Management of alcohol use disorder in cirrhosis: effect of a clinician-targeted alcohol use disorder in cirrhosis educational intervention on knowledge, attitudes, and practice habits

by

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ABSTRACT

Introduction: Alcohol use disorder (AUD) is a common cause of liver cirrhosis. Low knowledge and comfort managing AUD among well-intentioned clinicians impacts the number of patients with cirrhosis who receive AUD treatment. Structured education focused on screening, brief intervention, referral to treatment, and prescription of pharmacotherapy for relapse prevention are proposed as key skills for clinicians caring for this patient population, but no studies to date have developed and evaluated the effect of education that employs these components. Additionally, no studies have reported on Self Determination Theory, a theory about human motivation, in the context of a clinician educational intervention about AUD in cirrhosis.

Objectives: The purpose of this study was to systematically develop and assess the effect of an AUD in cirrhosis educational intervention on clinicians' knowledge, attitudes, and practice habits (preparedness, comfort, intention). Additionally, we wanted to assess participants perception of the learning environment using satisfaction of three basic psychological needs (autonomy, competence, and relatedness) as identified by Self Determination Theory.

Methods: Kern's 6-step Framework for Curriculum Development was used for development of the 1.5-hour virtually delivered educational intervention. Based on a qualitative descriptive method, clinicians participated in one-on-one interviews about their experiences and perceived barriers to caring for patients with concomitant cirrhosis and AUD. Development of education objectives and implementation of a pilot educational intervention followed a literature search and interview findings. The pilot session was didactic, and the adapted session adopted a flipped classroom strategy including a 30-minute video, case-based discussion, breakout sessions, and

question and answer. Participants completed questionnaires at baseline, immediately following the intervention (pilot), and four weeks following the intervention (adapted sessions).

Data analysis: A team of two coders analyzed transcripts from qualitative interviews using a deductive approach. Participant demographics were analyzed descriptively. Comfort, knowledge, and attitudinal measures were analyzed using a paired t-test after testing for normality. Self-determination theory measures were analyzed descriptively. Effect sizes were analyzed using Cohen's d.

Results: 16 clinicians completed the one-on-one interviews. Four themes emerged related to previous experienced and perceived barriers to caring for patients with AUD and cirrhosis: (*i) Practicing within knowledge constraints, (ii) Navigating limited resources and systems challenges, (iii) Balancing complexity of cirrhosis and AUD*, and (iv) *Acknowledging the influence of provider perceptions on care.* 86 clinicians participated in the pilot sessions and 38 consented and completed pre-post questionnaires (44.2%). Participants reported significant improvements in preparedness and intention to screen, provide a brief intervention, refer patients to treatment and prescribe pharmacotherapy for relapse prevention. Minor changes in attitudinal measures included the domains of role adequacy and motivation. Relatedness was the lowest domain (2.73/5), followed by competence (4.10/5), and autonomy (4.31/5).

229 clinicians participated and 95 (30-36 per session) consented and completed pre-post questionnaires (41.5%) in the adapted sessions. Preparedness to diagnose (pretest M=2.56, posttest M=3.47, $p<0.011$) and manage (pretest M=2.32, posttest M=3.26, $p<0.001$) alcohol

withdrawal significantly improved after exposure to the adapted session. Preparedness to screen and identify alcohol use (pretest M=3.17, posttest M=3.93, p=0.001), provide medical advice (pretest M=2.50, posttest M=3.33, p<0.001), and refer patients to treatment (pretest M=2.80, posttest M=3.67, p<0.001) significantly improved following participation in the adapted session. Intention to provide a brief intervention improved significantly from baseline (pretest M=5.00, posttest M=5.4, p=0.010). Comfort prescribing acamprosate (p<0.001), baclofen (p=0.032), and gabapentin (p<0.001) significantly improved from baseline despite non-significant improvement in intention to prescribe pharmacotherapy for relapse prevention. Significant improvements occurred in 4/5 attitudinal domains: role adequacy, role legitimacy, role support, and work satisfaction.

Conclusions: The 1.5-hour virtually delivered educational intervention had a positive effect on self-reported knowledge, attitudes, and practice habits. Adopting Kern's curriculum, involving clinicians from the outset, maximizing interactivity, and assessing how interventions meet the needs of learners appear to be key components in facilitating improvements in practice habits, knowledge, and attitudes. The findings from this study warrant further investigation using administrative data to evaluate actual versus perceived changes in practice habits. Future studies should continue to work with clinicians and continuing clinician professional development bodies to create medical education focused on AUD and cirrhosis.

PREFACE

This thesis is an original work by Emily Johnson. The research project(s) of which this thesis is a part, received research ethics approval from the Health Research Ethics Board – Health Panel at the University of Alberta. Project name "Cirrhosis Care Alberta: A Baseline Assessment of Provider Practices", No. Pro00094054, September 24, 2019.

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DEDICATION

In memory of my mother, Colleen J. Johnson, who inspired me with her unconditional love of education and service to mankind. And to my family and friends, thank you for the joy, love, understanding, and unwavering support that has sustained me through all my endeavors.

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CHAPTER 1: INTRODUCTION

1. Brief Introduction

Alcohol is a leading cause of morbidity and mortality, contributing to over 200 health conditions[1]. One of these conditions is Alcohol Use Disorder (AUD). AUD is a brain disease resulting from the hazardous consumption of alcohol and occurs in 20% of people who consume alcohol[1]. AUD is characterized by unhealthy alcohol use despite negative consequences including cravings, acute and chronic illness, and socioeconomic disparity[2]. For perspective, approximately two-thirds of those experiencing houselessness cited alcohol as the primary reason[3, 4]. Further, pathological changes affect almost every organ, with the highest alcohol-attributable deaths resulting from liver disease[5]. Treatment advances for AUD have led to increased rates of abstinence and reduction in relapse[6, 7]. However, less than 20% of people with AUD are connected to treatment in the form of behavioural therapy and pharmacotherapy for relapse prevention[8], even less among people living with cirrhosis (1%)[9]. It's clear that resources are needed to improve clinicians' provision of supports to treat AUD in their patients with cirrhosis.

Recent clinical practice guidelines from leading liver organizations like the European Association for the Study of the Liver (EASL) and the American Association for the Study of Liver Diseases (AASLD) have been released. Guidelines suggest intervening to address not only the symptoms of liver disease, but also to address the root cause – AUD. Unfortunately, there is a paucity of data available for treating AUD using behavioural and/or pharmacotherapy among individuals with cirrhosis. Given the clinical complexity and acuity of many of these patients, well-intentioned clinicians lack comfort implementing these treatments and thereby may be less likely to use them[10, 11]. There are few research works that have attempted to alleviate this gap

using clinician targeted educational interventions specific to concomitant AUD and cirrhosis, with some studies focused solely on screening[12] or brief intervention[13] and others focused on AUD management in patients without cirrhosis[14] targeted towards primary care providers (PCP)[15, 16] and nursing staff[17-19]. Overall, more research is required to determine the effectiveness of educational interventions on clinicians' practices related to caring for people living with AUD and cirrhosis.

1.1. Problem Statement and Purpose of the Thesis

The proposed study seeks to advance the care of people with concomitant cirrhosis and AUD by testing the effect of an educational intervention for clinicians who care for this patient population. There is limited evidence about the effects of specific educational interventions, with some research focused on individual practice components such as screening, brief intervention, or prescription of pharmacotherapy, and others focused on individual specialties (i.e., hepatology, primary care) as opposed to a more broad educational approach for every clinician involved in the circle of care. Further, existing studies have not described the development of the curriculum and how it met the needs of its learners. The research reported in this thesis addressed these gaps by using a framework for curriculum development that includes a mixed group of end-user clinicians from the outset and a validated motivational theory to assess how the intervention meets the needs of its target audience. The proposed thesis is a three-part, multi-method study evaluating a single group pretest-posttest intervention study of an educational curriculum focused on managing AUD in people living with cirrhosis. The overall purpose of this body of work is to evaluate the effect of a virtual one-and-a-half-hour educational intervention on clinicians' knowledge, practice habits (comfort, preparedness, intention), and attitudes towards people living with concomitant cirrhosis and AUD.

1.2. Objectives

Qualitative component (Chapter 3): To understand the potential educational needs of clinicians who care for people living with concomitant AUD and cirrhosis, as assessed by: (i) clinicians' perceptions of people with AUD and cirrhosis, and (ii) clinicians' experiences and perceived barriers to caring for people with AUD and cirrhosis.

Quantitative component (Chapter 4): To determine the effect of a brief educational intervention about AUD management in people with cirrhosis on clinicians' practice habits, as evaluated using:

- A questionnaire composed of previously published items that evaluate the post training effect on intention, preparedness, comfort, and knowledge
- The validated Short Alcohol and Alcohol Problems Perceptions Questionnaire (SAAPPQ) that assesses attitudes towards AUD using change in total score and domain scores.

Secondary Objectives:

- To report on the use of Kern's Framework for curriculum development in developing a clinician-targeted educational intervention about AUD in cirrhosis.
- Determine how the educational intervention met the needs of learners by assessing the post training satisfaction of three basic psychological needs (autonomy, competence, relatedness) as defined by Self Determination Theory (SDT).

1.3. Hypothesis

Primary Hypothesis: The virtual one-and-a-half-hour educational intervention will positively impact the knowledge, attitudes, and practice habits of clinicians' who care for people living with concomitant cirrhosis and AUD.

Secondary Hypothesis: Kern's 6-step method for curriculum development will serve as an effective framework for developing a clinician targeted educational intervention about managing AUD in cirrhosis. Additionally, the virtual one-and-a-half-hour education intervention will meet the basic psychological needs of its learners with higher post training effects observed among those participants who report greater autonomy, competence, and relatedness.

CHAPTER 2: LITERATURE REVIEW

2. Alcohol

Alcohol, also known as ethanol or ethyl alcohol, is a sedative-hypnotic created by the fermentation of sugars in different foods[20]. Alcohol is the most consumed psychoactive substance across the world. At low doses it acts as a stimulant, causing feelings of euphoria and chattiness[21]. At higher doses it causes drowsiness, slurred speech, and even coma and death[21].

Alcohol influences every organ in the body, with effects ranging depending on blood alcohol concentration (BAC), a measure of ethanol (in grams) in the blood stream or breath[22]. BAC depends on factors including strength of alcohol, rate of consumption, gender, body type, age, and liver health[22]. Although many organs are affected by alcohol consumption, the liver sustains significant effects because it metabolizes 90% of alcohol consumed by healthy individuals[23]. On average, a healthy liver metabolizes one standard drink (~13.6 grams of alcohol in Canada) per hour[23]. The brain is another organ significantly impacted by alcohol. Effects such as an impaired ability to think, mood changes, and difficulty coordinating movements, can be felt within 5-10 minutes of drinking alcohol[24]. Neurochemical changes also occur, including stimulation of dopamine and endorphin release which produce feelings of pleasure, satisfaction, and analgesia[24]. Prolonged and heavy consumption of alcohol can cause an overload of dopamine and other neurochemicals which alters natural pathways in the brain[25]. Continued consumption can result in permanent changes to the brain that may reduce impulse control and decision making, and lead to intense cravings[26].

2.1. A summary of alcohol as a public health problem

This intense biological process, the high prevalence of alcohol use in the general population, and a culture of consumption have all contributed to a significant public health problem[5]. Globally,

more than 2 billion people consume alcohol[5]. Disability adjusted life years (DALYs), which attempt to quantify the years of life lost due to poor health[27] estimate that 134 million DALYs were lost due to alcohol use in the last year alone[28]. This is dwarfed only by anxiety and depressive disorders, the two most common mental health conditions across the globe[29, 30]. In Canada, the prevalence of alcohol consumption has risen in the last decade[31], with amount and frequency increasing exponentially since the onset of the COVID-19 pandemic[32, 33]. Excluding the Canadian territories, Alberta has the second highest adult prevalence rate of self-reported alcohol consumption at least once in the last year, at 78.8%[31].

Alcohol is a significant factor in poor health. Individuals who consume alcohol outside of recommended limits are two times more likely to have comorbidities such as HIV/AIDS, hepatitis B/C, and cirrhosis[34]. Alcohol use is also an important risk for accidents, suicide, and socioeconomic inequities[35]. Approximately two-thirds of those experiencing houselessness cite alcohol as the primary reason[3, 4]. Joblessness is also more common among people who consume alcohol, especially for those who consume above recommended limits[36].

Beyond individual burden, alcohol bestows an enormous burden on economic and health care systems, costing Canadians around $46 billion each year[37]. These costs are attributed to lost productivity, enforcement, and operations of the health care system[37]. While data are lacking for Canada, spending related to alcohol consumption in the United States is estimated to be more than 1% of the gross national product, which extrapolates to a financial burden of ~$1.90 for every alcoholic beverage consumed[38].

Because of these systemic impacts and the risks for individuals, public health authorities are working to reduce the population burden of alcohol consumption. Several targets have been identified for public health intervention including prevention and policy development[39]. Such interventions include taxation[40], increasing the standard unit price of alcohol[41], restricting the sale of alcohol during certain hours, and creating awareness about Canada's Low Risk Alcohol Drinking Guidelines[42]. These guidelines were created to promote a healthy lifestyle and culture of moderation and include specifications for what amount constitutes a standard drink, when it is not safe to consume alcohol, and other tips for reducing negative consequences of alcohol consumption[43].

2.2. What is alcohol use disorder: definitions and risk factors

As hazardous alcohol use and binge drinking patterns progress, individuals may become unable to control or stop alcohol consumption, leading to a condition called alcohol use disorder (AUD). AUD is a brain disease characterized by unhealthy alcohol use despite adverse social, occupational, and/or health consequences[2]. Globally, around 107 million people have AUD, with estimates ranging from 0.5% - 5% across countries[44]. Prevalence of AUD across Canada varies, with conservative estimates at 1.1% of the population to over 18% in other reports[44, 45]. Over 3 million global deaths each year are directly related to alcohol, of which two-thirds are the result of AUD[46]. This number may be much higher, but factors such as stigma, access to healthcare, and improper reporting can prevent individuals from being diagnosed.

Binge drinking and heavy alcohol use are two hazardous patterns of alcohol consumption that put individuals at risk of developing AUD[1]. Binge drinking is defined as a pattern of drinking resulting in a BAC of ≥0.08 g/dL (0.08%). The National Institute on Alcohol Abuse and

Alcoholism (NIAAA) roughly equate this to ≥5 alcohol containing beverages in ~2 hours for males and ≥4 for females[1]. Other organizations differ on their definition of binge drinking (see Table 1)[1]. Heavy drinking is another problematic pattern of alcohol consumption, defined as >4 drinks per day or >14 per week for males and >3 per day or >7 per week for females[1]. The Substance Abuse and Mental Health Services Administration (SAMHSA) defines heavy drinking as binge drinking on ≥5 days in the past month[1].

Table 1. Definitions of hazardous drinking patterns

	NIAAA	SAMHSA	CCSA
Binge Drinking	Pattern of drinking that brings blood alcohol concentration (BAC) to 0.08% (0.08 g/dL) or greater. Males ▪ ≥5 drinks in ~2 hours Females ▪ ≥4 drinks in ~2 hours	Males ▪ ≥5 drinks on one occasion (at the same time or within a couple hours) on at least one day in the past month Females ▪ ≥4 on one occasion on at least one day in the past month	
Heavy Alcohol Use	Males ▪ >4 on any day ▪ >14 per week Females ▪ >3 on any day ▪ >7 per week	Binge drinking (as defined above) on ≥5 days in the past month	Males ▪ ≥5 drinks on one occasion, at least once a month in the past year Females ▪ ≥4 drinks on one occasion, at least once a month in the past year

* 1 drink = 13.6 grams of pure ethanol[43]

The number of individuals who exceed drinking guidelines and engage in binge drinking and heavy alcohol use is rising drastically, due in part to the COVID-19 pandemic; several reasons

have been cited included boredom, stress, convenience, and loneliness[47]. Additional factors may also play a role in making individuals more susceptible to developing AUD, including:

- Family history of AUD[48]
- Psychiatric comorbidities[49]
    - Other substance use disorders
- Adverse Childhood Experiences[50]
- Trauma[50]
- Female sex[51]
- Underage drinking[52]

AUD is diagnosed by a clinician (medical doctor or nurse practitioner) based on 11 possible symptoms outlined in the Diagnostic and Statistical Manual of Mental Disorders fifth edition (DSM-5) (Table 2)[2]. A minimum of two symptoms must be exhibited over the past 12 months, such as craving, tolerance, and social and occupational problems. Of note, the DSM-5 was released in May 2013 and differs slightly in its diagnostic criteria from its predecessor. The DSM-IV describes alcohol abuse (criteria 1-4 in DSM-5) and alcohol dependence (criteria 5-11 in DSM-5) which are now combined under one condition (AUD) that ranges in severity from mild (2-3 criteria), moderate (4-5 criteria), and severe (6+ symptoms). Increasing severity of AUD indicates a more urgent need for assessment and treatment.

Table 2. DSM-5 criteria for AUD

In the past year, have you:
Had times when you ended up drinking more, or longer, than you intended?
More than once wanted to cut down or stop drinking, or tried to, but couldn't?
Spent a lot of time drinking? Or being sick or getting over other aftereffects?
Wanted a drink so badly you couldn't think of anything else?
Found that drinking—or being sick from drinking—often interfered with taking care of your home or family? Or caused job troubles? Or school problems?
Continued to drink even though it was causing trouble with your family or friends?
Given up or cut back on activities that were important or interesting to you, or gave you pleasure, in order to drink?
More than once gotten into situations while or after drinking that increased your chances of getting hurt (such as driving, swimming, using machinery, walking in a dangerous area, or having unsafe sex)?
Continued to drink even though it was making you feel depressed or anxious or adding to another health problem? Or after having had a memory blackout?
Had to drink much more than you once did to get the effect you want? Or found that your usual number of drinks had much less effect than before?
Found that when the effects of alcohol were wearing off, you had withdrawal symptoms, such as trouble sleeping, shakiness, restlessness, nausea, sweating, a racing heart, or a seizure? Or sensed things that were not there?

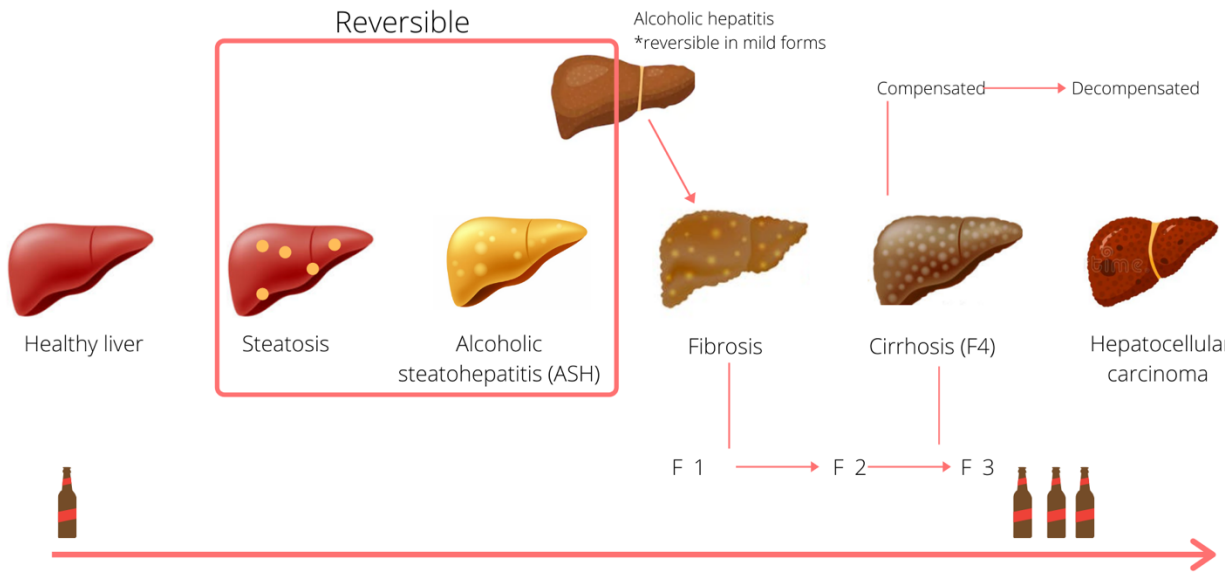
*Mild: 2-3 symptoms; Moderate: 4-5 symptoms; Severe: 6+ symptoms

2.3. Alcohol-related liver injury leading to cirrhosis

One of the most significant clinical consequences of AUD is alcohol related cirrhosis[38]. Individuals with excessive and prolonged alcohol intake may begin to develop alcohol associated liver disease[53]. This includes a range of liver disease entities, starting with steatosis, a condition characterized by excess fat deposits in hepatic cells[53]. It is estimated that around 80% of heavy alcohol consumers (>30g of alcohol/day) have steatosis[54]. Though this pathology is reversible if individuals are abstinent from alcohol for 4-6 weeks, it remains largely asymptomatic, presenting with elevated liver enzymes done on routine testing or with an ultrasound finding of fatty liver[54]. Continued alcohol consumption and hepatic destruction leads to a condition known as alcohol-related steatohepatitis (ASH); distinguished by hardening and inflammation of hepatic cells[55]. An acute condition, known as alcohol-related hepatitis, can also occur. This syndrome is associated

with heavy, prolonged alcohol use and is characterized by rapid onset jaundice (<3 months), liver failure, and systemic inflammation[56]. Further progression of the disease state leads to various stages of fibrosis (F1-F3) and then, the end stage of cirrhosis (F4)[57]. This disease sequelae are illustrated in the following figure.

