British Society of Gastroenterology
Best Practice Guidance: outpatient management of cirrhosis – part 2: decompensated cirrhosis

Dina Mansour,1,2 Steven Masson,3 Lynsey Corless,4 Andrew C Douds,5 Debbie L Shawcross,6 Jill Johnson,7 Joanna A Leithead,8,9 Michael A Heneghan,10 Mussarat Nazia Rahim,11 Dhiraj Tripathi,12,13 Valerie Ross,14 John Hammond,15 Allison Grapes,1 Coral Hollywood,16 Gemma Botterill,17 Emily Bonner,18 Mhairi Donnelly,19 Stuart McPherson,2,20 Rebecca West21

ABSTRACT
There are two distinct phases in the natural history of cirrhosis: compensated disease (corresponding to Child Pugh A and early Child Pugh B disease), where the patient may be largely asymptomatic, progressing with increasing portal hypertension and liver dysfunction to decompensated disease (corresponding to Child Pugh late B-C), characterised by the development of overt clinical signs, including jaundice, hepatic encephalopathy (HE), ascites, renal dysfunction and variceal bleeding. The transition from compensated cirrhosis to decompensated cirrhosis (DC) heralds a watershed in the nature and prognosis of the disease. DC is a systemic disease, characterised by multiorgan/system dysfunction, including haemodynamic and immune dysfunction. In this second part of our three-part series on the outpatient management of cirrhosis, we address outpatient management of DC, including management of varices, ascites, HE, nutrition, liver transplantation and palliative care. For recommendations on screening for oesophageal cancer, vaccination, surveillance and preventing further liver damage, see part one of the guidance. Part 3 of the guidance focuses on the management of patients with liver disease. While removal of aetiological factors driving liver damage is important at all stages of liver disease, the management of CC, focused on surveillance and preventing further liver damage, differs significantly from that of DC, where the focus is on managing complications, identifying suitable candidates for transplantation and ensuring good palliative care (PC). The following recommendations are accompanied by a care bundle for use in the outpatient setting (see figure 1).

Screening, surveillance and prophylaxis of variceal bleeding
All patients with DC who are not on a non-selective beta blocker (NSBB) should undergo endoscopy to screen for varices. The risk of progression to high-risk varices is higher in decompensated disease,2 so we recommend annual surveillance in all patients not already receiving primary prophylaxis. Patients with Child-Pugh C disease and small varices should have primary prophylaxis with NSBB if tolerated. All patients with medium-to-large varices/red signs should have primary prophylaxis with NSBB or variceal band ligation (VBL) (figure 2). Patients on NSBB...
HE develops in 35%-50% of patients after TIPSS and is associated with increased mortality. The risk of post-TIPSS HE can be reduced by using a smaller diameter (6–7 mm vs >8 mm) covered stent and by prophylactic use of rifaximin started 14 days before TIPSS.

Simulation studies and on-road driving tests have demonstrated impaired driving ability in patients with cirrhosis and HE. Patients with cirrhosis and cognitive impairment have more traffic accidents and often overestimate their driving ability. Treatment with rifaximin in a randomised trial improved driving simulator performance in patients with covert HE. However, two studies found no increased rate of accidents in patients with cirrhosis and covert HE.

No single psychometric test can currently reliably divide patients into safe and unsafe drivers, and there are no published guidelines on driving for patients with minimal/covert HE. Expert consensus recommends avoidance of driving within 3 months of an overt HE episode. UK patients diagnosed with overt HE must inform the Driver and Vehicle Licensing Agency (DVLA) and are advised not to drive. Even in the absence of overt HE, if there are concerns of poor short-term memory, disorientation, lack of insight/judgement or impaired attention, the patient is probably not safe to drive and the DVLA should be informed. If symptoms resolve (on or off treatment) and patients wish to resume driving, they should formally reapply to the DVLA—in some cases a driving assessment may be required. This includes patients with alcohol use disorder who have stopped drinking alcohol, recompensated and have had no recurrence of overt HE on or off lactulose and/or rifaximin for 12 months.

