Let op: Deze richtlijn is geldig op de datum van afdruk. Raadpleeg steeds de meest recente versie via het officiële platform op de NfN website

PDF gemaakt op: 06-07-25 03:52
Inititatiefnemer: NFN
Autorisatiedatum: 2024-08-26
Geautoriseerd door:

Richtlijninformatie

Verantwoording

Onderwerp

KDIGO 2022 clinical practice guideline for the prevention, diagnosis, evaluation, and treatment of hepatitis C in chronic kidney disease

KDIGO 2022 Clinical Practice Guideline FOR the Prevention, Diagnosis, Evaluation, and Treatment of Hepatitis C in Chronic Kidney Disease (sciencedirectassets.com)

De richtlijn bevat aanbevelingen van algemene aard. Het is mogelijk dat in een individueel geval deze aanbevelingen niet van toepassing zijn. Het is de verantwoordelijkheid van de behandelend arts te beoordelen of de richtlijn in de praktijk toepasbaar is. Er kunnen zich feiten of omstandigheden voordoen waardoor, in het belang van een goede zorg voor de patiënt, van een richtlijn moet worden afgeweken

Samenstelling werkgroep

- Dr. M.K. (Maaike) van Gelder, AIOS interne geneeskunde, UMC Utrecht
- Dr. S.C. (Sabine) Meijvis, internist-nefroloog, UMC Utrecht
- Dr. B.J. (Berend) van Welzen, internist-infectioloog, UMC Utrecht
- Dr. S.A. (Azam) Nurmohamed, internist-nefroloog, Amsterdam UMC
- Dr. R.J. (Rob) de Knegt, MDL-arts, Erasmus MC

Verantwoordelijk lid van de NFN richtlijnencommissie:

- Dr. S.C. (Sabine) Meijvis, internist-nefroloog, UMC Utrecht

Belangenverklaringen

Geen belangenverstrengeling

Methode ontwikkeling en werkwijze

AL(A)T	alanine aminotransferase
CKD	chronic kidney disease
DAA	direct werkende antivirale middelen
HBcAg	hepatitis B core antigen
HBsAg`	hepatitis B surface antigen
HBV	hepatitis B virus
HCV	hepatitis C virus
HIV	humaan immunodeficiëntievirus
KDIGO	Kidney Disease Improving Global outcomes
LONT	*Landelijk* Overleg Nier Transplantatie
MSM	mannen die seks hebben met mannen
NAT	nucleic acid test (polymerase chain reaction; PCR)
NFN	*Nederlandse* Federatie voor Nefrologie

Samenvatting

Algemeen

Inleiding

Deze richtlijn behandelt de preventie, diagnostiek en behandeling van hepatitis C virus (HCV) infectie bij patiënten met chronische nierinsufficiëntie, niertransplantatiepatiënten en HCV gerelateerde nierziekte. Voor adviezen ten aanzien van niertransplantaties met anti-HCV positieve postmortale nierdonoren verwijzen wij naar de LONT richtlijn “niertransplantatie met een anti-HCV positieve postmortale nierdonor”.

De richtlijn bevat de adviezen van de in 2022 herziene KDIGO (Kidney Disease Improving Global Outcomes) guideline met commentaar en adviezen van de richtlijnencommissie relevant voor de Nederlandse praktijk [1].

Sinds het verschijnen van de eerste KDIGO guideline in 2008 is er veel veranderd in de behandeling van HCV. Sinds 2014 zijn nieuwe direct werkende antivirale middelen (DAA’s) beschikbaar in Nederland. Behandeling met DAA’s is zeer effectief waarbij de kans op genezing >95% is. De geschatte HCV prevalentie in Nederland neemt hierdoor sterk af [2]. De beschikbaarheid van een effectieve behandelstrategie heeft er ook toe geleid dat niertransplantaties met anti-HCV positieve donoren mogelijk worden geacht, mits goede surveillance en eventuele DAA behandeling na transplantatie beschikbaar is.

KDIGO gebruikt naast GRADE systematiek voor aanbevelingen op basis van beschikbare evidence (1 A-D voor recommendations en 2 A-D voor suggestions) ook practice points op basis van expert opinion. Deze aanbevelingen en practice points zijn in deze NFN richtlijn ongewijzigd in het Engels vetgedrukt overgenomen en vervolgens waar nodig voorzien van commentaar voor de Nederlandse situatie

Hoofdstuk 1: Detectie en evaluatie van HCV in CKD

- 1.1: Screening patients with chronic kidney disease (CKD) for hepatitis C virus (HCV) infection

1.1.1: We recommend screening all patients for HCV infection at the time of initial evaluation of CKD (1C).

1.1.1.1: We recommend using an immunoassay followed by nucleic acid testing (NAT) if immunoassay is positive (1A).

1.1.2: We recommend screening all patients for HCV infection upon initiation of in-center hemodialysis or upon transfer from another dialysis facility or modality (1A).

1.1.2.1: We recommend using NAT alone or an immunoassay followed by NAT if immunoassay is positive (1A).

1.1.3: We suggest screening all patients for HCV infection upon initiation of peritoneal dialysis or home hemodialysis (2D).

1.1.4: We recommend screening all patients for HCV infection at the time of evaluation for kidney transplantation (1A).

Commentaar:

De geschatte prevalentie van HCV-antistoffen in de Nederlands bevolking is 0,06-0,27% en is relatief laag in vergelijking met andere landen [3, 4]. Daarom adviseren wij om CKD patiënten niet standaard te screenen op HCV zoals wordt aanbevolen in de KDIGO richtlijn. Wij adviseren om alleen de volgende CKD patiënten met een hoog risico op HCV te screenen:

- *eerste generatie migranten afkomstig uit endemische gebieden*
- *patiënten die op vakantie hebben gedialyseerd in een endemisch gebied*
- *HIV-positieve MSM*
- *injecterende drugsgebruikers*
- *patiënten die voor 1991 een transfusie van bloed(producten) of grote operatie hebben ondergaan*

Daarnaast wel standaard screening bij (pre)dialyse patiënten, pretransplantatiepatiënten en patiënten met een glomerulonefritis zonder classificerende diagnose.