Figure 1. Liver damage progression due to alcohol consumption



More than 50% of cirrhosis cases are the result of alcohol associated liver disease[58], and it is currently the fifth leading cause of death and eighth leading disease in economic costs in the western world[58]. Cirrhosis is characterized by extensive fibrosis and irreversible changes in liver structure, function, and vasculature[59]. There are two categories of cirrhosis: compensated and decompensated[59]. Decompensated cirrhosis refers to the disease state with any one of the following complications: ascites, hepatic encephalopathy (HE), and variceal bleeding[60]. Compensated cirrhosis is characterized by the existence of liver damage in the absence of these complications[61].

For individuals in early stages of liver disease, alcohol consumption can increase the risk of developing cirrhosis. A study by Toshikuni (2014) and colleagues found that the five-year risk of patients with steatohepatitis and steatosis developing cirrhosis were 16.9% and 6.9%, respectively[62]. Both are considered reversible, which highlights the importance of early identification and treatment to avoid disease progression. For individuals with established cirrhosis, continued consumption can increase the likelihood of decompensating and experiencing life threatening complications like gastrointestinal bleeding, HE, and ascites[63, 64]. Many people live in the compensated state, but the risk for decompensation can be accelerated with alcohol consumption[61].

Abstinence from alcohol reduces the risk of developing cirrhosis and preventing decompensation in those with compensated cirrhosis. A study by Gianni and colleagues showed that individuals with AUD and no evident liver damage experienced improved liver elasticity after 4 weeks of abstinence[65]. For individuals with alcohol-associated steatosis, total abstinence resolved the condition[66]. A study by Wei et al found that abstinence improved survival in patients with alcohol associated cirrhosis, with best results after 1.5 years of abstinence[67]. Intervening at any stage – AUD or early stages of liver disease – could improve outcomes and reduce the likelihood of developing alcohol related cirrhosis.

Due to binge drinking patterns and other social factors, alcohol related cirrhosis is becoming increasingly common in younger people[68]. A study by Flemming and colleagues (2019) found that overall risk has increased drastically, with those born in 1990 at twice the risk of developing

cirrhosis than those twenty years prior[61]. Cirrhosis related mortality for individuals in this age group has also increased more than 300% in the last decade, with alcohol related liver disease being one the main causes[61].

2.4. Treatment of Alcohol Use Disorder in People Living with Cirrhosis

For people with cirrhosis, abstinence from alcohol is the therapeutic goal. Refraining from alcohol has been shown to reduce liver fibrosis and reduce the risk of developing hepatocellular carcinoma, a type of liver cancer that is common in individuals with cirrhosis[65]. People who have cirrhosis and are actively drinking are at increased risk of hospitalization, due to many factors including complications of hepatic decompensation. As recommended by guidelines, treatment for individuals living with cirrhosis should incorporate AUD management[11], beginning with routine screening with a validated tool followed by appropriate diagnosis and connection to treatment.

2.4.1. Screening

Screening is key to identifying hazardous drinking patterns and AUD. Because liver disease typically presents symptomatically in its more severe and irreversible state, it is important that hazardous drinking patterns and AUD are identified early[64, 65, 69]. Routine interactions with the healthcare system, such as visits with primary care providers (PCPs) present opportunities for AUD screening. Recent work by Askgaard et al found that over half of patients with alcohol-related cirrhosis had interactions with the healthcare system before their diagnosis, which highlights a crucial gap in the clinical management of AUD[70]. For individuals attached to a liver specialist, many were asked about their alcohol use, though less than half of providers reported using a validated screening measure; instead relying on collateral history and patient report[10]. Frequent alcohol screening is useful for all patients; but guidelines recommended that all patients

'receiving care in primary care and gastroenterology/hepatology outpatient clinics, emergency departments, and inpatient admissions' be routinely screened using validated measures[71]. These tools have been shown to help identify heavy alcohol users[72], assist in early diagnosis of alcohol-associated liver disease[73], and improve detection and prediction of long term consequences for other alcohol associated conditions[74]. For patients admitted with alcohol-related liver disease, screening and identifying AUD before discharge reduces the risk of 30-day readmission[75].

The gold standard for validated screening tools is the ten-item Alcohol Use Disorder Identification Test (AUDIT-10)[76]. The first three questions on the AUDIT-10 have been developed into another screening measure called the AUDIT-Concise (AUDIT-C)[77], which is limited in its ability to provide information about more severe forms of AUD[71]. The NIAAA has recommended using the first question of the AUDIT-C, 'how many times in the last X have you had >5 for men or >4 for women drinks per day,' with X being any specified time[78]. An answer ≥ 1 indicates the AUDIT-C should be administered[78]. The quick delivery of this question and comparable sensitivity (74% versus 84%) and specificity to the AUDIT-C (81% versus 78%) for identifying AUD make it ideal for deployment in busy healthcare environments[78]. These and other screening tools can be found in Table 3.

Table 3. Screening and identification measures for AUD

Measure	Description
NIAAA one question: "How many times in the past X have you had >5 and >4 for men and women respectively, drinks in one day?"	○ Provides basis for conducting AUDIT-C for practitioners who are unsure ○ Begins the conversation of alcohol consumption in a simplistic and objective manner ○ Specificity and sensitivity to identifying AUD is similar to AUDIT-C ○ If answer is at least once, continue with the AUDIT-C

AUDIT-10	○ 10-item questionnaire ○ Good specificity and sensitivity for identifying AUD ○ Greater number and breadth of questions make it more effective at detecting moderate/severe AUD
AUDIT-C	○ 3-item questionnaire ○ Good specificity and sensitivity for recognizing recent, heavy drinking and dependence ○ Practical when time/human resources are limited ○ Limited in identifying severe alcohol use
CAGE / T-ACE[79]	○ Can identify lifetime use ○ Can't discern heavy drinkers or differentiate past/current alcohol use disorder ○ T-ACE is similar, where T symbolizes tolerance
Short Inventory of Problems (SIP-10)[80]	○ Measures physical, social, interpersonal, and impulsive impacts of alcohol consumption ○ 10-item questionnaire addresses alcohol and drugs so may be better suited to patients with polysubstance use
Composite international diagnostic interview (CIDI)– Substance Abuse[81, 82]	○ Substance abuse module (SAM) includes diagnostic criteria for alcohol use disorder, withdrawal, and dependence ○ Also questions the quantity and frequency of both the heaviest use and use in the past 12 months, age at first and last use, age at first and most recent symptoms, age that criteria were first and most recently met, and age(s) at remission(s)
Michigan Alcohol Screening Test (MAST)[78]	○ 22-item questionnaire created in 1974 which gives a score of 1 for no for items 1-4, and 1 for yes for items 2,3,5-22[17] ○ A score of 6+ indicates dependence ○ Patient reported based on social impacts of drinking
Alcohol, smoking and substance involvement screening test (ASSIST)[82]	○ 7-item questionnaire working through 9 illicit and licit substances ○ Resulting score indicates level of intervention (4-26 requires brief intervention, score of 27+ indicates need for medical intervention)

Despite the importance of screening to identify problematic alcohol use and AUD, less than 30% of people are screened for AUD with a validated tool, though no data are available for Canada[83]. It is estimated this number is even smaller for people with liver disease [10, 11]. Screening is the first step in identifying AUD, making the diagnosis, and providing treatment.

2.4.2. Diagnosis

AUD is diagnosed by a healthcare provider using patient history and DSM-5 criteria[2] as discussed above. In addition to assessing which of 11 criteria patients meet, stratifying the diagnosis as mild, moderate, or severe is useful in understanding the level of intervention needed. Other information that may be helpful when making a diagnosis of AUD include previous abstinent events, the existence of a controlled environment (i.e., where alcohol can be restricted), and quantity of alcohol consumed. Once diagnosed with AUD, a conversation with a clinician about the risks of drinking and motivation to change drinking behaviour is important.

2.4.3. Brief intervention

A brief intervention (BI) is a tool used by many clinicians (e.g., social worker, nurse, counselor, physician, nurse practitioner, etc.) to discuss an unhealthy behaviour and assess motivation to change[84]. The core of a brief intervention employs the practice of supporting an individual with identifying a problem with a behaviour (i.e., alcohol consumption) and motivating them to do something about it[85]. Specific definitions of brief interventions vary, with terminology ranging from 'simple advice' or 'brief counseling,' to 'short-term counselling[86].' The content of the intervention can range from simple suggestions or a series of interventions provided within a structured program or repeat clinic visits[86]. Brief interventions are distinct from other types of therapies or interventions as outlined by the following:

- Length (typically shorter, running 5-10 minutes on average). Sometimes defined according to length:
    - Very brief (<5 minutes, no follow-up)
    - Brief (<15 minutes, no follow-up)

    - Brief but repeated (individual sessions <15 minutes, multiple follow-up points)[86]
- No assessment involved.
- Used in a variety of settings (primary care, specialist care, substance use centres, etc.)
- Personnel delivering the treatment (wide range of professionals can deliver them)

Brief interventions are recommended by leading addiction and mental health organizations, such as the NIAAA, SAMHSA, and CCSA. There is a substantial amount of evidence supporting positive effects of brief interventions, including a reduction in alcohol consumption[84, 86, 87]. A Cochrane Review showed a reduction in alcohol consumption of 57 g/week among males who received a BI, with most success among those who have mild to moderate AUD[88]. Another, a meta review by Beyer et al (2018) looked at brief interventions in primary care, finding a significant impact on reducing hazardous drinking behaviours[89]. Few studies have assessed brief interventions on individuals with severe AUD[90], and only one has assessed their impact for people living with AUD and cirrhosis, showing improved quality of life[91]. The additional biopsychosocial factors affecting individuals with cirrhosis, may make BIs challenging to use but their value cannot be understated. They provide an opportunity to discuss other aspects that are important to behaviour change, like medication adherence and chronic disease management[91, 92].

Brief interventions can be facilitated through the use of a technique known as Motivational Interviewing (MI)[89]. This client-centered technique aims to foster a non-judgemental, non-confrontational environment with four main components of partnership, acceptance, evoking

action, and compassion[93]. This technique is used in various brief intervention frameworks, some of which are outlined in Table 4.

Table 4. Frameworks for brief interventions

4 step model[46]	○ Ask about alcohol use ▪ Consumption patterns ▪ AUDIT ○ Negotiation and goal setting ▪ Is the patient willing to focus on drinking? ▪ Is it important that they reduce/quit drinking? ▪ Provide suggestions for reducing drinking if open ▪ Behavioural modification techniques ▪ Identify high risk situations ▪ Provide resources/coping strategies ○ Follow up and refinement ○ Recommend a drinking log with a follow up appointment
FRAMES [84]	Feedback of risk Encouraging Responsibility for change Advice Menu of options Therapeutic empathy Enhancing Self-efficacy
Five A's[94]	Ask about use Advice to quit or reduce Assess willingness Assist to quit or reduce Arrange follow-up

2.4.4. Pharmacotherapy for relapse prevention

Abstinence from alcohol is imperative for patients with liver disease. Clinical, surgical, and pharmacological treatments for liver disease lose efficacy when drinking continues and continued consumption of alcohol can provoke complications and progress the disease state[95, 96]. The presence of AUD at any stage of liver disease can increase morbidity and mortality, with variable effects, such as increased likelihood of developing HCC as described by Lucey et al (2019)[97].

Clinical guidelines recommend treatment steps for individuals with concomitant cirrhosis and AUD that include (a) a referral to an AUD professional, (b) involvement of a multidisciplinary team, and (c) use of pharmacotherapies for relapse prevention[71, 98, 99]. Various pharmacotherapies have been used to treat AUD among the typical population which vary in their mechanism of action, core purpose, and contraindications. Some work to reduce cravings for those who are already abstinent, and others work to reduce the reward or pleasure-seeking behaviour resulting from alcohol consumption. Recommendations for pharmacological therapy for relapse prevention can be more difficult to generalize to individuals with cirrhosis. Of the number of approved, off-label, and studied pharmacotherapies, few have been tested in individuals with cirrhosis. Clinical guidelines and other literature suggest that three medications: baclofen, acamprosate, and gabapentin can be used due to their safety profiles, mechanism of action and primary metabolism[71, 95, 98, 99]. The various pharmacotherapies for relapse prevention that have been considered in the literature in expert review and clinical practice guidelines[71, 92] for people with cirrhosis are summarized here:

Table 5. Current pharmacotherapies for relapse prevention in people with cirrhosis

	Dosing in people with liver disease	Mechanism of action	Clinical considerations	Patient considerations	Contraindications	Studied in cirrhosis?	Cost
Acamprosate[92, 95, 100, 101]	666 mg tid	N-metil-D-aspartate glutamate receptor antagonist	Relief from alcohol Using opiates Most effective in mild to moderate AUD	Reduce craving when sober. No reduction in craving when drinking	Not to use if renal dysfunction Avoid in individuals who are breastfeeding Watch for acamprosate hypersensitivity Could be safe in patients with liver disease (no liver metabolism) but data limited to a one-day trial with CP A/B & fear HE provocation with continued use Retrospective chart review showed significantly reduced alcohol-related admissions for	For one day in patients with Child Pugh Class A/B cirrhosis Most commonly prescribe AUD medication in people with cirrhosis in one retrospective chart review	$165 per month

	Dosing in people with liver disease	Mechanism of action	Clinical considerations	Patient considerations	Contraindications	Studied in cirrhosis?	Cost
					patients prescribed acamprosate versus baclofen. Preferable FDA approved medication for treating AUD as it does not undergo hepatic metabolism Recommends sobriety >7 days		
Gabapentin[95, 102]	900-1800mg every day	GABA mimic	Relief from alcohol History of seizures Anxiety Insomnia Desire home detox Using opiates PTSD	Beneficial in those with seizure history in withdrawal	Not to use in those with historic or active stimulant use disorder Currently approved to treat seizures and neuropathic pain Could be safe in patients with liver disease – no data available	Not for treating AUD	$30 per month

	Dosing in people with liver disease	Mechanism of action	Clinical considerations	Patient considerations	Contraindications	Studied in cirrhosis?	Cost
Baclofen[95, 99, 100, 102, 103]	5mg 3 times a day. Dose can be increased at 3-5 days if patient tolerates it. Max dose 15mg three times a day 10mg three times a day 10mg tid (20mg qid max)	Selective GABAb receptor agonist	Relief from alcohol Using opiates Anxiety Insomnia Acute/Chronic liver failure	In those with late-stage liver disease AND/OR use alcohol to provoke sleep and reduce anxiety	Currently approved to treat spasticity Mixed results in trials. Overall had good effect on abstinence rates, but no real difference in heavy drinking days or craving scores	Yes, Randomized Controlled Trial	$30 per month
Naltrexone[95, 100]	50-100mg/day (oral) 380mg/month (IM)	u and k opioid receipt antagonist[9]	Reward from alcohol High level of craving Family history Polymorphism (Asn40Asp) in u opioid receptor gene (OPRM1) Alcohol reduction	Patient still drinking or is likely to resume	Not to use if active OUD (withdrawal precipitation) Not to use in acute hepatitis and liver failure Previous FDA black box/contraindicated in patients with liver disease	No	$105 per month

	Dosing in people with liver disease	Mechanism of action	Clinical considerations	Patient considerations	Contraindications	Studied in cirrhosis?	Cost
					No data for patients with liver disease—perception of hepatocellular injury		

Adapted from Dr. Jeff Harries, "How I choose an AUD pharmacotherapy." 2019[104] and British Columbia Center on Substance Use (BCCSU) "Pharmacotherapy Options for Alcohol Use Disorder" 2021[105]

The only randomized controlled trial (RCT) conducted on pharmacotherapy for relapse prevention among people with cirrhosis is baclofen[63]. This trial by Addolorato and colleagues suggests that baclofen is safe and effective in treating AUD in patients with liver disease and increased achievement and maintenance of abstinence over a 3-month period[104]. An additional study by Hauser and colleagues replicated the doses done by Addolorato et al in a subset of patients with AUD and chronic hepatitis C with contrasting results [106]. There was no indication of reduced alcohol cravings or consumption, or increased abstinence[106]. Other medications, including gabapentin and acamprosate are lacking RCT data to assess their safety among people with cirrhosis. Acamprosate was tested in a one-day trial in patients with Child Pugh A and Child Pugh B cirrhosis focused specifically on the outcomes of arterial pressure and HE[107]. The study concluded that moderate doses of acamprosate (666mg t.i.d) did not induce HE in individuals with cirrhosis[106]. A recent retrospective chart review of patients with cirrhosis who were prescribed baclofen or acamprosate for their AUD experienced fewer alcohol-related hospital admissions[101]. There were no significant differences in cravings or abstinence periods between these groups[101].

Clinical practice guidelines recommend the use of baclofen as a first-line treatment and acamprosate as second-line for the treatment of AUD in individuals with cirrhosis[71, 98]. A paper by Leggio and colleagues goes one step further suggesting the use of baclofen, gabapentin, and varenicline if hepatorenal syndrome is not present and avoidance of disulfiram and naltrexone for fears of hepatotoxicity, and ondansetron and topiramate for fear of HE provocation[92].

Recent work has attempted to mix various pharmacotherapies to assess effectiveness in reducing cravings and decreasing relapse potential. One such trial by Kiefer et al aimed to assess the efficacy of acamprosate and naltrexone combined[108, 109]. By the end of the 3-month trial period, the proportion of those on combination treatment who maintained abstinence was twice as high as those only on acamprosate, naltrexone, or placebo[108]. The authors mentioned side effects of nausea and diarrhea which were significantly greater in the combination group; believed to be the result of differing mechanisms of action[108]. The combination of pharmacotherapies for relapse prevention has yet to be studied in the liver disease population, and further work could look at the efficacy of prescribing an off-label and on-label AUD medication for relapse prevention in this group.

Based on the literature, it appears that most pharmacotherapies for relapse prevention show positive results. The recommended pharmacotherapies (outlined above) appear safe, and the risks of complications are generally perceived to be less than the guaranteed consequences of continuing to drink alcohol when diagnosed with cirrhosis. It must be noted though, that most of the pharmacotherapies for relapse prevention that were studied in those with cirrhosis, have included a behavioural treatment component. These treatments are also important in managing the pathology of addiction.

2.4.5. Behavioural treatment

The greatest effect of pharmacotherapies for relapse prevention have been found in individuals who receive a combination of medication and behavioural treatment. Behavioural interventions can take various forms, ranging from cognitive behavioural therapy (CBT), motivational enhancement therapy (MET), psychological support (counselling, trauma support), mutual aid

fellowships (Alcoholics Anonymous (AA)), and residential treatment. Finding the right behavioural treatment depends on the professionals involved, the mechanism of action, and a patient's location and motivation. Some of these interventions are highlighted and described in more detail in the following table.