Outpatient management of ascites
The onset of ascites signifies an important stage in cirrhosis evolution: the 2-year and 5-year cumulative mortality after ascites development is 38% and 78%, respectively.

Ascites is a clinical manifestation of portal hypertension related renal dysfunction, leading to sodium and water retention and impaired free water clearance. This presents progressively as ascites, refractory ascites, hyponatraemia and ultimately hepatorenal syndrome.

New-onset ascites should be evaluated to ensure it is related to portal hypertension, including calculating serum albumin gradient (SAAG) where SAAG >11 g/L is consistent with portal hypertension. In the absence of another clear cause of decompensation, CT scan of the liver to rule out hepatocellular carcinoma or portomesenteric vein thrombosis should be considered. Any significant increase in the volume of ascites, abdominal pain or fever should prompt an ascitic tap with fluid sent for white cell count to rule out spontaneous bacterial peritonitis (SBP) and ascitic fluid culture. A...
# Decompensated Cirrhosis Outpatient Bundle

## Varices (see over for management)

| Varices present? | Y | N |
| Size of varices? | Small (grade 1) | Medium (grade 2) | Large (grade 3) | Y | N |
| Previous variceal bleed? | Y | N |

### Prophylaxis:
- Is patient on a B Blocker? (carvedilol preferred) | Y | N |
- If not, why not? | Y | N |
- Has dosage been optimised? (aim HR 60/min and SBP >100) | Y | N |
- Variceal band ligation? | Y | N |
- Is a repeat OGD required? If so, date booked for | Y | N |

## Hepatic encephalopathy

| Encephalopathy present: | Y | N |
| Lactulose | Y | N |
| Rifaximin | Y | N |

Lactulose+/ rifaximin advised for patients with persistent or previous un-provoked HE, unless contraindicated

## Ascites

| Ascites present? | Y | N |
| Previous SBP? | Y | N |

If yes: Date: | Organism (if known)

### Prophylactic antibiotics
- If yes: name | Y | N |
- If no: reason why | Y | N |

Patients with ascites and an episode of SBP should be considered for antibiotics (secondary prophylaxis) as per local protocol

## Current management of ascites

| Diuretics | Y | N |
| Paracentesis | Y | N |
| Weight | Kg |

If ascites controlled consider reducing diuretics | Y | N/A |

## If requiring paracentesis:

- Predicted interval | weeks |
- Day case paracentesis booked for | 
- Or Information given to patient to contact

## Monitoring Renal function and electrolytes

Recommended frequency of U&Es monitoring in the community:

## Nutrition

| Dietician review? | Y | N |
| Supplements required? | Y | N |

## Substance / alcohol misuse

| Alcohol misuse | Y | N |
| Input from alcohol care team/ Community follow up plans | Y | N |
| Advice on controlled reduction to abstinence | Y | N |
| Thiamine prescribed | Y | N |

## Treatment plan

| Has liver transplantation been considered? | Y | N |
| Has prognosis been discussed? | Y | N |
| Has information been given about complications of cirrhosis | Y | N |
| Has a treatment escalation plan been documented | Y | N |
| Has palliative care referral been considered | Y | N |

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*Figure 1*  Decompensated cirrhosis outpatient care bundle. HR, heart rate; OGD, oesophago gastroduodenoscopy; SBP, spontaneous bacterial peritonitis.
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neutrophil count of >250/mm$^3$ confirms SBP requiring prompt treatment with antibiotics. The mainstay of ascites management in the outpatient setting is diuretic therapy. This involves a stepwise approach as outlined in figure 3 with the additional specific recommendations:

