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## The COVID Pandemic Will Have a Long-Lasting Impact on the Quality of Cirrhosis Care

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*Abstract*

The 2020 COVID pandemic shattered the meticulously developed processes by which we delivered quality care for persons with cirrhosis. Care has been transformed by the crisis but enduring lessons have been learned. In this article, we review how COVID will impact cirrhosis care. We describe how this impact unfolds over 3 waves; 1) an intense period with prioritized high-acuity care with delayed elective procedures and routine care during physical distancing, 2) a challenging 'return to normal' following the end of physical distancing, with increased emergent decompensations, morbidity, and systems of care overwhelmed by the backlog of deferred care, and 3) a protracted period of suboptimal outcomes characterized by missed diagnoses, progressive disease and loss to follow-up. We outline the concrete steps required to preserve the quality of care provided to patients with cirrhosis. This includes an intensification of the preventative care provided to patients with compensated cirrhosis, proactive chronic disease management, robust telehealth programs, and a reorganization of care delivery to provide a full service of care with flexible clinical staffing. Managing the pandemic of a serious chronic disease in the midst of a global infectious pandemic is challenging. It is incumbent upon the entire healthcare enterprise to be strong enough to weather the storm. Change is needed.

Cirrhosis is common and its prevalence is increasing.[1] Its course is characterized by life-limiting complications such as variceal hemorrhage, ascites, hepatic encephalopathy (HE) and hepatocellular carcinoma (HCC). Globally, it causes 2 million deaths per year.[2] Evidence-based interventions directed at each liver-related complication can improve patient outcomes. Examples include imaging-based screening for HCC,[3] endoscopic screening for varices, [4] immunization against viral hepatitis, and optimal therapy for HE.[5] Reproducible evidence of improved patient outcomes where care is concordant with quality indicators has validated each measure.[6, 7] Guidelines, therefore, have codified these practices as process measures that serve to define quality care in clinical practice.[8, 9] Where access to care is limited such as in response to pandemics (i.e. COVID-19) or natural disasters, priorities change. Indeed, the COVID pandemic shattered the processes, often meticulously developed over years, by which we delivered quality care. COVID exposed deep flaws in the structural and process measures developed to follow patients, evaluate disease status and response to therapy, and screen for complications, each of which depends upon frequent physical patient-physician interaction. Given the uncertain path ahead both with regards to severity and duration, there is a crucial need to adapt to preserve the outcomes our patients deserve. Herein, we review the specific ways that COVID impacted the way we improve the quality of our care.

*How will COVID negatively impact quality care*

We are only beginning to understand the impact of the pandemic on care quality. Our response is likely to unfold in 3 waves.[10]

1. **The first wave.** A patchwork of ersatz responses was deployed to divert and intensify resources for the sickest patients in an effort to reduce hospital utilization which were re-allocated from 'stable' patients whose routine care was deferred to mitigate the spread of SARS-CoV2. There are three major examples of deferred care. One, we halted for an indeterminate period all screening for varices and hepatocellular carcinoma (HCC). Delayed screening is safe for most. However, it may increase the relative risk of complications like variceal hemorrhage at the population level. We have already transitioned from screening all-comers for varices toward high-risk persons in accordance with Baveno VI criteria.[4] Similarly, although delay screening is safe for the vast majority of patients, it could increase in the risk of diagnosis of HCC at a later stage for the roughly 25% of patients with biologically aggressive disease.[11] Two, we cancelled elective therapeutic procedures. These include living donor liver transplantation as well as HCC resections/locoregional therapies. In both cases, most will experience good outcomes but some will not for the same reasons as above. Three, we decreased deceased donor liver transplantations. With limited assurance regarding the availability of intensive care beds and ventilators, blood products and/or renal replacement therapy in the context of COVID care, accepting organs for waitlisted patients is tenuous. Programs may risk stratify their waitlisted patients, deferring both evaluations and transplant offers. Uncertainty regarding coronaviral test-accuracy and transmission challenges donor assessments and quarantine travel restrictions hamper donor

procurement. Indeed, donor procurement declined 25% in the first 4 weeks of the COVID pandemic in Italy.[12] Waitlist mortality may increase.