Table 6. Some behavioural interventions for AUD

Program	Mechanism of action	Studied in cirrhosis?
Inpatient treatment	Combines sober living, pharmacological, and behavioural treatment with medical support	
Residential treatment	Combines sober living and behavioural treatment with the opportunity for pharmacological therapy in most cases	
Family/couple counselling	A patient with the support of loved one(s) discusses their dependency on alcohol and how it impacts those around them	
Mutual aid fellowships (i.e., 12 step programs)	Group therapy and shared experience	Yes[81]
Cognitive behavioral therapy	A structured goal-directed form of psychotherapy in which patients learn how their thought processes contribute to their behavior	Yes[108]
Motivational enhancement therapy	Attempts to increase a patient's awareness of the potential problems caused, consequences experienced, and risks faced because of excessive alcohol use.	Yes[108, 110]

The level of intervention necessary to treat people with AUD is multifaceted, beginning with screening and brief interventions and progressing to diagnosis and treatment in the form of pharmacotherapy and behavioral therapy. Several public health approaches have been implemented to standardize this process, draw attention to the components, and raise awareness

among clinicians involved in the care of individuals who may have AUD. Two of these approaches are MAT (**M**edication **A**ssisted **T**herapy) and SBIRT (**S**creening, **B**rief **I**ntervention, and **R**eferral to **T**reatment)[111, 112]. MAT is a treatment approach focused on using medications, in combination with counseling and behavioral therapies, to provide a "whole-patient" approach to the treatment of substance use disorders[112]. This approach has been used successfully for opioid use disorders and found to reduce mortality and the need for inpatient detox[113]. SBIRT is a public health approach aimed at prevention and early intervention for individuals with substance use disorder or at risk of developing one[111]. SBIRT can prevent progression to AUD[114], reduces stigma or underlying bias, and focuses the full range of drinking behavior[111]. Many clinical trials have been conducted to evaluate the efficacy of SBIRT in reducing and stopping alcohol consumption[115, 116]. They have also assessed the cost-effectiveness of this approach and the applicability across a wide range of medical settings including primary care, emergency departments, and outpatient settings[117, 118]. SBIRT is ideally implemented in individuals at risk for AUD or those with mild presentations[111, 119]. Individuals with alcohol related cirrhosis are typically towards the severe end of the AUD spectrum and their disease specific complications can make implementation of SBIRT more difficult. No research has been done to assess the entirety of the SBIRT approach in the context of people living with cirrhosis.

2.4.6 Treatment of Alcohol Withdrawal Syndrome in People Living with Cirrhosis

Alcohol withdrawal syndrome (AWS) is another disease entity that individuals living with AUD and cirrhosis can experience. It is estimated that up to 50% of individuals who have AUD will experience some form of withdrawal after discontinuing alcohol consumption, though many of these individuals will not need clinical intervention[120]. Alcohol withdrawal can vary from mild

symptoms including minor tremors, to a more severe form including delirium tremens[121]. In its more severe form, alcohol withdrawal can be life threatening and treatment is imperative. In individuals with cirrhosis, two pharmacological therapies are recommended (oxazepam and lorazepam) as they do not undergo hepatic metabolism[120]. It is also recommended that these patients are monitored and therapy is delivered on a symptom triggered schedule as opposed to a fixed dosing schedule[120]. In situations where treatment with benzodiazepines is contraindicated (i.e., experiencing distressing side effects), some clinicians suggest using GABAergic medications, such as baclofen[63]. Baclofen shows promise in treating AWS in patients with liver disease, though randomized controlled trial data are lacking[122]. It is important to note that treatment of AWS will not treat AUD, and connection to behavioural and pharmacological therapies for relapse prevention will need to occur following AWS treatment.

2.5. Patient-level and system-level factors limiting AUD treatment in cirrhosis

AUD is under-identified and undertreated across the world[8, 55]. For individuals who have concomitant cirrhosis and AUD, identification, and subsequent treatment of AUD is necessary for survival. Less than 1% of people living with cirrhosis and AUD receive guideline-based care in the form of SBIRT and prescription of pharmacotherapies for relapse prevention[9]. Clinical practice guidelines have been established to support people living with cirrhosis and AUD which recommend the involvement of a multidisciplinary team in an integrated care setting[71]. This proved beneficial in a study by Winder and colleagues who found that a multidisciplinary, co-located AUD and alcohol-related liver disease clinic significantly improved the identification and treatment of AUD for patients who attended[123]. Other studies looked specifically at integrated addiction medicine and liver care for those undergoing liver transplant; finding that the rate of relapse for those who received the combined care was significantly lower than those

who did not receive it[64, 124]. Another integrated care centre, Veterans Health Administration in the United States, showed over 60% of patients with cirrhosis were offered AUD treatment[125].

Though this remains the gold standard, these facilities are not readily available in many locations[126]. Indeed, there are no clinics in Alberta, Canada where AUD care and cirrhosis care are integrated. This highlights one major barrier to treating AUD in people with cirrhosis. Other factors, like the pathophysiology and late onset of symptoms of liver disease and cirrhosis make it challenging to diagnose and provide alcohol-related interventions in early stages when liver damage can be reversed[11, 126]. Other factors may include (a) patient portrayal of medical history, (b) stigma and bias about alcohol, (c) resource limitations, and more (Table 7).

Table 7. Common barriers to AUD treatment amongst people with cirrhosis

Patient level	System level
Misconceptions about the effects of alcohol, pharmacotherapies for relapse prevention, disease progression, and lifestyle modifications	Complex patients who see various providers may lead to piecemealed care
Perceived challenges with using screening measures on individuals with symptoms related to decompensated cirrhosis (like HE)	Effectiveness of screening measures in detecting AUD in the cirrhosis population.
Patient motivation to participate in mental health conversation and behavioural therapies, and take pharmacotherapies for relapse prevention	Limited research on the effectiveness of behavioural treatment options for patients with cirrhosis
Misinformation related to benefits of alcohol use, which may lead to inappropriate use of alcohol and downplaying of negative side effects of consuming alcohol	Pharmacotherapies for relapse prevention are understudied in individuals with cirrhosis, and dosing of these medications can be challenging due to poor liver function and complications
Age (older patients less likely to receive care for AUD, younger patients more likely to be offered AUD treatment)	Lack of international consensus on what is considered a standard drink, with numbers varying by country from 10-20g of pure ethanol in a standard drink
Comorbidities (patients with higher Charlson Comorbidity Index are less likely to receive AUD treatment)	Little integration of mental health/addiction into hepatology or acute care

Acuity. Those who had a history of decompensation are less likely to receive AUD treatment	Stigma and bias associated with alcohol consumption
Perceived challenges of decompensation (like HE) impacting a patient's ability to stay engaged and committed to behavioural therapy	Patient fear that being truthful about alcohol consumption will remove them from the transplant list and/or make them ineligible for medications
Patient reporting of their health history, including an accurate depiction of current alcohol intake	Inadequate training, support structures and education for clinicians
Poor understanding of addiction	Patients with AUD are likely to first interface with the healthcare system with their PCP who typically have less training in AUD identification and treatment
Health-related and social impediments to attending or committing to rehabilitation	Lack of universal routine screening process for AUD
Inability to maintain or achieve abstinence	Lack of pharma care
Geographic location (proximity to treatment, medical/behavioural/rehabilitation)	Poor association of clinical predictors with underlying pathophysiology
Current environment (controlled versus uncontrolled). Being in close contact with others who consume illicit substances, including alcohol; not having a stable home environment	View of alcohol related liver disease as 'self-inflicted' and therefore not deserving of a liver transplantation
Prior exposure to treatment for AUD or other substance use disorder	Organ shortage, leads to strict requirements for recipients

For some patients, these factors may contribute to reduced efficacy of various AUD treatments. In individuals for whom brief interventions, behavioural treatments, and pharmacological therapy do not work, alternatives exist. One option is to increase the level of clinical intervention, so if the patient is receiving outpatient therapy, engage them in inpatient or residential treatment. Other options include managed alcohol programs (MAP), where patients are prescribed alcohol to take at select intervals throughout the day. This is a harm reductive

approach that has shown benefit in Canada, especially amongst individuals experiencing houselessness[127]. The effect of these programs for individuals with liver disease has yet to be established. Abstinence from alcohol remains the goal for patients living with cirrhosis.

2.6. What is known about clinician knowledge, attitudes, and practice habits regarding AUD in cirrhosis?

Additional barriers in connecting patients with AUD and cirrhosis to treatment have to do with clinician practice habits, specifically SBIRT and prescribing pharmacotherapy for relapse prevention. Studies have found that less than 20% of individuals with AUD receive such care, which is more pronounced than any other mental disorder[8]. Using these methods may encourage patients to accept and identify that they must reduce their alcohol consumption. A study by Rogal and others found that any treatment measure (pharmacotherapy or behavioural therapy) to reduce or stop alcohol intake successfully decreased hepatic decompensation and mortality for patients with AUD and cirrhosis[9].

Many barriers exist that prevent patients from being diagnosed and connected to treatment for their AUD. One noted gap is in screening for AUD. Within Alberta, less than 9% of individuals living with AUD are screened for their condition despite meeting diagnostic criteria, representing a large proportion of patients not connected to any treatment[128]. Though no data specific to screening practices amongst liver specialists within Alberta is available, a recent survey conducted by the AASLD found that less than 25% of hepatology/gastroenterology providers use a validated screening measure for alcohol use[10]. Lower alcohol-specific education was found to be strongly associated with decreased comfort using such measures in practice. This lack of alcohol-specific education was also apparent amongst medical students, who reported receiving less than 20 days of alcohol-related content in their program[10, 17].

Another area along the journey of managing AUD that appears to be fragmented in medical education is BIs. One study by Azari and colleagues found that many well-intentioned clinicians in primary and specialty care felt they lacked the skills necessary to conduct a BI, including motivational interviewing skills[129]. Some residency programs in the United States have begun integrating BI and MI skills into their programs, with objective structured clinical examinations (OSCE) assessing performance and providing feedback for improvement[130]. A small trial by Cole and others (2011) aimed to improve family medicine residents' performance in MI and BI skills through OSCE's[131]. What they found was that after a two-day teaching course about MI and BI, most residents had improved scores on these skills[131]. Participants also expressed high satisfaction, demonstrating a desire to learn and master these skills[131].

As we look upon the journey of a patient with concomitant AUD and cirrhosis, the next step is diagnosis. Barriers to making a diagnosis of AUD in people with cirrhosis include clinician perspectives of diagnostic criteria, where many find it futile to make the diagnosis when they know their patient has alcohol-related cirrhosis[11]. A study by Sofair and colleagues found that less than half of patients with alcohol-associated liver disease had documentation in their medical record that alcohol was the cause, despite their long history of alcohol consumption and no other identifiable cause[66]. This solidifies the importance of making an AUD diagnosis, not only for patient awareness, but to identify the severity of the condition and level of intervention necessary[66].

Some of the largest gaps noted in the literature for people living with concomitant cirrhosis and AUD was receiving treatment, either in the form of pharmacotherapy or behavioural therapy. A study by Mellinger et al examined misconceptions and barriers for AUD treatment in approximately 125 patients with alcohol-related liver disease, finding <5% of patients were on medication for their AUD[132]. An article by Cotter and colleagues described knowledge and attitudes of hepatology providers towards prescribing pharmacotherapy for relapse prevention,[133] finding that >50% felt that they needed additional training to prescribe pharmacotherapy for relapse prevention, with education in fellowship, modules and webinars being the most requested methods[130]. Additional questions highlighted specific knowledge gaps regarding FDA approved pharmacotherapies for relapse prevention, where half of prescribers selected the incorrect response for each question[130]. AUD-specific education is necessary to change practice habits of clinicians and improve outcomes for patients living with both conditions. Additional clinical level factors that may affect the ability of patients with cirrhosis and AUD to connect to treatment, are presented in Table 8.

Table 8. Provider level factors that may contribute to AUD treatment provision in patients with cirrhosis

Provider level
Healthcare providers patients frequently interface with are specialists (hepatologists, GI) with limited training in AUD and treatments
Diversity in training backgrounds, cultural backgrounds and philosophies of care related to AUD
Healthcare providers that cirrhosis patients frequently interact with (Hepatology and Gastroenterology) were found to be inferior at detecting AUD and applying the AUDIT-C than mental health professionals
Perceived challenges with using screening measures on individuals with HE
Lack of communication between various healthcare providers (ex. Hepatology and primary care)
Underlying biases and assumptions about individuals who consume alcohol may impact care options that are presented to patients.

Providers may rely on tell-tale indicators (like the smell of alcohol on breath, liver enzymes, red eyes) rather than official criteria
Screening can be time consuming to administer and require scoring, leading clinicians to not apply it universally
Screening questionnaires (AUDIT, CAGE) are not as easily memorized by clinicians and therefore do not incorporate into workflow as easily
Practitioners' beliefs about their own drinking habits

2.7. What is known about the effects of clinician education about AUD on knowledge, attitudes, and practice habits

Recognizing the gaps in AUD management in healthcare settings, much research has gone towards developing and testing educational strategies. Few of these studies are focused solely on gastroenterology/hepatology, with most focusing on PCPs and nurses. Additionally, very few of the proposed interventions were specific to the nuances of cirrhosis and AUD, with most focusing on other chronic conditions (depression, hypertension, etc.)[16]. Some effort has gone into incorporating screening into routine hepatology care. For example, the Veterans Health Administration (VHA) in the United States implemented an annual alcohol use screening clinical reminder into their care clinics[13].

The management of alcohol use among patients who have liver disease is complex due to unique pathophysiology resulting from decreased liver function, complications like HE, and patient perspectives. Owing to the late manifestation of clinical indicators of liver disease, early identification of AUD, has been associated with reduced risk of decompensation and death[9]. A study by Sairaireh and others, determined that a clinician-led 1 hour targeted education session for gastroenterologists/hepatologists improved the management of patients with liver disease and AUD, with a statistically significant increase in: a) documentation of inquiry about alcohol use,

b) AUDIT-10 use, and c) alcohol related counselling[12]. Training included information about the DSM-5 criteria for AUD, AUDIT-10, and treatment impacts[130].

Internal medicine practitioners are also involved in the circle of care for people with cirrhosis and AUD. A study by Jonas and colleagues described a curriculum to these practitioners focused on improving confidence with screening, MI, and prescribing treatment[134]. The intervention included a lecture on the basics of MI, a provider support guide for MI, and steps for a two-visit patient intervention[134]. Their study saw 57% of patients receive a validated screen, but only 25% received MI[134]. Residency programs present another opportune time to introduce AUD training.

A study by Pringle and colleagues sought to implement education around SBIRT in residency using a 6-hour curriculum focused on screening, diagnosing AUD, and prescribing pharmacotherapy for relapse prevention[14]. There was no improvement in medication prescriptions, referrals, or AUD diagnoses but there was a significant improvement in screening and brief intervention practices across all implementation sites[14]. Another study by Proude and colleagues analyzed the effectiveness of a 2-hour training session in improving confidence of PCPs to identify AUD, conduct a BI, and refer patients to behavioural or pharmacological support[15]. The training sessions occurred over three years and included 300 PCPs from rural and urban practice settings. The authors noted significant improvements in confidence identifying hazardous alcohol use and conducting BIs[14]. Additional work by Harris et al focused on improving prescribing habits of pharmacotherapies for relapse prevention[18]. They used an extensive implementation process including identification of site champions and staff, iterative barrier analysis, and audit and feedback [14]. Trainers delivered the several education sessions at 37 VHA sites with the primary outcome of increasing the proportion of patients with AUD who

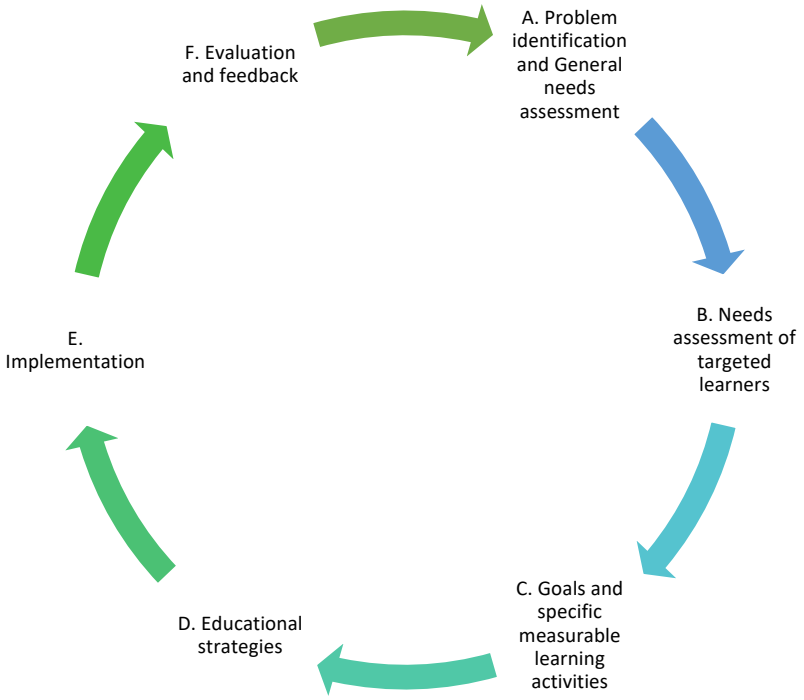
filled prescriptions for four pharmacotherapies[14]. There was an overall increase of 3.4% in prescriptions filled, which extrapolates to an increase in 11,000 AUD patients receiving pharmacotherapy for relapse prevention[14]. Harris et al tried another method composed of an educational website, a clinical dashboard, and training of two clinic champions[19]. With this intervention, they noted an increased in pharmacotherapies prescribed of 1.4% [14].

The preceding studies indicate that substantial evidence exists to showcase the use of various educational interventions in AUD education for healthcare providers. Beyond education related to screening, however, no studies have focused on AUD education specific to caring for people living with cirrhosis. Developing education specific to this patient population could be beneficial for clinicians who provide care for them.

2.8. The basics of the Kern Framework for Medical Education to guide curriculum development

One approach to developing educational interventions is Kern's 6-Step Framework for Medical Education[135]. Kern's framework for curriculum development has been applied across specialities as a means to systematically link educational curricula with the needs of the health care system[135]. The framework operates under four assumptions: (i) aims and goals are important in educational curricula, (ii) it is important that medical educators address the needs of learners and patients when developing curricula, (iii) educators must be held accountable for the curriculum outcomes, and (iv) using a stepwise approach to curriculum development will achieve the best outcomes[135]. The framework developed by Kern follows six steps:

Figure 2. Kern's 6-step approach to curriculum development for medical education



2.8.1. Problem identification and General needs assessment

This first step is focused on identifying and analyzing a health problem or group of problems. Examples include documenting AUD prevalence in a population or addressing low rates of AUD screening. Kern and colleagues advocate for a thorough analysis of the ideal approach versus the current approach, with the difference representing needs that must be targeted by the intervention. This thought experiment has been applied to clinicians' provision of AUD care among patients with cirrhosis, including screening practices, brief interventions, and prescribing pharmacotherapy for relapse prevention in the table below:

Table 9. Current versus ideal approach to AUD care for patients with concomitant cirrhosis and AUD

	Current	Ideal
Screening	Low AUD screening rates	Universal screening. Mandated use of validated measure, documented and revisited on a standardized basis
Brief intervention	Limited education provided in undergraduate medical school, residency and fellowship regarding conducting a brief intervention	Every healthcare provider educated and well-versed in providing brief interventions to patients with high-risk score. This is done throughout undergraduate medical education and reinforced with continuing education modules or session
Pharmacotherapy	Minimal education for hepatologists/gastroenterologists specific to pharmacotherapy for relapse prevention and dosing specifications for patients with liver disease	Prescribers are comfortable prescribing pharmacotherapy for relapse prevention in patients with cirrhosis. Education is provided throughout undergraduate medical education and residency for primary care and specific specialties that are more likely to interface with patients who have concomitant AUD and cirrhosis

2.8.2. Needs assessment of targeted learners

The next step is focused on assessing needs and experiences of the targeted group of learners, which can vary between health systems, communities, and specialties. Approaches to conducting needs assessments range from informal discussions, questionnaires, formal interviews, and focus groups.

