Reducing recurrent hospital admissions in patients with decompensated cirrhosis

ABSTRACT

Recurrent admissions to hospital are a major issue for people living with decompensated cirrhosis, particularly those who develop chronic hepatic encephalopathy, a condition that leads to significantly impaired quality of life for patients and their family caregivers. Such patients have high health-care use costs but recent data have shown how the appropriate use of effective medical therapy can significantly reduce hospital admissions, length of stay and unplanned readmissions. Redesigning clinical services to optimize access to specialist care and improving the education and support of patients and their carers can further help to reduce the burden of this disease.

Patients with decompensated cirrhosis have high rates of hospital admissions. Those with hepatic encephalopathy have significantly impaired quality of life and are frequent users of health-care resources. However, effective therapies are now available which can break the cycle of recurrent readmissions, particularly when combined with patient-centred approaches to delivering care. This review discusses how relatively simple interventions can have a hugely positive impact.

Decompensated cirrhosis and recurrent admissions

With acute hospitals coming under ever greater pressure, opportunities to simultaneously improve patient outcomes, reduce recurrent admissions and save money are clearly desirable. Patients with decompensated cirrhosis (advanced chronic liver disease with one or more of jaundice, ascites, hepatic encephalopathy or variceal bleeding) are a clear example of where relatively simple interventions can lead to substantial benefits for patients, their families and the wider health economy.

Recent decades have seen a dramatic rise in the incidence of chronic liver disease in the UK with a consequent increase in liver-related hospital admissions and deaths (Williams et al, 2014). Much of this has been driven by alcohol misuse but non-alcoholic fatty liver disease, largely related to obesity or diabetes, is an increasing contributor (Anstee et al, 2013).

Hospitalized patients with decompensated cirrhosis are at high risk of clinical deterioration and death, and require prompt access to specialist care (Moreau et al, 2013). Unfortunately, a National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report showed widespread deficiencies in the care of patients with alcohol-related liver disease in UK hospitals (NCEPOD, 2013). Among several concerns was the finding that most patients who died from alcohol-related liver disease had a recent history of recurrent hospital admissions where opportunities to intervene had been missed.

More than a third of patients with cirrhosis are readmitted within 1 month of discharge from hospital (Volk et al, 2012) and while some readmissions are unavoidable as a result of progressive disease, many can be prevented by optimizing health care and its delivery. Unplanned readmission can be an indicator of wider problems in coordinating care for people with cirrhosis, effectively a 'canary in the coalmine' for the quality of liver services (Volk, 2016).

Importantly, we can largely predict those patients who are at highest risk of readmission. For example, a recent large study from the UK demonstrated that simply screening for alcohol misuse in acute medical admissions can reliably identify patients with recurrent emergency department attendances and frequent hospital admissions and direct them to appropriate support services (Westwood et al, 2017).

In patients with more advanced liver disease, the presence of ascites or hepatic encephalopathy (in particular) are major predictors of unplanned readmission within 30 days of discharge. Patients with diuretic-intractable ascites requiring frequent abdominal drainage can have a markedly reduced quality of life (Orr et al, 2014) and their condition is often suboptimally managed, particularly where care is not delivered by specialist gastroenterologists or hepatologists (Kanwal et al, 2012; Lim and Lidofsky, 2015). Such patients are at high risk of further deterioration as a result of microbial infection or systemic inflammatory response (Bernardi et al, 2015) and it is perhaps unsurprising that an unresolved C-reactive protein level of >10 mg/litre at discharge predicted a significantly higher risk of 30-day readmission (44% *vs* 24%; P=0.007) in one recent study (Piano et al, 2017).

It is possible to pre-empt many of the complications of cirrhosis, and for hepatology services to be most effective they require a combination of medical, nursing and nutritional expertise, all emphasizing the importance of secondary prevention (Hirschfield et al, 2008). Examples include support with symptom control and quality of life, management of alcohol misuse, identifying varices and initiating prophylaxis, screening for hepatocellular carcinoma, avoiding nephrotoxic drugs (e.g. non-steroidal anti-inflammatory drugs, aminoglycosides), using long-term prophylactic antibiotics in patients following an episode of spontaneous bacterial peritonitis,

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Table 1. Roles of primary and secondary prevention

