ORIGINAL RESEARCH

A Pilot Study to Evaluate a New Hep-GRP Care Pathway to Improve Outcomes Among Canadian Older Adults with Liver Cirrhosis

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ABSTRACT

Background

Older adults with cirrhosis have complex medical needs that are not satisfied by organ specific management. Interdisciplinary approach may mitigate comorbidity and improve patient satisfaction.

Methods

A pilot study consisted of dual specialist interdisciplinary referral pathway and mixed virtual care delivery model are prospectively evaluated in older adults (65 years and older) with cirrhosis during the COVID-19 pandemic between September and December 2022. Participant attitudes towards telemedicine were surveyed.

Results

68 participants with cirrhosis were consecutively assessed by hepatology. The mean age was 73 years. 39 (57%) screened positive for one or more geriatric syndrome(s). Comprehensive geriatric assessments were conducted via telemedicine in 18 participants, with additional referrals to physiotherapy and nutritional education. Compared to a historic cohort matched for age, sex, and Child-Pugh class, acute health service utilization measured by ER visits among those received dual specialist interdisciplinary consultation were lowered by 1.11 per patient at three-month follow up period (p = .0006, 95% CI 0.47–1.74). Majority participants (87.6%) preferred telemedicine or mixed method visits.

Conclusion

An interdisciplinary approach to older adults with cirrhosis will likely be beneficial, and routine screening for geriatric syndrome may lead to reduced acute health-care utilization in the short term. Telemedicine and virtual screening tools in seniors should be fully explored to improve access to care.

Key words: telemedicine, interdisciplinary care, cirrhosis, comprehensive geriatric assessment, seniors

INTRODUCTION

As the population ages, there has been a noticeable increase in the prevalence of cirrhosis amongst older adults, with the most common causes being from non-alcoholic steatohepatitis (NASH) and alcohol,[1] resulting in the average listing age for liver transplantation increasing from 50.4 to 54.5.[2] This trend suggests an increased disease burden amongst older adults[3,4] which will likely increase given the complexity of their medical needs, which are frequently under-recognized.[5]

The recent COVID-19 pandemic has negatively impacted on timely access to health care, with one in three seniors experiencing delayed or cancelled medical appointments.[6] Delayed diagnoses of cirrhosis will inevitably increase chronic disease burden[7] in an already fragile health-care system. This results in more patients accessing acute care, resulting in increased rates of hospitalization and longer length of stay for patients with compensated and decompensated cirrhosis.[8] In addition, in the absence of timely outpatient cirrhosis management, it can result in increased rates of emergency department (ED) presentation for preventable hepatic encephalopathy, emergency paracentesis, and variceal bleeding, all of which are associated with significant economic costs and mortality.[7-9]

Aging poses specific challenges in cirrhosis management, with one in six older adults[10] experiencing frailty, which has an overall prevalence of 11% in community dwelling adults older than 65.[11] They are also more likely to have one or more geriatric syndromes, including cognitive impairment, malnutrition, falls, delirium, functional decline, incontinence, and polypharmacy,[12] which have been associated with frailty, disability, comorbidity and death.[5] Additionally,

with advanced age, there is overlap between minimal or covert hepatic encephalopathy (HE) and cognitive impairment:[13] it is hypothesized that up to 25% of older patients presenting with symptoms of minimal HE may harbor a degree of neurocognitive impairment and had a lower quality of life than those without cognitive impairment.[13]

The Comprehensive Geriatric Assessment (CGA) is a "multidisciplinary diagnostic and treatment process that identifies medical, psychosocial, and functional limitations of a frail older person to develop a coordinated plan to maximize overall health with aging".[14] Its benefits have been well-established for in-patients,[15,16] and for certain populations (e.g., dementia).[14] However, there has been surprisingly little research on CGAs for older adults living with cirrhosis, who are potentially one of the most vulnerable populations most likely to benefit.

CGAs have been traditionally performed in-person; however, with the recent COVID-19 pandemic, there has been a need to explore other methods for administering CGAs, which includes virtually via telemedicine. The utility, perception, and acceptance of telemedicine has been well-studied in non-geriatric populations before and during the COVID-19 pandemic.[17,18] Although limited in scope compared with their traditional counterparts, virtual CGAs offer a more feasible option for accessing health care, especially for those with mobility issues, limited transport, or are rurally situated.[19]

The CGA usually incorporates one or more screening tools to help identify geriatric syndromes. Although mostly validated for in-person assessments, several screening tools have been validated for virtual use, which includes the nutritional screening tool SCREEN-8 tool, which can be administered by telephone.[20] The Saint Louis University Mental Status examination (SLUMS) is another option that can be administered virtually via videoconference or telephone, which is recommended by one of the author's health authority.[21]

METHODS

This inter-provincial quality improvement pilot study was conducted across two Canadian provinces (Nova Scotia and Alberta) from September 2022 through to June 2023. All research activities were carried out at the Halifax site except for the virtual CGAs, which were conducted in the geriatricians' office at the University of Alberta in Edmonton. The manuscript was written using both the SQUIRE 2 guidelines[22] and the CONSORT 2010 statement: extension for pilot studies guidelines.[23]

Study Population

Eligible participants were new referrals to the Halifax hepatology clinic at the Queen Elizabeth II Health Science Centre who were aged 65 years or older, had a diagnosis of liver cirrhosis confirmed by either liver biopsy, liver stiffness test (Fibroscan or MR elastography) or using the serum fibrosis test (FIB-4 score), with appropriate radiological findings, and had had no prior hepatologist contact. Individuals were excluded if they had limited life expectancy at less than six months from metastatic cancer or life-threatening conditions, or were unable to provide consent.