2.8.3. Goals and objectives

After identifying needs of targeted learners, Kern and colleagues suggest developing curriculum goals and objectives. The authors recommend identifying broad goals and then specific, measurable objectives. These objectives can be clinician-oriented, focusing on knowledge, attitudes, and skills or patient-oriented, focusing on patient outcomes and delivery of health care services.

2.8.4. Educational Strategies

This step is focused on selecting educational methods that best suit goals and objectives described in the preceding step. The authors recommend matching knowledge objectives with lecture-based strategies, attitudinal or affective objectives with reflection and the creation of an open and non-judgemental space, and skills objectives with roleplay or other 'higher-level' activities.

2.8.5. Implementation

Once goals and objectives have been established, medical educators can move onto choosing strategies to achieve these goals. Kern and colleagues identify several things medical educators need to consider when implementing their curriculum, including resources (e.g., time, human resources), buy-in from stakeholders (i.e., professional organizations, project champions), marketing of the curriculum and disseminating findings, planning for barriers, and planning for introduction of the curriculum (i.e., begin with pilot or adopting a phased approach).

2.8.6. Evaluation and feedback

The final step in Kern's framework is multifaceted and can be focused on assessing the individual learners (i.e., performance on curriculum objectives) and/or the curriculum. The evaluation can use quantitative and qualitative methods to answer questions about the effect of the curriculum, benefits of different strategies, and room for improvement.

Kern's approach has been used across medical specialties and professional roles. A study by Hostetter and colleagues showed positive results on knowledge and perceptions of medical students when providing compassionate care to women with SUD[136]. Another study among medical students by Gomez and colleagues (2021) focused on developing and assessing the

impact of an educational curriculum about the health impacts of climate change[137]. The 10-week seminar significantly impacted students perception of their role in providing health care for climate change afflictions[137].

Kern's curriculum has also been used to develop educational curricula for residents. A curriculum by Walter and colleagues (2021), assessed a 4.5-hour didactic intervention for emergency medicine residents focused on prescribing treatment for opioid use disorder[138]. They found significant improvements in knowledge and comfort, and noted positive feedback from participants about the curriculum's impact on their practice[138]. Another resident-targeted curriculum was an end-of-life curriculum developed by Wilson and colleagues for pediatric residents[139]. The curriculum improved residents perceptions of end-of-life education and motivated them to pursue additional educational opportunities[139].

Other longitudinal interventions are underway, assessing the effect on learners and patients. One such intervention, is an undergraduate medical school educational program about substance use disorder at the Yale School of Medicine[140] . Though data have yet to be released, the effect of this intervention will be valuable to inform other undergraduate medical education interventions and advocate for improved access to substance use disorder education across health professions.

2.9. The Basics of using Self Determination Theory to assess how educational interventions might meet the motivational needs of learners

There are many theories that analyze learning, behaviour change, and motivation. Cook et al provided an overview of 5 contemporary theories that aim to assess and quantify motivation, which they define as "the process whereby goal-directed activities are instigated and sustained"[141]. The theories possess four commonalities: (a) they assess competence, (b) they

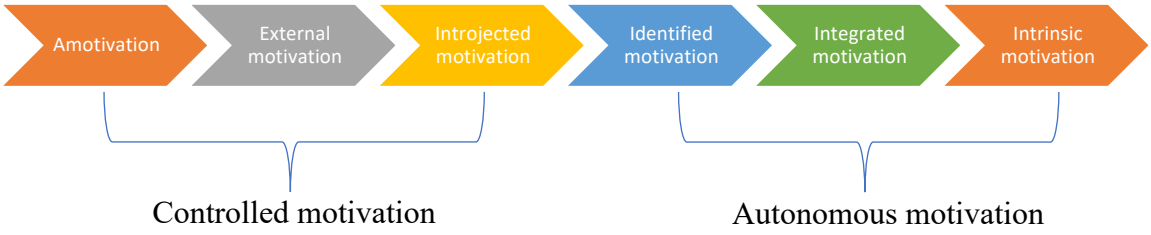
analyze the value of learning a task and where it comes from, (c) they look at the relationship between an outcome and individual factors (attributions), and (d) they refer to motivation as at least a partially cognitive process that cannot be observed[141]. Self-determination theory (SDT) is one discussed theory that has been used in to assess educational interventions across disciplines.

When thinking of the greatest accomplishments in one's life, these are typically those that you were intrinsically motivated to do. However other accomplishments may require extrinsic motivation because they may not be interesting, but present with some payoff, such as career advancement, financial gain, or positive societal impact[141]. Despite being extrinsically motivational, these rewards can dampen the intrinsic value of a goal, which is necessary to change behaviour[141].

SDT proposes that people have three basic psychological needs that are believed to impact intrinsic motivation: autonomy, competence and relatedness[142]. Autonomy refers to the need to feel ownership of one's behaviour; competence refers to the need to produce desired outcomes and experience a sense of mastery over a set of skills; and relatedness refers to the need to feel connected to others[142]. The theory holds that the more an environments support these basic psychological needs, the more likely an individual is to perceive an activity as being intrinsically motivating[142]. Without satisfying all three, motivation can be said to exist along a spectrum between amotivation on the far left to integrated motivation (i.e. not achieving intrinsic motivation (Figure 3)[142]. In between these extremes, motivation varies from external, which result from a motivating factor external to an individual, like money[142]. Or they can be introjected, where an individual is likely to engage in an activity simply because they know they

can[142]. Next, identified regulation occurs when an activity is completed because it makes sense to do it, but with little enjoyment[141]. And lastly, before complete intrinsic motivation, is integrated regulation, where an individual does not need to do something but chooses to out of interest[141, 142]. This spectrum of motivation is further classified as controlled motivation, or autonomous motivation[142].

Figure 3. Motivational spectrum



There are various measures informed by SDT that assess motivation and the three basic psychological needs. A list of measures that have been used in the medical literature are listed below:

Measures:

- Multidimensional work motivation scale (MWMS)[143]
    - Assess work motivation
- Jefferson scale of physician lifelong learning[143]
    - Assess motivation for lifelong learning

- Basic psychological needs satisfaction scale (BPNSFS-work domain)[143]
    - Assess perceived autonomy and competence at work
- Team climate inventory scale (TCI)[144]
    - Assess relatedness of specialists to their peers

A study by Van Der Burgt et al used SDT to analyze physicians scores of autonomous motivation, controlled motivation, and lifelong learning motivation and their relationship with work satisfaction of the psychological needs[145]. With a response rate of 12% (n=193) autonomy and autonomous motivation were found to be related, as were competence and motivation for lifelong learning, with no significant comparisons between relatedness and motivation[145]. Other interesting results were the demographic comparisons, where specialists in academic centres were more motivated to engage in lifelong learning than non-academic located specialists[145].

Incorporating SDT is useful to understand how best to engage clinicians in best practices for the clinical management of AUD. Integrating specific learning techniques to maximize autonomous motivation through fulfilment of the three psychological needs of autonomy, competence, and relatedness will be of great benefit. Assessing how changes in knowledge, attitudes, and practice habits correlate with satisfaction of the psychological needs would also be helpful to understand how to deliver education with the greatest benefit.

2.10. Summary and Rationale

To improve the lives of individuals living with cirrhosis and AUD, and to overcome the existing gaps in knowledge, attitudes, and practice habits, we need to advance research on the effectiveness and safety of behavioural interventions and pharmacotherapy for relapse

prevention. This includes routine adoption of screening for alcohol-related problems, use of BIs, pharmacotherapy for relapse prevention, and behavioural treatment. Providing support to clinicians who routinely interface with this patient population with education about how to provide these interventions is also of upmost importance.

There have been advances in treatment approaches for AUD in people with cirrhosis. This includes prescribing pharmacotherapy and behavioural therapy and advocating for integrated care involving addiction medicine and liver specialists. Clinical practice guidelines have advocated for not only management of cirrhosis and related complications, but also treating the root cause of the condition– alcohol. Despite these guidelines, research indicates that few people with AUD and cirrhosis are screened for AUD, given a BI, or connected with treatment.

Several barriers have been identified in the literature limiting the connection of individuals with concomitant AUD and cirrhosis to treatment. One such limitation includes a paucity of RCTs examining the safety and effectiveness of various pharmacotherapies in reducing alcohol consumption and cravings in people with cirrhosis. The clinical complexity of cirrhosis adds to this burden.

Many medical schools across Canada and globally have not yet included structured curricula about managing substance use disorders, like AUD. Additionally, contrary to the noted relationship between many specialties and addiction medicine, few residencies or fellowship programs incorporate specific training[133]. Limited professional development opportunities for clinicians established in their practice also plays a role. This lack of training has led to a perceived lack of knowledge and comfort caring for people living with concomitant AUD and

cirrhosis. Without comfort and established research findings, many well-intentioned clinicians may not incorporate AUD management into their practice. More research is needed to determine both the safety and effectiveness of pharmacotherapy for relapse prevention in people with cirrhosis as well as the role of integrated behavioural therapy in this population. It has been proven in individuals living without established liver disease, but further research is needed to explore low provision of these treatments by clinicians caring for patients with AUD and cirrhosis. Additional work on the role of education on clinicians' practices managing AUD in their patients with cirrhosis is warranted to advocate for greater inclusion of addiction medicine curricula in undergraduate and postgraduate medical education.

CHAPTER 3: CLINICIANS' PERSPECTIVES AND PERCEIVED BARRIERS TO CARING FOR PATIENTS WITH ALCOHOL USE DISORDER AND CIRRHOSIS

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3. ABSTRACT

Background

Alcohol use disorder (AUD) is one of the leading etiologies for liver cirrhosis and liver transplantation. Few individuals with AUD receive guideline-based care in the form of screening, brief intervention, referral to treatment, or prescription of pharmacotherapy for relapse prevention. We interviewed clinicians across Alberta to assess the current experience and perceived barriers to managing AUD in people who have cirrhosis. The aim of this paper is to summarize these findings to inform the development of an educational intervention.

Methods

We used a qualitative descriptive approach to explore the experiences of clinicians who care for patients with cirrhosis and AUD in Alberta. We conducted semi-structured interviews directed by an interview guide. Interviews were recorded and transcribed verbatim. We used an inductive thematic analysis approach whereby transcripts were coded, with codes grouped into larger categories, then themes.

Results

Sixteen clinicians participated in this study. Many participants acknowledged that they do not use a standardized approach to screening, brief intervention, and referral to treatment. Through thematic analysis we identified four themes surrounding barriers to managing AUD in patients with cirrhosis: (i) Practicing within knowledge constraints, (ii) Navigating limited resources and system challenges, (iii) Balancing the complexity of cirrhosis and AUD, and (iv) Acknowledging the influence of provider perceptions on care.

Conclusion

This article presents the perspectives of clinicians who care for people who have AUD and cirrhosis. Significant barriers exist, including limited knowledge and resources, systemic challenges, and patient complexity. The information gathered will be used to develop an educational intervention that will delve deeper into these issues in order to have the greatest impact on clinicians who routinely interface with this patient population.

Keywords: Alcohol use disorder; Cirrhosis; Alcohol-associated liver disease; Clinician perspectives; Interviews

3.1. Background

Alcohol use disorder (AUD) is a chronic, relapsing condition that affects approximately 14% of individuals in North America [45, 55]. AUD can lead to a host of negative health consequences, with one of the most prevalent being alcohol-associated cirrhosis [146, 147]. Individuals with concomitant cirrhosis and AUD are at increased risk of experiencing adverse health consequences attributable to their liver disease, in addition to psychological stress, financial hardship, and houselessness [148]. Despite these negative consequences, and the evidence to support the benefit of AUD related treatment [124, 149], less than 20% of individuals with AUD receive psychological/behavioural therapy with or without pharmacotherapy for relapse prevention [55]. While current statistics are lacking for Canada, a recent study in the United States found that among 21,270 adults with AUD, only 5.8% reported receiving treatment [8].

Recent clinical practice guidelines from the American Association for the Study of Liver Disease (AASLD) and the European Association for the Study of the Liver (EASL) have stressed the importance of considering not only the management of direct liver complications (e.g. alcohol associated hepatitis), but also intervening to address the root cause of the liver disease – alcohol consumption [71, 98]. For patients who meet criteria for AUD and/or have alcohol-related liver disease, a multidisciplinary integrated care approach including the involvement of an addiction medicine specialist and initiation of pharmacotherapies for relapse prevention, is recommended [71, 98]. Current evidence supports the use of acamprosate, as well as the off-label use of Baclofen and gabapentin for relapse prevention in people who have liver disease [71, 150]. Though an integrated multidisciplinary care approach is the recognized gold standard for patients with concomitant AUD and cirrhosis, integrated clinics and addiction medicine specialists are not easily accessible to many clinicians who care for patients with cirrhosis [151]. Indeed, there are no

clinics in our province where cirrhosis care and AUD care are integrated. An interim step to support clinicians without access to an integrated care model would be to increase provider confidence with skills including screening, brief intervention, referral to psychosocial/behavioral therapy (SBIRT), and confidence with initiating pharmacotherapy for relapse prevention [115].

The multiple treatment options for AUD range from behavioural therapy (Cognitive behavioural therapy (CBT), motivational enhancement therapy (MET)), psychological support (counselling, trauma support), mutual aid fellowships (Alcoholics Anonymous (AA)) provided alone or, ideally, in combination with pharmacotherapy for relapse prevention [92, 95]. Taken in conjunction with patient wishes to change their alcohol consumption, these treatment options may help to improve the likelihood of abstinence and reduce the risk of alcohol-related complications. There is evidence to support the effectiveness of AUD treatment among people with liver disease [92, 95], but these treatments are greatly underused [55] despite frequent interactions with the healthcare system,

Individuals with AUD can present with liver related complications, or additional physical and mental health conditions, such as depression and post-traumatic stress disorder [152]. Each of these point-of-care interactions represents an opportunity for clinicians (e.g., primary care, emergency medicine, hepatology and hospitalist, nurse practitioners etc.) to intervene and support patients to reduce or cease their hazardous consumption of alcohol. Low rates of SBIRT implementation [153] lead to delays in treatment and worse mental and physical health outcomes [154]. By increasing SBIRT practices and prescription of pharmacotherapies for relapse prevention, more patients may have the opportunity to connect to treatment. After implementation of SBIRT practices in

emergency departments for example, a systematic review by Barata et al (2017) demonstrated fewer alcohol related consequences and repeat visits [114]. Hays et al 2020 reported that implementation of SBIRT practices into their trauma center resulted in significant increases in patient acceptance of referral to an outpatient treatment center for their substance use disorder [155]. In order to change practice habits and reduce the burden of AUD, it is crucial that we understand the barriers to SBIRT and initiation of pharmacotherapies for relapse prevention in cirrhosis related AUD care.

To date, there have only been two studies that have explored clinicians' experiences in managing AUD in patients with cirrhosis [10, 133]. Using a survey-based approach, key findings have included the lack of adoption of a standardized approach to AUD management, and low reported knowledge and comfort around pharmacotherapy for relapse prevention. Survey-based approaches are limited by the decision of which items to include. This is unlike qualitative methodology which can include open-ended questions and the ability to ask participants to expand on their experiences and perspectives. Moreover, clinicians in existing survey-based studies have primarily been from a gastroenterology/hepatology background, with no representation of other sub-specialties who also play a vital role in the circle of care (e.g., primary care, internal medicine, emergency medicine). To our knowledge, we are unaware of a qualitative exploration of barriers and facilitators around AUD management in people with cirrhosis involving primary care providers and gastroenterologists/hepatologists.

To address these knowledge gaps, the goal of this study was to describe the experience of clinicians caring for patients with concomitant AUD and cirrhosis. Specifically, we wanted to

answer the following research questions: (i) What is the experience and present practices of clinicians caring for patients with cirrhosis and AUD, and (ii) What are the perceived barriers to providing care to patients with cirrhosis and AUD?

3.2. Methods

We used a qualitative descriptive approach [156] to address the research objectives. This study was approved by the Health Ethics Research Board at the University of Alberta (Pro00089501). Informed consent was obtained prior to commencing interviews with participants.

3.2.1. Sampling and Recruitment

The present study is part of Cirrhosis Care Alberta (CCAB) a multi-site pragmatic trial aimed at improving the quality of care for patients with cirrhosis [157]. A portion of this trial is devoted to improving care for patients with cirrhosis and AUD through implementation of a standardized screening, intervention and treatment approach including the prescription of pharmacotherapy for relapse prevention. Participants were employed at hospital sites involved in the parent trial and were invited to participate in the present study by the principal investigator (PT) or additional CCAB site leads via email. A total of 19 participants were invited to join the study from 8 hospital sites (5 urban hospitals, 3 community hospitals) and practice settings that included gastroenterology/hepatology, internal medicine, and primary care; 3 did not wish to participate due to time constraints. We used a purposive sampling strategy to guide selection of participants to ensure that the study participants represented diverse professional roles (physician vs. nurse practitioner), geographic location of practice (North Zone, South Zone, Central Zone, Edmonton Zone and Calgary Zone), years of practice, and urban and community hospital sites.

3.2.2. Data Collection

Semi-structured interviews [158] were conducted by the first author (EJ) of this paper and supervised by a team member (AH) with expertise in qualitative methodology. Interviews were conducted via Zoom from January 2021-March 2021 and lasted 10-46 minutes (mean = 25 minutes). Development of the interview guide by EJ and AH (Table 10) was informed by a desire to explore current AUD management practices and perspectives of clinicians in Alberta caring for patients with AUD and cirrhosis. Interviews were audio recorded and transcribed verbatim. At the outset of each interview, demographic data were collected and following each interview, field notes detailing the interviewer's preliminary impressions were recorded. The interview guide was refined as interviews progressed to probe areas of interest and emerging themes. Interviews progressed until saturation was achieved, with no new concepts emerging after 16 interviews.

Table 10. Semi-structured interview guide

1. Can you tell me about your experiences with caring for patients who have AUD and cirrhosis? 2. What are your challenges in providing care for patients with AUD and cirrhosis? 3. What resources do you feel are missing for you to be able to provide optimal care to patients with AUD and cirrhosis? 4. Can you tell me about how allied health (particularly social work and addictions) are involved in the care of a patient with AUD and cirrhosis at your site? 5. Can you tell me about what kind of educational resources would enhance your practice when caring for patients with AUD and cirrhosis? 6. Can you tell me how caring for patients with cirrhosis and AUD has changed since the start of the COVID-19 pandemic?

3.2.3. Data Analysis

We used a theoretical thematic analysis approach [159] whereby codes and themes were identified in an inductive manner based on a desire to understand our participant's experience of caring for patients who have AUD and cirrhosis. Analyses were conducted by two members of the research team (EJ and AH) who coded several transcripts separately, then came together to develop a

coding framework based on consensus. Following development of the framework, the remainder of the transcripts were coded by EJ. Frequent meetings with our team member with qualitative expertise (AH) and principal investigator (PT) enabled verification of emerging categories and themes. An audit trail detailing methodological and analytical decisions was maintained. NVIVO Pro (Version 12) was used for data management and to facilitate analysis [160].

3.3. Results

We conducted a total of 16 interviews with 11 physicians and 5 nurse practitioners. The majority (n=12) were specialized in gastroenterology and hepatology, and the remainder were specialized in primary care (3) and internal medicine (1). Participants were recruited from all five Alberta Health Services (AHS) care delivery zones and both sexes were equally represented (50% male, 50% female). Additional demographic details are presented in Table 11**.** Four key themes emerged that described the experience of providing care to patients with cirrhosis and AUD: (i) Practicing within knowledge constraints, (ii) Navigating limited resources and system challenges, (iii) Balancing the complexity of cirrhosis and AUD, and (iv) Acknowledging the influence of provider perceptions on care (Results are presented graphically in Figure 4**)**.

