

Recommendations for minimising the risk of transmission of COVID-19 in UK adult haemodialysis units

KQuIP COVID-19 HD Ensuring Patient Safety Work Stream

Review date 1st September 2020

Please refer to the most recent version on the RA/BRS website. For current government guidance on COVID-19, visit <https://www.gov.uk/coronavirus>. The devolved nations should consult their nation's public health website as advice may be different. A separate recommendation will be developed for children receiving haemodialysis.

Aim - To provide practical advice to minimise the risk of COVID-19 transmission within both in-centre and satellite adult haemodialysis units according to current knowledge and experience.

Key Messages

- Patients receiving haemodialysis treatment are extremely vulnerable to severe COVID-19 infection and there is evidence that transmission has occurred in UK dialysis units.
- COVID-19 is highly infectious and asymptomatic carriage is common, so dialysis units should ensure scrupulous cleaning and disinfection practices in all areas.
- Social distancing measures should be fully implemented including during transport, in waiting areas and throughout dialysis.
- Patients should use fluid resistant surgical masks for dialysis and travel.
- Staff should use PPE according to guidance from Public Health England (PHE).
- Staff should use enhanced Personal Protective Equipment including FFP3 mask during cardiopulmonary resuscitation.
- Dialysis units should have defined processes for symptoms screening, testing of symptomatic patients and follow-up of results.
- Dialysis units should keep a central record of where and when each patient dialysed as this information will be needed for contact tracing purposes.
- If a patient has a positive COVID-19 swab, then all patients who were on the same dialysis shift / shared transport / shared waiting room are defined as "close contacts". This shift should be "locked down" for 14 days with no patient changing shift or dialysis unit except for necessary moves because of COVID-19 symptoms or positive status.
- Dialysis units should have a defined protocol for isolating or cohorting patients who are a "close contact" or have COVID-19 symptoms or a positive test.
- If local COVID-19 incidence is high or there has recently been a positive case on the dialysis unit, surveillance COVID-19 swabs in asymptomatic patients are likely to be helpful in preventing clusters.
- The safest protocol for de-isolation of patients receiving haemodialysis is not yet known. Many patients remain COVID-19 swab positive for several weeks after resolution of symptoms but at present it is not known whether this poses a significant risk to others.
- De-isolation decisions for patients with a history of immunosuppression should be based on COVID-19 test results and may need discussion with a virologist.
- For patients with no history of immunosuppression, dialysis units should decide which of the two protocols listed below is most appropriate for use, taking into account local requirements for isolation and cohorting.

Recommendations for minimising the risk of transmission of COVID-19 in UK adult haemodialysis units

Contents

1. Shielding.....	3
2. Patient Education.....	3
3. Staff Education.....	3
4. Hand hygiene	4
5. Social distancing.....	5
6. Personal Protective Equipment (PPE)	6
7. Environmental cleaning and disinfection.....	6
8. Symptom screening and reporting.....	7
9. COVID-19 Swab (PCR) testing	8
10. Contact tracing.....	9
Table 1 – ECDC definition of a high risk “close contact” applied to a haemodialysis unit ^{12,13}	9
11. Isolation and cohorting.....	11
12. De-isolation protocols	12
References.....	13
Appendix 1 – COVID-19 patient isolation flow chart.....	15
Appendix 2 – COVID-19 patient de-isolation flow chart	16

Introduction

People receiving haemodialysis for end stage kidney disease are classified as extremely vulnerable to infection with COVID-19. To date around 10% of adult patients receiving haemodialysis in the UK have had confirmed COVID-19 and 25% of these have died¹. Some dialysis units have experienced significant outbreaks within groups of patients who received dialysis at the same time, suggesting that transmission may have occurred within the dialysis unit. The KQuIP COVID-19 HD Ensuring Patient Safety group has gathered information and advice from renal healthcare professionals, expert patients, public health medicine and published reports in compiling these recommendations.

Dialysis units should adjust their working practices to support the following 12 key elements to protect patients and staff from COVID-19 infection:

1. Shielding

Patients should continue to shield at home apart from attending for dialysis and any other essential face to face hospital treatments which cannot be carried out remotely.

Patients should only have contact with individuals from their household. Current government advice is that patients may take outdoor exercise once a day in order to reduce the adverse effects of shielding on mental and physical wellbeing². Further relaxation of shielding advice may follow over the coming weeks. If patients choose to relax shielding, they should maintain scrupulous hand hygiene and social distancing practices for the long term to minimise the risks to themselves and others.

