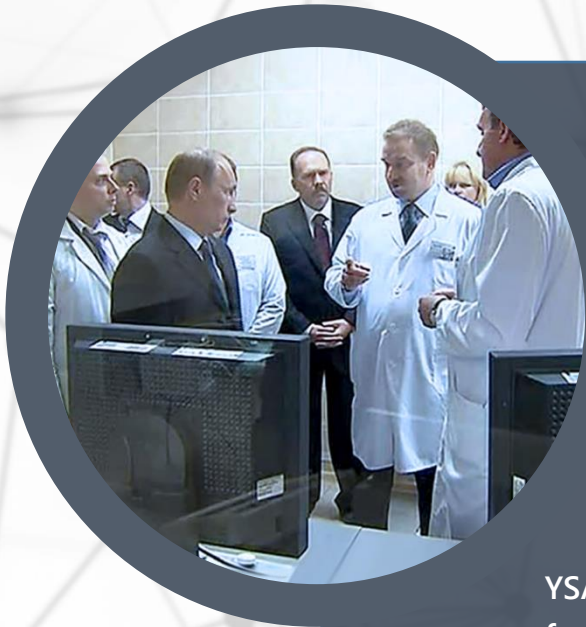
- interaction with diagnostic equipment and analysis of obtained images;
- sequential estimation and standardized description of changes found in thoracic organs if there clinical indications of COVID 19 infection;
- recommendations to a radiologist devised by a AI Neural Network Algorithm Module on the analysis of changes characteristic of coronavirus pneumonia with automatic evaluation of quantitative extent of lung tissue damage;
- Specialized medical tele consultation is available.

2. All the software we offer has a medical product Authorisation Certificate issued by the Russian government authority RZN (RosZdravNadzor).

3. Set of software implementation services, including:

- customized adjustment;
- instruction of health professionals;
- after sales service.





**YSAR+** company is a leading Russian developer and integrator of IT systems in health care. We have been working in the IT market for more than two decades. Our partners in the regions of Russia, CIS States, Asia, Middle East and Europe place their trust with us.

**YSAR+** areas of priority are development, implementation and after-sales service of state-of-the-art information systems in health care.

**YSAR+** company is engaged in development of bundled software intended for automation of breast, lung and cervical cancer screening programs.

Systemic approach, collaborative work of high-level health care professionals, analysts, advisors and programmers under the supervision of experienced top managers allow to implement federal and regional turnkey projects of any level of complexity, meeting the most ambitious targets of customers.



YSAR+

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*Thank you for attention!*