Table 11. Demographic characteristics

Variable	N (%)
Gender	
Male	8 (50)
Female	8 (50)
Practice Specialization	
Family Doctor	3 (19)
Gastroenterologist/Hepatologist	12 (75)
Internist	1 (6)
Professional role	
Medical doctor (MD)	11 (69)
Nurse Practitioner (NP)	5 (31)
Practice Zone (Alberta Health Services)	
North Zone	2 (12.5)

Edmonton Zone	8 (50)
Central Zone	2 (12.5)
Calgary Zone	3 (19)
South Zone	1 (6)

3.3.1. Theme #1: Practicing within knowledge constraints

Nearly all participants spoke about their limited knowledge of how to provide treatment for AUD in people who have cirrhosis. This perceived "lack of understanding" and knowledge stemmed from an absence of formal training and familiarity with treatment options for this patient population. One participant shared, "...we were never really educated about it [AUD] or didn't really know what the options were". Though participants described their familiarity with clinical practice guidelines for management of cirrhosis, many did not use guidelines for AUD, instead relying on their 'gut instincts' and 'spidey senses' to assess their patient's alcohol use and determine whether it required clinical intervention. Of this, one participant said,

> *Usually, you get a fairly good idea about how much alcohol [a patient] uses…depending on if they tell me if they drink two beers a week for years, I don't usually explore it much further.* (Participant 12, MD, Hepatology)

Further, participants did not routinely employ a validated screening measure to assess for AUD or use a structured approach to brief intervention. For some, this approach was attributed to being unaware, while for others it was due to a perceived lack of clinical evidence including the "limited research done on this patient population" and concerns over "how effective" various interventions are in this group of patients. For example, one participant noted:

> *I don't go through a whole questionnaire or anything like that…if I know that they're already an alcoholic, I don't really think that I need to screen them for the severity because I don't really treat them differently.* (Participant 9, MD, Gastroenterology/Hepatology)

This unstructured approach extended to the process of diagnosing AUD. Participants stated that they typically did not use a set of diagnostic criteria such as those in the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) because they "believe their patients would meet the criteria anyway" and that "it doesn't take much to make the diagnosis" especially with a "collateral history" such as the presence of cirrhosis. One participant reflected on their experience with diagnosing a patient with AUD when they were unfamiliar with the patient's history.

> *I personally have a hard time ascribing a diagnosis to fit to symptoms that I didn't personally observe…you're going to start giving people diagnoses that they never actually had and altering the way they interact with the healthcare system.* (Participant 1, MD, Primary Care).

Participants also shared their discomfort with the prescription of pharmacotherapy for relapse prevention as a result of their perceived gaps in knowledge. They noted that the advances in addiction medicine contributed to their knowledge deficits: "a lot of these medications came out after I finished training…". Other participants reflected on how clinical norms in treating AUD combined with their lack of knowledge:

> *In all the settings that I worked, [prescribing pharmacotherapy] is just not something we do. And I realized that it is a knowledge deficit for all of us and we need to get better at that.* (Participant 5, NP, Gastroenterology/Hepatology).

Several participants shared that they "did not feel comfortable" prescribing pharmacotherapy for relapse prevention for AUD in patients who also had cirrhosis due to what they see as limited "viable options" resulting from a paucity of randomized controlled trials testing the efficacy and safety in this unique population. Further, they also reported feeling generally unaware of community resources to compliment potential medical therapies: "I don't even know where it [addictions clinic] is...I don't know what's offered there". One participant reflected on how these knowledge constraints could ultimately impact the patient's desire to receive treatment for AUD:

> *If I knew a bit more, I'd feel more confident. And if people [clinicians] are more confident in what they're recommending, generally their patients are more interested in it"* (Participant 1, MD, Primary Care Provider)

3.3.2. Theme #2: Navigating limited resources and systems challenges

Many participants spoke of the resource challenges they encountered in their care of patients with cirrhosis and AUD. For some, the most striking resource limitation was their own clinical time, which they felt prevented them from providing "reliable follow up." They recognized that effectively treating patients with concomitant cirrhosis and AUD required a significant investment of time:

The trouble is we just don't have 45 minutes to sit down with a patient and go over everything and tell them exactly what to do.
(Participant 2, MD, Gastroenterology/Hepatology)

For clinicians that practiced in an acute care setting, this notion of time as a limited resource was especially pronounced. One participant said the following regarding building relationships with patients admitted to acute care units:

It is a challenge in acute care because we only see them for such a short snippet of time. We can't build that relationship, follow that relationship through, and see it to the end. We're really trying to put a Band-Aid on something that needs an abdominal pad because we see them for such a short time period. (Participant 13, NP, Gastroenterology/Hepatology).

This sentiment was echoed by those in specialist settings who expressed concerns over providing reliable timely follow up in the context of pharmacotherapy for relapse prevention:

It's not really a drug I want to be prescribing myself from a practice management standpoint…because if there is an issue, they're going to be able to see their primary care provider way easier than seeing me just by volume and access.
(Participant 12, MD, Gastroenterology/Hepatology)

Struggles with "workload management" were also found to impede participant's ability to provide the additional supports they deemed necessary for their patients. They noted that coordinating psychosocial services was difficult to achieve in a timely manner, with one participant saying, "it's actually a disservice because it's hard to target therapy because of that." Another participant noted that medication for relapse prevention "don't work on their own" and interventions like "cognitive behavioural therapy" are important to achieving the best outcome in patients but "getting both of those pieces coordinated together" was a "challenge."

Participants also felt that a shortage of manpower affected their care of patients with cirrhosis and AUD. Participants who worked as PCPs in the community spoke about the perceived inability to refer patients to see a liver specialist as they "wouldn't see just anyone due to the sheer volume of patients". This extended to a perceived lack of addiction medicine support. One participant stated:

> *I don't really have anybody accessible to me that I can say to my patient, 'oh this person is willing to see you urgently.' It's really hard for them to get in to see somebody.* (Participant 4, MD, Gastroenterology/Hepatology)

Similarly, another participant acknowledged how providing care in a rural area further limited the support they could provide:

> *Endemic to my zone is the sense that it's very poorly funded and it lives between two giant polarities. And when you don't have the tools, you often become really resistant to*

opening those doors anyways, because you feel like you don't know where to go with it, it just becomes overwhelming.

(Participant 3, MD, Gastroenterology/Hepatology).

Others who provided care for individuals in rural settings further expressed that limited services in these communities makes it challenging to access addiction medicine in particular. One participant commented:

We service a large population outside the city, so being able to do outreach to the different facilities or different cities or towns themselves would be helpful. But it's challenging with only a limited number of resources.

(Participant 4, MD, Gastroenterology/Hepatology).

Participants also described systems challenges including role clarity and the confusion about which provider should initiate and maintain AUD treatment for patients with cirrhosis. Several participants who practiced as liver specialists felt that treatment was beyond their role as "the alcohol use is well established" by the time they see the patients. This sentiment was similar regarding prescription of pharmacotherapy for relapse prevention, with most liver specialists indicating that they were not comfortable initiating them because "it's very hard to see these patients for follow up in three to four months' time". They felt that their inability to provide timely follow up made it risky for patient's overall health if they experienced an "issue with the medication". Several specialists did, however, indicate that they would be inclined to initiate pharmacotherapy for relapse prevention "if [a patient] is in a steady state and the family doctor can continue the refills".

For most PCPs, these perceptions about whose responsibility it is to care for patients with AUD and cirrhosis, led to mixed feelings regarding their role. One PCP said the following about feeling equipped to support patients with AUD and cirrhosis:

> *Part of me thinks like in a perfect world, there'd be some sort of place where I'd send them and somebody else would deal with them. But that's not fair because as a primary care practitioner, we know in the evidence that the very best place they receive care is with their family doctor at a place that they feel comfortable. So, though I would love to be able to pawn someone out, that's not fair and that wouldn't be in my patient's best interest.* (Participant 10, MD, Primary Care).

Deciding who is responsible for caring for patients with AUD and cirrhosis was an issue identified by a number of participants. Division of liver care from the AUD care was described by specialists and PCPs, with many acknowledging time constraints with specialists as a major factor, but realizing many things get "dumped" onto primary care to manage.

3.3.3. Theme #3: Balancing the complexity of cirrhosis and AUD

Apart from identifying personal and system-level barriers to effectively caring for patients with AUD and cirrhosis, participants also discussed challenges in the concurrent management of the conditions. Multiple participants described the often-high acuity of patients with concomitant cirrhosis and AUD and how this impacted their approach to care:

> *I think one of the biggest hurdles is that these patients are quite sick, and their body is more fragile, and so these hits that normally people would bounce back from, they just take longer to bounce back from.* (Participant 1, MD, Primary Care).

Similarly, another participant shared "I'm just trying to deal with the biggest thing" with AUD "sort of on the backburner, it's like when you feel better, we can get you on that". They acknowledged that this acuity also influenced their willingness to prescribe pharmacotherapy for relapse prevention. One participant shared:

> *A lot of my patients, when they wind up seeing me in the clinic, have very advanced cirrhosis…where my choices are very, very limited. I don't see a lot of people now that are Child Pugh A [i.e., the absence of liver related complications] …it's just sort of the way the practice is.* (Participant 12, MD, Gastroenterology/Hepatology).

Participants not only discussed the need for consideration of the severity of the patient's cirrhosis when planning treatment, but also the consideration of the severity of AUD. For patients with severe AUD, care was perceived as more challenging with one participant stating:

> *The biggest challenge in some of these folks is, it's not even the use, I can handle the use piece…it's just the behavioural piece, which makes lives chaotic and makes it hard to relate to people and makes them sometimes unreliable and just makes them fragile and their health very precarious. And they fall, and they fall back down into a dark place, a tunnel, a place that I can't find them. And then they show up in hospital and I haven't*

been able to track them down for six or eight months…. I think that's the biggest challenge. (Participant 3, MD, Gastroenterology/Hepatology)

Participants also shared how "patient motivation" and "initiative" served as an impetus for initiating treatment. One participant reflected on the importance of patient responsibility and how "it sort of establishes itself really quickly, those that are going to be motivated and self-starters". Others considered patient "compliance" with lab tests, appointments, and previous medication as indicative of that patient's eligibility to receive treatment for their AUD. However, participants also expressed the difficulty of living with AUD, remembering "it is an illness" and it "is not easy" to maintain abstinence. One participant reflected on this balance between understanding and being honest with their patient regarding their alcohol use:

Being empathetic is one thing but we can't be delusional in thinking that we can massage the reality for our patients. Say if I tell you that alcohol is not the problem, maybe they will change. No, we have to be honest with our patients.
(Participant 14, MD, Primary Care).

3.3.4. Theme # 4: Acknowledging the influence of provider perceptions on care

Participants approach to caring for patients with AUD and cirrhosis was influenced by their formal medical education, personal perceptions of addiction, and culture of the organizations in which they practiced. Participants acknowledged how "massively stigmatized" liver disease was, with AUD tending to compound this stigma. One participant noted that "there's a lot of prejudice among physicians about these conditions" adding that the burden can feel worse for patients "who must carry that stigma with them."

Several participants also spoke about stigmatized attitudes toward patients with cirrhosis because of their alcohol dependence and perceived 'worthiness' of those patients for other services. They believed that these attitudes would lead to a cascade of events in which future encounters a patient had with the healthcare system would be colored by judgement from other healthcare providers. One physician reflected on how this affected the patient's journey through the healthcare system:

> *There's a lot of assumptions [about patients with AUD and cirrhosis]-they're not a transplant candidate, they're not an ICU candidate, they're not going to follow-up, so what's the point in giving recommendations? It's very, very disheartening.*
> (Participant 9, Gastroenterology/Hepatology)

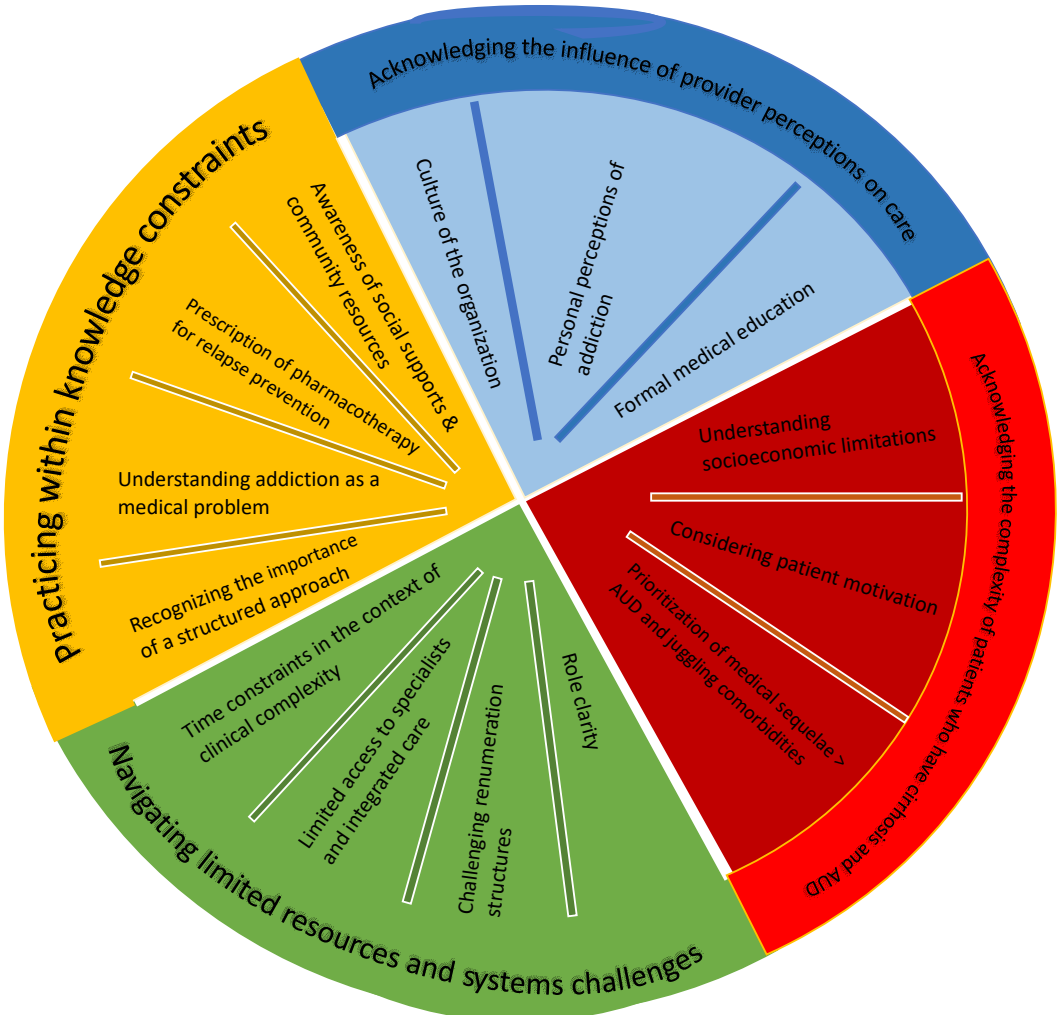
While personal perceptions and organizational culture influenced care of patients with AUD and cirrhosis, participants also noted differences in care according to the career stage of the clinician. This not only affected willingness to use of pharmacotherapies for relapse prevention, but also colored their interactions with patients and their understanding of AUD as a "brain-body" disease. One physician who recently completed their training commented on this, saying:

> *I think it's a generational thing as well, this concept of using agonist therapies or partial agonist therapies like anti-craving meds, wasn't really something that was done even before the opioid crisis…you had to have a license to put people on suboxone. And the same thing happens with other substance use disorders. People tend to continue to*

practice the way they were trained, and the way most people were trained was heavily focused on abstinence. (Participant 1, Primary Care Provider)

This was reinforced by a provider who was in the later stages of their medical career, who acknowledged the evolving nature of caring for patients with AUD and the field of addiction, saying "it has come a long way." Although participants appreciated the influence of the "social aspects" of AUD like poverty, unemployment, and trauma, they acknowledged the tendency for most clinicians to "deal with [AUD] in a very medical way."

Figure 4. Major themes and codes



3.4. Discussion

Though there have been several studies of clinician practices, knowledge, and attitudes towards patients with cirrhosis and AUD [10, 133], to our knowledge our study is the first to qualitatively explore the experiences of clinicians working with this group of patients. The participants in our study described a number of challenges, and recognized the importance of providing person-centered, continuous care considerate of the medical complexity, motivation, and support systems available to the patient. Participants acknowledged that managing AUD and cirrhosis requires an understanding of the nuances of both conditions and the processes and factors that influence them. However, limited training, research and understanding of the physiological processes of AUD and its relevance to cirrhosis complications adds complexity which, for many of our participants, made it harder to manage either condition. Awareness of existing stigma by healthcare providers and the medical system were also brought forth by several participants as a factor preventing effective care of people with concomitant AUD and cirrhosis. Acknowledging the pervasiveness of stigma, readers will note that even within this manuscript, some quotes reflect disempowering language and attitudes.

A prominent finding of this study was the relative lack of training clinicians receive about caring for patients with AUD. This is congruent with data suggesting that less than 16% of clinicians report receiving adequate addiction medicine training either in medical school [161] or in their fellowship programs [133]. A report by the National Centre for Addiction and Substance Abuse at Columbia University has advocated for more addiction training "at every level – in medical school, residency training, continuing education and in practice" to prepare current and future clinicians to deal with all aspects of substance use disorder management [162].

Clinicians not surprisingly described feeling ill-equipped to employ standardized screening tools and brief interventions in their treatment for patients with AUD. Despite well-established clinical practice guidelines [71, 98, 163] that suggest screening, brief intervention, referral to treatment [111] and prescription of pharmacotherapy for relapse prevention, few clinicians in our study described using this approach. These findings align with previous research that found that less than 40% of clinicians use a validated measure to screen for AUD [164]. With a high specificity and sensitivity to identifying AUD, validated screening tools [165] are important tools to avoid missing patients with milder use and falsely diagnosing a patient with AUD, a mistake that can occur when using clinical intuition alone [166, 167]. In a meta-analysis by Mitchell, Meader, Bird and Rizzo (2012) clinical judgement resulted in the incorrect diagnosis of AUD in 50% and 60% and of patients among hospital staff and PCPs , respectively [167]. A structured approach to brief interventions can reduce alcohol consumption [168]. At a systems-level, this can be supported by the integration of validated screening measures into electronic medical record systems. This increased screening rates for AUD (73.9%) [169] compared with the typical population (~25% in some data captured in the United States) [153]. Similar findings were observed with integrated reminders to conduct a brief intervention for patients with excess alcohol use [170].

Similar to screening and brief interventions, research also supports the effectiveness of pharmacotherapy for relapse prevention in reducing hepatic decompensation and long-term mortality in patients with cirrhosis and AUD [9, 53, 63, 92, 171-173]. Both specialists and PCPs in our study shared their hesitancy in prescribing these medications as they had concerns with their inability to effectively monitor patient progress due to short appointment times with long waitlists for follow-up. This was consistent with other studies, which reported a short

appointment window and inability to maintain follow up as the biggest hurdles to providing substance use disorder care [174-177]. This hesitancy was further compounded by the perceived lack of availability of addiction medicine services that could enable long-term follow up with a greater focus on the unique medical and psychological needs of these patients.

Clinicians in our study acknowledged that for many patients, AUD was the root cause of their medical comorbidities like cirrhosis. However, they described prioritizing treatment of medical sequelae like gastrointestinal bleeding, ascites, and hepatic encephalopathy over AUD, as those most significantly affected patient acuity. Indeed, some shared their hesitancy to initiate treatment for AUD unless patients were compliant with treatments for their comorbidities, like routine lab testing and lactulose therapy for hepatic encephalopathy. Several clinicians, both PCPs and specialists, expressed uncertainty about who should initiate treatment for the AUD. Specialists shared concerns about initiating treatment as they felt that due to long waitlists they could not provide timely follow up to monitor progress with prescribed AUD treatments. PCPs shared that they were often hesitant to initiate treatment because of the patient's medical complexity, particularly their impaired liver function and tolerance of pharmacotherapeutics for AUD. Issues of role clarity, particularly who should initiate treatment for AUD, remain relatively unexplored in the literature. While there are several studies that explore the roles of PCPs and specialists who care for patients with cirrhosis and AUD, we were unable to identify any that specifically explored issues of role clarity in concomitant cirrhosis and AUD (43-45). Given the increasing prevalence of AUD and cirrhosis, further exploration and explication of clinician roles is warranted.

Stigma from healthcare providers has been found to significantly contribute to negative perceptions of people with substance use disorders and sub-optimal care [178, 179]. Although several participants acknowledged existing personal and systems-level stigma towards individuals who have substance use disorders (including AUD), the views expressed in the interviews suggest significant work needs to be done to reduce stigma and improve outcomes and experiences for people affected by substance use disorders. Stigmatized language used to describe the pathophysiology of AUD (e.g. "revolving door"), people with AUD (e.g. "alcoholics"), and treatments were not empowering.

