

COVID19 –Nuclear Medicine Departments, be prepared!

Hian Liang Huang^a, Rayjanah Allie^a, Gopinath Gnanasegaran^{a,b} and Jamshed Bomanji^a

Nuclear Medicine Communications 2020, 41:297–299

Keywords: COVID-19, Coronavirus, Nuclear Medicine Department, Preparation

^aInstitute of Nuclear Medicine, University College London Hospital, 235 Euston Road, London NW1 2BU and ^bDept of Nuclear Medicine, Royal Free Hospital, Pond Street, London NW3 2QG, UK

Corresponding to Prof Jamshed Bomanji, Institute of Nuclear Medicine, Tower 5, University College London Hospital, 235 Euston Road, London, NW1 2BU, UK
Tel: +44 20 3447 0528; fax: +44 20 3447 0596;
e-mail:jamshed.bomanji@nhs.net

Received 2 March 2020 Accepted 2 March 2020

In late 2019, a novel coronavirus was isolated from a cluster of patients presenting with viral pneumonia in Wuhan, China¹. With increasing global population movement, there has been a great deal of concern regarding the possibility that this new virus may spread and reach pandemic levels². While the initial cluster of patients were believed to have caught the virus from the wet “seafood market” in Wuhan. There have since been multiple reports of person-to-person transmission³ and it has reached multiple countries in virtually all continents, with new countries affected reported almost daily⁴. Primarily COVID-19 spreads in a similar way to flu.

The imposed Wuhan quarantine bought the world time to prepare for Covid-19. With the increasing case numbers, there has been a greater focus on infection control measures, particularly in hospitals where there is potential for spread of the virus not just between patients but also to staff members in healthcare⁵. These measures can be implemented not just at hospital level, but also regional or even national level. There have been articles on how radiology departments can exercise caution to reduce the risk of an outbreak in their unit⁶, but still little advice has been given in the nuclear medicine setting. Whilst there are similarities, there are also pertinent differences between the subspecialties regarding the urgency of scans, length of patient contact, ability for portable scanners and period of scans, which we feel would necessitate a separate set of advice.

As with radiology departments, the nuclear medicine technologists, nurses and healthcare assistants are generally the most at-risk for exposure to the novel coronavirus 19 (COVID-19)⁶. COVID-19 is believed to be transmitted-via respiratory droplets and fomites during close unprotected contact between an infector and infectee. The airborne spread has not been reported for COVID-19 and it is not believed to be a major driver of transmission based on available evidence; however, it can be envisaged if certain aerosol-generating procedures are conducted in health care facilities⁷ such as supplemental oxygen or intubation. There are some clues from previous outbreaks of coronaviridae such as the SARS

and MERS epidemics, that have given rise to advice and measures in the current outbreak⁸. We present suggestions for nuclear medicine departments to follow, based on a typical patient ‘journey’ through our departments.

Nuclear Medicine is slightly fortunate in that the majority of our scans and therapies tend to be outpatient, elective studies, and the new studies are usually in in-patients who would have been screened for COVID-19 on the wards before being transferred for scans. Unfortunately for us, in general there is no portability in our SPECT and PET scanners, not to mention the need for patients to be injected with radiopharmaceuticals. The option of reducing patient transport by portable machinery is limited to us in nuclear medicine departments.

Patient arrival, waiting area

On arrival and registration with the department, patients should be encouraged to self-declare if they have travelled to a country where COVID-19 has been known to have spread, particularly if they are symptomatic. A notice at the reception desk for patients to self-declare would be helpful. Large departments dealing with outpatient or provider to provider referrals, should consider thermal screening using mass screening systems that measure the skin temperature at high-speed using thermal imaging and temperature measurement equipment as used in airports. Healthcare staff should recognise the symptoms of COVID-19 infection, including fever, dry cough, fatigue and dyspnoea. However they should also be aware of the fact that there are asymptomatic carriers of the virus and a good contact history is of use. It may be prudent to ensure the waiting area has access to hand washing facilities and tissue boxes and masks are within easy reach so patients can be encouraged to follow basic hygiene practices⁹. The waiting area may need to have enough space so that waiting patients may sit at enough distance, as the risk of transmission increases within three feet²⁷.

When such patients are identified they should be placed in a separate waiting area if available and the appropriate consultations to infectious diseases should be sought. Given current knowledge, the patients should don a

surgical mask in order to minimize the risk of transmission while waiting for further management by the appropriate healthcare teams. If the COVID-19 becomes endemic in the UK, giving surgical masks to all patients to wear while they are in the department should be considered. However, this may come at the cost of dehumanizing the patient journey. If possible, their scans should be rescheduled until the results of tests for COVID-19 can be made available.

If the patient is called, history is taken and the radiopharmaceutical has been injected

The nuclear medicine frontline staff such as radiographers or nurses will have the most potential close contact with infected patients. It is therefore crucial that potentially infected patients should be identified prior to this step, as physical contact is inevitable for cannulation, and a significant amount of time may be spent with the patient. Appropriate personal protective equipment (PPE) is mandatory if COVID-19 spreads widely in the UK. This consists of eye protection with goggles, surgical masks at least (if N95 masks are unavailable), fluid resistant isolation gown and disposable gloves. However, currently performing procedures with full PPE is difficult at the best of times, and this may affect the ability of staff to handle the same patient load as before. However, these may change in future subject to the volume of positive cases in hospital and departmental catchment.