Vanwege de lage prevalentie van HCV-infectie in Nederland, volstaat een immunoassay (antistoffen) als screenende test conform de KDIGO richtlijn, tenzij een eventuele besmetting kort geleden kan hebben plaatsgevonden zoals bij patiënten die hebben gedialyseerd in een endemisch gebied. In dat geval kunnen HCV-antistoffen (immuno-assay) nog negatief zijn en is een NAT-test (PCR) geïndiceerd.

NFN advies:

HCV screening is geïndiceerd bij CKD patiënten met een hoog risico op HCV, (pre)dialyse patiënten, pretransplantatiepatiënten en patiënten met een glomerulonefritis zonder classificerende diagnose.

- 1.2: Follow-up HCV screening of in-center hemodialysis patients.

1.2.1: We recommend screening for HCV infection with immunoassay or NAT in in-center hemodialysis patients every 6 months (1B).

1.2.1.1: Report any new HCV infection identified in a hemodialysis patient to the appropriate public health authority (Not Graded).

1.2.1.2: In units with a new HCV infection, we recommend that all patients be tested for HCV infection and that the frequency of subsequent HCV testing be increased (1A).

1.2.1.3: We recommend that hemodialysis patients with resolved HCV infection undergo repeat testing every 6 months using NAT to detect possible re-infection (1B).

1.2.2: We suggest that patients have serum alanine aminotransferase (ALT) level checked upon initiation of in-center hemodialysis or upon transfer from another facility (2B).

1.2.2.1: We suggest that hemodialysis patients have ALT level checked monthly (2B).

Commentaar

Vanwege de relatief lage HCV-infectie prevalentie in Nederland, adviseren wij om bij hemodialysepatiënten eenmaal per jaar HCV-antistoffen en eenmaal per zes maanden leverenzymen te bepalen conform de NfN Richtlijn "laboratoriumbepalingen en periodiek onderzoek bij stabiele chronische hemodialyse en peritoneale dialyse patiënten" [5]. In dialysecentra waar HCV positieve patiënten en/of hoogrisico patiënten dialyseren, adviseren wij echter om maandelijks het ALAT te meten bij alle dialysepatiënten, vanwege de kans op iatrogene transmissie [6]. Een tijdelijke ALAT stijging bij een nieuwe HCV infectie kan gemist worden indien slechts eenmaal per zes maanden een ALAT zou worden gecontroleerd.

NFN adviezen:

- ***Bepaal HCV-antistoffen eenmaal per jaar in hemodialysepatiënten.***
- ***Controleer leverenzymen minimaal eenmaal per zes maanden in alle hemodialysepatiënten en eenmaal per maand in dialysecentra waar HCV positieve patiënten en/of hoogrisico patiënten dialyseren.***

- 1.3: Liver testing in patients with CKD and HCV infection

1.3.1: We recommend assessing HCV-infected patients with CKD for liver fibrosis (1A).

1.3.2: We recommend an initial noninvasive evaluation of liver fibrosis (1B).

1.3.3: When the cause of liver disease is uncertain or noninvasive testing results are discordant, consider liver biopsy (Not Graded).

1.3.4: We recommend assessment for portal hypertension in CKD patients with suspected advanced fibrosis (F3–4) (1A).

NFN advies:

Verwijs HCV-positieve patiënten naar de MDL arts voor analyse van leverfibrose.

- 1.4: Other testing of patients with HCV infection

1.4.1: We recommend assessing all patients for kidney disease at the time of HCV infection diagnosis (1A).

1.4.1.1: Screen for kidney disease with urinalysis and estimated glomerular filtration rate (eGFR) (Not Graded).

1.4.2: If there is no evidence of kidney disease at initial evaluation, patients who remain NAT-positive should undergo repeat screening for kidney disease (Not Graded).

1.4.3: We recommend that all CKD patients with a history of HCV infection, whether NAT-positive or not, be followed up regularly to assess for progression of kidney disease (1A).

1.4.4: We recommend that all CKD patients with a history of HCV infection, whether NAT-positive or not, be screened and, if appropriate, vaccinated against hepatitis A virus (HAV) and hepatitis B virus (HBV), and screened for human immunodeficiency virus (HIV) (1A).

Commentaar

In de richtlijn voor MDL artsen is opgenomen dat nierfunctie gecontroleerd moet worden bij een nieuwe HCV infectie.

Hoofdstuk 2: Behandeling hepatitis C bij chronische nierschade

CKD populations	Direct-acting antiviral (DAA) regimens[a]	HCV genotypes	Quality of evidence (total N)[b]
G1–G3b,[c] not KTR	Any licensed DAA regimen	All	Not evaluated
G4–G5ND,[d] including KTR[e,f]	Sofosbuvir / Daclatasvir, 12 or 24 wk	All	High (571)
	Glecaprevir / Pibrentasvir, 8 wk	All	High (132)
	Grazoprevir / Elbasvir, 12 wk	1a, 1b, 4	High (857)
	Sofosbuvir / Velpatasvir, 12 wk	All	Low (99)
	Sofosbuvir / Ledipasvir, 12 wk	All	Very low (43)
G5D[g]	Sofosbuvir / Velpatasvir, 12 wk	All	High (405)
	Glecaprevir / Pibrentasvir, 8 wk	All	Moderate (529)
	Sofosbuvir / Daclatasvir, 12 or 24 wk	All	Moderate (278)
	Sofosbuvir / Ledipasvir, 12 wk	All	Moderate (220)
	Grazoprevir / Elbasvir, 12 wk	1a, 1b, 4	Moderate (962)
	PrO ± D, 12 wk	1a, 1b, 4	Moderate (582)
	Daclatasvir / Asunaprevir, 24 wk	1b	Low (341)
KTR,[e] G1–G3b[c]	Sofosbuvir / Ledipasvir, 12 or 24 wk	All	High (300)
	Sofosbuvir / Daclatasvir, 12 or 24 wk	All	High (290)
	PrO ± D, 12 wk	1a, 1b, 4	Very low (33)
	Grazoprevir / Elbasvir, 12 wk	1a, 1b, 4	Very low (21)