Cirrhosis complication	Management examples
Ascites	Optimize diuretic therapy
	No added salt diet
	Consider transjugular intrahepatic portosystemic shunt if diuretic intractable
Varices	If medium or large varices which have not bled, non-selective β-blockers or endoscopic banding are recommended for prevention of first variceal haemorrhage
	Use of antibiotic prophylaxis within 24 hours in any patient with cirrhosis and gastrointestinal haemorrhage
	Patients with cirrhosis who have a variceal bleed should receive therapy to prevent recurrence – ideally a combination of endoscopic banding and non-selective β-blockers
Hepatocellular carcinoma	Suitable patients with cirrhosis should have 6-monthly screening with ultrasound +/- serum alfa fetoprotein
Hepatic encephalopathy	Avoiding precipitants – e.g. over-diuresis, electrolyte imbalance, constipation
	Use of lactulose to ensure 2–3 soft stools per day
	Rifaximin to prevent recurrent episodes
Spontaneous bacterial peritonitis	Following treatment of spontaneous bacterial peritonitis, all patients should receive long-term secondary prophylactic antibiotics (e.g. quinolone or co-trimoxazole)
	Consider primary prophylaxis in patients with very low ascitic protein concentration (<15 g/litre)

From Hirschfield et al (2008); Volk and Kanwal (2016)

Table 2. Chronic liver disease and hepatic encephalopathy

Outpatients with compensated cirrhosis have a 20% annual risk of developing overt hepatic encephalopathy
60–80% of patients with compensated cirrhosis have subclinical evidence of minimal hepatic encephalopathy on psychometric testing
30–45% of inpatients with decompensated cirrhosis have overt hepatic encephalopathy

From Bajaj (2010)

ensuring adequate nutrition and preventing avoidable diseases through vaccination (*Table 1*).

The impact of chronic hepatic encephalopathy on health-care use

Chronic hepatic encephalopathy is a common complication of cirrhosis (*Table 2*). Patients undergo periods of remission and relapse with a wide spectrum of neuropsychiatric manifestations that can mimic many neurological disorders. The condition has a high long-term mortality rate and sufferers should be at least evaluated for their potential suitability for liver transplantation. In an analysis of 120 000 cirrhosis admissions across six states in the USA, the presence of hepatic encephalopathy was the most significant predictor of unplanned readmission within 30 or 90 days of discharge (Tapper et al, 2016a).

Unfortunately, the diagnosis of hepatic encephalopathy is often delayed or missed (particularly in the early stages), its clinical impact may be under-appreciated and, until recently, there have been few changes in its management over the last 20 years (Seery et al, 1998).

However, the availability of effective therapy in the form of rifaximin has transformed the outlook for many patients with hepatic encephalopathy. In a pivotal, randomized placebo-controlled trial, rifaximin significantly improved the maintenance of remission from recurrent hepatic encephalopathy as well as lowering the risk of hospitalization (Bass et al, 2010). In keeping with this, an audit conducted across seven UK sites demonstrated major reductions in hospital admissions and numbers of bed days (Orr et al, 2016) in patients taking rifaximin to control hepatic encephalopathy.

The recent IMPRESS study went a stage further, collecting 'real world' data from 13 sites in the UK (ranging from small acute hospitals through larger regional centres to liver transplant units) and including patients with the full spectrum of decompensated cirrhosis including the sickest 14% who had high MELD (Model for Endstage Liver Disease) scores of over 25. The IMPRESS investigators looked at five key markers of health-care utilization – hospital admissions, emergency department attendances, bed days occupied, 30-day unplanned readmissions and critical care bed usage – and found all were significantly reduced in the 6 months following initiation of rifaximin with major cost savings (Hudson et al, 2017).

As for many chronic conditions, it is important that patients with hepatic encephalopathy understand their illness, recognize early signs of deterioration and optimize their use of effective medications. Unfortunately, hepatic encephalopathy patients' knowledge of the condition and its management can be poor (Montagnese et al, 2012) and informal caregivers, such as family members, have a vital role in providing support.

As discussed above, patients with chronic hepatic encephalopathy have significantly impaired quality of life but there are also major burdens on their caregivers (*Table 3*) for whom episodic deteriorations in their relatives' cognitive function can be particularly distressing (Künzler-Heule et al, 2016). The socioeconomic burden of hepatic encephalopathy is considerable. Liver cirrhosis already disproportionately affects the socially deprived (Williams et al, 2014) but the impact of hepatic encephalopathy is even greater, leading to significant further falls in employment rates and financial status along with impaired quality of life for the caregiver him-/herself (Bajaj et al, 2011).

Improving education and support for patients and optimizing clinical pathways

The clinical practice guidelines for hepatic encephalopathy, issued jointly by the American Association for the Study of

Liver Disease and the European Association for the Study of the Liver, emphasize the importance of education and support for patients and carers (Vilstrup et al, 2014). They recommend that consultations should be planned to allow time to adjust treatment and prevent the appearance of factors that might precipitate relapse. Close liaison with the patient's family, GP and other caregivers is advocated, so that all parties understand the nature of hepatic encephalopathy and how it should be managed. Specifically, the guidelines state that education of patients and relatives should include:

1. The actions and side effects of medications (lactulose, rifaximin)
2. The importance of adherence to therapy
3. The early signs of hepatic encephalopathy and what to do if they develop.