2. Patient Education

Patients should have access to information in a variety of forms and language, focusing on the following areas:

- Mechanism of spread of COVID-19.
- Hygiene practices – hand hygiene, respiratory hygiene, cough etiquette, avoiding unnecessary contact with surfaces.
- Safe use of surgical face masks
- Self-reporting of symptoms of COVID-19 – range of symptoms and action to be taken.
- The need to inform the dialysis unit if they are a “close contact” of someone with COVID-19, or have been contacted by NHS Test and Trace (in Wales this is called Test Trace Protect and in Scotland it is called Test and Protect).
- Indications for COVID-19 swab testing.
- Actions to be taken if swab result is positive – self isolation.
- Current patient information can be found on <https://www.kidneycareuk.org/news-and-campaigns/coronavirus-advice/>

3. Staff Education

Staff should be educated on their individual role in protecting themselves and others from COVID-19 as per local Trust guidelines, including the following information:

- Follow government guidelines on the need for self-isolation if they or a household contact have symptoms of COVID-19³.
- How to self-report to their line manager if they have symptoms of COVID-19.
- How to arrange a COVID-19 swab test.

- If the COVID-19 swab result is positive, they should self-isolate for at least 7 days.
- If symptoms persist for more than 7 days, follow advice on <http://www.nhs.uk/conditions/coronavirus-covid-19/self-isolation-and-treatment/how-long-to-self-isolate/>.
 - In Wales, follow advice on <https://gov.wales/self-isolation-stay-home-guidance-households-possible-coronavirus>
 - In Scotland, follow advice on <https://www.nhsinform.scot/illnesses-and-conditions/infections-and-poisoning/coronavirus-covid-19/test-and-protect/coronavirus-covid-19-guidance-for-households-with-possible-coronavirus-infection>
- What to do if staff are informed by NHS Test and Trace that they are a “close contact” of a case of COVID-19. <http://www.nhs.uk/conditions/coronavirus-covid-19/testing-and-tracing/nhs-test-and-trace-if-youve-been-in-contact-with-a-person-who-has-coronavirus/>.
 - In Wales, follow advice on <https://gov.wales/test-trace-protect-your-questions#section-42186>
 - In Scotland, follow advice on <https://www.gov.scot/publications/coronavirus-covid-19-test-and-protect/>

4. Hand hygiene

Dialysis unit staff should follow established hand hygiene practices with audit of compliance and prompt intervention to address any deficiencies.

Patients should perform hand hygiene (either with soap and water or hand gel) at key stages during the dialysis process, supported by appropriate facilities and encouragement:

- Before travelling
- On entry to dialysis unit
- At their dialysis station
- Before and after eating
- Before and after using the toilet
- On leaving their dialysis station
- Before travelling home
- On arrival home

A hand washing best practice pictorial guide can be found at

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/886217/Best_practice_hand_wash.pdf

5. Social distancing

Dialysis units should adjust their service to minimise close contact between individuals, given the crucial role of social distancing in preventing the spread of infection. This includes distancing both in time and physical proximity.

Dialysis units should facilitate the following social distancing measures:

5.1. Stagger appointment times to ensure prompt patient flow

5.2. Transport - shared decision making with each patient to identify the best solution (in order of preference):

- Use own car
- Driven by family member
- Driven by trusted taxi drivers who commit to cleaning the vehicle between patients and may use protective screens.
- Shared NHS transport, with at least one empty seat between patients in the same row, and at least one empty row between rows of patients.
- Patients who are a contact / suspected COVID-19 should travel alone.
- Patients with confirmed COVID-19 may share transport with each other but not with other patient groups (see section 11 - isolation and cohorting).
- Public transport with maximal social distancing.

5.3. Waiting areas – the following strategies should be considered where possible:

- Avoid use of waiting areas before dialysis – patients stay in transport until called in by staff
- Avoid use of waiting areas after dialysis – patients stay at dialysis station until transport arrives
- If not possible, use separate “arrival” and “departure” waiting areas, to prevent spread of COVID-19 between shifts of patients (see contact tracing).
- Remove chairs to maintain a minimum distance of 2 metres
- Use additional areas to ensure a minimum distance of 2 metres
- COVID-19 positive patients should use a different entry and exit point from other groups of patients.