Intervention

The intervention involved the implementation of a new Hep-GRP Care Pathway for eligible older adults with cirrhosis (Figure 1). The Hep-GRP Care pathway involved screening older adults with cirrhosis for the presence of five pre-specified geriatric syndromes, with a positive finding prompting an electronic referral (using a standardized electronic referral form) to be sent to a geriatrician for a virtual or in person CGA. When deemed appropriate, the appointment was made with the patient by a specified geriatrician, by videoconference where possible, otherwise by telephone, within two weeks from the time of referral. An in-person geriatric consult was requested if patient was not candidate for a virtual visit. The virtual appointment involved completion of a modified virtual CGA using a problem-based standardized template (Figure 2). Nutritional screening tool SCREEN-8 tool and the Saint Louis University Mental Status examination (SLUMS) were administered by videoconference or telephone. Collateral history was obtained either before, during or after the appointment, where possible. A consultation letter with the CGA results was sent to the referring hepatologist and family physician, which included a problem list and recommendations, including recommendation for any geriatric follow-up visit. Depending on the CGA findings, multidisciplinary clinic visits were then arranged at the discretion of the referring physicians when appropriate.

Measures

Outcome measures included the rate of ED visits and hospital readmissions at three months, average wait-time for the virtual

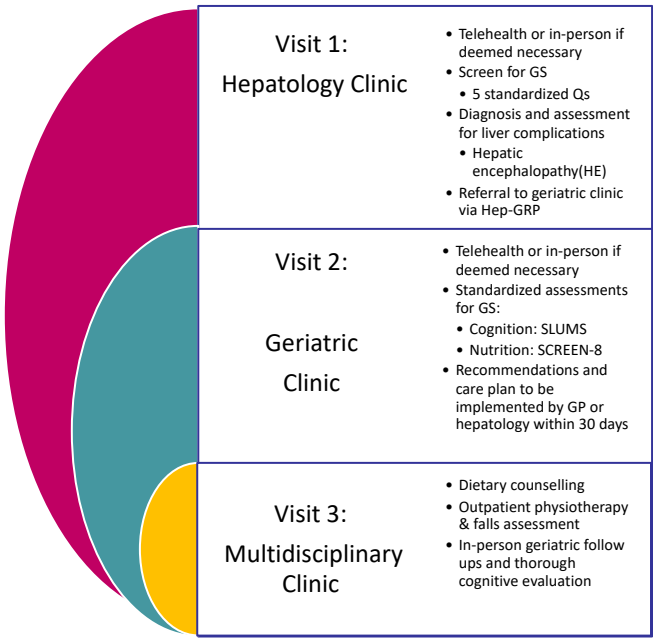

FIGURE 1. The Hep-GRP Care pathway

or in-person CGA, and patient satisfaction. Process measures included the total number of geriatric referrals sent and the number of geriatric CGAs completed. Balancing measures included the total cost for the geriatric consultations, and the number of unintended consultations.

Process

All potentially eligible participants referred to the Halifax hepatology clinic between September through to December 2022 and who met the inclusion criteria were initially approached and consented during their hepatology appointment. Eligible participants comprised the intervention cohort, with whom the Hep-GRP care pathway was implemented. Thirty days following their virtual CGA, participants were administered a standardized survey by telephone to reduce recall errors, alongside a three-month telephone follow-up to assess for ED visits and hospitalizations. In-person visits were offered to selected participants when appropriate, during which information was collected on ED and hospital visits.

A historical comparison cohort were randomly selected from a list of patients whose hepatology visits occurred during the COVID-19 pandemic period but prior to September 2022 (March 2020–August 2022). They were matched in 1:1 ratio for age, sex, and Child-Pugh class with the prospective cohort. Clinical information was retrospectively collected from the provincial medical record. Primary clinical outcomes including ED, hospital visits, and mortality were collected up to 90 days from initial hepatologist visits by a full chart review.

Ethical approval was obtained for the two sites from their respective local institutions. As this study was a pilot study, participants were not randomized, and the nature of the intervention prevented blinding.