2. **The second wave.** When normal clinical operations resume, a massive backlog of routine visits may overwhelm pre-pandemic capacities for months. The higher threshold for urgent care in the first wave will result in a higher incidence and overall acuity of second wave encounters compounded by delayed care, lapsed prescriptions, and a fear of seeking medical attention. Those who were misclassified as low-risk during the first wave begin presenting with decompensations, drawing additional resources with the risk of cascading deferrals for presently compensated patients. Isolation places additional stresses on patients. For the decompensated patient, physical distancing policies restrict mobility and limit the potential pool of caregivers, while reducing access to community assistance including support groups and meal delivery programs. These factors may further perpetuate frailty and malnutrition while worsening mental health. At the same time, nutritional guidance is also challenging to follow in a pandemic. Cheap and processed foods may be more accessible, impeding salt restriction and exacerbating volume overload while an overwhelmed system struggles to accommodate rising demand for paracentesis. Finally, alcohol sales have already increased and is skewed towards consumption of larger quantities with higher alcohol content. (<https://www.forbes.com/sites/joemicallef/2020/04/04/how-the-covid-19-pandemic-is-upending-the-alcoholic-beverage-industry/#56a8f7664b0b>) All these factors raise the risk of acute decompensations that will characterize the second wave.
3. **The third wave.** We will encounter complications of the pandemic for years due to missed diagnoses and haphazard follow-up or tracking mechanisms. This would include a failure to diagnosis HCC at earlier stages, complications of medical therapy for lack of timely lab-

work, and delayed surveillance procedures (including colonoscopy) and follow up after diagnostic tests. Furthermore, any postponed appointment will be accompanied by unintended loss to follow-up. Finally, we anticipate a protracted economic crisis. This will impact insurance coverage as well as the capacity to travel or take leave from work for care. The consequence is stage-migration and a conversion of the curable to incurable.

Each wave's impact will be compounded by the healthcare system fixed resources (limited slots for visits/procedures overwhelmed by demand), inadequate provider support (anticipated cuts, staff furloughs, and realignment of the healthcare infrastructure to make up for financial losses), and more importantly patient factors (sicker patients, loss of insurance, increased cost of insurance, and job losses due to the economic crisis). Physician burnout is already high under the current medical environment.[13] Each wave could exacerbate the healthcare's psychological toll by increasing exposure to adverse outcomes as deferred procedures and interventions may lead to a high rate of untoward events despite best efforts. The resulting feelings of helplessness will need to be countered for some time to come.

*How COVID should change our approach to quality*

Our tools for interventions and program infrastructure will need to adapt.(**Figure 2A-2B**)

**First**, proactive care that reduces the need for or risk of further interventions should be favored over reactive care. In a pandemic-responsive care paradigm, the incremental value is highest for interventions that safely reduce risks, decrease avoidable emergency room or urgent care visits, and eliminate the need for elective procedures. This entails in practice an intensification of the care provided to persons with compensated cirrhosis. The hepatology care team would focus on proactive coordination, sharing information and resources, and offering secondary services which could reduce the burden of cirrhotic complications inclusive of a broad set of vaccinations, nutritional counseling and substance use disorder therapy.

**Second**, we must modify our interventions. The most conceptually straightforward change is a liberalized usage of non-selective beta-blockade (NSBB). Whereas current practice uses endoscopy to refine selection for NSBB-based primary prophylaxis, we must recognize that endoscopic screening is costly and reduces access for patients requiring other endoscopic procedures. Many meeting Baveno VI criteria will benefit from NSBB in place of endoscopic screening while risks are low. Furthermore, mounting data links NSBB to a reduced risk of cirrhotic complications including ascites.[14] Serum based noninvasive risk markers (e.g . FIB-4) may substitute for elastography based risk-stratification, further limiting needs for imaging. Outpatient albumin infusions for management of ascites and anasarca may help prevent readmissions and improve survival.[15] Interventions to reduce the burden of hepatic encephalopathy through early recognition and initiation of prophylactic therapies can be easily implemented.[16, 17] The time has come for proactive risk-stratification tools ranging from



simple scores (e.g. Animal Naming Test) to mobile applications that engage patients and caregivers. [16, 17]