The majority of the clinicians we interviewed practiced in an urban setting with access to a tertiary care center with specialized gastroenterology and addiction medicine services. Despite this proximity, they expressed challenges in accessing these specialized services, including a lack of integration between these services and perceived paucity of addiction medicine specialists. This was amplified for clinicians who practiced in rural settings who noted limited access to specialized care, including behavioral therapy. These findings are congruent with the literature which notes significant differences in the treatment of patients for AUD in rural and urban settings [151, 180-183]. Though it may not be feasible to increase rural access to supports for patients with AUD, an increased awareness and visibility of processes to access these supports for both specialists and PCPs will no doubt benefit patients with AUD and cirrhosis.

3.5. Limitations

Our study has several limitations. First, the participants of this qualitative study were clinicians recruited via convenience sampling based on their involvement in a broader provincial quality improvement initiative aimed at improving cirrhosis care for patients in Alberta[157]. Clinicians not

directly involved in this initiative may have had different experiences in providing care to patients with cirrhosis and AUD. Second, the sample in this study was relatively homogenous, with the majority of participants being gastroenterologists/hepatologists (75%) and from urban practice zones (69%); more work is needed to understand the unique experiences of clinicians practicing in non-urban settings or in primary care or internal medicine. Third, clinicians who were interviewed were established in their professional roles; it is possible that learners (residents, fellows, etc.) have different experiences and perceptions than those who have already achieved their professional certification.

3.6. Conclusion

This qualitative study highlights the complexities of caring for patients with concomitant cirrhosis and AUD. In caring for this unique patient population, clinicians face a myriad of challenges including limited knowledge and limited comfort with structured approaches to screening, brief intervention and treatment, inadequate access to timely resources, and competing medical sequelae that also require their attention. While identifying solutions to some of these challenges is difficult, there are tangible interventions that can be used to increase clinician knowledge on the screening, brief intervention and treatment of patients with cirrhosis and AUD. Future research should explore the effectiveness of educational interventions in improving knowledge across a range of providers, and the potential impact this has on care for patients with concomitant cirrhosis and AUD.

CHAPTER 4: THE DEVELOPMENT AND EVALUATION OF A PROVIDER-FOCUSED EDUCATIONAL INTERVENTION ABOUT ALCOHOL USE DISORDER IN PATIENTS WITH CIRRHOSIS

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4. Abstract

Background and Aims: Alcohol use disorder (AUD) is a leading cause of liver cirrhosis. Insufficient clinician knowledge and comfort managing AUD impacts the number of patients with cirrhosis receiving treatment. We aimed to (i) develop and evaluate the effect of an AUD in cirrhosis educational intervention on knowledge, attitudes, and practice habits among medical clinicians, and (ii) assess clinicians' perceptions of the learning environment using Self Determination Theory (SDT), a theory of human motivation.

Methods: We used Kern's approach to curriculum development. Pilot session feedback informed a 3-part flipped-classroom series conducted by interdisciplinary clinicians in hepatology, psychiatry, family medicine, and addiction psychology. Participants watched a video followed by a live session focused on (a) withdrawal, (b) screening and brief intervention, and (c) prescribing pharmacotherapy. Questionnaires assessed knowledge and practice habits. Attitudes were evaluated using the Short Alcohol and Alcohol Problems Perception Questionnaire (SAAPPQ). Perceptions of the learning environment as competence, relatedness, and autonomy-supportive were informed by SDT.

Results: Paired sample t-tests on pretest-posttest questionnaires (n = 229 clinicians; 95 completed questionnaires) revealed significant improvements in preparedness and comfort in screening, providing a brief intervention, prescribing pharmacotherapy, and SAAPPQ domains. No significant changes were observed in intention to prescribe pharmacotherapy. Effect size analysis showed medium to large effect across all topic areas.

Conclusions: The developed sessions improved knowledge, attitudes, and practice habits of medical clinicians caring for this patient population. Given the rise in AUD and significant consequences this may have in cirrhosis, this data offers promise that interactive education may improve practice habits of interdisciplinary clinicians interfacing with this patient population.

Keywords: alcohol use disorder; cirrhosis; alcohol-related cirrhosis; training; clinician education; curriculum development

4.1. Introduction

Alcohol use disorder (AUD) is a major contributor to global morbidity and mortality. More than 107 million people have AUD, and >180,000 die as a direct result every year[44]. The prevalence of AUD in Canada is rising, due in part to the psychological and socioeconomic impact of the COVID-19 pandemic[31]. Even so, AUD is under recognized and under treated[8].

A common clinical consequence of AUD is cirrhosis, affecting 10-25% of individuals with AUD [184, 185]. It is predicted this will increase, with over 15% of people per capita living with alcohol related liver disease (ALD) by 2040[147]. This is projected to represent over 5%[186] of a primary care physician's patient list, and 30% of gastroenterology and hepatology referrals[187].

Clinical practice guidelines from the American Association for the Study of Liver Disease (AASLD) have stressed the importance of considering not only the management of liver complications (e.g., gastrointestinal bleeding) but also interventions that address alcohol consumption[71, 98]. This includes routine screening using a validated measure, conducting brief interventions, and referring to behavioral therapy. This approach is collectively referred to as SBIRT (Screening, Brief Intervention, and Referral to treatment)[71, 95, 111]. Though traditionally intended for mild to moderate problem severity, enhancing SBIRT skills amongst non-addiction medicine providers (primary care and liver specialists), and increasing comfort with the prescription of pharmacotherapy for relapse prevention, could potentially reduce treatment gaps for people with severe AUD. This is especially important in sites such as our own where access to addiction medicine services is limited and no integrated clinics (i.e., where liver and alcohol care are integrated) exist[188-190].

The literature demonstrates major gaps in care in patients living with coexisting AUD and cirrhosis[8, 9]. Less than 25% of gastroenterologists/hepatologists use a validated AUD screening measure in their practice[191] and few diagnose AUD in patients with ALD despite a long history of alcohol use and no other identifiable cause[66]. Brief interventions also remain underused and undocumented in healthcare settings[78] despite evidence that these interventions reduce alcohol intake and improve quality of life[81, 85, 192]. Across the majority of sites, a minority (<15%) of patients with cirrhosis receive pharmacological or behavioral treatment for their AUD[9, 193]. Even within a coordinated single-payer healthcare system such as the Veteran Health Administration (VHA) in the United States, a chart review study (n=652) found that 64% of Veterans with concomitant ALD and AUD were offered AUD treatment in the form of behavioural of pharmacologic therapy, but only 40% of them followed up with these treatments within 3 months[125]. Factors related to patient acuity and age[125], lack of clinics where AUD and liver care are integrated, limited research, and time and human resource constraints have been identified as major barriers to providing this treatment[9, 11, 125].

Previous research indicates that limited exposure to alcohol related content in medical education are barriers to clinician's provision of AUD treatment in their patients with cirrhosis[10]. Medical students report receiving <20 days of AUD related content in their program [10] and >50% of liver specialists feel they need additional training to prescribe pharmacotherapy for relapse prevention[133]. Guidelines also recommend patients with liver disease be counselled about the risks of alcohol and importance of abstaining from alcohol,[97] highlighting the importance of education as a tool to address the disparity between access to AUD treatment for people with cirrhosis[194]. Some research examined outcomes associated with medical education about

substance use disorders (SUD), finding the learning environment can impact clinician's experiences and motivation to change practice[195]. Self Determination Theory (SDT) is a motivational theory that has been used to assess motivational impacts of learning environments. SDT proposes the quality and engagement in learning will be greater when educational environments support basic psychological needs for autonomy, competence, and relatedness.

Overall, AUD is an underrecognized and poorly addressed condition among patients with cirrhosis despite guideline recommendations. The purpose of this study was to develop and evaluate an educational intervention focused on screening, brief intervention, and prescribing pharmacotherapy for relapse prevention in the context of cirrhosis.

4.2. Methods

4.2.1. Study setting

This work is part of a broader quality improvement initiative called Cirrhosis Care Alberta (CCAB) which aims to improve care for individuals with cirrhosis by implementing a standardized inpatient order set, developing clinician resources, and disseminating patient education[157]. AUD was a top priority identified by project stakeholders, and appropriate resources were dedicated to improving knowledge, attitudes, and comfort managing AUD in patients with cirrhosis. This was especially important across the study site because access to addiction medicine is limited and no clinic where integrated liver and alcohol care exists[188-190].

4.2.2. Framework for curriculum development

This was a single group pretest-posttest intervention study of an educational curriculum for clinicians focused on managing AUD in people living with cirrhosis conducted between Spring 2021 and Winter 2022. Kern's 6-Step Approach to Curriculum

Development for Medical Education was used to systematically address the needs of potential learners and develop objectives and educational strategies for the intervention[135]. This included the following 6-steps:

4.2.2.1. Step 1: Problem identification and general needs assessment

Through the baseline assessment as part of CCAB, including informal discussions and focus groups, our stakeholders identified AUD as a key gap in care in patients with cirrhosis, and asked for clinician level interventions to increase knowledge around SBIRT and the prescription of pharmacotherapies for relapse prevention[157]. We carried out a literature review on AUD in cirrhosis to supplement the general stakeholder needs assessment. Topic areas included pharmacotherapy for relapse prevention in people with cirrhosis, behavioural therapy for AUD, AUD screening measures, educational interventions about AUD for clinicians caring for patients with cirrhosis, and qualitative and survey studies amongst clinicians caring for patients with cirrhosis and AUD.

4.2.3. Step 2: Targeted needs assessment

Using this information, we conducted a qualitative assessment of clinicians' perceptions, experiences, and perceived barriers to caring for people with cirrhosis and AUD, with a focus on SBIRT and pharmacotherapy for relapse prevention. A diverse range of clinicians, including PCPs, gastroenterologists/hepatologists, and internists in various roles and locations were interviewed via semi-structured interviews with questions developed from findings of the general needs assessment. This study identified clinician limited knowledge about AUD interventions, often high complexity of patients with

cirrhosis, and resource limitations as major barriers to provision of AUD care in their patients with cirrhosis[11].

After identifying knowledge as a major barrier, we created a presentation using content from the literature search, clinical practice guidelines, screening and brief intervention approaches, and pharmacotherapies for relapse prevention. This content was piloted in a 1.5-hour didactic session conducted by a specialist in addiction medicine (SMG) and a hepatologist (PT) with question and answer in Spring 2021 (See objectives: Table 17). The main thing we wanted to check with the pilot was if comfort, intention, and preparedness to screen, provide a brief intervention, and prescribe pharmacotherapy for relapse prevention improved following the intervention. The pilot succeeded in improving these post-test changes among a group of clinicians caring for patients with AUD and cirrhosis (Table 18) so we adapted the intervention to target a broader audience and promote interactivity between participants and speakers.

4.2.3.1. Step 3. Goals and Objectives

Goals and objectives were developed for an adapted intervention alongside the Physician Learning Program (PLP) at our institution. The PLP works with clinicians, teams, and patients to develop and implement tools and resources that support meaningful change in health systems[196]. Working with the PLP gave us access to a broader range of clinicians, a structured team of educational implementation experts, and a means to accredit the sessions. Alongside the PLP, we recruited a 6-member planning committee composed of family physicians, and specialists in education, addiction medicine, and hepatology. The committee met three times over 2 months via Zoom and used additional email

communication to develop specific objectives (Table 12). While not identified in the pilot, this committee, which also had representation from our intended participants, felt it was important to add content about identifying and treating alcohol withdrawal and an objective was created.

Table 12. Goals and objectives of the adapted educational intervention

	Objective
Session 1: Alcohol use disorder 101	Explain the biological process of alcohol use disorder as a brain disease Review existing literature on healthcare practitioner attitudes towards patients with alcohol use disorder Describe the multi-system consequences of alcohol use disorder
Session 2: Screening, brief intervention, and patient centered goal setting	Describe the AUDIT-C and how it can be used to provide patient-centered feedback Apply motivational interviewing skills and use interactive tools (e.g., decisional balance table, scaling) with patients diagnosed with alcohol use disorder Provide patients with a menu of therapeutic options depending on their readiness to change (e.g., managed alcohol use to abstinence)
Session 3: Pharmacotherapy and behavioural therapy	Describe the risks and benefits of selected anti-craving pharmacotherapies and positively impact their intention to prescribe these agents in practice. Describe the advantages of concurrent behavioural and pharmacological therapies Discuss first line therapies for concurrent anxiety, depression, or sleep disturbance in patients with alcohol use disorder and liver disease. Explain the nuances of treating alcohol use disorder in unique populations (e.g., poly-substance use, geriatrics, and people experiencing houselessness).

4.2.3.2. Step 4. Educational Strategies

The adapted sessions were carried out in Winter of 2022 using a flipped classroom approach;[197] a strategy characterized by blended learning where participants are exposed to content on their own time followed by time for practice and time to apply learnings,

ask questions, and gain feedback on their performance[197]. Content was adapted from the pilot into three unique sessions, (i) Alcohol Use Disorder 101, (ii) Screening, Brief Intervention (Motivational Interviewing) and Patient Centered Goal Setting, and (iii) Pharmacotherapy and Behavioural therapy.

4.2.3.3. Step 5. Implementation

The adapted sessions were accredited by the Royal College of Physicians and Surgeons of Canada and the College of Family Physicians of Canada as continuing medical education with up to three credits per hour. The planning committee identified 5 clinical experts to lead each session:

- Session 1: Family Physician, Addiction Medicine Specialist (JK, SMG)
    - Session 2: Psychologist, Liver Specialist (AF, JM)
    - Session 3: Psychiatrist, Liver Specialist (GSW, JM)

Speakers created a 30-minute video covering the didactic content for each session that was shared with participants via email one week before the live session. The live session was 1 hour in length and involved (i) case presentations, (ii) group breakout sessions with skills practice, and (iii) a question-and-answer period.

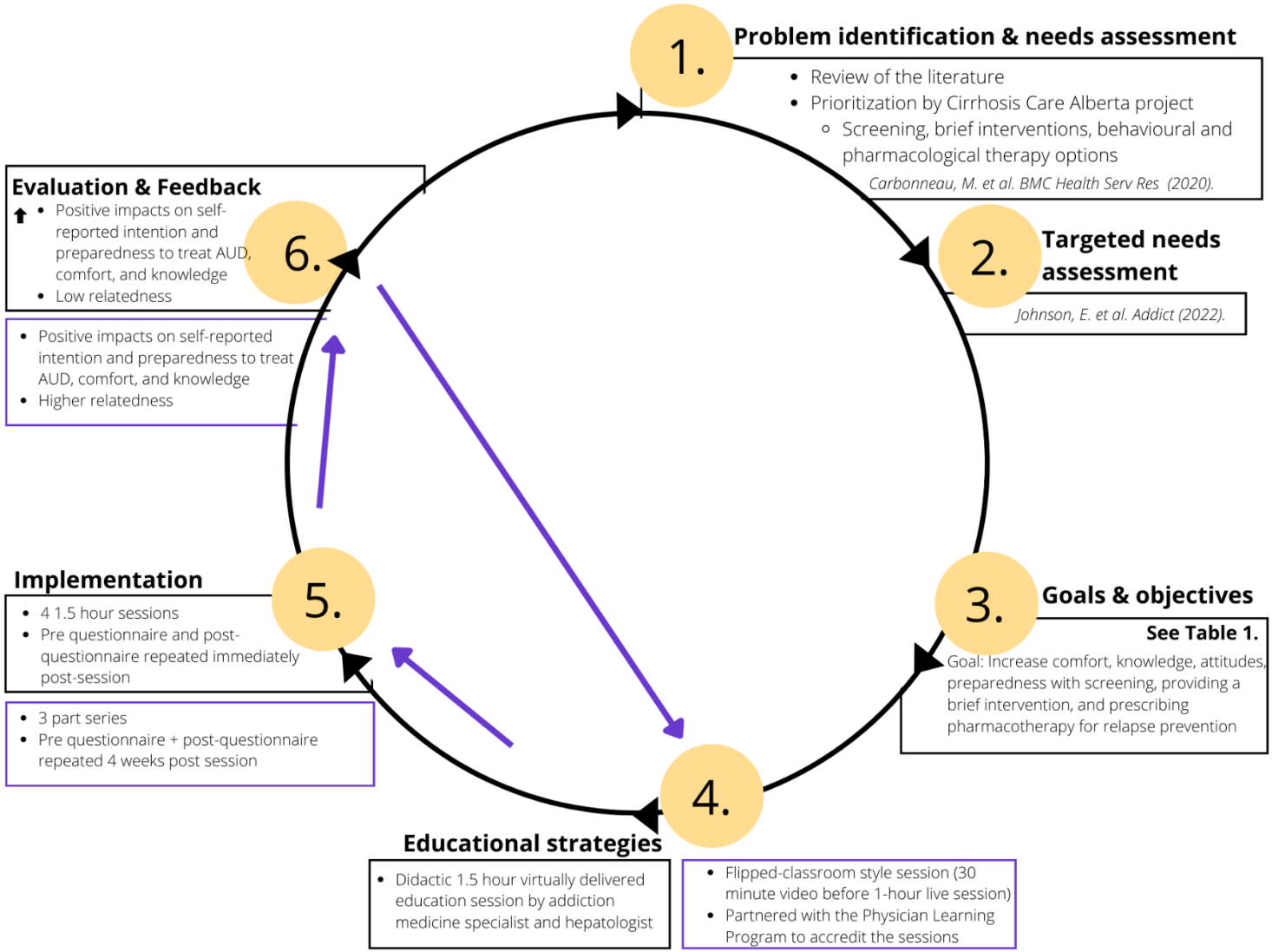
4.2.3.4. Step 6. Evaluation and feedback

Data collection instrument development

Pretest-posttest multiple-choice questionnaires were adapted from the published literature[10, 133, 198, 199] and deployed in both the adapted and pilot sessions. Demographic items included clinician type (physician trainee, physician, nurse, nurse practitioner, other) and location of practice (zone of practice if in Alberta; province or country if outside of Alberta). To assess participants' preparedness to implement AUD care into their practice, questions (4-point scale) were adapted from a study by Wakeman et al that

surveyed internal medicine physicians about caring for people with substance use disorder[198]. To evaluate comfort implementing such practices in care, questions (4-point scale) were adapted from a study by Cotter et al that surveyed gastroenterologists and hepatologists about alcohol-related interventions for patients with liver disease[133]. To measure intention to implement screening, brief intervention, and change prescribing habits for pharmacotherapies for relapse prevention, we included intention questions (7-point scale) adapted from a study by Korttestio et al about providers intention to implement clinical practice guidelines[133, 198, 199]. To measure clinicians' attitudes towards providing care to patients with AUD, we included the 10-item SAAPPQ where five pairs of items assess role adequacy (i.e., feeling right for the job), task-specific self-esteem (i.e., self-esteem about ones work), motivation (i.e., motivation to care for patients with AUD), role legitimacy (i.e., feeling like asking about AUD is part of their role), and satisfaction (i.e., feeling satisfied with one's work with patients who have AUD)[200]. These questions were altered to reflect patient centered language (i.e., 'alcoholic' exchanged for 'patient with alcohol use disorder.'). Items in the final questionnaire were divided into three domains (i) knowledge, (ii) attitudes, and (iii) practice habits (comfort, preparedness, and intention). Twelve additional questions included in the post-questionnaire informed by SDT were used to understand clinicians' perceptions of the learning environment and motivation to implement AUD practices into routine care in their patients with cirrhosis[143].

Table 13. Application of Kern's 6-step framework for curriculum development



Data collection procedures

All questionnaire data was captured and measured using REDCap electronic data capture tools hosted at the University of Alberta[201, 202]. All participants gave informed consent after receiving full information about the study objectives and content. Participants registered through a database stored at the PLP. Their email address was then entered into RedCap and anonymized using a unique participant ID connected with this email address in the PLP database. were emailed the pre-questionnaire and video one week before the live session. The post-survey was sent to participants four weeks following the live session to allow for time to put learnings into practice and reflect on how the session impacted their practice.