Data Collection

Patient demographics, their medical history (including a diagnosis of liver cirrhosis), medications, relevant investigations, and Child-Pugh scores were collected from electronic medical records. Health-care encounters including hospitalizations, ED visits, reason for the encounter (e.g., hepatic decompensation), and mortality were collected using medical records. Primary clinical outcomes including ER and hospital visits and patient mortality were prospectively collected up to 90 days from subsequent patient visits and electronic medical records. Secondary outcome data were collected from

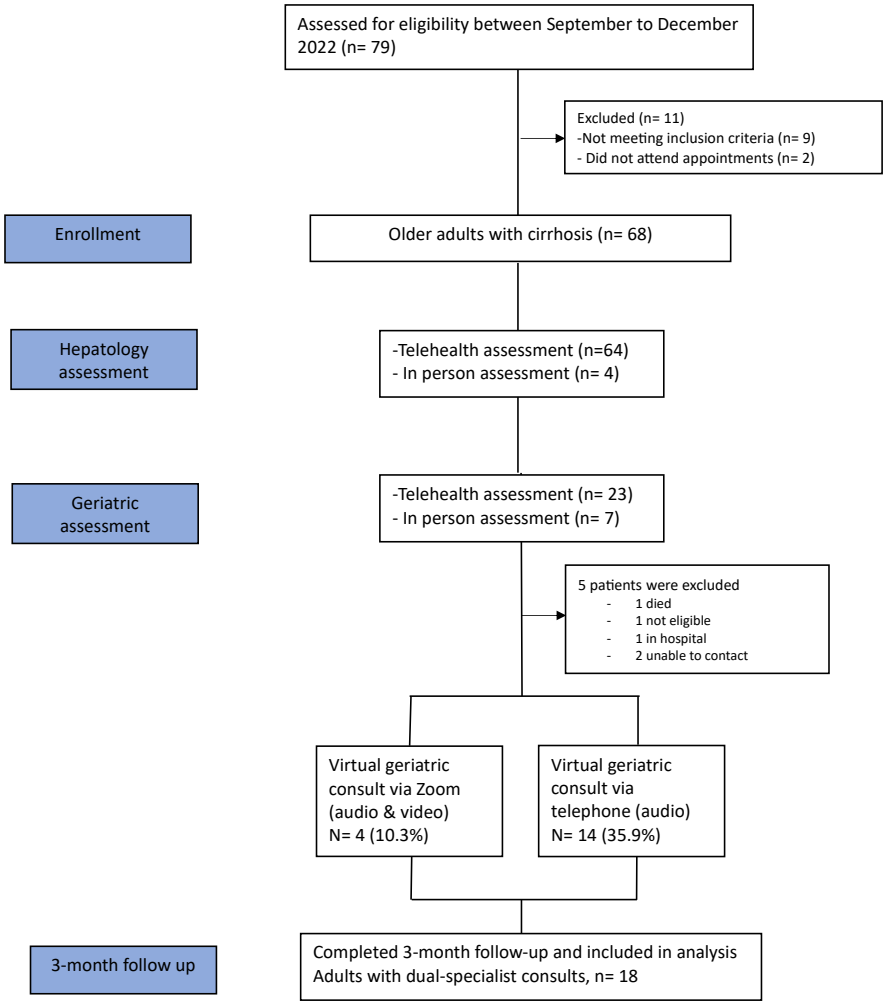

FIGURE 2. STROBE flow diagram

patient responses to a standardized survey, administered by an independent research assistant.

Data Analysis

All data were analyzed using the STATA SE software package version 17.0 (https://www.stata.com/). An initial exploration of the data was performed, followed by descriptive and inferential statistical analysis. Analyses compared intervention vs. historical group in their percentage of ER visits and hospitalizations within 90 days. A two-way chi-squared and Fisher's exact test were performed to compare categorical variables between the male and female sex. Unpaired *t*-tests compared differences in means of continuous variables. All-cause mortality was calculated as crude mortality in the prospective and retrospective populations. A p value $< .05$ was considered to be statistically significant. Multivariate logistic and linear regression analyses were used determine the association between primary outcomes and care delivery models. Although plans were made to account for missing data, upon data analysis, all data were accounted for, so this was not a concern.

RESULTS

Sixty-eight participants were recruited into the intervention group and assessed using Hep-GRP Referral/Care Pathway (Figures 1 & 23). The mean age was 73.9 years (SD= 5.6 yr), 60.3% of them being male (N=41). All participants were either English or English/French bilingual speaking. Most participants had compensated liver cirrhosis (Child-Pugh Class A) from non-alcoholic steatohepatitis cirrhosis followed by alcoholic liver disease (Table 1). Their full demographics are summarized in Table 1. The mean follow-up time was 90 days.

Geriatric and Multidisciplinary Referrals

Among 68 participants assessed, 39 (57.4%) had one or more geriatric syndromes (GS) identified on hepatology screening (Table 1). Only five patients had established geriatric care (7.3%) prior to their hepatology consultation. The most common GS's were related to falls or mobility concerns (53.8%), followed by cognitive issues (46.2%), nutritional risk (10.3%), and frailty (7.7%) (Table 2). Of the 34 participants eligible for geriatric referrals, geriatric referrals were sent for 30 patients, with 23 participants being referred for a virtual CGA assessment and seven for in-person CGA assessments. Four patients declined referral. Physiotherapy and dietary consults were arranged for 34 and seven patients, respectively. Thirty patients had follow-up arrangement with hepatologist or hepatology nurse practitioner.

Participant Waiting Time

The mean wait-time from referral to hepatology consultation was 24.0 days. The mean wait-time from referral to a virtual CGA was 12.8 days vs. 120 days for an in-person CGA within Halifax. The seven patients who were referred for an in-person geriatric assessment, either after their virtual CGA or new referral to geriatrics, were still on the in-person geriatric waiting list at the time of study completion.