Chronic disease management models involve redesigning services to be more patient centred, accompanied by improved self-management of chronic illness and easier access to specialist care in an effort to avoid crises that result in hospital admission (*Table 4*).

Published data show that such approaches involving care coordination or 'day hospital' access can transform the management of complications of cirrhosis and lead to fewer hospital admissions and lower costs (Mellinger and Volk, 2013; Morando et al, 2013). However, it is not enough simply to have an innovative design for clinical services, the effective implementation is crucial and the collection of accurate data documenting how chronic disease management translates into better outcomes is an essential aspect of any scheme (Newhouse et al, 2013).

Patient knowledge and disease self-management was the subject of a study of 150 patients with cirrhosis (approximately a third on diuretics and a quarter taking medication for hepatic encephalopathy). Baseline knowledge of their disease and its management was generally poor across the board but was worst for understanding hepatic encephalopathy (Volk et al, 2013). However, the introduction of a structured education programme which included issuing patients with a 14-page booklet on cirrhosis with sections to complete on medications, diet, appointments and current weight led to significantly improved awareness across all domains.

In addition to educating patients, quality improvements can also be seen with decision support tools that prompt medical staff to use goal-directed therapies in cirrhosis (e.g. use of rifaximin and lactulose for hepatic encephalopathy, antibiotics and intravenous albumin for spontaneous bacterial peritonitis, antibiotic prophylaxis in upper gastrointestinal haemorrhage, appropriate use of beta blockers).

Following the deficiencies in care identified in the 2013 NCEPOD report, a 'care bundle' for the initial management of patients with decompensated cirrhosis was developed in Newcastle and subsequently adopted by the British Society of Gastroenterology and the British Association for the Study of the Liver (McPherson et al, 2016). The care bundle consists of a series of auditable steps to ensure appropriate high quality care is delivered promptly. It includes identification of alcohol misuse and withdrawal risk, aggressive treatment of sepsis (particularly spontaneous bacterial peritonitis), management of renal dysfunction and prompt referral to specialist gastroenterologists or hepatologists. A multicentre audit confirmed that use of the care bundle was associated with significant improvements in the initial management of these conditions (Dyson et al, 2016).

However, it is similarly important to ensure that appropriate management plans are enacted at discharge from hospital and continued in the community if an early readmission is to be avoided. In an inpatient study of over 800 patients with cirrhosis, use of a physician's hand-held electronic device featuring these prompts led to more effective medication on discharge and a 40% reduction in the risk of unplanned readmission within 30 days (Tapper et al, 2016b). The wider adoption of such decision support tools may lead to further improvements in the quality of care provided for people with liver disease.

Table 3. Impact of hepatic encephalopathy on families: problems reported by relatives of patients with cirrhosis

Feeling overwhelmed by relatives' unusual symptoms and behaviours
Valued education that these experiences were complications of liver disease
Increasingly aware of symptoms of hepatic encephalopathy
Having feelings of isolation and being 'tied down'
Experiencing and overcoming obstacles in working with health-care professionals
From Künzler-Heule et al (2016)

Table 4. Chronic disease management models and cirrhosis

Redesign of health-care systems to optimize outpatient care and reduce admissions
Use of clinical information systems and decision support analysis tools (e.g. prognostic models) to guide management
Maximize the impact of outpatient visits
Easier access to specialist care when needed
Increased patient education and self-management
From Volk et al (2010), Morando et al (2013)

Conclusions

For people with cirrhosis, recurrent hospital admissions are associated with considerable morbidity and mortality as well as high health-care costs. However, significant advances in the quality of care can be achieved through better adherence to effective medicines, optimizing patient support and the redesign of services. Hepatic encephalopathy is a major driver of such readmissions but effective medical therapy is associated with a significant reduction in admissions, emergency department attendances and health-care utilization costs. Patient and caregiver education is a key aspect of improving the treatment of hepatic encephalopathy, and should be integrated into chronic disease management models. **BJHM**

KEY POINTS

- Patients with decompensated cirrhosis have high rates of readmission to hospital, particularly those with ascites and/or hepatic encephalopathy.
- Most complications of cirrhosis can now be prevented or minimized with effective interventions.
- Specialist services should be designed to be outward-facing and patient-centred.
- Optimizing the delivery of effective medical care and providing support for patients and their caregivers can reduce readmissions.

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