Data analysis and sample size

We used Statistical Packages for the Social Sciences (SPSS) for Windows version 24.0[203] for descriptive statistics to describe the study population (count, percentage), survey results (mean, standard deviation, effect size), and paired t-tests to evaluate post-intervention changes in knowledge, attitudes, and practice habits. We set statistical significance at $p<0.05$. The normality of all survey measures was examined using histograms and Q-Q plots. The target sample size was set to at least 50 participants, similar to other research in this area [12, 118, 204].

Participant recruitment

Participants were recruited via email, continuing medical education event calendars, and institutional networks in the five Alberta Health Services (AHS) care delivery zones (North, Edmonton, Central, Calgary, South). We also used social media (e.g., Twitter) to expand our scope. Although sessions were delivered sequentially, interested participants could register for one, two, or all three of the virtual sessions using Zoom.

Ethics

All study procedures were approved by the Health Ethics Research Board at the University of Alberta (Pro008051).

4.3. Results

Two hundred and twenty-nine clinicians (66-89 per session) participated across the three adapted sessions. Ninety-five (95) consented and completed both the pretest and posttest questionnaires. The majority of participants were physicians (59%) and a minority were physician trainees (1%). The majority practiced in Alberta (88%), with some representation from other provinces including British Columbia (2%), Ontario (2%), Manitoba (4%), Nova Scotia (1%) and a few outside Canada (3%) (Table 14).

Table 14. Participant demographics

Variable	N(%)
Clinician type • Physician • Physician trainee • Nurse Practitioner • Nurse • Other/Did not specify	 56(59%) 1(1%) 7(8%) 8(8%) 23(24%)
Location • Alberta • British Columbia • Ontario	 83(88%) 2(2%) 2(2%)

• Manitoba • Nova Scotia • Outside Canada	4(4%) 1(1%) 3(3%)

Results from the questionnaires revealed significant improvements in preparedness to diagnose (pretest *M*=2.56, posttest *M*= 3.47, p<0.001, Cohen's d =1.17) and manage alcohol withdrawal (pretest *M* = 2.23, posttest *M* = 3.26, p<0.001, Cohen's d=1.17) (Table 15) among the 36 participants who completed pretest-posttest questionnaires. Results from the SAAPPQ showed significant improvements in domains of role adequacy, role legitimacy, role support, and work satisfaction (Table 20), among the 36 participants who completed pretest-postttest questionnaires. No significant improvement was noted in the domain of task-specific self-esteem. Significant improvements were found in session 2 in preparedness to screen for AUD and refer patients to treatment with large effect, and in preparedness providing a brief intervention and medical advice with medium effect among the 30 participants who completed pretest-post-test questionnaires. In session three, there was a positive but insignificant improvement in intention to prescribe pharmacotherapy for relapse prevention, and significant improvement in comfort prescribing acamprosate, baclofen, and gabapentin for AUD among the 29 participants who completed pretest-posttest questionnaires (Table 15). Data from SDT questions showed relatedness was the lowest (*M* = 3.4) , followed by competence (*M* = 4.0) and autonomy (*M* = 4.1) (Table 20).Analysis of correlation between basic psychological need satisfaction, revealed significant negative correlations between relatedness and (i) preparedness to refer patients to treatment for AUD (*r* = -.444), (ii) intention to provide medical advice about alcohol (*r = -.410)* , and (iii) comfort prescribing baclofen for AUD (*r = -.599)* (Table 23). Intention to screen every patient for AUD was significantly positively correlated with autonomy

(*r = .442)* (Table 23). Competence was only significantly correlated with the SAAPPQ domain of role adequacy (*r = .454)* (Table 23).

Table 15. Paired t-test pretest and posttest practice habit questions

Adapted Session(s)	N	Pretest Mean(SD)	Posttest Mean (SD)	P-value	Cohen's d
Preparedness (4-point scale)					
Preparedness to diagnose alcohol withdrawal	36	2.56 (0.98)	3.47 (0.50)	<0.001	1.17
Preparedness to manage alcohol withdrawal	36	2.32 (1.07)	3.26 (0.38)	<0.001	1.17
To screen and identify patients with harmful levels of alcohol use	30	3.17(1.10)	3.93(0.40)	0.001	0.92
To provide medical advice and a brief intervention	30	2.50(1.20)	3.33(1.20)	<0.001	0.69
To refer patients to treatment for AUD	30	2.80(1.10)	3.67(0.80)	<0.001	0.90
Intention (7-point scale)					

To screen every patient for AUD	30	4.10(2.10)	5.0(1.80)	0.053	n/a
To provide medical advice about alcohol	30	5.17(1.70)	5.13(2.20)	0.923	n/a
To provide a brief intervention	30	5.00(1.60)	5.4(1.80)	0.010	0.23
To prescribe anti-relapse medications for AUD	29	6.10(1.30)	6.45(1.10)	0.134	n/a
Comfort (4-point scale)					
Prescribing acamprosate for AUD	29	3.00(1.20)	3.51(1.00)	<0.001	0.46
Prescribing baclofen for AUD	29	2.86(1.20)	3.1(1.00)	0.032	0.22
Prescribing gabapentin for AUD	29	2.97(1.10)	3.5(0.90)	<0.001	0.53

Cohen's d interpretation = Small effect = 0.2; Medium Effect = 0.5; Large Effect = 0.8[205]

Table 16. Paired t test on SAAPPQ total score and subscales (7-point scale)

Adapted session Session 1 (n=36)	Pre-mean (SD)	Post-mean (SD)	P-value	Cohen's d
Total	4.91(0.88)	5.44(0.91)	0.05	0.7
Role adequacy	4.60(0.75)	5.73(0.65)	<0.001	1.6
Role legitimacy	4.96(0.80)	5.65(0.90)	<0.001	0.81
Role support	5.20(1.30)	5.59(1.00)	0.012	0.34
Task-specific self-esteem	5.22(0.70)	5.33(1.15)	0.532	n/a

Work satisfaction	4.57(0.85)	4.89(0.85)	0.034	0.38

4.4. Discussion

We report on the development and impact of an educational intervention on clinicians' attitudes, intention, comfort, and preparedness to screen with a validated measure, conduct a brief intervention, and prescribe pharmacotherapy for relapse prevention. The main offerings of our study are three-fold. First, we provide a description of the process of curriculum development using Kern's approach. Second, we demonstrate a positive impact on attitudes, preparedness, and comfort in screening, providing a brief intervention, and prescribing pharmacotherapy. Third, we included Self Determination Theory as a novel framework to evaluate an educational intervention about AUD in cirrhosis.

These findings should serve as a strong indicator of the value of implementing future training programs for medical clinicians managing AUD in patients with cirrhosis to help address the treatment gap for screening, brief intervention, and provision of behavioural and pharmacological therapy.

To our knowledge, this is the first study to use Kern's six-step approach to curriculum development to develop, implement, and evaluate the effect of an educational intervention specific to clinicians' provision of AUD care in people with cirrhosis. Through a targeted needs assessment, barriers were identified including limited resources, perceptions and previous experiences, and patient acuity[11]. By following the step wise approach described by Kern, the specific needs of our target population were identified, such as underlying attitudes, which led us

to include questions on attitudes and devoting portions of the curriculum to impacting them. The cyclical approach of Kern's framework provided the opportunity to pilot curriculum content to check if we could impact attitudes, comfort, and preparedness to implement AUD practices in patients with cirrhosis. The positive findings led to us using a flipped classroom strategy which gave participants the opportunity to review didactic information before a live session where they applied their learnings. This was chosen to enhance relatedness and build on current literature which supports the positive effect of flipped classroom strategies[197, 206]. The flipped classroom model encourages participants to undergo learning outside at their own pace, thereby allowing instructional time to be allocated towards more engaging educational experiences, and to enhance interaction and relatedness among participants[197]. In a meta-analysis by Hew and colleagues, a significant effect on knowledge and skills was observed among health professionals exposed to a flipped classroom strategy when compared to traditional learning[206]. Consistent with the literature, these flipped classroom sessions received high satisfaction scores, and participants felt "confident" and "more empathetic" towards providing care to their patients with AUD (See Table 21 for more).

Using Kern's framework and adopting a flipped classroom approach positively impacted knowledge, attitudes, and practice habits. Over the three sessions, 229 clinicians enrolled. In the 95 who completed the surveys, significant improvements were noted in preparedness to (a) diagnose and manage alcohol withdrawal, (b) screen and diagnose AUD, (c) provide a brief intervention, and (d) refer patients to treatment for AUD. Interestingly, responses at baseline suggested that participants were fairly prepared to implement these practices prior to the intervention, with an average score of 2.8/4 (1=unprepared, 2=slightly unprepared, 3=slightly

prepared, and 4=prepared). There were also significant improvements in comfort prescribing acamprosate, baclofen, and gabapentin for AUD. At baseline, clinician scores reflected the lowest amount of comfort with the prescription of pharmacotherapies for relapse prevention, particularly baclofen. This is of interest given that baclofen is the only medication studied via randomized controlled trial in people with cirrhosis[207]. An insignificant improvement in intention to prescribe pharmacotherapy for relapse prevention was also noted despite significant improvements in comfort prescribing all three medications. This could be explained by the period between curriculum implementation and posttest completion, where participants reflected on their intention to implement these learnings into practice and additional barriers, such as the systemic barriers identified in the targeted needs assessment, impeded this intention. This relationship between comfort and intention to change prescribing habits is worth further exploration. Results from the SAAPPQ evaluating attitudes indicated improvements from pretest to posttest training across the five domains of the SAAPPQ subscales, with statistical significance found in four.

This intervention was novel in its inclusion of Self Determination Theory to assess clinicians' perceptions of the learning environment and served as a useful lens to develop the intervention. To maximize relatedness-support, we adopted a flipped classroom approach to give participants the opportunity to interact with other attendees and speakers via case-based discussions and breakout sessions. To maximize competence-support, education was provided via video with external resources (www.cirrhosiscare.ca) that participants could continuously consult. To support autonomy, the speaker line-up was diversified to include clinical experts in addiction medicine, hepatology, and primary care to target more clinicians and ensure content was relevant

to a variety of individual specialties. SDT encouraged us to adopt a flipped-classroom approach following low relatedness scores in the pilot, which improved in all sessions in the adapted series. Correlation analyses revealed few positive correlations between basic psychological need satisfaction and positive posttest changes. Our participants were heterogenous in that they were from a variety of backgrounds (social work, addiction, family medicine, etc.). More purposeful marketing and selection of participants could have improved the effects of the intervention. By adopting SDT, we better understood the complexity of education and the limitations of didactic teaching, especially at a time when virtual education is being delivered. Exploring way to adapt the educational intervention to maximize basic psychological need satisfaction and exploration of their correlation with posttest scores changes for similar clinical-level educational interventions would be beneficial.

4.5. Limitations

Several study limitations are noted. First, we used a single-group pretest-posttest pre-experimental design. The nature of this design limits the interpretation of our findings, as other factors beyond exposure to the educational intervention could have accounted for changes in knowledge, attitudes, and practice habits. One individual who attended the pilot sessions also attended the adapted sessions, so can be considered as having two doses of the intervention. Second, to engage a broad range of participants involved in the care of patients with cirrhosis and AUD, the invitation was extended to clinicians across family medicine, gastroenterology and hepatology, as well as allied health professionals. It is possible that more targeted sessions developed to the needs of each of these participant groups may have seen a greater impact. Moreover, speakers from outside of Alberta were included to ensure a range of expertise, particularly with integrated cirrhosis and AUD care. As a trade-off to this international lineup,

speakers may not have been aware of the specific nuances, pathways, and resources available to the 88% of clinicians who were from the Alberta context. A pairing of international and local speakers may serve to address this in future sessions. Additional factors related to the questionnaire may limit the generalizability of our findings. Though the response rate (41.5%) was satisfactory for survey studies done with clinicians in the health care setting[208], the results represent less than half of the participants who participated in the intervention and missing responses may have impacted the results. Additionally, the questionnaire used multiple choice answers for participants to self-report their knowledge, practice habits and attitudes, but we were unable to evaluate whether actual practice changes took place. Furthermore, participants were heterogenous (i.e., a portion were not physicians or nurse practitioners) and so content and practice changes may not have been as apparent in these participants. To address this, we gave individuals the opportunity to indicate that an item in the questionnaire did not apply to them. Additionally, while a validated measure (i.e., SAAPPQ) was used to evaluate changes in attitudes towards patients with AUD, there was no available validated measure to evaluate changes in preparedness, intention, and comfort. We took measures to mitigate this by using questions from other studies evaluating clinicians' knowledge, comfort, and preparedness towards caring for patients with various substance use disorders. Additionally, participants completed the post questionnaire 4 weeks following the intervention. Following up at a later time may have given different results with a better presentation of changes in reported knowledge, attitudes and changes in practice habits. Finally, other forms of education, such as online modules, standardized patients, or journal clubs may offer an alternative to flipped classroom approaches. Testing the delivery of AUD in cirrhosis related education in alternative formats is

worth exploring. Understanding the best delivery mode that leads to greatest improvements in knowledge, attitudes, and practices habits, and sustained practice change is worthwhile.

4.6. Conclusions

Our findings suggest that a brief educational intervention was an effective strategy to improve clinician reported comfort, attitudes, and preparedness to implement screening, use brief interventions, and prescribing pharmacotherapy for relapse prevention in their patients with AUD and cirrhosis. As AUD-specific training for clinicians becomes more common across specialties, assessment of the curriculum developed as part of this, and other interventions should focus on long-term and patient-level impacts of an educational intervention. Understanding actual practice changes and impacts on patient care could provide the data necessary to advocate for improved access to education. Targeting other clinician groups and learners (i.e., residents and medical students) with future initiatives could also have impact. Finally, novel approaches to enhance the basic psychological needs of autonomy, competence, and relatedness should be implemented to develop interventions and assess motivation to change practice behaviours. At a time when AUD rates are rising, there is hope that this approach and findings can be used for the development of future educational interventions across the spectrum of undergraduate, post-graduate, and continuing medical education in practicing clinicians.

Chapter 5: DISCUSSION

This thesis discusses a three-part, multi-method study evaluating the development, evaluation, and effect on knowledge, attitudes, and practice habits of a virtually delivered one-and-a-half-hour educational intervention for clinicians about AUD in cirrhosis. This thesis contains to our knowledge, the first independent qualitative study on the perceptions and experiences of clinicians who care for patients with AUD and cirrhosis and describes the development and evaluation of an AUD curriculum for clinicians specific to cirrhosis. Important learnings from this thesis include that: (a) clinician level barriers exist that limit AUD treatment in people with cirrhosis which serve as potential targets for an educational intervention, (b) Kern's framework for curriculum development is an effective way to develop, implement, and evaluate a clinician targeted educational curriculum about AUD in cirrhosis, (c) Self-determination theory supports the assessment and adaptation of an educational intervention about AUD in cirrhosis, and (d) education about AUD in cirrhosis supports positive changes in clinician knowledge, attitudes, and practice habits (preparedness, intention, and comfort).

5. Clinician level barriers exist that limit AUD treatment in people with cirrhosis which serve as potential targets for an educational intervention

To our knowledge this is the first qualitative exploration of clinician's experiences and perceived barriers to caring for patients with AUD and cirrhosis. Clinicians in our study described several factors impacting their provision of AUD care in patients with cirrhosis, including patient acuity and complexity, underlying stigma about AUD and alcohol-related liver disease, perceptions of available resources, and limited knowledge and awareness about behavioural and pharmacological treatments for AUD in people with cirrhosis. Im et al published similar findings in a nationwide survey of liver specialists where low knowledge levels were reported about

FDA-approved pharmacotherapies for relapse prevention and safe alcohol use in patients with cirrhosis[10]. Over 90% of participants in the study by Im et al. desired more education, and authors called for further research and training to increase adherence to clinical practice guidelines which advocate for screening, referral to treatment, and prescription of baclofen or acamprosate for relapse prevention where suitable[10, 71]. Cotter and colleagues investigated this further, using a survey to evaluate attitudes and prescribing practices of pharmacotherapies for relapse prevention amongst transplant hepatologists in the United States[133]. Despite a majority of hepatologists (60%) indicating that they prescribe pharmacotherapy for relapse prevention in their practice, less than one-third felt comfortable prescribing these medications. Additional education was again felt to be necessary to reduce the comfort and knowledge gap[209]. Authors advocated for further exploration to delve deeper into experiences and perspectives of clinicians who care for patients with AUD and cirrhosis.

By adopting a descriptive qualitative methodology, our team was able to better understand clinicians' perspectives and perceived barriers to caring for patients with AUD and cirrhosis within Alberta, Canada. This study identified several barriers related to screening, brief intervention, and treatment practices. Specifically, clinicians reported not routinely using a standardized approach to AUD screening, and having assumptions about previous healthcare interactions (i.e., referral from primary care provider) that prevented routine screening for alcohol use. Of this, one participant said "If I know that they already have [alcohol associated disease], I don't really explore it much further[11]." Brief interventions were also not routinely carried out, with many clinicians citing a lack of time and knowledge about how to broach these conversations as major barriers[11]. The lack of knowledge and comfort was perhaps most pronounced when discussing prescribing practices for relapse prevention pharmacotherapies in

patients with cirrhosis. Similar to the studies by Cotter, Im and colleagues, participants reported low available evidence, safety concerns, and insufficient knowledge about prescribing and monitoring these medications in patients with cirrhosis as significant barriers to their use[209]. It is clear that reduction or abstinence from alcohol intake is the only way to reduce hepatic decompensation and fibrosis for patients with co-existing AUD and cirrhosis[9]. Thus, the management of AUD alongside alcohol related liver disease has been prioritized by guidelines. The American Association for the Study of Liver Diseases advocates that "all patients receiving care in primary care and gastroenterology/hepatology outpatient clinics, emergency departments, and inpatient admissions should be screened routinely for alcohol use using validated questionnaires" and further support, including "brief intervention, pharmacotherapy, and referral to treatment should be offered to patients engaged in hazardous drinking[71]." Our findings extend the current literature base and identify clinician empowerment for screening, providing a brief intervention, and feeling knowledgeable about prescribing pharmacotherapy for relapse prevention as a crucial next step. We anticipate that education and training will result in changes in clinician practice habits and begin to close the treatment gap experienced by patients with AUD and cirrhosis.

Despite identifying targets for the educational intervention, the qualitative assessment revealed several findings related to systemic barriers and clinical 'norms', including time constraints, role clarity amongst prescribers, and perceptions about patient compliance with treatment for comorbidities which were not addressed in the educational intervention. Working with provincial groups to develop a pathway for AUD and reducing the resource limitations of the provincial health care system would require a lot more resources and time. Working together to discuss and

address systemic changes and working with medical students and new clinicians to invoke changes in practice habits could be a step to address these clinical norms that could not be addressed within the scope of this educational intervention.

5.1. Kern's 6-step framework for curriculum development was a valuable framework to develop and evaluate a clinician-targeted educational intervention about AUD in cirrhosis

Kern's 6-step framework for curriculum development was an effective method for developing a clinician-targeted educational intervention about AUD in cirrhosis, as evidenced by the significant improvements in knowledge, attitudes, and practice habits. By starting with a review of the literature and targeted needs assessment of prospective learners we simultaneously assessed knowledge gaps and identified targets for the intervention that would be most meaningful to learners. The study team identified screening, brief intervention approaches, and guidance around how to prescribe and monitor pharmacotherapies for relapse prevention in patients with cirrhosis as educational targets. This facilitated the development of goals and specific objectives for our learners. We were next able to pilot the sessions using a didactic approach and move naturally to evaluating this programming using questionnaire data and the theory of Self Determination (SDT). Kern has been used successfully in other studies, including development of substance use disorder curricula for medical education. The cyclical collaborative nature of the framework has received praise from other authors[138, 210]. By following the step wise approach described by Kern, the specific needs of our target population were identified, such as underlying attitudes, which led us to include questions on attitudes and devoting portions of the curriculum to impacting them. The nature of Kern's framework also provided the opportunity to pilot curriculum content and educational strategies and refine them for an adapted series to better meet the needs of our target audience. The great benefit of Kern's

framework is the opportunity to further refine the objectives, implementation, and evaluation of the curriculum in future iterations and different populations (i.e., medical students, residents, etc.).