Table 1.
Baseline characteristics

	Total Recruitment (N=68)	*Intervention Group (N=18)*	*Historical Comparison Group (N=19)*	*P value*
Age in years (mean ± SD)	74.0 ± 5.6	75 ± 7.2	73.0 ± 6.7	.39
Males (n, %)	41 (60.3)	9 (50.0)	9 (47.3)	.87
Liver Diagnosis				
NASH (n, %)	36 (52.9)	9 (50.0)	11 (57.9)	.63
ALD (n, %)	14 (20.6)	5 (27.8)	1 (5.3)	
NASH & ALD (n, %)	3 (4.4)	2 (11.1)		
PBC (n, %)	4 (5.9)	1 (5.6)	1 (5.3)	
PSC (n, %)	2 (2.9)	1 (5.6)		
Secondary sclerosing cholangitis (n, %)	1 (1.5)			
AIH (n, %)	1 (1.5)			
HCC (n, %)	2 (2.9)			
Cryptogenic (n, %)	1 (1.5)		1 (5.3)	
HCV (n, %)	1 (1.5)		1 (5.3)	
MTX (n, %)	2 (2.9)		3 (15.8)	
Sarcoidosis (n, %)	1 (1.5)			
Child-Pugh Classification **(N, %)**				
A (n, %)	44 (64.7)	10 (55.6)	(57.9)	.89
B (n, %)	16 (23.5)	8 (44.4)	8 (42.1)	.89
C (n, %)	8 (11.8)	0 (0)	0(0)	

Intervention Group with Dual Specialist Consultations

Twenty-three participants were referred for a virtual CGA, with 18 undergoing a virtual CGA. After promoting video-conference as the modality of choice, 14 participants reported a lack of home access to a computer, tablet or smart phone. Four participants underwent simultaneous video and audio consultation via Zoom. Twelve participants had mixed telephone and in-person visits, with the hepatology consult being telephone or Zoom and were waitlisted for in-person geriatric consult. Fifteen patients received outpatient physiotherapy referrals and four received referrals for nutritional education with dietician.

Historical Comparison Group

The historical comparison group was consisted of 19 subjects with mean age of 73.0 years and 47.4% males (N=9) (Table 1). 57.9% had Child Pugh A liver cirrhosis (N=11) and 42.1% (N=8) were of Child-Pugh B status. A total of 21 liver related ED visits occurred in the three-month follow up period, averaging 1.1 ER visit per patient (SD 0.30, 95% CI 0.46–1.75). There were five hospital admissions in the same period.

Health-care Resource Utilization

ED and hospital admissions were evaluated at three months after the participant's initial geriatric telehealth consultation and were compared to the historical group. Of the intervention group that completed virtual dual specialist consultation, no ER visits or hospital admissions occurred in the three-month follow-up period. In comparison to the historic group from March 2020 to May 2022, which consisted of 19 patients selected randomly and matched for age, sex and Child-Pugh classification, the average ED visits per patient were lowered by 1.11 (p = .0006, 95% CI 0.47–1.74), while the average number of hospital admissions per patient was lowered by 0.32 (p = .056, 95% CI -0.08– 0.71) at three months. There was no change in mortality (p = .08, 95% CI -0.02–0.34).

TABLE 2.
Prevalence of geriatric syndrome
and specialist consultation wait-time

Geriatric Syndromes in the Recruitment Cohort	*(n, %)*
Prevalence of at least one Geriatric Syndrome	39 (57.4)
Falls/mobility concerns	21 (53.8)
Cognitive issues	18 (46.2)
Existing geriatric care	5 (7.3)
Nutritional risk	4 (10.3)
Frailty	3 (7.7)
Polypharmacy concerns	2 (5.1)
Dual Specialist telehealth sub-cohort Wait-Time (N=18)	*(Mean days, SD)*
Time to hepatology consult (days) (n =18)	24.0 ± 32.6
Time to virtual geriatric consult (days) (n = 18)	12.8 ± 17.1
Time to in-person geriatric consult (days) (N=7)	120
Dual-Specialist Consult Modality (N= 30)	*(n)*
Telephone	14
In person (geriatric)	12
Video & audio	4

Patient Satisfaction

Sixteen of the 18 participants who completed dual specialist consultation via telehealth provided their opinions of the experience on a standardized survey. All participants were either extremely satisfied (50%) or satisfied (50%) with the audio or visual-audio quality of their appointments, with most participants (62.5%) being extremely satisfied with their overall experience using telehealth. All participants (100%) reported satisfaction (extremely satisfied or satisfied) with the quality of their appointments. Interestingly, 43.8% of the participants preferred telehealth in the future, while 43.8% preferred combination; a small number (12.5%) expressed interests with only in-person visits. No harms were reported or identified during the study.

Cost Analysis

In Canada, one ED visit generated a direct full hospital cost of $304 (CDN) or $229 (USD) in 2019,[24] and an average hospital stay in Nova Scotia cost $7,225 (CND) or $5,555 (USD) in 2022.[25] A reduction in health resource utilization from ED visit and hospitalization translated to a direct cost saving of $7,784 (CDN) per patient. In contrast, the base rates of a virtual CGA or in-person assessment costs were $80 and $166 (CND), respectively.