Figure 1 | Direct-acting antiviral (DAA) regimens with evidence of effectiveness for various chronic kidney disease (CKD) populations. [a]The figure includes only regimens that were evaluated by *at least 2 studies* in the specific CKD population and for which summary sustained virologic response at 12 weeks [wks] (SVR12) was >92%. Sofosbuvir monotherapy is excluded since current DAA regimens incorporate at least 2 agents. Other regimens may be appropriate for the above populations. Readers are encouraged to consult the Association for the Study of Liver Diseases (AASLD) or European Association for the Study of the Liver (EASL) guidelines for the latest information on various regimens. The suggested durations of treatment are those most commonly employed by the relevant studies. Studies commonly extended treatment for patients with cirrhosis, prior DAA failure, or for some genotypes. Readers should consult the AASLD or EASL guidelines, as needed, to determine optimal treatment duration. [b]The order of hepatitis C virus (HCV) regimens does not indicate a ranking or preferential order of selection. The regimens are presented in order of the quality of evidence, then by HCV genotype, then alphabetically. The differences in quality of evidence primarily relate to the numbers of evaluated patients and small differences in methodological quality of the underlying studies (see Supplementary Tables S5–S7). [c]Estimated glomerular filtration rate (eGFR) ≥30 ml/min per 1.73 m^2. [d]eGFR <30 ml/min per 1.73 m^2, not dialysis-dependent. [e]Regimens in kidney transplant recipients (KTRs) should be selected to avoid drug–drug interactions, particularly with calcineurin inhibitors. [f]Strength of evidence for CKD G4T-G5T is very low for all regimens. [g]Evidence primarily for patients on hemodialysis. Very few patients were on peritoneal dialysis. G, refers to the GFR category with suffix D denoting patients on dialysis and ND denoting patients not on dialysis; PrO±D, ritonavir-boosted paritaprevir and ombitasvir with or without dasabuvir.

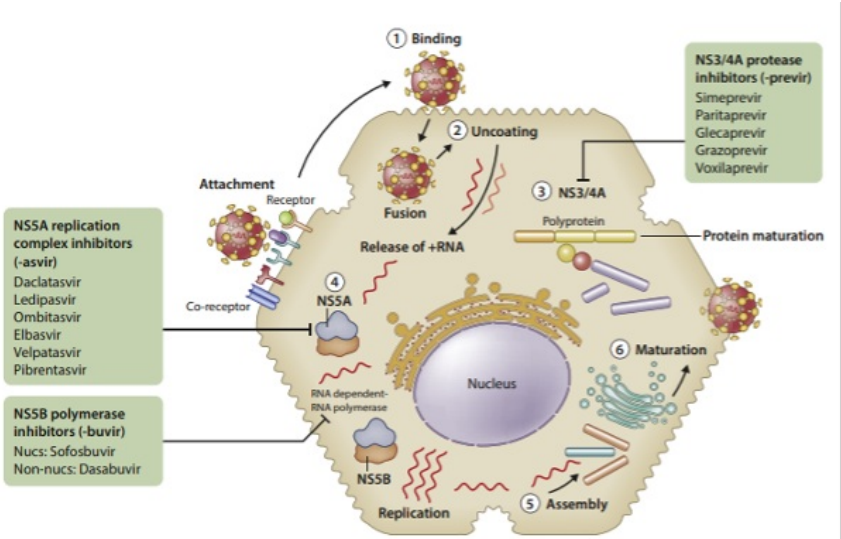

Figure 2 | Summary of currently available direct-acting antiviral (DAA) treatment targets in hepatitis C virus (HCV) life cycle. Infection is initiated by (1): virus binding and internalization, followed by (2) cytoplasmic release and uncoating; (3) translation and polyprotein processing; (4) RNA replication; (5) packaging and assembling; and (6) virion maturation and release. Adapted with permission from Stanciu C, Muzica CM, Girleanu I, et al. An update on direct antiviral agents for the treatment of hepatitis C. *Expert Opin Pharmacother* 2021;22:1729–1741,[89] reprinted by permission of the publisher (Taylor & Francis Ltd, http://www.tandfonline.com). NS3/4A, nonstructural protein proteases; NS5A, nonstructural phosphoprotein; NS5B, nonstructural protein RNA-dependent RNA polymerase.

2.1: We recommend that all patients with CKD (G1-G5), on dialysis (G5D), and kidney transplant recipients (G1T-G5T) with HCV be evaluated for direct-acting antiviral (DAA)-based therapy as outlined in Figure 1 (1A).

2.1.1: We recommend that the choice of specific regimen be based on prior treatment history, drug–drug interactions, GFR, stage of hepatic fibrosis, kidney and liver transplant candidacy, and comorbidities (1A). If pangenotypic regimens are not available, HCV genotype (and subtype) should guide the choice of treatment (Figure 1).

2.1.2: Treat kidney transplant candidates in collaboration with the transplant center to optimize timing of therapy (Not Graded).

2.1.3: We recommend pre-treatment assessment for drug–drug interactions between the DAA-based regimen and other concomitant medications including immunosuppressive drugs in kidney transplant recipients (1A).

2.1.4: We recommend that calcineurin inhibitor levels be monitored during and after DAA treatment in kidney transplant recipients (1B).