5.2. Self-determination theory supported the assessment and adaptation of an educational intervention about AUD in cirrhosis

Inclusion of SDT was novel and served as a valuable tool to develop an intervention about AUD in cirrhosis and assess motivation of participants to change practice related to AUD in cirrhosis care. SDT has been used as a development and assessment tool in other education initiatives to maximize autonomy, competence, and relatedness in the learning environment[211, 212]. Low relatedness-support in the pilot session was attributed to the didactic nature of the sessions with limited options for participant interaction with each other and with the speakers. Kern's cyclical framework gave us the opportunity to adapt the intervention, shifting delivery to a flipped classroom format to encourage interactivity, promote relatedness, and reinforce learning concepts. This strategy encourages participants to undergo learning outside at their own pace, thereby allowing instructional time to be allocated towards more engaging educational experiences. In the literature, it is associated with more positive effects when compared to traditional educational strategies, such as didactic education[197, 212, 213]. SDT supported the adaptation of the educational intervention and was associated with improved relatedness scores (mean relatedness scores: Session 1=3.37 (SD=0.27), Session 2=3.46 (SD=0.25), Session 3=3.35 (SD=0.13)) compared to the pilot (mean relatedness score=2.73 (SD=1.08)). Combining SDT with Kern's framework served as a valuable means to inform enhancement of basic psychological need support in the intervention. Despite this, SDT did not correlate with positive improvements in many of the questionnaire items. Our participants were heterogenous in that they were from a variety of backgrounds (social work, addiction, family medicine, etc.). More

purposeful marketing and selection of participants could have improved the effects of the intervention. Further analysis of these scores and introducing qualitative methodology to better understand participants experiences with educational intervention may serve as a valuable tool to enhance the basic psychological needs of participants.

5.3. Education about AUD in cirrhosis supports positive changes in clinician knowledge, attitudes, and practice habits

Participants experienced significant improvements in their preparedness and intention to implement screening, conduct a brief intervention, and identify and manage alcohol withdrawal. These findings warrant further investigation via administrative and patient-outcome data into actual changes in practice habits. Given the low rates (<1%) of pharmacological and behavioural AUD treatment,[9] there is an opportunity to improve clinician knowledge, attitudes, and practice habits with AUD care in their patients with cirrhosis. Clinicians' self-reported comfort prescribing the three suggested medications for relapse prevention increased significantly from the pre-test phase, an important result given our previous findings of hesitancy prescribing pharmacotherapies for relapse prevention elicited in our qualitative work (Chapter 3) and limited research about the safety and efficacy of these medications in people with cirrhosis. Interestingly, despite the increase in comfort levels, self-reported intention to prescribe these medications in patients with liver disease did not improve significantly from the baseline phase in the adapted version of the educational intervention. The relationship between intention and comfort warrants further investigation. It is also notable that the medication that participants were least comfortable prescribing at baseline and following the intervention was baclofen, the only medication tested via RCT[207]. The additional improvements observed in this study, including intention, preparedness, and comfort for both screening and providing a brief

intervention may also contribute to the improved access to treatment for patients with concomitant cirrhosis and AUD.

In addition to self-reported changes in practice habits around implementing SBIRT and pharmacotherapy for relapse prevention, there were significant improvements in provider attitudes. Given that many patients with AUD generally experience stigma and bias due to their condition, these findings warrant further investigation[132, 179]. In the pilot, two of the five SAAPPQ domains (role adequacy and motivation) significantly improved, whereas in the adapted sessions, four of the five domains significantly improved (excluding task-specific self-esteem). The improvement from pilot to adapted sessions may be a result of participants attending both the pilot and adapted sessions, altering their attitudes more significantly than those who just attended the adapted sessions alone. Also, the interactive nature and content of the adapted session may have lent itself to changing attitudes more significantly than the pilot in ways not evaluated. Further research is warranted to investigate the long-term impact of education on attitudes of clinicians who care for patients with AUD.

5.4. Limitations

The work presented in this thesis has several limitations. Firstly, the assessment of the educational intervention is a single group pretest-posttest pre-experimental survey study with a response rate of less than 50%. The study team chose a single group pretest-posttest study design due to the study's primary focus on knowledge, attitudes, and practice habit outcomes following an education intervention. The study team chose to focus on the effect of an educational intervention given the lack of available training for clinicians about AUD in cirrhosis. However, without responses from all participants, it is not possible to generalize the effects of the

educational intervention. Moreover, this study design has inherent limitations. Our study did not include a control group and relied on pretest-posttest surveys of a single group to test for differences. Outside factors, such as natural maturation or exposure to other education could have caused the changes we identified, and we can't be sure the impact came from the educational intervention.

Secondly, a proportion of the participants were not prescribers. Though participants had the opportunity to indicate if a question does not apply to them, their interaction with the intervention may be different than a sample containing all prescribers. Thirdly, questionnaire data can be limiting in that participants may not report the true nature of their experience due to fears of being judged or misconceptions about their actual practice habits. Further work should confirm the effects of this educational intervention on clinician practice habits via chart review and administrative data to discern whether the effects observed in the current study translate to actual practice and patient care. Fourth, given the absence of these tools in the setting of AUD and cirrhosis, this study did not include validated measures for practice habits and knowledge. Instead, the study team used questionnaire items adapted from previous studies assessing clinicians' knowledge and practice habits caring for patients with other substance use disorders[133, 198, 199]. This lack of availability of standardized tools creates a barrier for interpretation of the findings and comparisons across the literature. Fifth, some of the content created in the adapted sessions and speakers included were from outside of the study area. This may have impacted participants experiences in the intervention, as these speakers were not aware of the context and nuances of providing AUD care in the study area (i.e., extent of integrated services, referral support, insurance, etc.). Finally, delivering in-person education was not

possible over the study period due to the COVID-19 pandemic. To minimize the risk of viral transmission and to target a wider group of physicians, the speakers delivered educational content virtually. These were likely to benefit the study given that many clinicians were burdened with clinical assignments making it difficult to attend in person programming. The impacts of the COVID-19 pandemic may also limit the generalizability of the findings from the current study. COVID-19 has had a significant impact on the psychological health of clinicians and their ability to manage complex patients with multiple comorbidities. This may have influenced results, as participants might have had less time and energy to dedicate to learning and applying learnings into practice. Finally, the development and implementation of the educational intervention did not include patient perspectives. Due to limited resources and a primary focus on clinical education, adoption of patient perspectives was not included. Including these experiences as part of the targeted needs assessment and implementation of the intervention (i.e., as speakers) could have had significant impacts. Assessing these impacts on domains of SDT, specifically clinician relatedness to their patients, would be an interesting next step. Future interventions should attempt to involve clinicians and patient voices from the outset and assess the impact this has on knowledge, attitudes, and practice habits.

5.5. Conclusions

This thesis supports the positive effect of a virtually delivered educational intervention for clinicians about managing AUD in cirrhosis. Our team had several learnings, including that local experts should be included alongside international experts to ensure that the content fits the local context of care delivery. Content delivery should also include interactivity, with case-based discussions, time for questions and answers, and conversations between participants to maximize relatedness and create a comfortable learning environment. Programs should also include content

relevant to various providers, including PCPs and liver specialists. Additional adaptations to the curriculum including a variety of case discussions, teamwork involving different specialties, and long-term follow-up on education may be of benefit to curriculum development and participants. Longitudinal assessment of provider practices and patient level impacts may help to describe the true impact of education, including on outcomes of prescribing habits, patient abstinence, cirrhosis related outcomes, and patient experiences with healthcare providers. Given the rising rates of AUD and contributions to developing alcohol related liver disease, developing and implementing structured AUD education for future clinicians can help to reduce the treatment gap and meet the needs and priorities of clinicians who care for people living with AUD and cirrhosis.

5.6. Future directions

Beyond exploring or rectifying limitations of the research, future work can look at applying the education to a broader group of clinicians, including trainees (residents, medical students). Assessment measures, including self-report, qualitative, and survey measures can be implemented alongside administrative data to determine the effect of education on actual and reported practice habits. Adapting questionnaire items based on data and feedback could be an important step in validating a questionnaire that can be used across studies that focus on AUD management. This common measure could then be used to compare various interventions across the published literature. Additionally, the questionnaire included items assessing how the intervention met the basic psychological needs of autonomy, competence, and relatedness. This information can be used to adapt future interventions and inform the use of self-determination theory as a medical education assessment tool. Demographic data could also be explored more

extensively, for example, to assess patterns of attitudes, knowledge, and practice habits among different providers.

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APPENDICES

Table 17. Objectives for pilot AUD in cirrhosis sessions

Pilot	By the end of the curriculum prescribers will be able to:
	Demonstrate that abstinence is ideal in this population (i.e., there is no safe amount of alcohol)
	Differentiate between pharmacotherapies for relapse prevention that are/are not suitable for people with cirrhosis
	Screen for AUD using validated measures
	Conduct a brief intervention
	Diagnose AUD according to the DSM-5 criteria

Table 18. Results from pilot session pretest-posttest questionnaires

	Pretest mean (SD)	Posttest mean (SD)	P-value	Cohen's d
Pilot (n=38) out of 82 who participated				
Preparedness (4-point scale)				
To screen and identify patients with harmful levels of alcohol use	3.34 (.85)	3.82 (.39)	0.001	0.73
To provide a brief intervention	2.76 (.91)	3.58 (.50)	<0.001	1.1
To refer patients for treatment	3.00 (.96)	3.55 (.50)	0.001	0.72
Intention (7-point scale)				
To screen every patient for AUD	4.97 (1.20)	5.73 (.74)	<0.001	0.76
Provide a brief intervention	5.26 (.93)	5.74 (.68)	0.009	0.59
Prescribe anti-relapse medications	4.58 (1.50)	5.19 (1.20)	0.028	0.46

Comfort (4-point scale)				
Prescribing acamprosate for AUD	2.36 (.82)	3.16 (.75)	<0.001	1.01
Prescribing baclofen for AUD	2.19 (.62)	2.97 (.68)	<0.001	1.21
Prescribing gabapentin for AUD	2.49 (.65)	3.14 (.67)	<0.001	0.98
	Pretest (Mean + SD)	Posttest (Mean + SD)	P-value	Cohen's d
SAAPPQ				
Total	5.12(0.74)	5.44(0.68)	0.044	0.45
Role adequacy	5.03(1.12)	5.54(0.99)	0.034	0.49
Role legitimacy	2.77(0.45)	2.84(0.61)	0.56	n/a
Motivation	5.06(1.04)	5.53(0.99)	0.044	0.47
Task specific self esteem	4.87(1.21)	5.11(0.92)	0.25	n/a
Work satisfaction	5.12(1.05)	5.34(0.90)	0.23	n/a

Table 19. Participant demographics

	Completed both pretest and posttest questionnaires (n=38) Attended = 82
Variable	N(%)
Pilot	

Clinician type		
Physician		23(60.5)
Physician trainee		5(13.2)
Nurse Practitioner		8(21.1)
Other		2(5.3)
Location of practice		
North zone		3(7.9)
Edmonton zone		13(34.2)
Calgary zone		14(36.8)
Central zone		5(13.2)
South zone		3(7.9)
Adapted session(s)		
Session 1 (n=36) 74 attended	Clinician type	
	▪ Physician	22(61.1)
	▪ Nurse Practitioner	2(5.6)
	▪ Other/Did not specify	7(19.4)
	▪ Nurse	5(13.9)
	Location of practice	
	▪ Alberta	31(86.1)
	▪ British Columbia	1(2.8)
	▪ Ontario	1(2.8)

	▪ Manitoba	1(2.8)
	▪ Outside Canada	1(2.8)
2 (n=30) 66 attended	Clinician type ▪ Physician ▪ Physician trainee ▪ Nurse Practitioner ▪ Nurse ▪ Other/Did not specify	 16(53.3) 1(3.3) 2(5.6) 2(5.6) 9(30)
	Location of practice ▪ Alberta ▪ Manitoba ▪ Ontario ▪ Nova Scotia ▪ Outside Canada	 26(8.7) 1(3.3) 1(3.3) 1(3.3) 1(3.3)
3 (n=29) 89 attended	Clinician type ▪ Physician ▪ Nurse Practitioner ▪ Other ▪ Nurse	 18(62.1) 3(10.3) 7(24.1) 1(3.4)
	Location of practice ▪ Alberta ▪ British Columbia ▪ Manitoba	 25(27.8) 1(3.4) 2(6.9)

	▪ Outside Canada	1(3.4)

Table 20. Results from self determination theory questions from pilot and adapted sessions

	Mean (SD)
Pilot	
Autonomy	4.31(0.47)
Competence	4.10(0.55)
Relatedness	2.73(1.08)
Adapted session(s)	
Session 1 ▪ Autonomy ▪ Competence ▪ Relatedness	 4.03(0.16) 4.03(0.24) 3.37(0.27)
Session 2 ▪ Autonomy ▪ Competence ▪ Relatedness	 4.21(0.08) 4.03(0.24) 3.46(0.25)
Session 3 ▪ Autonomy ▪ Competence ▪ Relatedness	 3.97(0.07) 3.98(0.18) 3.35(0.13)

Table 21. Participant comments on how adapted sessions impacted practice

The session impacted my confidence in the care and options that I can provide
I feel more confident and grateful
Since the program, I have used MI to question what they wanted to do, rather than trying to just educate and give my ideas.
In general, I am trying to become more aware of biases I may have toward certain patient groups in all areas of my practice. This includes AUD.
Since this course I remind myself that this is a disease. It changes the brain and is often attributed to trauma. I recognize that the patient is in control, and I offer resources
I have realized that due to frequent relapses I sometimes felt a bit hopeless, which may have limited my willingness to make recommendations
I've become more compassionate and more understanding.
I am used to seeing these patients in the inpatient setting where it can sometimes be a revolving door of admissions for alcohol withdrawal. I sometimes found myself assuming that any admission for alcohol withdrawal was not really interested in cessation.
I believe attitude is everything when working with folks who are struggling with alcohol use. It is so important to approach them in a calm and non-judgemental way, to let them know that you'd like to provide support if they'd like to receive it and then to provide them with a menu of options.
When working with individuals with alcohol use disorder in the past, I have found myself checking my implicit bias at the door to ensure their care is not only equal but equitable in recognizing additional barriers to care, challenges they may experience in their admission - both medically e.g. from withdrawal standpoint, but also with potential for discrepant care/attention from providers. I have at times found it unsatisfying if I feel like little or no progress can be made with their drinking habits and impacts on their health, but I will always try to broach it.
I was able to reframe their internalized stigma using motivational interviewing
Having low expectations really set up an encounter for failure. Taking a few minutes to do "OARS" is really an opportunity to change that mindset for both myself and patient.
Recently was able to use resources advised and felt confident with dealing with withdrawal
I have become more conscious of my underlying attitudes

I am aware of AASLD guidelines, options for treatments with my patients and alternatives For me the main barrier, particularly in the inpatient setting, is time. But I certainly do find I will go a step further and flesh out people's alcohol use a bit more thoroughly now compared to before the session. I think my greater knowledge made me more empathetic I feel compassionate and more aware of the disease process, the underlying factors, and the humanness of the individual I feel greater empathy towards my patients with AUD which I helped me to better communicate with them and greater interest in them This has certainly influenced my outlook as to the likelihood of success of treatment, which may have indirectly influenced my ability to screen I am more confident in finding resources to support AUD I am more confident in giving advice I was able to reframe a patient's self-stigmatizing attitudes through motivational interviewing

Table 22. Short Alcohol and Alcohol Problems Perception Questionnaire (SAAPPQ)

1 = strongly agree, 2 = quite strongly agree, 3 = agree, 4 = neither agree nor disagree, 5 = disagree, 6 = quite strongly disagree, 7 = strongly disagree

Role adequacy	1. I feel I know enough about causes of drinking problems to carry out my role when working with people who have alcohol use disorder
	2. I feel I can appropriately advise my patients about drinking and its effects
Role legitimacy	3. I feel I have the right to ask patients questions about their alcohol consumption when necessary
	4. I feel that my patients believe I have the right to ask them questions about alcohol consumption when necessary
Motivation	5. I want to work with people who have alcohol use disorder
	6. Pessimism is the most realistic attitude to take towards people with alcohol use disorder
Task-specific self esteem	7. All in all, I am inclined to feel I am a failure with people with alcohol use disorder

	8. I feel I do not have much to be proud of when working with patients who have alcohol use disorder
Work satisfaction	9. In general, it is rewarding to work with people with alcohol use disorder
	10. In general, I like people with alcohol use disorder

Figure 5. Proposed influence of basic psychological need satisfaction on pretest - posttest scores

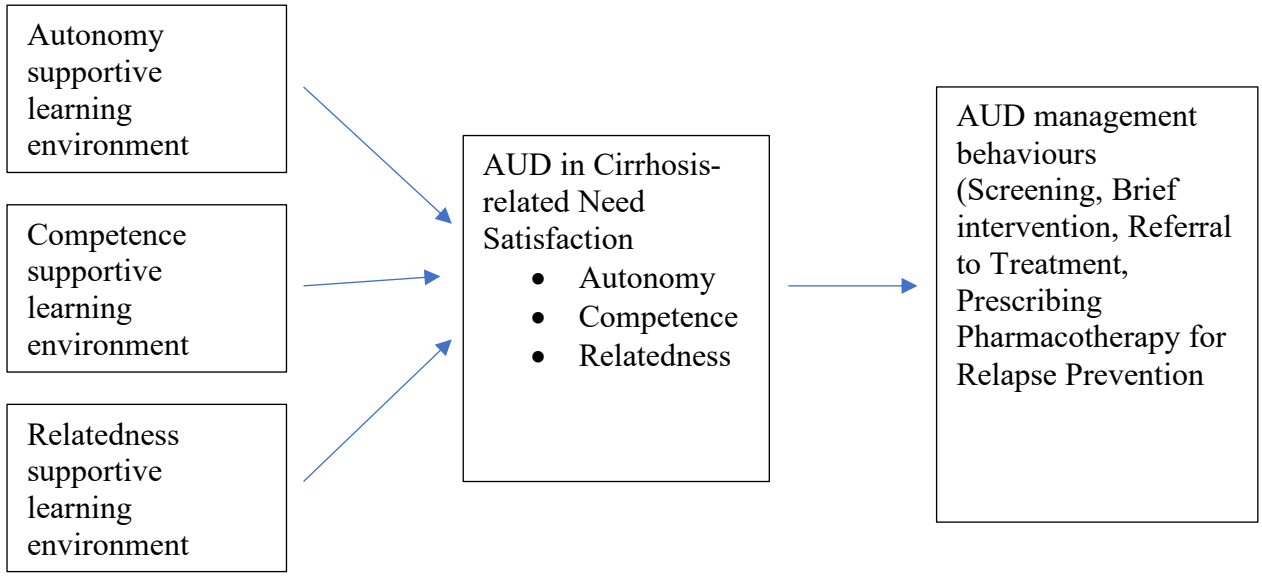

Table 23. Pearson Correlation Coefficient for basic psychological need satisfaction with mean differences on questionnaire items

	Autonomy	Competence	Relatedness
1. Role adequacy	.327	.454*	.140
2. Role legitimacy	-.157	-.158	-.062
3. Role support	.069	.215	.214
4. Task specific self-esteem	.064	.143	.047
5. Work satisfaction	.106	.234	.221
6. Preparedness to diagnose alcohol withdrawal	.132	.144	.252
7. Preparedness to manage alcohol withdrawal	-.105	-.099	.017
8. Preparedness screen and identify patients with harmful levels of alcohol use	-.097	-.005	.189

9. Preparedness to provide medical advice and a brief intervention	-.187	-.052	.010
10. Preparedness to refer patients to treatment for AUD	-.246	-.188	-.444*
11. Intention to screen every patient for AUD	.442*	.252	.304
12. Intention to provide medical advice about alcohol	.025	.055	-.410*
13. Intention to provide a brief intervention	-.253	-.119	-.021
14. Intention to prescribe pharmacotherapy for relapse prevention	.312	-.129	-.021
15. Comfort Prescribing acamprosate for AUD	.028	.128	-.066
16. Comfort Prescribing baclofen for AUD	-.200	-.244	-.599*
17. Comfort Prescribing gabapentin for AUD	-.050	-.196	.064

** Signifies statistical significance at $p<0.05$*