DISCUSSION

This pilot study confirmed the feasibility of implementing this novel Hep-GRP Care Pathway, which was associated with a high level of satisfaction and acceptability amongst participants. Telemedicine utilizes digital technologies with various software platforms, all of which have been invented within the last decade. There is an ingrained assumption amongst society that the older generation is reluctant to engage in telemedicine, with reasons including low levels of computer literacy, lack of technology skills, and concerns about privacy issues. However, our findings reject this notion and, instead, indicate that the majority of older adults find telemedicine acceptable and non-inferior to traditional types of visits while still meeting their medical expectations. It should be kept in mind that our study was conducted during the later phases of the COVID-19 pandemic, during which time there had been a surge in digital technology use, and thus, older adults may have become more familiar with using technology and telemedicine compared to before the pandemic.

There are many potential advantages offered by this innovative care model. Telemedicine overcomes challenges with transportation, resulting in greater access to health care at decreased costs for patients. From a health-care system

perspective, key findings included the significantly shorter specialist wait-times for the virtual CGAs and decreased acute care utilization. The provision of timely specialist care allows for earlier problem recognition and management which, in addition to improving patient care and outcomes, decrease health-care usage, as evident in the reduced hospital visits and reduced acute health resource utilization observed in our study.

The cognitive changes associated with minor or major neurocognitive disorders, or from secondary causes such as alcoholism, can mimic minimal or covert hepatic encephalopathy (HE), posing diagnostic challenges for the assessor. An early CGA would help ensure patients receive a correct diagnosis and appropriate management. Ensuring a correct diagnosis is particularly important when considering that older adults with cirrhosis with even minimal HE have a lower quality of life than those diagnosed with a mild cognitive impairment (MCI) alone, and those with HE and MCI tended to have the lowest quality of life.[13]

Most studies assessing the perception and acceptance of telemedicine from the participants' perspective were published prior to the COVID-19 pandemic era, and there are currently none, to our knowledge, focused on older adults with liver cirrhosis. Additionally, no studies have directly evaluated the impact telemedicine has for this uniquely vulnerable population on health resource utilization. These striking gaps in current research highlight the significance of our study, and its results.

Our study has several strengths. It is the first study of its kind to evaluate the feasibility and the impact of a dual speciality interdisciplinary referral pathway using well-defined inclusion criteria and virtual screening tools. Its prospective design with longitudinal comparative evaluations of health resource utilization using an age, sex, and Child-Pugh status matched cohort increase its internal validity. The study included older adults who would not otherwise be seen in reasonable time frame during the pandemic by using telemedicine to provide medically complex and frail seniors access to health care who would otherwise not be able to see a medical specialist due to physical distance and other barriers to travel. The assessment of participant satisfaction and acceptability with telemedicine is an important patient outcome, lending support to its generalizability and external validity. Early on during recruitment, we recognized the limitations of using telemedicine alone without in-person physical examinations to detect the presence of ascites and need for bedside paracentesis. Therefore, we specifically did not include participants with a Child-Pugh C status in our telehealth arms alone, as we feel it would be impractical to provide clinical assessment without an in-person assessment first. We also excluded referrals for large clinical ascites from our telemedicine cohort for safety reasons, and thus we continue to advocate for participants with advanced liver disease in Child-Pugh C category to be seen initially in person rather than via a virtual consultation.

The study has several limitations. As a non-randomized pilot study, it is associated with the inherent limitations seen with this study design. A future plan includes conducting a randomized multi-centred trial to allow direct assessment of this intervention. Our study population was comprised of predominantly English-speaking Caucasian individuals, thus limiting the external validity of the study findings to more diverse populations. Expanding the study to include other centres with a more diverse population would help overcome this, in addition to the collection of additional demographic data regarding race/ethnicity. Additionally, virtual CGAs are less comprehensive than in-person CGA and, as a result, these assessments may not have captured all geriatric syndromes present. Finally, as this was a pilot study, the effectiveness and sustainability of this intervention were not formally assessed, but require formal evaluation in future studies, which should include the use of a randomized control study design.

CONCLUSION

Our study sheds new light on the medical complexity faced by health-care providers in how best to manage this special population and provide some clarity by empathizing the unique needs of this vulnerable population. We have shown that this innovative Hep-GRP Care Pathway is feasible and acceptable to older adults with cirrhosis, and provides a multidisciplinary approach for addressing their complex medical and psychosocial needs, which could not be met by a single specialist or organ-specific care alone. However, further evaluation is required. Further research on virtual screening tools in seniors should be developed.

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There are no acknowledgements of note.

CONFLICT OF INTEREST DISCLOSURES

We have read and understood the *Canadian Geriatrics Journal*'s policy on conflicts of interest disclosure and declare the following interests: JZ and FC received a research grant from Pfizer Canada for this study. The rest of the authors have no relevant conflict of interest to declare.

