

Interventional radiology workflow during the COVID-19 pandemic: recommendations of the Swiss Society of Vascular and Interventional Radiology

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Context

The coronavirus disease is caused by a new virus (SARS-Cov-2) of the coronavirus family. The virus was identified as a cause of pneumonia and the disease named COVID-19 on 7 January 2020. On 11 March 2020, the World Health Organization (WHO) declared COVID-19 as a pandemic [1].

Vascular and interventional radiology (IR), which offers a very wide spectrum of interventions from emergency procedures to highly specialised elective interventions, is affected by changes and adjustments in daily workflow necessary for coping with the pandemic. Given the importance of a continuum in providing services and the exigency of protecting healthcare professionals during this period, the Swiss Society of Vascular and Interventional Radiology (SSVIR) is releasing guidance for interventional radiologists as preparedness for managing COVID-19 patients, the workflow of non-COVID-19 patients and optimising interactions with other healthcare professionals. Because of the rapidly changing nature of the pandemic, these recommendations might be subject to regular updates.

In addition to guidelines from the Swiss Federal Office of Public Health (BAG-OFSP) [2], institutional local policies (defined as measures established by each institution) and international expert panel positions [3], the SSVIR recommendations are based on the following principles:

1. To provide care for the COVID-19 patients;
2. To continue to provide care to non-COVID-19 patients who need procedures;
3. To protect non-COVID-19 patients during IR procedures;

4. To protect IR teams;
5. To maintain sufficient active resources for IR in the mid-term;
6. To minimise physical interactions between onsite workforces and healthcare professional partners.

Interventions on COVID-19 patients

As the risk of transmission of the SARS-Cov-2 is directly related to the degree of contact with COVID-19 positive patients, protective measures are mandatory for the IR team.

- Any patient with COVID-19, suspected, confirmed or under investigation, should be clearly identified at all levels of the patient's clinical itinerary, particularly when IR procedures are requested.
- Consider bed-side procedures whenever possible to minimise patient transfer.
- Ideally identify one IR suite for procedures.
- Ideally prefer a facility with negative air pressure or switch to neutral pressure in case the suite was equipped with positive pressure.
- Identify high-risk procedures for the IR team (table 1).
- Consider direct admission of the patient in the operating suite.
- There should be clean access to the suite.
- Consider keeping the patient's bed in the room, whenever possible.
- Limit staff members to those required for the procedure.
- Avoid any changes in staff members during the procedure, whenever possible.
- Prepare dedicated materials for dressing and protection in an identified area.

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- Observe institutional (local policies) guidelines regarding dressing and preparation for patients and for team members.
- Observe institutional guidelines related to “high risk” patients [4], if different from above.
- For patients under ventilation, observe guidelines on respirator use.
- Observe institutional guidelines on dressing, materials management and apparel decontamination.
- Develop/follow a plan for cleaning the IR suite after the procedure.
- Ensure that personal protective equipment required for protection and disposal for cleaning are available, properly designated and stored securely.
- Inform and instruct the IR team. Ideally establish procedure simulation and training and a quality control process.
- Encourage the use of panels for COVID-19 procedure signature.

Interventions on non-COVID patients

Screen the patient for clinical signs suggestive of COVID-19 before entering the IR suite when possible. Any patient who cannot be questioned is considered a suspected case of COVID-19.

Develop an isolation and management plan for COVID-19 suspect patients in the IR suite.

Every patient entering the IR suite should wear a surgical mask (face mask) and follow appropriate hand hygiene procedures.

Inform patients about preventive measures to ensure patient and IR team safety.

Workflow of non-COVID-19 patients

Cancelation of interventions

In March 13, 2020, the OFSP stated (Ordonnance 2 COVID-19, Art. 10a) that “health institutions are prohibited from carrying out examinations, treatments and nonurgent interventions” [2] and are asked to cancel planned interventions accordingly. Defining “nonurgent interventions” might be challenging. The SSVIR considers that the decision-making process should integrate multiple factors and take into account risks and benefits for the patient in a personalised approach. However, to guide decision making, IR activities could be stratified as reported in table 2

Table 1: Interventions on COVID-19 patients presenting a high risk for transmission to the IR team.

Endocavitary intervention on airways, oesophagus and stomach-
Bronchial embolisation
Thoracic drainage
Thoracic biopsy
Intervention that requires intubation/extubation in the IR suite
Intervention on patients with a tracheostomy
Intervention on patients requiring CIPAP/BIPAP or similar equipment
Implantation of central venous catheter
Hybrid intervention requiring endoscopy of airways/oesophagus

- BIPAP = bi-level positive airway pressure; CIPAP = continuous positive airway pressure; IR = interventional radiology

. Priority 1 corresponds to procedures that should be performed urgently, priority 2 to those that should be done within 7 days, priority 3 to procedures to perform as soon as possible depending on availability of facilities/resources but within 30 days, and priority 4 to interventions that can be performed after 30 days. Patients who have their interventions cancelled should be contacted by a dedicated and instructed team member. Patients should be instructed to call back to a dedicated phone number if their symptoms or clinical conditions have changed.

Planning elective interventions

The IR team should be able to schedule patients for interventions, in accordance with the priority, as mentioned above. Patients should be informed and instructed to call back a dedicated phone number if their symptoms or clinical conditions have to change.