**Third**, optimal care for persons with cirrhosis should include integrated telehealth. Although essential to providing care in a pandemic, telehealth's usefulness extends far beyond its role as a substitute for clinic visits during physical distancing. Telehealth enables remote monitoring by the care team, allowing for focused education (e.g. nutrition), caregiver support, and early interventions to ensure medication compliance and to prevent decompensation for immunosuppressed and post-discharge patients. Telehealth is associated with multiple patient-centered benefits, including decreased harms (e.g. missed doses of lactulose for travel), decreased costs (i.e. parking, travel), and decreased absenteeism for those who work. Telehealth through video visits has also been shown to both improve time to waitlisting of potential transplant candidates and reduce referrals and travel for non-candidates.[18, 19] Transplant evaluation can proceed without face-to-face visits.

Multiple initiatives, however, are needed to facilitate telehealth uptake. First, in jurisdictions such as the US where policies limit telehealth (i.e. cannot occur across state-lines, limited reimbursement), we must advocate freedom and flexibility. Second, many of our patients are older, alone, or lack the instrumental support to transition to new modes of care. Telehealth must be flexible, including video and telephone-based visits. It is unclear if patients will remain as engaged and motivated without personal contact. Telehealth therefore requires co-deployment of behavioural interventions aimed at improving patient participation across socioeconomic strata and technological awareness.

**Fourth**, quality care entails coordinated care. First, as shown by the Morando experience with 'day-hospitals', patients with emerging needs identified in clinic or by telehealth benefit from

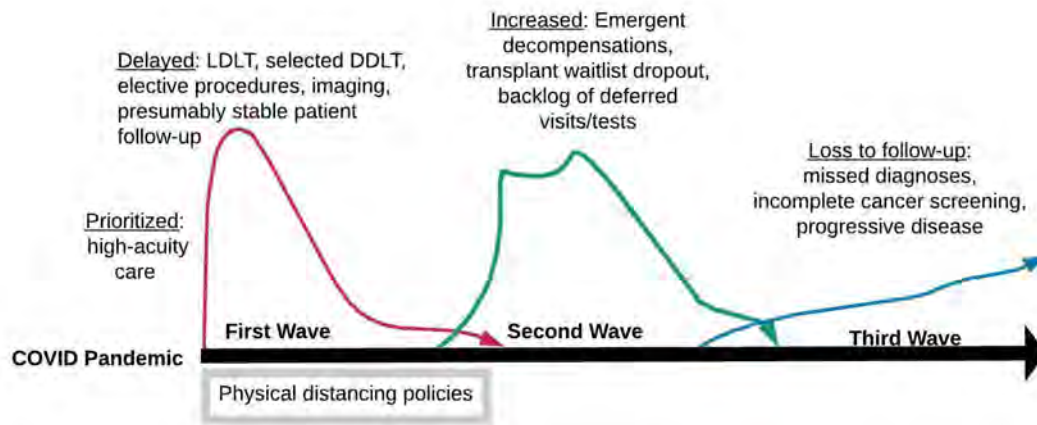
coordinated care by a dedicated rotation of specialists and nurses that serve the whole practice.[20] Creating a clinical space where patients with cirrhosis can receive timely evaluation and management of common conditions (including procedures, psychometrics, and substance abuse counselling) requires prospectively establishing care protocols, creative staffing schema, and tolerating some redundancy within clinical schedules to facilitate unplanned, potentially lengthy visits. Second, in order to optimize outcomes for remote patients at great distances from the referral center, using consultations for case-based learning enabled by telecommunication to a successful strategy to strengthen knowledge of complex liver disease at the frontline. This strategy - Extension for Community Healthcare Outcomes (ECHO) – was pioneered for community-based interferon-based hepatitis C therapy but has been adapted to improve outcomes for persons with cirrhosis.[21] Similar teleconsultation programs have been implemented in Spain to empower clinicians in prisons to treat hepatitis C.[22] Democratizing knowledge and providing local providers with tools for successful management is crucial. Third, collaborative rather than concentrate care is more flexible and responsive to urgent needs. When a patient's care-team involves multiple capable partners who may, individually, have periods of limited clinical access but collectively offer gapless care, urgent issues are more likely to be handled without hospitalization, readmission, and at a lower risk of death.[23] Conversely, these data also show that care which is concentrated in the hands of one doctor is associated with suboptimal outcomes.[23] Finally, coordinated transitions of care following hospitalization need to be a crucial focus; early follow-up, in-person or by telehealth, by any member of the care team yields improved clinical outcomes.[23, 24]