5.4. Patient flow – staff should optimise efficient patient flow to ensure social distancing is maintained.

The following measures should be considered where possible:

- Floor stickers to direct social distancing and flow
- Separate doors for arrival and departure
- One-way systems for patients and staff to prevent “hot spots” for close contact.

5.5. Dialysis chairs / beds should be separated by 2 metres.

Where this is not possible, the following options could be considered:

- Transparent screens between stations to minimise potential droplet spread
- Removal of dialysis stations to ensure a minimum distance of 2 metres between stations and chairs – an additional dialysis shift may therefore be needed to ensure there is adequate dialysis capacity.

5.6. Staff should maintain social distancing wherever possible throughout working practices, during handovers and break times.

6. Personal Protective Equipment (PPE)

6.1. Patients should wear fluid resistant surgical face masks throughout the dialysis process from leaving the house until they arrive back home⁴.

- Fluid resistant surgical face masks should be supplied by the dialysis unit with an adequate supply of at least 1 mask per dialysis session (patients may need more if the mask becomes contaminated and needs to be replaced).
- Masks may be removed to allow eating and drinking but should be replaced immediately afterwards.
- If removing a face mask to eat or drink, patients should use hand sanitizer before taking a mask off and before putting it back on.
- Anyone taking their mask off must keep a 2 metre distance between them and all other people on the unit, including staff and other patients receiving dialysis.
- Advice on eating and drinking during haemodialysis can be found at <https://renal.org/wp-content/uploads/2020/05/Final-Statement-RNG-Eating-drinking-on-haemodialysis.pdf>

6.2. Staff working in COVID-19 negative areas should follow current PHE guidance on use of PPE⁵.

- All staff should be fit-tested for an FFP3 mask in case this is needed.
- All clinical staff should use a fluid resistant surgical face mask, visor, plastic apron and gloves.
- If there has recently been an outbreak of COVID-19, the dialysis unit may decide to use enhanced PPE such as a surgical gown until the causes of the outbreak have been addressed following discussion with the trust's infection control team.

6.2. Staff should use full PPE during cardiopulmonary resuscitation^{6,7}

- There should be a reliable supply of full PPE (fluid resistant surgical gowns and fit-tested FFP3 masks) for use during cardiopulmonary resuscitation (CPR).

6.3. Staff in COVID-19 positive areas should follow current PHE guidance on use of PPE⁵.

- All clinical staff should use a fluid resistant surgical face mask, visor, plastic apron and gloves
- The dialysis unit should have the flexibility to use enhanced PPE such as fluid resistant surgical gown and FFP3 mask guided by a risk assessment of aerosol generation.
- If an aerosol generating procedure is likely to occur during dialysis, e.g. use of CPAP, the patient should be dialysed in a side room and full PPE must be used (including surgical gown and FFP3 mask)

7. Environmental cleaning and disinfection

COVID-19 is highly infectious - transmission may occur via respiratory droplet spread, bodily fluids and contact with infected surfaces and equipment. Routine procedures for the cleaning and disinfection of dialysis stations and equipment are adequate to prevent transmission of COVID-19 providing they are rigorously followed^{8,9}.

7.1. Asymptomatic carriage of COVID-19 is common, therefore the same cleaning and disinfection practices should occur in both COVID-19 negative and positive areas.

7.2. Dialysis staff should pay particular attention after each dialysis session to the following^{8,9}

- Cleaning should only commence once the patient has left the area
- Disinfect or discard all surfaces, supplies or equipment located within 2 metres of the patient, including protective screens and remote controls
- Choose an appropriate cleaning agent and concentration for the surface / equipment according to manufacturer's instructions
- Clean shared medical equipment after each patient use (e.g. blood pressure cuffs, oxygen saturation monitor, scales)
- For side rooms, allow adequate time for air change between patients. As this depends on the type of ventilation used (negative or neutral pressure), local guidance may need to be sought from infection control⁸.