2.2: All patients with CKD (G1-G5), on dialysis (G5D), and kidney transplant recipients (G1T-G5T) with HCV should undergo testing for hepatitis B virus (HBV) infection prior to DAA therapy (Not Graded).

2.2.1: If hepatitis B surface antigen [HBsAg] is present, the patient should undergo assessment for HBV therapy (Not Graded).

2.2.2: If HBsAg is absent but markers of prior HBV infection (HBcAb-positive with or without HBsAb) are detected, exclude HBV reactivation with HBV DNA testing if levels of liver function tests rise during DAA therapy (Not Graded).

NFN advies:

- ***De richtlijncommissie verwijst naar het "HCV richtsnoer" voor de indicatiestelling en behandeling van patiënten met een hepatitis C infectie (https://hcvrichtsnoer.nl/), waarin ook een onderdeel "nierinsufficiëntie" te vinden is met adviezen voor patiënten met eGFR <30 ml/min/1.73m ^{2} en hemodialyse. Uitgangspunt hierbij is dat er een behandelindicatie bestaat voor iedere HCV patiënt. De CE-gecertificeerde onafhankelijke app "TherapySelector" kan gebruikt worden om een op de patiënt afgestemd therapieregime te selecteren (https://therapyselector.nl/).***
- ***Behandeling van hepatitis C dient altijd in overleg met een HCV-gespecialiseerde internist-infectioloog en/of MDL arts plaats te vinden.***

Hoofdstuk 3: Preventie hepatitis C bij hemodialyse

3.1: We recommend that hemodialysis facilities adhere to standard infection control procedures including hygienic precautions that effectively prevent transfer of blood and blood-contaminated fluids between patients to prevent transmission of blood-borne pathogens (see Table 1) (1A).

Table 1 | Infection control practices ("hygienic precautions") particularly relevant for preventing HCV transmission

- Proper hand hygiene and glove changes, especially between patient contacts, before invasive procedures, and after contact with blood and potentially blood-contaminated surfaces/supplies.
- Proper injectable medication preparation practices following aseptic techniques and in an appropriate clean area, and proper injectable medication administration practice.
- Thorough cleaning and disinfection of surfaces at the dialysis station, especially high-touch surfaces.
- Adequate separation of clean supplies from contaminated materials and equipment.

3.1.1: We recommend regular observational audits of infection control procedures in hemodialysis units (1C).

3.1.2: We recommend not using dedicated dialysis machines for HCV-infected patients (1D).

3.1.3: We suggest not isolating HCV-infected hemodialysis patients (2C).

3.1.4: We suggest that the dialyzers of HCV-infected patients can be reused if there is adherence to standard infection control procedures (2D).

3.2: We recommend that hemodialysis centers examine and track all HCV test results to identify new cases of HCV infections in their patients (1B).

3.2.1: We recommend that aggressive measures be taken to improve hand hygiene (and proper glove use), injection safety, and environmental cleaning and disinfection when a new case of HCV is identified that is likely to be dialysis-related (1A).

3.3: Strategies to prevent HCV transmission within hemodialysis units should prioritize adherence to standard infection control practices and should not primarily rely upon the treatment of HCV-infected patients (Not Graded).

Table 3 | Factors and lapses in infection control practices associated with transmission of HCV infection in dialysis units

- Preparation of injections in a contaminated environment (including at patient treatment station)
- Reuse of single-dose medication vial for more than 1 patient
- Use of mobile cart to transport supplies or medications to patients
- Inadequate cleaning or disinfection of shared environmental surfaces between patients
- Failure to separate clean and contaminated areas
- Failure to change gloves and perform hand hygiene between tasks or patients
- Hurried change-over processes
- Low staff-to-patient ratio HCV, hepatitis C virus

Table 4 | Hygienic precautions for hemodialysis (dialysis machines)

Definitions

- The 'transducer protector' is a filter (normally a hydrophobic 0.2-μm filter) that is fitted between the pressure-monitoring line of the extracorporeal circuit and the pressure-monitoring port of the dialysis machine. The filter allows air to pass freely to the pressure transducer that gives the reading displayed by the machine, but it resists the passage of fluid. This protects the patient from microbiologic contamination (as the pressure-monitoring system is not disinfected) and the machine from ingress of blood or dialysate. An external transducer protector is normally fitted to each pressure-monitoring line in the blood circuit. A back-up filter is located inside the machine. Changing the internal filter is a technical job.
- A "single-pass machine" is a machine that pumps the dialysate through the dialyzer and then to waste. In general, such machines do not allow fluid to flow between the drain pathway and the fresh pathway except during disinfection. "Recirculating" machines produce batches of fluid that can be passed through the dialyzer several times.

Transducer protectors

- External transducer protectors should be fitted to the pressure lines of the extracorporeal circuit.
- Before commencing dialysis, staff should ensure that the connection between the transducer protectors and the pressure-monitoring ports is tight, as leaks can lead to wetting of the filter.
- Transducer protectors should be replaced if the filter becomes wet, as the pressure reading may be affected. Using a syringe to clear the flooded line may damage the filter and increase the possibility of blood passing into the dialysis machine.
- If wetting of the filter occurs after the patient has been connected, the line should be inspected carefully to see if any blood has passed through the filter. If any fluid is visible on the machine side, the machine should be taken out of service at the end of the session so that the internal filter can be changed and the housing disinfected.
- Some blood tubing sets transmit pressure to the dialysis machine without a blood–air interface, thus eliminating the need for transducer protectors.