During Uptake Phase

The majority of nuclear medicine scans and procedures require an uptake phase ranging from a few minutes to a few hours. During this time, the patients may be waiting in separate radioactive patient areas or in uptake bays if waiting for PET. Similar considerations as those for patients in the initial post registration waiting area would then apply for all other procedures.

When the patient is scanned and goes home

After the patients are scanned, there should be disinfection of the scanners and room surfaces to prevent potential spread. Public Health England has published guidance for disinfection of scanner and clinic rooms with solutions containing 1000 parts per million of available chlorine, and appropriate training of environmental maintenance staff is recommended.

Nuclear Medicine Staff

The same precautions and screening that apply to the patients on arrival should in theory apply to nuclear medicine staff (e.g., technologist, nurses, nuclear medicine physicians and radiologist). Simple measures such as staying home if unwell and particularly if having travelled to known COVID-19 affected countries would do much to reduce risk of virus transmission. We would suggest that senior clinicians and/or management take a

more proactive stance to advise staff that they should not come to work if they are not well.

If COVID-19 becomes more endemic, larger nuclear medicine departments may consider segregating staff into teams so as to reduce the potential of transmission of virus between healthcare providers causing a catastrophic inability of the department to function.

There are an increasing number of reports of CT findings of COVID-19 associated pneumonia¹⁰, and recently a short article regarding incidental findings suggestive of COVID-19 seen on the CT component of PET/CT studies¹¹. In this respect, it becomes even more vital for nuclear medicine reporters to be vigilant and scrutinize the lung windows on each and every CT component as such patients may be asymptomatic and unwittingly transmitting the virus. The imaging findings, while suggestive and appear similar to previous viruses such as MERS or SARS, are non-specific and may be seen in other conditions. Upon identification of potential cases with the appropriate clinical context of acute illness and contact history, relevant patient management and contact tracing should be instituted.

Key points:

- Robust screening process for outpatients in line with hospital policy should be in place.
- Develop clear escalation pathway to ensure cases are identified in a timely manner.
- Training for all staff members to ensure maximum compliance and vigilance.
- Display posters to promote hand washing and good respiratory hygiene measures within the department. Combine this with other communication measures such as briefings at meetings and information on the intranet to promote hand-washing.
- All camera gantries, blood pressure cuffs, surfaces (desks & tables) and image viewing station mice and keyboards should be wiped with disinfectant regularly and after every contact with suspected patients.
- Place sanitizing hand rub dispensers in prominent places around the workplace. Make sure these dispensers are regularly refilled.
- Environmental services staff members who clean all departmental areas during and out of work hours must be specifically trained for professional cleaning of potentially contaminated surfaces after each high-risk patient contact.
- Communicate and promote the message to staff to stay at home even if they have just mild symptoms of COVID-19.
- Develop a contingency and business continuity plan if one of your staff becomes sick with COVID-19.

Conclusion

Although there are many issues raised for nuclear medicine practice by the current COVID-19 outbreak, if

adequately prepared with PPE, nuclear medicine departments can contribute to mitigate the impact on patients and staff. The experience of preparing for this virus will help in improving readiness if there are new outbreaks in the future.

Conflict of Interest:

All authors declare no conflict of interest.

Reference

- 1 Chan JFW, Yuan S, Kok KH, *et al.* A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. 2020;395(10223):514–523. doi:10.1016/S0140-6736(20)30154-9
- 2 Li Q, Guan X, Wu P, *et al.* Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N Engl J Med*. January 2020. doi:10.1056/nejmoa2001316
- 3 Huang C, Wang Y, Li X, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395(10223):497–506. doi:10.1016/S0140-6736(20)30183-5
- 4 Coronavirus Situation Report. Coronavirus disease 2019 (COVID-19). 2020;2019(February).
- 5 Chang D, Xu H, Rebaza A, Sharma L, Dela Cruz CS. Protecting health-care workers from subclinical coronavirus infection. *Lancet Respir Med*. 2020;2600(20):2001468. doi:10.1016/s2213-2600(20)30066-7
- 6 Kooraki S, Hosseiny M, Myers L, Gholamrezanezhad A. Coronavirus (COVID-19) Outbreak: What the Department of Radiology Should Know. *J Am Coll Radiol*. February 2020. doi:10.1016/j.jacr.2020.02.008
- 7 Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). 2020;2019(February):16–24.
- 8 Wan Y, Shang J, Graham R, Baric RS, Li F. Receptor recognition by novel coronavirus from Wuhan: An analysis based on decade-long structural studies of SARS. *J Virol*. 2020;(January). doi:10.1128/jvi.00127-20
- 9 Novel Coronavirus (2019- nCoV) advice for the public Section navigation Basic protective measures against the new coronavirus. 2020:1–23.
- 10 Adam Bernheim. Chest CT findings in COVID-19. *Radiology*. 2020;19.
- 11 Qin C, Liu F, Yen T-C, Lan X. 18F-FDG PET/CT findings of COVID-19: a series of four highly suspected cases. *Eur J Nucl Med Mol Imaging*. 2020. doi:10.1007/s00259-020-04734-w