8. Symptom screening and reporting

Many patients with COVID-19 have a fever, persistent cough or loss of taste and smell. Other common symptoms include breathlessness, diarrhoea, fatigue, aches and pains¹⁰. Sometimes frequent clotting of the haemodialysis circuit is the first apparent sign of COVID-19¹¹. Some patients develop symptoms for the first time during their dialysis treatment, sometimes associated with rapid deterioration, so early reporting of symptoms is essential. In contrast, some patients are asymptomatic but may still be infectious to others⁸. Some patients have a COVID-19 illness but remain swab negative and no other explanation is found for their illness. These patients are often assumed to have COVID-19 illness but have false negative swab tests. Understanding of this patient group is likely to grow with time as tests improve.

Routine practice in dialysis units should include symptoms screening/reporting at the following points if they or a household contact have symptoms of possible COVID-19:

- **Symptoms on non-dialysis days** - Patients should self-report so that appropriate action can be taken (see sections 9.1 and 9.2)
- **Symptoms on dialysis days** - Patients should self-report to the dialysis unit before they leave home.
 - Family members and transport providers may be able to assist with symptoms screening and reporting before the patient travels to the dialysis unit
- **On entry to dialysis unit**, including measurement of body temperature by the dialysis nurse before commencing treatment.

9. COVID-19 Swab (PCR) testing

Each dialysis unit should have a clear process by which they are informed of positive swab results without delay to ensure further actions are taken.

COVID-19 swabs should be performed in the following situations in all cases:

- **New patients starting dialysis or moving to another unit**
 - Perform swab within the 72 hours before planned start date to ensure they are isolated or cohorted appropriately if necessary.
- **Symptomatic patients**
 - Renal unit team should arrange for swab test as soon as possible, with results available within 24 hours.

9.1. Actions to be taken for patients who inform the dialysis unit that they are a close contact of a household member or friend who has tested positive

- Arrange next dialysis in an isolation area separate from other patients (not with known COVID-19 patients)
- Perform COVID-19 swab at next dialysis session (see section 9.3).
- Perform clinical review at next dialysis session

9.2. Actions to be taken for symptomatic patients before COVID-19 status is known:

- *For symptomatic patients who are at home* - perform a telephone clinical review to decide whether or not they need hospital assessment that day.
- *For symptomatic patients who arrive at the dialysis unit* - move into an isolation room for clinical assessment to determine severity of illness and urgency of dialysis.
- **Perform COVID-19 swab test without delay**
 - If swab positive – dialyse in isolation or in a COVID-19 positive cohort
 - If swab negative and clinically unlikely to be COVID-19 illness – return to routine dialysis area
 - If swab negative but clinically likely to be COVID-19 illness – continue to dialyse in isolation and do further investigations as guided by the clinical picture.

9.3. Further action to be taken for COVID-19 swab positive cases:

- Inform the patient and advise that household contacts should self-isolate for 14 days
- Inform the patient that they will be contacted by the NHS Test and Trace service (or equivalent if in Wales or Scotland)
- If the patient lives in a care home or similar, contact the manager without delay
- Arrange frequent medical assessment to monitor clinical progress and arrange admission where needed
- Commence contact tracing for other patients on dialysis (see section 10).

9.4. Surveillance testing of asymptomatic patients in haemodialysis units

- The purpose of surveillance testing is to identify asymptomatic positive cases early and isolate appropriately, thus minimising the risk of transmission to others
- It has not yet been carried out on a large scale in the UK due to lack of testing capacity

- Dialysis units which have performed surveillance testing have detected 0-2% of patients with positive swabs
- Local infrastructure is needed to obtain timely results and act on them before the patient's next dialysis is due (see above) - without this, its benefits may be limited.
- Its role in preventing transmission of COVID-19 in haemodialysis units is currently unknown, although it is likely to be helpful if community transmission is high
- In areas of high incident COVID-19, consideration should be given to weekly COVID-19 swabs where testing capacity allows, for patients who are in the following categories:
 - on an active waiting list for elective surgery (once the surgery date is known)
 - on an active transplant list
- Each dialysis centre may consider performing surveillance COVID-19 swabs at a frequency determined by recent levels of COVID-19 infection within the dialysis unit as well as infection rates in the local community.
- Frequency of surveillance testing should increase if there is an increase in local COVID-19 infection.
- Asymptomatic patients who have a positive COVID-19 swab should be managed in the same way as symptomatic patients (see sections 9.2 and 9.3)

10. Contact tracing

A "close contact" is defined by the European Centre for Disease Prevention and Control (ECDC) as any person who has had contact with a COVID-19 case for > 15 minutes within a timeframe ranging from 48 hours before the onset of symptoms of the case to 14 days after the onset of symptoms¹². There is no ECDC definition of a "close contact" in a dialysis unit but this has been defined following discussion with Public Health England. This applies despite the use of fluid resistant surgical masks by patients given their vulnerability to a severe form of COVID-19¹³.