1. Secondary antibiotic prophylaxis should be considered in patients with a previous episode of SBP. Suitable antibiotic choices are norfloxacin 400 mg, ciprofloxacin 500 mg or co-trimoxazole 960 mg once daily.$^{26}$ The ASEPTIC trial, investigating the role of primary prophylaxis of SBP, is ongoing.$^{27}$ Some centres offer primary prophylaxis for those considered high risk of SBP (protein concentration <15 g/L)$^{26}$ but there are concerns around antibiotic resistance and this should only be considered following discussion with local microbiology teams. Rifaximin prescribed for secondary prophylaxis of HE may negate the prescription of a second oral systemic antibiotic with substantial evidence to suggest it prevents SBP.$^{28}$

2. NSBB, when indicated, is not contraindicated in refractory ascites; although patients require close monitoring; dose reduction or discontinuation may be appropriate in those who develop hypotension or acute/progressive renal dysfunction.$^{30}$

3. Long-term outpatient albumin administration to patients with cirrhosis and ascites is not currently recommended: despite encouraging results from the ANSWER trial, the accompanying medical supervision was a strong confounding variable$^{29}$; further research is required to determine the efficacy, practicality, cost-effectiveness and impact on quality of life.

4. Patients with refractory ascites requiring regular large-volume paracentesis should have them performed as planned day case procedures as this reduces costs and improves patient outcomes, particularly in the last year of life.$^{30}$

5. Indwelling abdominal drains remain experimental but can be considered in palliative patients with advanced disease as an alternative to recurrent large volume paracentesis following careful discussion involving the patient about the risk benefit ratio, and in particular the

Figure 2  Surveillance and treatment of non-bleeding gastrooesophageal varices in decompensated cirrhosis. $^*$Titrate from 6.25 mg od to target 12.5 mg od in single or divided doses if tolerated (maintain HR, 50–60, systolic blood pressure >90 mm Hg). $^*$Small varices defined as <5 mm diameter or varices which completely disappear with moderate insufflation of the oesophagus, medium-large varices >5 mm diameter. NSBB, non-selective beta blocker; VBL, variceal band ligation.
Special considerations for prescribing in DC

The pathophysiological changes in decompensated liver disease may significantly change the pharmacokinetic and pharmacodynamic profiles of many medicines, altering pharmacological and toxicological responses (online supplemental table 1). In addition, many medications can exacerbate fluid overload and/or HE in patients with DC. Table 2 provides a summary of prescribing adjustments to consider in some commonly used medications.36

Careful consideration should be given to the potential risk–benefit of treatment in each individual with advanced liver disease. Polypharmacy should be avoided, and medicines regularly reviewed to ensure all are still required. Concordance should be addressed regularly; if suboptimal, medicines should be rationalised in partnership with patients to optimise concordance with the most important treatments. Medicines should be titrated slowly, closely monitored and suspended or withdrawn if there are signs of toxicity or patient deterioration. Therapeutic drug monitoring should be employed where available.

Nutrition in DC

All patients with DC are at high risk of malnutrition and should have nutritional screening, including an assessment of dietary intake, preferably by a dietitian,
to determine the presence and severity of malnutrition and sarcopenia, both of which are independent predictors of poor outcomes in cirrhosis.\textsuperscript{37} While outpatient dietetic services are not widespread for patients with cirrhosis, intervention to prevent/treat malnutrition is important, as its presence is associated with increased decompensation, hospitalisation and mortality.\textsuperscript{37}

Traditional nutritional screening tools such as body mass index (BMI) are unreliable in patients with ascites/oedema and dry weight should be used/estimated. Bedside tests such as grip strength, can be used to assess and monitor sarcopenia.\textsuperscript{37}

Malnutrition is almost universal in patients with DC. Multiple factors may be involved, including...
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Table 2 Summary of prescribing commonly used medicines in patients with DC