Virtual visits

Encourage virtual clinical visits or teleconsulting.

Workflow of the interventional radiology team

Reduce onsite IR workforces to institutional needs.

Encourage building two separate teams able to act independently, using the rotation principle, to avoid cross physical coverage.

Promote/develop distant reporting.

Halt unnecessary meetings and hold virtual meetings in preference.

Follow institutional policies on social distancing, personal protective equipment and hand hygiene.

Follow institutional policies on how to handle personnel with unprotected contact to persons or personnel with COVID-19 symptoms [5, 6].

Management of materials and implantable devices

Maintain an appropriate supply of personal protection equipment.

Optimise utilisation of materials.

Plan to maintain supplies to cover IR services, but do not overstock to preserve the global supply.

Low-supply items should be reserved for critical care.

Visitors

Visitors should not be allowed to access IR facilities, including recovery facilities and day hospitals.

Inform and instruct patients.

Limit physical interactions between healthcare professionals and their colleagues.

Education and training

Promote teleconferencing for supervision and remote read-out, whenever applicable.

Table 2: IR intervention priority: proposal from the Swiss Society of Vascular and Interventional Radiology.

	Definition	Interventions		
Priority 1	Urgent Within 24 hours	Embolisation for acute bleeding		
		TIPSS/BRTO for acute bleeding		
		Endovascular management vascular pseudoaneurysm		
		Endovascular management of acute aortic syndrome		
		Endovascular management of acute ischaemia (peripheral, visceral)		
		Catheter directed management of acute pulmonary embolism		
		Endovascular management of acute vena cava syndrome		
		Intravascular foreign body retrieval		
		Temporary venous access for dialysis (acute renal failure)		
		Biliary drainage (sepsis)		
		Drainage of collections (sepsis)		
		Any other intervention fulfilling the same criteria (multidisciplinary decision encouraged)		
		Priority 2	Short-term planning Within 7 days	Endovascular management of high risk aortic aneurysm
				Endovascular management of critical limb ischaemia
Endovascular management of superior vena cava syndrome (subacute)				
Endovascular management of acute deep vein thrombosis				
Inferior vena cava filter insertion				
Endovascular management of arteriovenous shunt acute dysfunction				
Tunnelled dialysis catheters				
Central venous access and PICCs				
Nephrostomy				
Airway / gastrointestinal tract stenting (obstruction)				
Drainage of collection				
Biopsies of transplanted solid organs				
Fluoroscopy-guided lumbar puncture				
Any other intervention fulfilling the same criteria (multidisciplinary decision encouraged)				
Priority 3	Time sensitive intervention As soon as possible and no more than 30 days	Endovascular management of chronic peripheral ischaemia (non claudicant)		
		Endovascular visceral ischemia (subacute)		
		Endovascular management of arteriovenous shunt dysfunction		
		Endovascular management of superior vena cava syndrome		
		Lymphatic thoracic duct embolisation		
		Malignant tumour ablation/chemoembolisation/radioembolisation		
		Portal vein embolisation		
		Airway/gastrointestinal tract stenting (no obstruction)		
		Gastrostomy/jejunostomy		
		Tunnelled peritoneal/pleural catheters		
		Needle biopsy		
		Acute pain management		
		Any other intervention fulfilling the same criteria (multidisciplinary decision required)		
		Priority 4	Acceptable to be planned after 30 days	Embolisation of peripheral/visceral arteriovenous malformation
Management of low flow vascular malformation				
Endovascular management of chronic peripheral (claudicant)/visceral ischaemia				
Endovascular management of vascular aneurysm				
Endovascular management of chronic venous obstruction				
Management of pelvic congestion syndrome				
Embolisation of scrotal varicocele				
Management of varicose veins				
Portal vein recanalisation				
TIPSS for ascites				
Inferior vena cava filter retrieval				
Venous sampling				
Management of benign tumours				
Intervention for infertility				
Tube drainage change				
Chronic pain management intervention				

BRTO = balloon-occluded retrograde transvenous obliteration; IR = interventional radiology; PICC= peripherally inserted central catheter; TIPSS = transjugular intrahepatic portosystemic shunt

Disclosure statement

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References

- 1 World Health Organization. Coronavirus disease COVID-19 Data. <https://who.int/emergencies/disease/novel-coronavirus-2019>.
- 2 New coronavirus: measures, ordinance and explanations. <https://www.bag.admin.ch/bag/fr/home/krankheiten/ausbrueche-epi->

- demies-pandemies/aktuelle-ausbrueche-epidemien/novel-cov/massnahmen-des-bundes.html#-834045337
- 3 Joint CIRSE-APSCVIR checklist to prepare IR departments for COVID 19. <https://www.cirse.org/education/covid-19-resource-centre/>
 - 4 Swiss Society Of Intensive Care Medicine. Recommendations for the admission of patients with COVID-19 to intensive care and intermediate care units (ICUs and IMCUs). Swiss Med Wkly. 2020;150:. doi:<https://doi.org/>. <http://dx.doi.org/10.4414/smw.2020.20227>. [PubMed](#).
 - 5 Management of COVID-19 positive or suspect employees involved in care of patients in acute care hospitals. <https://www.swissnoso.ch>
 - 6 Recommendations for healthcare workers, having had unprotected (without mask) contact with COVID-19 cases. <https://www.swissnoso.ch>