External cleaning

- After each session, the exterior of the dialysis machine and all surfaces in the dialysis treatment station should be cleaned with a low-level disinfectant if not visibly contaminated. Pay particular attention to high-touch surfaces that are likely to come into contact with the patient (e.g., arm rests, blood pressure cuff) or staff members' hands (e.g., machine control panel).
- Disinfection of external machine surfaces should not commence until the patient has left the dialysis treatment station. A complete (unit-wide) patient-free interval between shifts might facilitate more thorough cleaning and disinfection of the unit.
- If a blood spillage has occurred, the exterior should be disinfected with a commercially available tuberculocidal germicide or a solution containing at least 500 p.p.m. hypochlorite (a 1:100 dilution of 5% household bleach) if this is not detrimental to the surface of dialysis machines. Advice on suitable disinfectants, and the concentration and contact time required, should be provided by the manufacturer.
- If blood or fluid is thought to have seeped into inaccessible parts of the dialysis machine (e.g., between modules or behind blood pump), the machine should be taken out of service until it can be dismantled and disinfected.

Disinfection of the internal fluid pathways

- It is not necessary for the internal pathways of single-pass dialysis machines to be disinfected between patients, even in the event of a blood leak. Some facilities may still opt to disinfect the dialysate-to-dialyzer (Hansen) connectors before the next patient.
- Machines with recirculating dialysate should always be put through an appropriate disinfection procedure between patients.

Table 5 | Steps to initiate concurrently and undertake following identification of a new HCV infection in a hemodialysis patient (Adapted from CDC Health Alert[25])

A. Report the infection to appropriate public health authority.
   - Assess risk factors of the affected patient in conjunction with public health.

B. Determine HCV infection status of all patients in the hemodialysis unit.
   - Test all patients treated in the center for HCV infection (Chapter 1) unless they are already known to have active infection. Follow-up and testing of patients who were treated in the center and those subsequently transferred or discharged may be warranted.

C. Conduct a thorough root cause analysis of the infection and address infection control lapses.
   - Perform rigorous assessments of staff infection control practices to identify lapses. This should minimally include assessments of hand hygiene and glove change practices; injectable medication preparation, handling, and administration; and environmental cleaning and disinfection practices.
   - Share findings with all staff members and take action to address lapses. Staff education and retraining may be necessary.
   - Consider hiring a consultant with infection prevention expertise to provide recommendations for improvement of practices and work flow and/or to help implement actions to address identified lapses.
   - Conduct regular audits to ensure improved adherence to recommended practice.
   - Demonstrations of cleaning adequacy such as use of Glo Germ (Moab, UT) or luminol might be helpful for staff education.

D. Communicate openly with patients.
   - Inform all patients of the reason for additional HCV testing and the results of their HCV tests.
   - If transmission within the center is suspected or confirmed, inform all patients of this. Patients should also be made aware of steps being taken to assess and improve practices.

CDC, Centers for Disease Control and Prevention; HCV, hepatitis C virus.

Table 6 | Strategies to support adherence to infection control recommendations in hemodialysis centers

- It is important for the designers of dialysis units to create an environment that makes infection control procedures easy to implement. Adequate hand-washing facilities must be provided, and the machines and shared space should make it easy for staff to visualize individual treatment stations. Certain jurisdictions specify the area around a hemodialysis machine.
- The unit should ensure that there is sufficient time between shifts for effective decontamination of the exterior of the machine and other shared surfaces.
- The unit should locate supplies of gloves at enough strategic points to ensure that staff has no difficulty obtaining gloves in an emergency.
- When selecting new equipment, ease of disinfection should be considered.
- There are indications from the literature that the rate of failure to implement hygienic precautions increases with understaffing. Understaffing has been associated with hepatitis C outbreaks. Certain jurisdictions specify a specific nurse-to-patient ratio (e.g., 1:4 in France). Formal healthcare training of all staff should be required (e.g., in the US, technicians provide most direct hemodialysis care but lack standardized training). Dialysis units that are changing staff to patient ratios, or introducing a cohort of new staff, should review the implications on infection control procedures and educational requirements.
- Resource problems should be handled by carrying out a risk assessment and developing local procedures. For example, if blood is suspected to have penetrated the pressure-monitoring system of a machine but the unit has no on-site technical support and no spare machines, an extra transducer protector can be inserted between the blood line and the contaminated system so that the dialysis can continue until a technician can attend to the problem.

The following are useful CDC and WHO informational resources to improve hand hygiene, environmental cleaning and disinfection and injection safety:
http://www.cdc.gov/dialysis/PDFs/collaborative/Env_notes_Feb13.pdf
http://www.cdc.gov/dialysis/PDFs/collaborative/Env_checklist-508.pdf
http://www.cdc.gov/dialysis/PDFs/dialysis-Station-Disinfect-Tool-508.pdf
http://www.cdc.gov/dialysis/PDFs/collaborative/Hemodialysis-Hand-Hygiene-Observations.pdf
http://www.cdc.gov/dialysis/PDFs/collaborative/Hemodialysis-InjectionSafety-Checklist.pdf
http://www.cdc.gov/dialysis/PDFs/collaborative/Hemodialysis-InjectionSafety-Observations.pdf
Hand Hygiene in Outpatient and Home-based Care and Long-term Care Facilities: http://apps.who.int/iris/bitstream/handle/10665/78060/9789241503372_eng.pdf (See Figure 9 of document and p. 44-49)

CDC, Centers for Disease Control and Prevention; US, United States; WHO, World Health Organization.

Table 7 | Key hygienic precautions for hemodialysis staff*

Definitions
- A "dialysis station" is the space and equipment within a dialysis unit that is dedicated to an individual patient. This may take the form of a well-defined cubicle or room, but there is usually no material boundary separating dialysis stations from each other or from the shared areas of the dialysis unit.
- A "potentially contaminated" surface is any item of equipment at the dialysis station that *could* have been contaminated with blood, or fluid containing blood, since it was last disinfected, even if there is no visual evidence of contamination.