<table>
<thead>
<tr>
<th>Therapeutic category</th>
<th>Considered safe with monitoring</th>
<th>Avoid</th>
<th>Caution/modify dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastric acid suppression</td>
<td>Simple antacids, for example, calcium carbonate</td>
<td>Proton pump inhibitors H2 antagonists</td>
<td>Altered gut microbiome may increase risk of infection and disease progression</td>
<td></td>
</tr>
<tr>
<td>Analgesics</td>
<td>NSAIDs, COX-2 inhibitors</td>
<td>Paracetamol Opiates</td>
<td>See palliative care section</td>
<td></td>
</tr>
<tr>
<td>Antimicrobials</td>
<td>Most antibiotics</td>
<td>Azithromycin Erythromycin Rifampicin Isoniazid</td>
<td>Aminoglycosides antifungals</td>
<td>Monitor renal and liver function</td>
</tr>
<tr>
<td>Antidiabetic drugs</td>
<td>Insulin GLP-1 agonists SGLT-2 inhibitors</td>
<td>Pioglitazone (in patients with fluid overload)</td>
<td>Metformin Sulphonylureas</td>
<td>Risk of lactic acidosis (metformin) Fluid accumulation</td>
</tr>
<tr>
<td>Drugs used in cardiovascular disease</td>
<td>Calcium antagonists</td>
<td>ACE-inhibitors ARBs Amiodarone</td>
<td>Beta blockers</td>
<td>Risk of acute kidney injury</td>
</tr>
<tr>
<td>Lipid lowering agents</td>
<td>Cholestyramine</td>
<td>Statins</td>
<td>Risk of accumulation/DILI</td>
<td></td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>Levetiracetam</td>
<td>Sodium valproate Phenobarbitone</td>
<td>Phenytin Carbamazepine Lamotrigine</td>
<td>Risk of accumulation and increased toxicity</td>
</tr>
<tr>
<td>Antidepressants/sedatives</td>
<td>Duloxetine</td>
<td>SSRI Venlafaxine Mirtazapine Benzodiazepines</td>
<td>Limited data in severe disease</td>
<td></td>
</tr>
<tr>
<td>DMARDs</td>
<td>TNF inhibitors</td>
<td>Methotrexate Leflunomide Budesonide</td>
<td>Prednisolone Pre-screen for HBV</td>
<td></td>
</tr>
<tr>
<td>Drugs affecting clotting</td>
<td>LMWH</td>
<td>DOAC (Child Pugh C) Warfarin Thrombopoietin Receptor Agonists</td>
<td>Lack of evidence in use of DOACs in DC</td>
<td></td>
</tr>
</tbody>
</table>

ARB, angiotensin receptor blocker; DC, decompensated cirrhosis; DILI, drug induced liver injury; DOAC, direct oral anticoagulant; HBV, hepatitis B virus; LMWH, low molecular weight heparin; NSAIDs, non-steroidal anti-inflammatory drugs; SSRI, selective serotonin reuptake inhibitor.

reduced oral intake (due to encephalopathy, ascites or anorexia), malabsorption (due to portal enteropathy, jaundice or pancreatic insufficiency) and protein loss into ascites. Fundamental changes in energy metabolism in DC drive accelerated starvation, resulting in muscle catabolism, deconditioning and frailty. Diminished hepatic glycogen stores, due to high circulating levels of glucagon, result in gluconeogenesis as an alternative fuel and protein breakdown resulting in sarcopenia. Rapid transition from fed to fasting state means even short-term fasting results in muscle loss.

The priority is therefore to meet protein requirements (minimum of 1.5 g/kg dry weight) to prevent catabolism. Attenuation of muscle breakdown improves function and well-being, which in turn supports voluntary oral intake. Protein intake should increase to 2 g/kg in the presence of severe sarcopenia and/or ascites. Nutritional supplements to support protein intake may be required even when overall energy intake is maintained.