Table 1 – ECDC definition of a high risk "close contact" applied to a haemodialysis unit^{12,13}

ECDC high risk "close contact"	Example on a dialysis unit
A person who was in a closed environment for more than 15 minutes, e.g. a vehicle, waiting room, classroom, meeting room.	<ul style="list-style-type: none"> • Patient on the same dialysis shift • Patient who shared hospital transport • Patient on a different shift who shared a waiting room at shift changeover for >15 minutes
<p>A person having unprotected direct contact with infectious secretions of a COVID-19 case (e.g. being coughed on).</p> <p>A person having had physical contact with a COVID-19 case</p>	<ul style="list-style-type: none"> • A driver who had physical contact with a patient but was not wearing recommended PPE • A nurse who was not wearing recommended PPE

10.1. Preparedness for contact tracing

Dialysis units should do the following, which will require additional staff resource (nursing and administrative) as well as information technology (IT) support.:

- Keep a central record of patients' dialysis details including location, dates, times, transport and symptoms onset to allow retrospective identification of "close contacts"
- Be able to identify "close contacts" retrospectively once a COVID-19 positive patient has been identified (see table 1).

10.2. Identification of "close contacts" of a patient with a positive COVID-19 swab

The NHS Test and Trace service (or equivalent in Wales, Northern Ireland or Scotland) is new and it is not yet clear exactly how this will work for patients receiving haemodialysis. Further information can be found on <https://www.gov.uk/guidance/nhs-test-and-trace-how-it-works>. In Wales, see <https://gov.wales/test-trace-protect-your-questions#section-42186>, In Scotland, see <https://www.gov.scot/publications/coronavirus-covid-19-test-and-protect/>. In Northern Ireland, see <https://www.publichealth.hscni.net/covid-19-coronavirus/testing-and-tracing-covid-19>.

Dialysis units need to be able to:

1. Identify the date when symptoms started and location of dialysis = Day 0
2. Identify the date which is 48 hrs before symptoms developed = Day -2
3. Identify all patients who were "close contacts" from Day -2 onwards:
 - a. Dialysed on the same shift
 - b. Shared transport
 - c. Shared waiting room for >15 minutes
4. Identify any staff and driver "close contacts" who were not wearing appropriate PPE (see table 1).
5. Discuss with the patient their home circumstances to clarify household contacts.

10.3. Actions to be taken for "close contacts" on a dialysis unit

- Inform all dialysis unit "close contacts" as soon as possible, advising them to quarantine for 14 days from date of contact (patients should still attend for dialysis).
- Symptomatic patients should be managed as in section 9.
- *For asymptomatic dialysis patients who are "close contacts"*
 - arrange COVID-19 swab at next dialysis, then at days 7 and 14
 - isolate positive cases to COVID positive shift / unit (see section 9).
- Heightened surveillance for symptoms – perform a daily wellbeing call.
- Re-swab any patient who initially tests negative but subsequently develops symptoms.
- **Lockdown of affected dialysis shift - no patient should move shift or dialysis unit until 14 days quarantine is complete (except necessary moves due to COVID swab positive status).**
- Where possible, staff should not provide care at another dialysis unit until day 14.
- Staff with symptoms should be tested without delay and self-isolate until test result available. Household contacts of symptomatic staff should self-isolate for 14 days according to government policy.

11. Isolation and cohorting

Dialysis centres should work collaboratively with others in the region to decide the best way to provide safe dialysis care to different groups taking into account their infection control requirements. The options for isolating / cohorting patients with suspected or confirmed COVID-19 are in order of preference where possible:

1. Patients are dialysed in a separate dialysis unit from patients without COVID-19.
 2. Patients are dialysed in a separate shift - ideally this would be the last shift of the day to maximise opportunities for cleaning and disinfection.
 3. Patients are dialysed in isolation rooms which are as far away from other patients as possible (use separate entrance and exit for COVID-19 positive patients).
 4. Patients are cohorted, including the use of temporary screens to separate from other cohorts (use separate entrance and exit for COVID-19 positive patients).
- Inpatients should not be dialysed in an outpatient dialysis unit as this has been linked to clusters of COVID-19 in dialysis units – transfer to a hospital with inpatient dialysis facilities is preferable.
 - Where possible, staff teams should be designed to avoid staff moving between patient cohorts during the same day. Additional staff may be used as “runners” to assist trained staff and prevent staff from moving between patient cohorts.
 - Infection control precautions for blood borne viruses should be maintained throughout.