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REFERENCES

1. Cheemerla S, Balakrishnan M. Global epidemiology of chronic liver disease. *Clin Liver Dis*. 2021 May;17(5):365–70.
2. Gil E, Kim JM, Jeon K, Park H, Kang D, Cho J, *et al*. Recipient age and mortality after liver transplantation: a population-based cohort study. *Transplantation*. 2018 Dec;102(12):2025–32.
3. Durand F, Levitsky J, Cauchy F, Gilgenkrantz H, Soubrane O, Francoz C. Age and liver transplantation. *J Hepatol*. 2019 Apr 1; 70(4):745–58.

4. USA Government. Department of Health & Human Services. OPTN/SRTR 2020 Annual Data Report: Liver. Available from: https://srtr.transplant.hrsa.gov/annual_reports/2020/Liver.aspx#LI_dist_adult_waiting_age_b64
5. Carrier P, Debette-Gratien M, Jacques J, Loustaud-Ratti V. Cirrhotic patients and older people. *World J Hepatol*. 2019 Sept 9; 11(9):663–77.
6. CIHI. How Canada compares: impact of COVID-19 on seniors' access to care [infographic]. [Internet]. [cited June 13, 2023.]. Available from: https://www.cihi.ca/en/how-canada-compares-impact-of-covid-19-on-seniors-access-to-care
7. Scalone L, Fagiuoli S, Ciampichini R, Gardini I, Bruno R, Pasulo L, *et al.* The societal burden of chronic liver diseases: results from the COME study. *BMJ Open Gastroenterol*. 2015;2(1):e000025.
8. Desai AP, Mohan P, Nokes B, Sheth D, Knapp S, Boustani M, *et al*. Increasing economic burden in hospitalized patients with cirrhosis: analysis of a national database. *Clin Transl Gastroenterol*. 2019 Jul;10(7):e00062.
9. Shaw J, Beyers L, Bajaj JS. Inadequate practices for hepatic encephalopathy management in the inpatient setting. *J Hosp Med*. 2022 Aug;17(Suppl 1):S8–S16.
10. Ofori-Asenso R, Chin KL, Mazidi M, Zomer E, Ilomaki J, Zullo AR, *et al*. Global incidence of frailty and prefrailty among community-dwelling older adults: a systematic review and meta-analysis. *JAMA Netw Open*. 2019 Aug 2;2(8):e198398.
11. Collard RM, Boter H, Schoevers RA, Oude Voshaar RC. Prevalence of frailty in community-dwelling older persons: a systematic review. *J Am Geriatr Soc*. 2012 Aug;60(8):1487–92.
12. Inouye SK, Studenski S, Tinetti ME, Kuchel GA. Geriatric syndromes: clinical, research, and policy implications of a core geriatric concept. *J Am Geriatr Soc*. 2007 May;55(5):780–91.
13. Bajaj JS, Duarte-Rojo A, Xie JJ, Acharya C, Wade JB, Robles C, *et al*. Minimal hepatic encephalopathy and mild cognitive impairment worsen quality of life in elderly patients with cirrhosis. *Clin Gastroenterol Hepatol*. 2020 Dec 1;18(13):3008-16.
14. Pilotto A, Cella A, Pilotto A, Daragjati J, Veronese N, Musacchio C, *et al*. Three decades of comprehensive geriatric assessment: evidence coming from different healthcare settings and specific clinical conditions. *J Am Med Dir Assoc*. 2017 Feb 1;18(2):192.
15. Rubenstein LZ, Josephson KR, Wieland GD, English PA, Sayre JA, Kane RL. Effectiveness of a geriatric evaluation unit. A randomized clinical trial. *N Engl J Med*. 1984 Dec 27; 311(26):1664–70.
16. Rubenstein LZ, Abrass IB, Kane RL. Improved care for patients on a new geriatric evaluation unit. *J Am Geriatr Soc*. 1981 Nov; 29(11):531–36.
17. Kang E, Lee H, Hong KJ, Yun J, Lee JY, Hong YC. The general public's perspectives on telemedicine during the COVID-19 pandemic in Korea: analysis of a nationwide survey. *Epidemiol Health*. 2022;44:e2022020.
18. Rasmussen B, Perry R, Hickey M, Hua X, Wong ZW, Guy L, *et al*. Patient preferences using telehealth during the COVID-19 pandemic in four Victorian tertiary hospital services. *Intern Med J*. 2022 May;52(5):763–69.
19. Elbaz S, Cinalioglu K, Sekhon K, Gruber J, Rigas C, Bodenstein K, *et al*. A systematic review of telemedicine for older adults with dementia during COVID-19: an alternative to in-person health services? *Front Neurol*. 2021 Dec 14;12:761965.
20. Keller HH, Goy R, Kane SL. Validity and reliability of SCREEN II (Seniors in the community: risk evaluation for eating and nutrition, Version II). *Eur J Clin Nutr*. 2005 Oct;59(10):1149–57.
21. Alberta Health Services. Virtual Cognitive /Perceptual Assessment: Occupational Therapy Practice Guidance. Published June 24, 2020. Available from: https://www.strokenetworkseo.ca/sites/default/files/files/virtual_cognitive_perceptual_assessment_ot_guide.pdf
22. Ogrinc GD, Davies, L, Goodman D, Batalden PB, Davidoff F, Stevens D. SQUIRE 2.0—Standards for QUality Improvement Reporting Excellence: revised publication guidelines from a detailed consensus process. *BMJ Quality and Safety* [Internet]. 2016 Dec; 25(12):986–92. Available from: https://pubmed.ncbi.nlm.nih.gov/26369893/
23. Schulz KF, Altman DG,, Moher D. CONSORT 2010 Statement: updated guidelines for reporting parallel group randomised trials. *Ann Intern Med* [Internet]. 2010;152(11):726–32. Available from: https://www.equator-network.org/reporting-guidelines/consort/
24. CIHI. Hospital spending: focus on the emergency department 2020. 2020. Available from: https://www.cihi.ca/sites/default/files/document/hospital-spending-highlights-2020-en.pdf
25. CIHI. Cost of a standard hospital stay 2023. 2023. Available from: https://www.cihi.ca/en/indicators/cost-of-a-standard-hospital-stay