Education
- A program of continuing education covering the mechanisms and prevention of crossinfection should be established for staff caring for hemodialysis patients.
- Staff should demonstrate infection control competency for the tasks they are assigned. Infection control competencies (e.g., use of aseptic technique) should be assessed upon hire and at least yearly thereafter.
- Appropriate information on infection control should also be given to nonclinical staff, patients, caregivers, and visitors. Patients should be encouraged to speak up when they observe an infection control practice that is concerning to them.

Hand hygiene
- Staff should wash their hands with soap or an antiseptic hand-wash and water, before and after contact with a patient or any equipment at the dialysis station. An alcohol-based hand rub may be used instead when their hands are not visibly contaminated.
- In addition to hand washing, staff should wear disposable gloves when caring for a patient or touching any potentially contaminated surfaces at the dialysis station. Gloves should always be removed when leaving the dialysis station.
- Patients should also clean their hands with soap and water, or use an alcohol-based hand rub or sanitizer, when arriving at and leaving the dialysis station.

Injection Safety
- Medication preparation should be done in a designated clean area.
- All vials should be entered with a new needle and a new syringe, which should be discarded at point of use.
- Medications should be administered aseptically, after wearing a disposable glove and disinfecting the injection port with an antiseptic.
- Hand hygiene must be performed before and after administration of injection.
- All single-dose vials must be discarded and multidose vials, if used, should not be stored or handled in the immediate patient care area.

Equipment management *(for management of the dialysis machine, see Table 4)*
- Single-use items required in the dialysis process should be disposed of after use on 1 patient.
- Nondisposable items should be disinfected after use on 1 patient. Items that cannot be disinfected easily (e.g., adhesive tape and tourniquets) should be dedicated to a single patient and discarded after use.
- The risks associated with use of physiologic monitoring equipment (e.g., blood pressure monitors, weight scales, and access flow monitors) for groups of patients should be assessed and minimized. Blood pressure cuffs should be dedicated to a single patient or made from a light-colored, wipe-clean fabric.
- Medications and other supplies should not be moved between patients (e.g., on carts or by other means). Medications provided in multiple-use vials, and those requiring dilution using a multiple-use diluent vial, should be prepared in a dedicated central area and taken separately to each patient. Items that have been taken to the dialysis station should not be returned to the preparation area.
- After each session, all potentially contaminated surfaces at the dialysis station should be wiped clean with a low-level disinfectant if not visibly contaminated. Surfaces that are visibly contaminated with blood or fluid should be disinfected with a commercially available tuberculocidal germicide or a solution containing at least 500 p.p.m. hypochlorite (a 1:100 dilution of 5% household bleach).

Waste and specimen management
- Needles should be disposed of in closed, unbreakable containers, which should not be overfilled. A "no-touch" technique should be used to drop the needle into the container, as it is likely to have a contaminated surface. If this is difficult due to the design of the container, staff should complete patient care before disposing of needles.
- All blood and other biologic specimen handling should occur away from dedicated clean areas, medications, and clean supplies.
- The used extracorporeal circuit should be sealed as effectively as possible before transporting it from the dialysis station in a fluid-tight waste bag or leak-proof container for disposal. Avoid draining or manipulating the used circuit. If it is necessary to drain the circuit to comply with local regulatory requirements, or to remove any components for reprocessing, this should be done in a dedicated area away from the treatment and preparation areas.

*In addition to standard precautions.

Commentaar

Ter preventie van de verspreiding van HCV dienen de juiste methoden en producten te worden toegepast zoals beschreven in de multidisciplinaire richtlijn 'Hemodialyse' van Samenwerkingsverband Richtlijnen en Infectiepreventie (SRI), die in najaar 2024 zal verschijnen.

Hoofdstuk 4: Hepatitis C en niertransplantatie

- 4.1: Evaluation and management of kidney transplant candidates regarding HCV infection

4.1.1: We recommend kidney transplantation as the best therapeutic option for patients with CKD G5 irrespective of presence of HCV infection (1A).

Commentaar

De keuze voor het starten van nierfunctievervangende therapie en welke vorm (dialyse of niertransplantatie, komt tot stand middels gedeelde besluitvorming en dient niet beïnvloed te worden door de aan- of afwezigheid van een HCV infectie [7].

4.1.2: We suggest that all kidney transplant candidates with HCV be evaluated for severity of liver disease and presence of portal hypertension prior to acceptance for kidney transplantation (2D).

4.1.2.1: We recommend that patients with HCV, compensated cirrhosis, and no portal hypertension undergo isolated kidney transplantation and that patients with decompensated cirrhosis or clinically significant portal hypertension (i.e., hepatic venous pressure gradient ≥10 mm Hg or evidence of portal hypertension on imaging or exam) undergo a simultaneous liver–kidney transplantation (1B). Treatment of those with mild-to-moderate portal hypertension should be determined on a case-by-case basis.

4.1.2.2: We recommend referring patients with HCV and decompensated cirrhosis for combined liver–kidney transplantation (1B).

4.1.3: Timing of HCV treatment in relation to kidney transplantation (before vs. after) should be based on donor type (living vs. deceased donor), wait-list times by donor type, center-specific policies governing the use of kidneys from HCV-infected deceased donors, and severity of liver fibrosis (Not Graded).

4.1.3.1: We recommend that all kidney transplant candidates with HCV be considered for DAA therapy, either before or after transplantation (1A).

4.1.3.2: We suggest that HCV-infected kidney transplant candidates with a living kidney donor be considered for treatment before or shortly after transplantation depending on the anticipated timing of transplantation (2B).

Commentaar

Geen aanvullingen voor Nederlandse situatie.