Nutritional supplements providing protein and energy are recommended where energy intake is low (<30–35 Kcal/kg dry weight per day). Fasting times should be minimised to 2–3 hours, so patients should aim to have three meals and three snacks per day. Adding a carbohydrate (such as cereal/toast/milk and biscuits/cereal/bar/ flapjack for non-diabetic/low BMI patients) or mixed carbohydrate/protein (such as yoghurt/cheese and crackers/pumpkin butter on toast for diabetic patients/those with higher BMI) bedtime snack and including carbohydrate at each meal supports fuelling and preservation of muscle protein. Where jaundice is present, a combination of lower fat diets and supplements is recommended to minimise biliary malabsorption. Patients with ascites or oedema should follow a no added salt diet, being careful to preserve protein and overall nutritional intake. Consider short-term enteral nutrition where oral nutritional support is insufficient or not consistently achieved, particularly in patients suitable for transplantation, or those with encephalopathy who are unable to eat. Nasogastric feeding is first line but nasojejunal feeding is well tolerated if nasogastric feeding is limited by early satiety.

Micronutrient deficiency is common in patients with DC. Vitamin D levels should be checked and supplemented if low in line with local protocols. Specific evidence about the beneficial effect of other micro-nutrients and vitamin supplementation in cirrhotic...
patients is not available. However, confirmed or clinically suspected deficiency should be treated with vitamin supplementation (including calcium, magnesium, phosphate, iron, B₁₂, and folate). Oral thiamine (100 mg two times per day) should be supplemented in all patients who continue to drink alcohol. As vitamin status is not easily assessed and multivitamin supplementation is cheap and substantially side effect free, a course of oral multivitamin supplementation could be justified in decompensated patients.

Physical activity can contribute to improving muscle mass and function. Nutritional stability must be achieved prior to initiating exercise. Movement can start at a low baseline with normal daily activities. Endurance exercise such as walking and cycling can support muscle functional capacity and resistance exercise can increase muscle mass. Therefore, a combination of endurance and resistance exercise is most beneficial. Simple exercises such as sit to stand can be a good first step.

**When to refer for transplant**

LT is the definitive treatment for selected patients with DC and should be considered when the severity of liver disease incurs a likelihood of poor survival or impaired quality of life. A UK clinical guideline outlining the process of LT assessment, including who and how to refer, has recently been published. To summarise, the over-riding principles of LT in the UK are that anticipated life expectancy after LT must exceed that without. A UK Model for End-stage liver disease (UKELD) score of 49 is the equipoise at which the predicted 1-year mortality without LT matches that after LT and is therefore the current minimum listing threshold for elective LT in those with irreversible decompensation.

In the absence of variant conditions, we recommend that referral for LT is considered when a patient with chronic liver disease develops the typical features of DC (ie, jaundice, ascites, variceal bleeding or HE) and UKELD ≥49. Early referral is preferable because a patient can become too unwell for LT if the referral is made too late. The referring clinician should consider first whether the decompensation is potentially reversible (for example with abstinence, in the case of alcohol-related liver disease (ARLD), or with antivirals in untreated chronic viral hepatitis). If not, is the patient suitable for LT? Contraindications to LT include coexisting significant extrahepatic comorbidity (with predicted mortality of >50% at 5 years), presence of extrahepatic sepsis, active malignancy and some previous extrahepatic malignancies. Some contra-indications can be temporary or relative, so if a patient is not currently suitable for LT, consider whether they may be suitable following treatment or an intervention (eg, nasogastric feeding in a patient with severe sarcopenia). If there is any doubt, advice should be sought from the LT unit.

ARLD is the leading indication for LT in the UK. Detailed recommendations for LT referral in ARLD in the UK are beyond the scope of this practice guidance. These have recently been revised. To summarise, it is recommended that patients with decompensated ARLD should be referred to consider their suitability for LT if they still have evidence of decompensation after optimal management and 3 months validated abstinence from alcohol and are otherwise suitable candidates for LT, in line with The National Institute for Health and Care Excellence (NICE) guidance. Contraindications to LT in ARLD include active ongoing alcohol use, drinking alcohol while on the waitlist and during the period of transplant evaluation, and a history of repeated non-adherence to advice to abstain from alcohol.