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APPENDIX A. Geriatric Assessment Form

GERIATRIC ASSESSMENT

Patient Name:

Patient Address: **Phone:**

Referring Physician/Source fax: **Phone:**

Primary Caregiver/NOK: **Phone:**

Referral Date: **Assessment date:**

Collateral history obtained from: **Contact phone number:**

Date collateral history obtained:

Reason for Referral:

Cognitive impairment / dementia ☐ (previous cognitive testing results =)

Falls / declining mobility: ☐

Malnutrition / weight loss: ☐

Using BZD / anti-depressants / morphine: ☐

HISTORY OF CURRENT PROBLEMS:

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STUDY: Interdisciplinary Telehealth Consultations to Improve Outcomes among Canadian Older Adults with Liver Cirrhosis
ETHICS ID:

GERIATRIC SYNDROMES:

☐ Cognitive changes

Onset & Course of Cognitive Deficits:

☐ **Learning & Memory**	
☐ **Language**	
☐ **Perceptual-motor function**	
☐ **Complex attention**	
☐ **Executive Function**	
☐ **Social cognition**	

BSPD:

Behavior: ☐ Agitation ☐ Aggression ☐ Impulsive ☐ Resistance to Care ☐ Vocalizations ☐ Withdrawn ☐ Hoarding ☐ Wandering ☐ Disinhibition ☐ Abnormal Sleep Cycle ☐ Personality change

Thought Process: ☐ Hallucinations ☐ Paranoia ☐ Delusional ☐ Suicidal Thoughts ☐ Thoughts of harming Others

Substance Abuse:_____

Comments:

☐ MOOD CHANGES

STUDY: Interdisciplinary Telehealth Consultations to Improve Outcomes among Canadian Older Adults with Liver Cirrhosis
ETHICS ID:

☐ Depressed ☐ Angry ☐ Anxious ☐ Euphoric ☐ Flat ☐ Withdrawn ☐ Lonely

Comments

☐ **FALLS / DECLINING MOBILITY**

☐ **NUTRITION / WEIGHT LOSS**

☐ **POLYPHARMACY**

☐ **BOWEL OR BLADDER INCONTINENCE**

☐ **SLEEP**

☐ **SENSORY (VISION AND/OR HEARING)**

☐ **CAREGIVER ISSUES (ALSO SEE SOCIAL HISTORY)**

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ETHICS ID:

PAST MEDICAL +/- SURGICAL HISTORY

MEDICAL & SURGICAL HISTORY	CURRENT MEDICATIONS	DOSING (Dose, frequency)

ADDITIONAL INFORMATION:

Drug Allergies: **Reaction:**

Medications Administered By:

Medications: ☐ Blisterpack ☐ Vials ☐ Dosette ☐ Lockbox ☐ Other _____

Pharmacy Name & Phone Number:

Family History:

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SOCIAL HISTORY:

Primary language: **Other languages:**

Highest level of education: **Career:**

Home/Living with: **Home Environment (house, condo, etc.):**

Married?: **Family (yes/no; who):**

Primary supports: **Formal Supports (e.g. homecare):**

ETOH history (include amount): Yes ☐ No ☐

Current drinker ☐ (drinks/day; type:)

Ex-smoker ☐ (stopped years ago; drinks a day for years; type:)

Smoking history (include pack year history): Yes ☐ No ☐

Current smoker ☐ (packs/day for years) Ex-smoker ☐ (stopped years ago; pack/ year history)

Recreational drug history (type, duration, frequency): Yes ☐ No ☐

Drugs: Duration: Frequency:

Has legal decision-making documents (Yes / No; if yes, what type)?: Yes ☐ No ☐

Type:

Other comments:

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FUNCTIONAL HISTORY:

0 Independent 1 Independent with Special Devices 2 Able to manage with assistance to set up 3 Able to manage with some assistance; patient participates 4 Unable to manage; needs constant assistance of 1 5 Unable to manage; needs constant assistance of 2 (circle appropriate score)							**Additional information**	**Assisted By?**
Dressing	0	1	2	3	4	5		
Washing/Grooming	0	1	2	3	4	5		
Bathing	0	1	2	3	4	5		
Feeding	0	1	2	3	4	5		
Toileting	0	1	2	3	4	5		
Transfers	0	1	2	3	4	5		
Ambulation	0	1	2	3	4	5		
Meals/Cooking	0	1	2	3	4	5		
Shopping	0	1	2	3	4	5		
Housekeeping/Laundry	0	1	2	3	4	5		
Use of Phone	0	1	2	3	4	5		
Yard Work	0	1	2	3	4	5		
Driving	0	1	2	3	4	5		
Finances	0	1	2	3	4	5		
Medication	0	1	2	3	4	5		

Safety Issues (fires, wandering, inappropriate clothing, weapons, driving):

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PHYSICAL EXAMINATION:

Appearance:

Chronological physiological age.