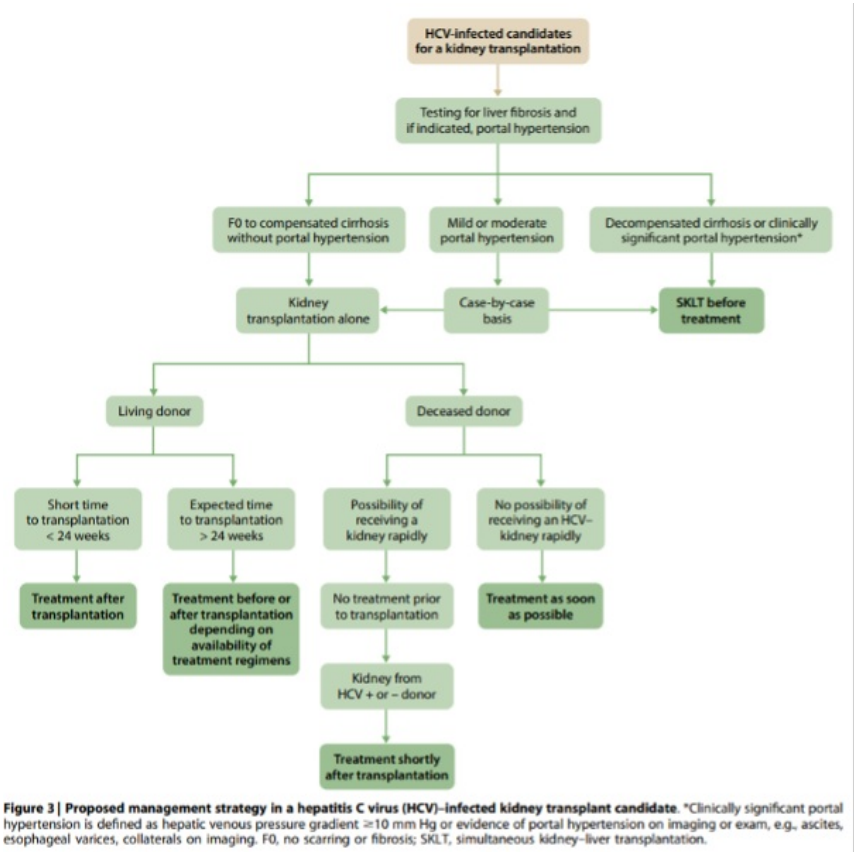

Figure 3 | Proposed management strategy in a hepatitis C virus (HCV)–infected kidney transplant candidate. *Clinically significant portal hypertension is defined as hepatic venous pressure gradient ≥10 mm Hg or evidence of portal hypertension on imaging or exam, e.g., ascites, esophageal varices, collaterals on imaging. F0, no scarring or fibrosis; SKLT, simultaneous kidney–liver transplantation.

- 4.2: Use of kidneys from HCV-infected donors

4.2.1: We recommend that all kidney donors be screened for HCV infection with both immunoassay and NAT (if NAT is available) (1A).

4.2.2: After assessment of liver fibrosis, HCV-infected potential living kidney donors who do not have cirrhosis should undergo HCV treatment before donation if the recipient is HCV-uninfected; they can be accepted for donation if they achieve sustained virologic response (SVR) and remain otherwise eligible to be a donor (Not Graded).

4.2.3: We recommend that kidneys from HCV-infected donors be considered regardless of HCV status of potential kidney transplant recipients (1C).

4.2.4: When transplanting kidneys from HCV-infected donors into HCV-uninfected recipients, transplant centers must ensure that patients receive education and are engaged in discussion with sufficient information to provide informed consent. Patients should be informed of the risks and benefits of transplantation with an HCV infected kidney, including the need for DAA treatment (Not Graded).

4.2.5: When transplanting kidneys from HCV-infected donors into HCV-uninfected recipients, transplant centers should confirm availability of DAAs for initiation in the early post-transplant period (Not Graded).

Commentaar:

Beleid ten aanzien van HCV positieve donoren wordt bepaald door de transplantatiecentra en zal in nabije toekomst vastgelegd worden in "LONT richtlijn niertransplantatie met een anti-HCV positieve postmortale nierdonor".

- 4.3: Use of maintenance immunosuppressive regimens

4.3.1: We recommend that kidney transplant recipients being treated with DAAs be evaluated for the need for dose adjustments of concomitant immunosuppressants (1C).

Commentaar:

Beleid ten aanzien van HCV positieve donoren wordt bepaald door de transplantatiecentra en zal in nabije toekomst vastgelegd worden in "LONT richtlijn niertransplantatie met een anti-HCV positieve postmortale nierdonor".

- 4.4: Management of HCV-related complications in kidney transplant recipients

4.4.1: We suggest that patients previously infected with HCV who achieved SVR before transplantation undergo testing by NAT 3 months after transplantation or if liver dysfunction occurs (2D).

4.4.2: Kidney transplant recipients with cirrhosis should have the same liver disease follow-up as non-transplant patients, as outlined in the American Association for the Study of Liver Diseases (AASLD) guidelines (Not Graded).

4.4.3: HCV-infected kidney transplant recipients should be tested at least every 6 months for proteinuria (Not Graded).

4.4.3.1: We suggest that patients who develop new-onset proteinuria (either urine protein-creatinine ratio > 1 g/g or 24-hour urine protein > 1 g on 2 or more occasions) have an allograft biopsy with immunofluorescence and electron microscopy included in the analysis (2D).

4.4.4: We recommend treatment with a DAA regimen in patients with post-transplant HCV-associated glomerulonephritis (1D).

Commentaar

HCV patiënten komen altijd in aanmerking voor behandeling, ongeacht de aanwezigheid van een HCV-geassocieerde nierziekte.

Hoofdstuk 5: Diagnostiek en behandeling van hepatitis C gerelateerde nierziekten

5.1: HCV-infected patients with a typical presentation of immune-complex proliferative glomerulonephritis can be managed without a confirmatory kidney biopsy. However, a biopsy may be indicated in certain clinical circumstances (Figure 4) (Not Graded).