All of these interventions demand investment to ensure that the healthcare system infrastructure is nimble enough to adapt.(**Figure 2**) Clinics must cross-train staff for multiple roles, streamline

staffing to care teams assigned certain days or weeks to consolidate in-person visits, and restructure clinical space to provide extended services, procedures, and infusions. Registries are needed to track and remind staff of the needs for all high-risk or immunosuppressed persons. New partnerships need to be reliable (medication delivery to home), training for new applications robust (remote weight monitoring, healthcare apps, caregiver materials) and infrastructure reliable to disseminate knowledge (project ECHO).

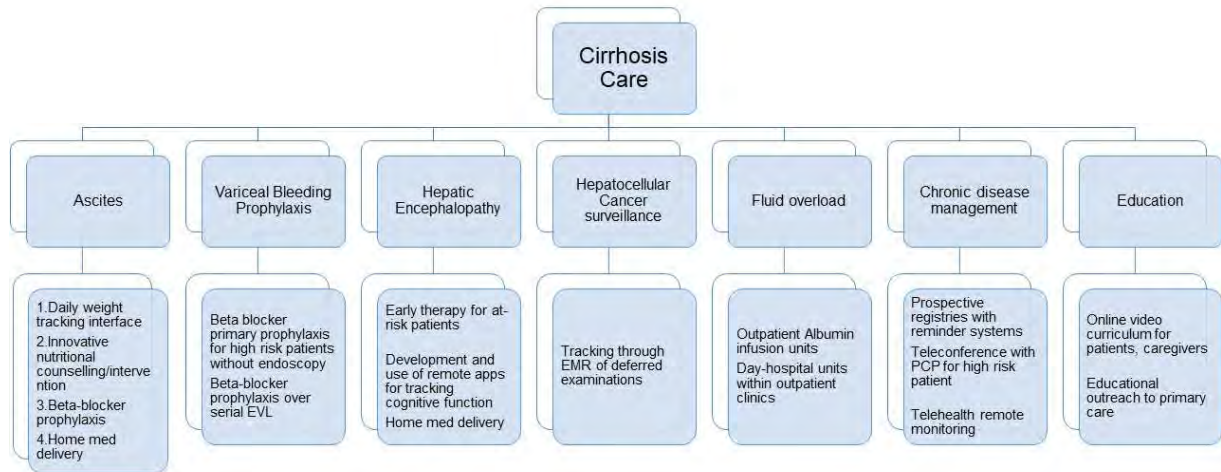
### *Conclusion*

COVID brought into sharp relief the trade-offs inherent in our daily clinical decision making. Care has been transformed by the crisis but enduring lessons have been learned. Novel quality metrics are needed to emphasize the importance of team-based care and telehealth. In addition, a definition of quality that depends on processes and procedures that are not tenable in the context of pandemics and, particularly where a non-procedural alternative exists, highlighting inefficient resource utilization. Managing the pandemic of a serious chronic disease in the midst of a global infectious pandemic will be difficult. Change will be needed. It is incumbent upon the entire healthcare enterprise to be strong enough to weather the storm.