**PC in patients with DC**

DC is associated with a significant physical and psychosocial symptom burden which is most pronounced in the final year of life. Determining an accurate prognosis in patients with liver disease is challenging, due to the uncertain trajectory of the illness characterised by decompensations of disease and subsequent (partial) recovery. It is important to make patients aware of this uncertainty. It is now well recognised that there is a place for PC earlier in the patients' disease course. Parallel planning is important in the management of patients with other organ failures—‘hopping for the best but planning for the worst’. This is a useful phrase to use with patients when introducing the concept of PC.

**Who and when to refer to PC?**

Clinicians are often unsure as to when referral to PC services is appropriate. There are several tools available to identify patients with decompensated liver disease, who may benefit from referral to PC. Broadly speaking, they include:

- Patients with Child Pugh C cirrhosis.
- Patients with decompensated ARLD and ongoing alcohol use.
- Patients with irreversible and decompensated disease not deemed to be candidates for LT.
- Patients undergoing assessment for LT or who are on the liver transplant waiting list.
- Patients with two unplanned liver-related admissions within the past 6 months.
- Patients with hepatocellular carcinoma for best supportive care.

Symptoms and problems addressed by PC

Patients with DC often have general symptoms such as nausea, vomiting, fatigue and breathlessness frequently overlooked due to a focus on more liver specific symptoms such as itch, ascites and encephalopathy. Addressing symptoms has a clear impact on quality of life. In addition, there are often broader psychosocial...
**Table 3  Managing symptoms in advanced liver disease**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Recommended dose</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paracetamol</td>
<td>2–3 g/24 hours orally (long term)</td>
<td>&gt;50 kg (dry weight) 1 g four times a day orally safe for short periods (&lt;7 days)</td>
</tr>
<tr>
<td>NSAIDs</td>
<td>Avoid (bleeding risk/renal toxicity)</td>
<td></td>
</tr>
<tr>
<td>Tramadol</td>
<td>15–30 mg orally three times a day (short course only)</td>
<td>Avoid if possible—oral morphine preferable. If unable to use oral morphine monitor closely for constipation and encephalopathy</td>
</tr>
<tr>
<td>Codeine</td>
<td>15–30 mg orally three times a day (short course only)</td>
<td></td>
</tr>
<tr>
<td>Morphine sulfate</td>
<td>2.5 mg 4–6 hourly as needed</td>
<td>First choice oral opiate if eGFR&gt;30 Use short acting unless pain and liver function stable Titrate as required Monitor closely for constipation and encephalopathy</td>
</tr>
<tr>
<td>Hydromorphone</td>
<td>1.3 mg 8 hourly orally as needed (×10 as potent as oral morphine)</td>
<td>First choice oral opiate for eGFR&lt;30 Increased dose interval Monitor for constipation and encephalopathy</td>
</tr>
<tr>
<td>Oxydodone</td>
<td>1.25 mg 6–8 hourly orally as needed (×2 as potent as oral morphine)</td>
<td>Ideally avoid (half-life&gt;triples) Consider if patient not tolerating oral morphine/coexisting renal impairment (eGFR 30–60) Monitor closely for constipation and worsening encephalopathy</td>
</tr>
<tr>
<td>Buprenorphine transdermal patch</td>
<td>Dose according to oral opioid requirements</td>
<td>Can be used if pain and liver function are stable Monitor closely for constipation and worsening encephalopathy Only initiate on advice of palliative care and/or specialist pain team</td>
</tr>
<tr>
<td>Gabapentin</td>
<td>100 mg orally two times and titrate up as normal</td>
<td>Probably safe but can have sedative effect and may exacerbate HE.</td>
</tr>
<tr>
<td>Pregabalin</td>
<td>50 mg orally two times and titrate up as normal</td>
<td>Probably safe but can have sedative effect and may exacerbate HE.</td>
</tr>
<tr>
<td>Amitriptyline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>4–8 mg orally once</td>
<td>For patients with HCC/liver metastases and capsular pain Give gastric protection Review after 5 days</td>
</tr>
<tr>
<td>Nefopam</td>
<td>30–60 mg orally three times a day</td>
<td>An option in patients who do not tolerate other analgesia. Use with caution in decompensated disease, use lowest possible dose and monitor for side effects. Use may be limited by high cost and lack of evidence of effectiveness.</td>
</tr>
<tr>
<td><strong>Nausea and vomiting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metoclopramide</td>
<td>5 mg orally/intravenous/subcutaneous three times a day Titrare to max 10 mg three times a day</td>
<td>First-line option if gastrointestinal (GI) cause, acts as prokinetic May increase fluid retention Consider QT interval prolongation</td>
</tr>
<tr>
<td>Domperidone</td>
<td>5 mg orally two times a day</td>
<td>Titrate to maximum 10 mg three times a day Alternative first line option, acts as prokinetic Consider QT interval prolongation</td>
</tr>
<tr>
<td>Haloperidol</td>
<td>0.5–1 mg orally two times a day</td>
<td>Titrate to maximum 5 mg/24 hours in divided doses First line option if opioid or centrally induced</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>4 mg orally/intravenous two times a day Maximum dose 8 mg/24 hours</td>
<td>Second-line option Monitor for constipation</td>
</tr>
<tr>
<td>Levomepromazine</td>
<td>3 mg orally nightly Titrare to maximum 12.5 mg two times a day</td>
<td>Second-line option Causes drowsiness and can lower seizure threshold</td>
</tr>
<tr>
<td>Cyclizine</td>
<td>50 mg orally two times a day</td>
<td>Third-line option Monitor closely for constipation and worsening encephalopathy</td>
</tr>
<tr>
<td></td>
<td>25 intravenous/subcutaneous two times a day</td>
<td></td>
</tr>
</tbody>
</table>