The following separate patient groups will be required:

A. Asymptomatic contacts of a known positive case (YELLOW)

- Should be dialysed in isolation (not cohorted) until COVID-19 status is known
- Where a whole shift have become asymptomatic “close contacts”, they should remain in their existing shift, with the shift placed on “lockdown” (see section 10.4).

B. Suspected COVID-19 - Symptomatic patients awaiting swab result (AMBER)

- Should be dialysed in isolation (not cohorted) if facilities allow until COVID-19 status is known.
- If patient numbers in this group are high, they may need to be cohorted.

C. Confirmed COVID-19 – patients with a positive COVID-19 swab (RED)

- For patients on days 0-14 since symptom onset (or positive swab if asymptomatic)
- May be cohorted if inadequate isolation rooms.
- Ideally dialysed by dedicated staff team who are not in contact with groups A and B.
- Staff dialysing these patients should not also care for patients in group E.

D. Recovering COVID-19 – patients with a positive COVID-19 swab (PURPLE)

- For patients who are on days 15+ but have not yet returned to a COVID-19 negative shift.

E. Patients who are not in the above groups (GREEN)

- These patients should be dialysed as far from the above groups as possible, by staff who are not involved in the care of COVID-19 positive patients.

12. De-isolation protocols

There are various de-isolation protocols available¹⁴⁻¹⁷, but none specifically for haemodialysis patients. Published case series have also reported a variety of protocols, some based on time since symptom onset and some rely on one or two negative COVID-19 swabs taken at day 12-14^{18,19}. There are advantages and disadvantages of each approach – a time-based strategy allows simple planning to maximise flow of patients during peak pandemic activity but a test-based strategy could allow more rapid de-isolation and theoretically confer a small reduction in the possibility of transmission (unproven). Dialysis units should choose which protocol to follow, depending on the patient's clinical history and local resources.

So far in the UK there have not been any published reports of outbreaks caused by a patient returning to a dialysis unit after recovering from COVID-19. It is known that some dialysis patients continue to have positive COVID-19 swabs long past day 14, but it is not yet known whether this poses any infection risk to others¹⁹. Detecting viral RNA by PCR test does not necessarily mean that infectious virus is present¹⁷.

- **Symptomatic patients with COVID-19 who have no history of immunosuppression should remain in isolation or COVID-19 positive cohort until they meet criteria for either strategy (see below and appendix 2).**
- **For patients with a history of immunosuppression use within the last 12 months, or bone marrow disorder, the test-based strategy should be adopted¹³.**
- **If in doubt, decisions about de-isolation should be discussed with a virologist.**

1. *Symptom-based strategy*

- At least 3 days (72 hours) have passed *since recovery* defined as resolution of fever without the use of fever-reducing medications **and** improvement in respiratory symptoms (e.g. cough, shortness of breath); **and**
- At least 10 days have passed *since symptoms first appeared*
- Note - a dry cough may persist for several weeks and this alone should not prevent de-isolation

OR

2. *Test-based strategy*

- Resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g. cough, shortness of breath), **and**
- Negative results of a COVID-19 swab (PCR test) from at least two consecutive respiratory specimens collected ≥24 hours apart (total of two negative specimens)

If in doubt, decisions about de-isolation should be discussed with a virologist¹³.

Antibody testing

Testing for COVID-19 antibodies at day 12-14 may provide additional information for patients who remain swab (PCR) test positive, but its role is currently unclear and decisions should not be based on the results of antibody tests alone. There are several ongoing research studies which include patients receiving haemodialysis, so further evidence is likely to emerge over the coming months.