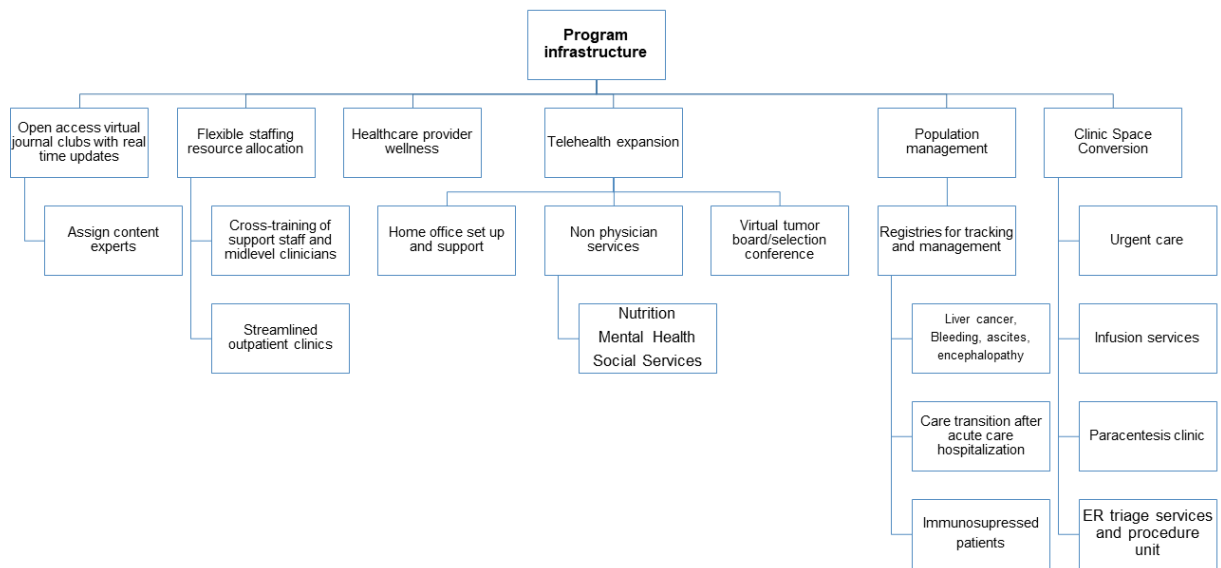
**Figure Legends:****Figure 1: The Impact of the COVID Pandemic Unfolds in Three Waves**

**DDL T = deceased donor liver transplant, LDL T = living donor liver transplant**

**Figure 2: Adaptations to Preserve High Quality Care: Interventions (A) and Changes to Program Infrastructure (B)**



EMR = electronic medical record, EVL = endoscopic variceal ligation, PCP = primary care physician