Alert? Yes ☐ No ☐ **Orientated?** Time ☐ Place ☐ Person ☐

Attentive? Yes ☐ No ☐

Eye contact: **Affect:** **Mood:**

Speech (content, fluency, rate, tone):

Thought processes:

Thought disorders present? Yes ☐ No ☐

Behaviour:

Perceptual disturbances present? Yes ☐ No ☐

Insight and judgement (intact, impaired, etc.):

Other comments:

General Appearance:	
Head and Neck Exam:	***Glasses:*** Yes ☐ No ☐ ***Hearing aids:*** Yes ☐ No ☐ ***Facial asymmetry:*** Yes ☐ No ☐ ***Facial movements intact?*** Yes ☐ No ☐ (If no, describe below) ***Active ROM of neck (if impaired, describe below):*** Intact ☐ Impaired ☐ ***Able to shrug shoulders bilaterally:*** Bilaterally ☐ Unilateral - right ☐ Unilateral - left ☐ Unable to bilaterally ☐

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Extremity examination	***Appearance of right upper extremity:*** ***Appearance of Left upper extremity:*** ***Appearance of Left lower extremity:*** ***Appearance of right lower extremity:*** ***Deformity present? (Yes/no; if yes, describe below):*** Yes ☐ No ☐
Foot wear	***Type of footwear***: ***Type of sole:*** ***Use of orthotics? (Yes / no, if yes, describe):*** Yes ☐ No ☐
Foot	**Left foot:** ***Appearance:*** ***Deformity present? (Yes/no; if yes, describe):*** Yes ☐ No ☐ ***Skin changes? (Yes/no; if yes, describe):*** Yes ☐ No ☐ ***Comments:*** **Right foot:** ***Appearance:*** ***Deformity present? (Yes/no; if yes, describe):*** Yes ☐ No ☐ ***Skin changes? (Yes/no; if yes, describe):*** Yes ☐ No ☐ *b*

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Musculoskeletal:	***Active ROM of left shoulder:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of left elbow***: Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of left wrist:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of left hand***: Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of left hip:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of left knee:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of left foot:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right shoulder:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right elbow:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right wrist:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right hand:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right hip:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right knee:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of right foot:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of back:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Active ROM of neck:*** Full ☐ Decreased ☐ None ☐ (if decreased / none, explain) ***Comments***

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Neurological exam:	***EOM:*** ***Normal:*** Yes ☐ No ☐ ***Restricted (if yes, describe below):*** Yes ☐ No ☐ ***Confrontational testing (get pt to look at the centre of the computer screen):*** ***Normal:*** Yes ☐ No ☐ *Abnormal (describe below):* Yes ☐ No ☐ ***Visual Acuity (using electronic Snellen chart):*** Right: _____/____ Left ____/____ ***Muscle Bulk:*** ***Normal:*** Yes ☐ No ☐ *If abnormal, describe:* ***Pronator Drift (if yes, describe below):*** Yes ☐ No ☐ ***Observed weakness of face or upper / lower extremeties:*** ***Coordination (Heel to shin test, hand clenching):*** ***HST:*** Normal ☐ abnormal ☐ ***Hand clenching:*** Normal ☐ Abnormal ☐ ***Other:***
Gait	***General stance:*** Normal ☐ Full ☐ Decreased ☐ Broad ☐ None ☐ ***Stance with feet together:*** Normal ☐ Mild sway ☐ Severe sway ☐ Unable to ☐ ***Comments:*** ***Gait using mobility aid where needed (base stance, stride length, limb movements, arm sway, stance):***
Mobility aids?	***Used a mobility aid***? Yes ☐ No ☐ ***If yes, what type of aid was used?*** Single pronged cane ☐ Quad cane ☐ 2-wheeled walker ☐ 4-wheeled walker ☐ Manual wheelchair ☐ Electric wheelchair ☐ Electric scooter ☐

Comments

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TOOLS

1. SLUMS/MOCA:

Previous Score:_____ Date:_____

Scores:	Orientation:	/10	Recall:	/3
	Registration:	/3	Language:	/9
	Attention & Calculation:	/5	TOTAL	/30
	Adjusted Score:	_____/30	_____	

Comments:

2. 30 SECOND SIT TO STAND TEST

Number =

Comments:

3. SCREEN-8 SCORE

Comments:

SUMMARY:

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PROBLEM LIST/PLAN:

	PROBLEM	PLAN
1		
2		
3		
4		
5		
6		