Continued
There is often uncertainty about the safety of medication prescribing in patients with DC, but this should not lead to inadequate management of patients’ symptoms. See table 3 for a summary of how to manage common symptoms in patients with DC. The British Association for the Study of the Liver (BASL) has further guidance on anticipatory prescribing at the end of life.

Patients who may be suitable for PC should be discussed in a multidisciplinary meeting with representatives from PC, hepatology/gastroenterology (including specialist nurses) and other Allied Health Practitioners (AHPs) such as dieticians and alcohol care teams. Outcomes should be clearly communicated to the community team. Patients should be given the opportunity to discuss advance care plans, emergency healthcare plans and resuscitation status, and should be added to the PC register. Consider signposting patients and families to additional practical support such as social prescribers, accessible through primary care.

### Multidisciplinary care

Patients with DC have high rates of hospital admissions, long lengths of stay, high complication rates and significant healthcare costs. Liver specialist nurse led clinics can play an important role in admission avoidance and facilitating early discharge. Early postdischarge clinics (within 2 weeks of patient discharge) and urgent nurse-led liver clinics can facilitate diuretic titration, early detection of HE, symptom management and offer support to patients and carers. If admission is required, they can ensure early specialist input, which is crucial in improving outcomes for patients admitted with decompensation.

Nurse-led day case paracentesis services significantly reduce emergency admission rates, lower costs and improve outcomes and patient experience. There should be clear referral pathways in place via the gastroenterology/hepatology team to ensure patients are appropriate for the service. Patients should be given information on when and who to contact when symptoms (such as encephalopathy) deteriorate, or their ascites accumulates.
The aim should be to develop a service with an integrated MDT including dieticians, physiotherapists, pharmacists, PC nurse specialists and alcohol care teams to support a holistic approach to outpatient management of advanced liver disease.