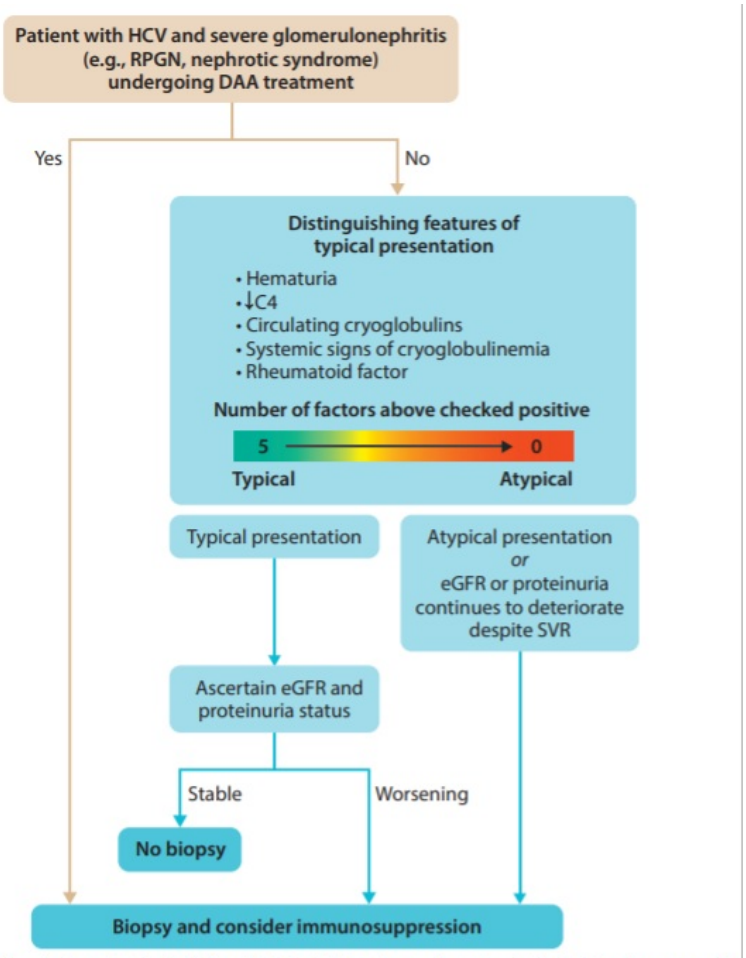

Figure 4 | Indications for biopsy in patients with hepatitis C virus (HCV) and severe glomerulonephritis. Algorithm above assumes that patient with HCV and with HCV and chronic kidney disease (CKD) is already receiving direct-acting antiviral (DAA) treatment. Systemic signs of cryoglobulinemia include skin lesions such as purpura, arthralgias, and weakness. eGFR, estimated glomerular filtration rate; RPGN, rapidly progressive glomerulonephritis; SVR, sustained virologic response.

5.2: We recommend that patients with HCV-associated glomerulonephritis receive antiviral therapy (1A).

5.2.1: We recommend that patients with HCV-associated glomerulonephritis, stable kidney function, and without nephrotic syndrome be treated with DAAs prior to other treatments (1C).

5.2.2: We recommend that patients with cryoglobulinemic flare or rapidly progressive glomerulonephritis be treated with both DAAs and immunosuppressive agents with or without plasma exchange (1C).

5.2.2.1: The decision whether to use immunosuppressive agents in patients with nephrotic syndrome should be individualized (Not Graded).

5.2.3: We recommend immunosuppressive therapy in patients with histologically active HCV-associated glomerulonephritis who do not respond to antiviral therapy, particularly those with cryoglobulinemic kidney disease (1B).

5.2.3.1: We recommend rituximab as the first-line immunosuppressive treatment (1C).

Commentaar

Geen aanvullingen voor de Nederlandse situatie.

Referenties

1. Kidney Disease: Improving Global Outcomes Hepatitis, C.W.G., *KDIGO 2022 Clinical Practice Guideline FOR the Prevention, Diagnosis, Evaluation, and Treatment of Hepatitis C in Chronic Kidney Disease.* Kidney Int, 2022. **102**(6S): p. S129-S205.

2. van Dijk, M., et al., *The Netherlands Is on Track to Meet the World Health Organization Hepatitis C Elimination Targets by 2030.* J Clin Med, 2021. **10**(19).

3. *LCI guidelines hepatitis C. July, 2019. Accessed June 11, 2024. https://lci.rivm.nl/richtlijnen/hepatitis-c.*

4. Koopsen, J., et al., *Chronic hepatitis B and C infections in the Netherlands: estimated prevalence in risk groups and the general population.* Epidemiol Infect, 2019. **147**: p. e147.

5. *NFN guidelines: Laboratoriumbepalingen en periodiek onderzoek bij stabiele dialysepatiënten, 2016. Accessed August 17, 2024. https://www.nefro.nl/sites/www.nefro.nl/files/richlijnen/Laboratoriumbepalingen%20en%20periodiek%20onderzoek%20dialysepatienten%2C%202016.pdf.*

6. Schneeberger, P.M., et al., *The prevalence and incidence of hepatitis C virus infections among dialysis patients in the Netherlands: a nationwide prospective study.* J Infect Dis, 2000. **182**(5): p. 1291-9.

7. *NIV Guidelines. Nierfunctie vervangende behandeling. Accessed August 17, 2024. https://richtlijnendatabase.nl/richtlijn/nierfunctievervangende_behandeling/nierfunctievervangende_behandeling_-_startpagina.html.*

Bijlagen

- **HepC1** (297 KB) 0
- **Hepc2** (258 KB) 0
- **hepc3** (335 KB) 0
- **hepc4** (155 KB) 0
- **hepc5** (249 KB) 0
- **hepc6** (407 KB) 0
- **hepc7** (155 KB) 0
- **hepc8** (164 KB) 0