ER= emergency room

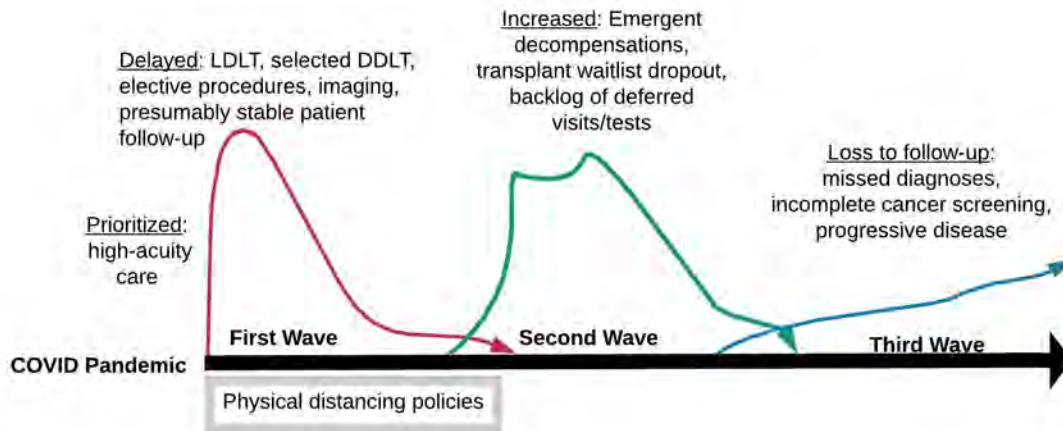
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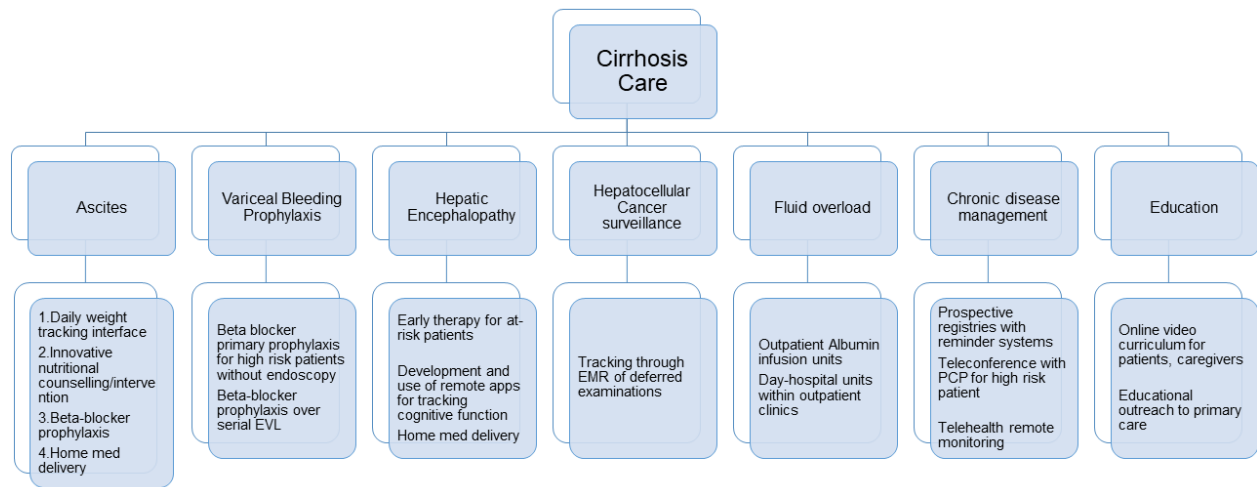
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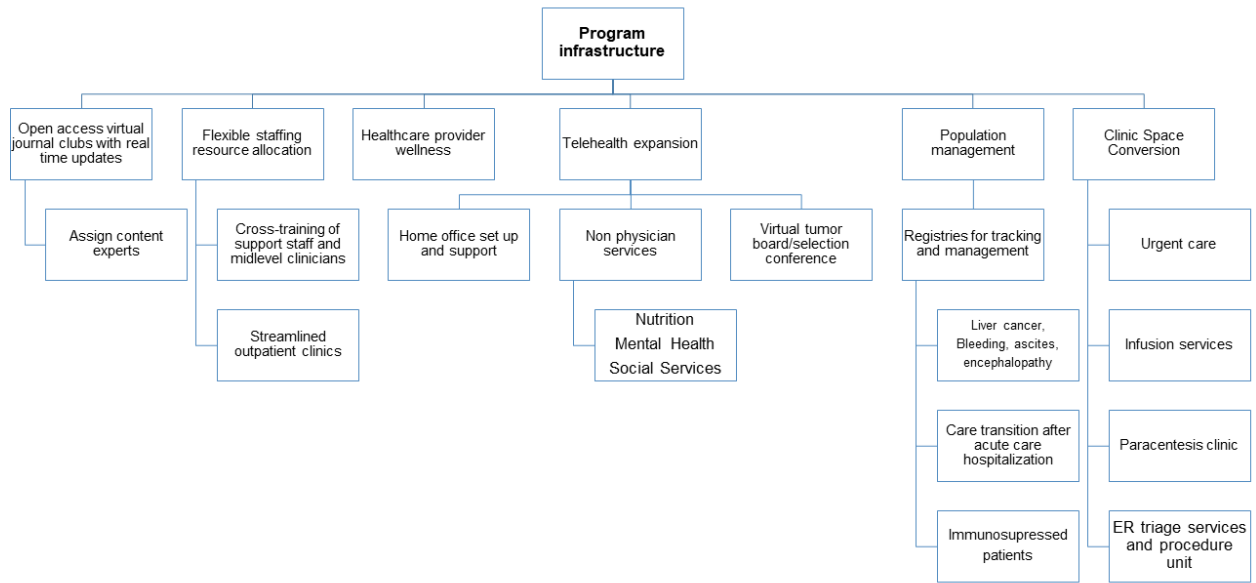
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