Guideline

Author affiliations
1 Gateshead Health NHS Foundation Trust, Gateshead, UK
2 Newcastle University, Newcastle upon Tyne, UK
3 The Newcastle upon Tyne Hospitals NHS Foundation Trust, Newcastle, UK
4 Gastroenterology, Hull University Teaching Hospitals NHS Trust, Hull, UK
5 Gastroenterology, Queen Elizabeth Hospital, Kings Lynn, UK
6 King’s College Hospital Liver Unit, London, UK
7 University Hospitals Birmingham NHS Foundation Trust, Birmingham, UK
8 Addenbrooke’s Hospital, Cambridge, UK
9 Forth Valley Royal Hospital, Larbert, UK
10 Institute of Liver Studies, King’s College Hospital NHS Foundation Trust, London, UK
11 Institute of Liver Studies, King’s College Hospital, London, UK
12 University Hospitals Birmingham NHS Foundation Trust, Liver Unit, Birmingham, UK
13 Institute of Immunology and Immunotherapy, University of Birmingham, Birmingham, UK
14 Barts and The London NHS Trust, London, UK
15 Hepatopancreatobiliary Multidisciplinary Team, Freeman Hospital, Newcastle upon Tyne Hospitals NHS Foundation Trust, Newcastle upon Tyne, UK
16 Gloucestershire Hospitals NHS Foundation Trust, Cheltenham, UK
17 Queen Elizabeth Hospital, Birmingham, UK
18 Freeman Hospital, Newcastle upon Tyne, UK
19 Royal Infirmary of Edinburgh, Edinburgh, UK
20 Newcastle Upon Tyne Hospitals NHS Foundation Trust, Newcastle Upon Tyne, UK
21 British Liver Trust, Ringwood, UK

Twitter Dina Mansour @drdina_mansour, Mussarat Nazia Rahim @MussaratRahim, John Hammond @Jo_St_Ham and Stuart McPherson @stumpc

Contributors DM was project lead responsible for conceptualisation, writing original draft, reviewing and editing. SMasson, CH, DLS, GB, AG, JJ, JAL, JH, MNR, DT, VR, EB and MAH were section leads responsible for section first drafts and reviewed text; SMcPherson developed the care bundles, edited first draft and reviewed text; LC edited first draft and reviewed text; MAH and ACD reviewed text and recommendations.

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ORCID iDs
Dina Mansour http://orcid.org/0000-0002-8367-4232
Steven Masson http://orcid.org/0000-0003-1041-9844
Andrew C Douds http://orcid.org/0000-0002-7870-7984
Joanna A Leithead http://orcid.org/0000-0001-9443-4352
Michael A Heneghan http://orcid.org/0000-0002-5441-9064
Mussarat Nazia Rahim http://orcid.org/0000-0001-7733-8278
Dhiraj Tripathi http://orcid.org/0000-0001-9043-6382
Stuart McPherson http://orcid.org/0000-0002-5638-2453

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<table>
<thead>
<tr>
<th>Pathophysiological Feature</th>
<th>Potential effect on drug disposition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced / altered blood flow through the liver. Fibrosis, TIPS</td>
<td>Reduced first pass effect, resulting in increased bioavailability and risk of toxicity and drug-drug interactions.</td>
</tr>
<tr>
<td>Loss of hepatocytes</td>
<td>Reduced metabolic capacity</td>
</tr>
</tbody>
</table>
| Ascites | Impaired absorption  
          Altered distribution |
| Reduced synthesis of haematopoietic growth factors and coagulation factors Splenomegaly, varices, thrombocytopenia. | Predispose to bruising and bleeding. Prolonged prothrombin time and raised INR (does not correlate with bleeding risk) |
| Portal hypertension | Thrombotic complications with thrombopoietin agonists. |
| Cholestasis | Absorption of highly lipophilic drugs reduced. Impaired elimination via biliary excretion. |
| Hypalbuminaemia Raised bilirubin | Drugs displaced from binding sites, increasing bioavailability. |