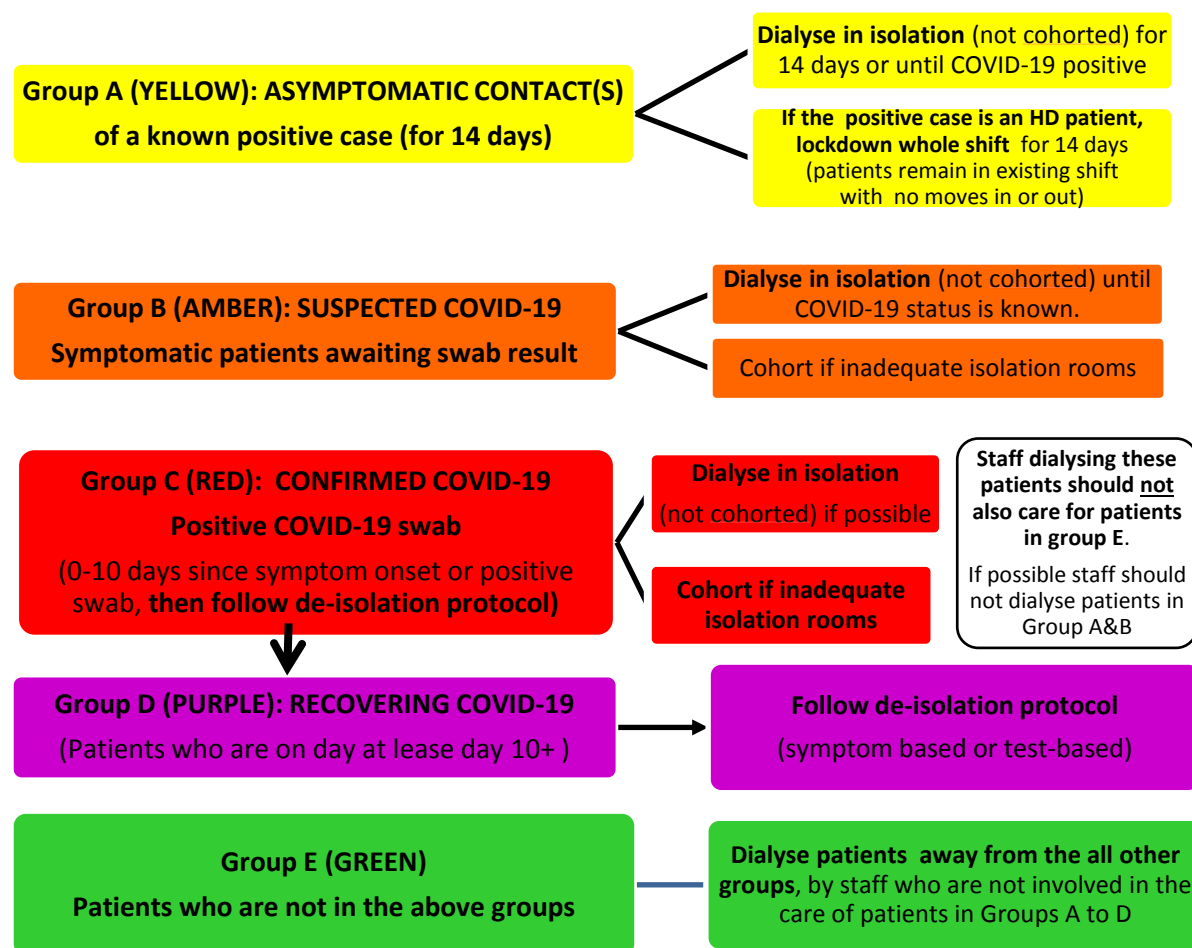
References

1. UK Renal Registry (2020) COVID-19 surveillance report for renal centres in the UK: All regions and centres. The Renal Association, Bristol, UK.
2. UK government guidance on shielding <https://www.gov.uk/government/publications/guidance-on-shielding-and-protecting-extremely-vulnerable-persons-from-covid-19>
3. UK government advice on self-isolation <https://www.gov.uk/government/publications/covid-19-stay-at-home-guidance/stay-at-home-guidance-for-households-with-possible-coronavirus-covid-19-infection>
4. Kidney Care UK advice on use of face masks for patients receiving haemodialysis <https://www.kidneycareuk.org/news-and-campaigns/coronavirus-advice/#dialysis>
5. UK government recommendations on PPE <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/covid-19-personal-protective-equipment-ppe>
6. RA/BRS statement on PPE during CPR <https://renal.org/wp-content/uploads/2020/05/Resus-in-HD-PPE-May-2020.pdf>
7. Resuscitation Council statement on PPE during CPR <https://www.resus.org.uk/media/statements/resuscitation-council-uk-statements-on-covid-19-coronavirus-cpr-and-resuscitation/statement-on-ppe-ppe-guidance/>
8. Centers for Disease Control and Prevention COVID-19 guidance for outpatient haemodialysis facilities https://www.cdc.gov/coronavirus/2019-ncov/hcp/dialysis.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fhealthcare-facilities%2Fdialysis.html
9. Public Health England guidance on COVID-19 infection control https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/886668/COVID-19_Infection_prevention_and_control_guidance_complete.pdf
10. Kliger et al, Managing the COVID-19 pandemic: international comparisons in dialysis patients, Kidney International (2020). [https://www.kidney-international.org/article/S0085-2538\(20\)30396-3/fulltext?dgcid=raven_jbs_aip_email](https://www.kidney-international.org/article/S0085-2538(20)30396-3/fulltext?dgcid=raven_jbs_aip_email)
11. Personal communication from the Pan-London renal group.
12. ECDC guidance on contact tracing https://www.ecdc.europa.eu/sites/default/files/documents/Contact-tracing-Public-health-management-persons-including-healthcare-workers-having-had-contact-with-COVID-19-cases-in-the-European-Union%E2%80%93second-update_0.pdf
13. Personal communication from Dr Su Sethi, Consultant in Public Health Medicine
14. Government guidance on stepdown of infection control precautions within hospitals <https://www.gov.uk/government/publications/covid-19-guidance-for-stepdown-of-infection-control-precautions-within-hospitals-and-discharging-covid-19-patients-from-hospital-to-home-settings/guidance-for-stepdown-of-infection-control-precautions-and-discharging-covid-19-patients>
15. Royal College of Pathologists guidance on de-isolation <https://www.rcpath.org/uploads/assets/17e1995f-d42c-4ebe-ad3b3dde90744ff1/1487b00c-23b3-4a51-a4b46394eaff3903/G218-2-Guidance-on-the-de-isolation-and-discharge-of-COVID-19-patients.pdf>
16. ECDC guidance on de-isolation <https://www.ecdc.europa.eu/sites/default/files/documents/covid-19-guidance-discharge-and-ending-isolation-first%20update.pdf>

17. CDC guidance on de-isolation <https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-hospitalized-patients.html>
18. Dudreuilh et al, De-isolation of COVID-19–positive haemodialysis patients in the outpatient setting: a single-center experience. Letter to the editor, Kidney International (2020) [https://www.kidney-international.org/article/S0085-2538\(20\)30437-3/fulltext](https://www.kidney-international.org/article/S0085-2538(20)30437-3/fulltext)
19. Roper et al, Delivering Dialysis During the COVID-19 Outbreak: Strategies and Outcomes. Kidney International, May 2020. [https://www.kireports.org/article/S2468-0249\(20\)31279-1/fulltext](https://www.kireports.org/article/S2468-0249(20)31279-1/fulltext)

Appendix 1 – COVID-19 patient isolation flow chart

Patients should be isolated from each other in one of the following groups A-E:



Appendix 2 – COVID-19 patient de-isolation flow chart

- There are 2 possible protocols based on CDC guidelines¹⁷:
 - For non-immunosuppressed patients, de-isolation may occur by following either protocol.
 - For patients with a history of bone marrow disorder or immunosuppression within the last 12 months, a test-based strategy should be followed.

Symptom-based strategy (do not use for immunosuppressed patients)

1. At least 10 days have passed *since symptoms first appeared*
AND
2. At least 3 days (72 hours) since *recovery* - resolution of fever and improvement in respiratory symptoms (eg. cough, shortness of breath)

De-isolate to Group E (GREEN)

Note - a dry cough may persist for several weeks and this alone should not prevent de-isolation

De-isolation
flow charts

OR use Test-based strategy below (always use this for immunosuppressed patients)

Resolution of fever and/or improvement in respiratory symptoms (eg. cough, shortness of breath)

Negative results of a COVID-19 swab (PCR test) from at least two consecutive respiratory specimens collected ≥ 24 hours apart (total of two negative specimens)

De-isolate to Group E (GREEN)

If in doubt, decisions about de-isolation of an individual patient should be discussed with a virologist