



A Clinical Audit of the Rate of Hospital Presentations for Decompensated Alcoholic Liver Cirrhosis and its Complications, Before, Early and in the Endemic COVID-19 Period in Townsville University Hospital

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ABSTRACT

Background: COVID-19 shook the foundations of society, with governments taking swift and strict actions to limit social interactions. This unpredictable and volatile landscape led to a sharp increase in alcohol use and binge drinking, posing the question, what effect did COVID have on decompensated alcoholic liver cirrhosis, specifically in a Townsville context?

Method: This project was designed as a clinical audit that investigated the trends in rates of presentation of alcohol associated decompensated liver disease before (March 2019-March 2020), early (March 2020-March 2021) and in the endemic (March 2021-March 2022) COVID phases in Townsville University Hospital (TUH). In particular, data pertaining to Child-Pugh and MELD scores, along with precipitants of decompensation, length of stay and clinical complications were noted.

Results: Over 1800 iEMR entries were analyzed, of which 262 presentations met inclusion criteria. Indigenous populations contributed to 29% of presentations. Alarming, the total number of presentations increased on a yearly basis, with majority of those being Child-Pugh C in severity.

Conclusion: The threat of another pandemic is a real and present concern. The findings of our study emphasize concerns surrounding rising alcohol related decompensation, particularly amongst the Indigenous population within the Townsville university hospital catchment. Thus, highlighting the need for better delivery of care and prevention programs. Given the significant rise in cases during the pandemic period, additional funding should be directed towards public health and hospital based initiatives to mitigate the long-term effects of COVID restrictions on those with alcoholic liver disease.

Keywords: Alcoholic liver cirrhosis; Liver cirrhosis; Alcohol; COVID 19; Townsville

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INTRODUCTION

COVID 19 shook the foundations of society, with governments taking swift and strict actions to limit social interactions. This unpredictable and volatile landscape brought about social isolation, job losses and financial hardships to many in society [1]. These stressors also increased alcohol use and binge drinking with data published by the Commonwealth Bank of Australia, reporting a sharp increase in alcohol purchases made by Australians during COVID. The week leading up to the 27th of March in 2020 demonstrated a 34% rise in expenditure on alcohol when compared to the same week in 2019 [2].

Data from the United States also follow suit with overall alcohol sales up 55% in the week ending on the 21st of March as well as an increase in online sales of alcohol, up 243% [3]. Alarming, data from the United States suggests that one week spent in home quarantine led to a 19% increase in binge drinking. This translated to a 55% increase in alcoholic beverage sales in the United States, for the year 2020 [4]. With nationwide lockdowns enforced in Australia, a question begs to be answered-what effect did COVID have on decompensated alcoholic liver cirrhosis presentations in Australia?

Alcoholic Liver Disease (ALD) is one of the leading causes of mortality in the world, with cirrhosis related deaths being higher than Diabetes, AIDS (Acquired Immunodeficiency Syndrome) and Tuberculosis. In 2018, The World Health Organization (WHO) published data which suggested that 48% of all cirrhosis related deaths were associated with chronic alcohol use [5].

Within an Australian context, there has been limited data published on hospital admissions that longitudinally assess rates of presentations of patients with alcoholic liver disease. One notable paper, by Powell, et al, identified a 1.6-fold increase in Cirrhosis admissions over an eight-year period (2008-2016) in the state of Queensland. In a similar vein to the WHO, Powell, et al, also reported that 55% of such presentations were attributable to alcohol consumption [6].

From an ALD patient perspective, there were many ramifications from COVID 19. Social isolation prevented individuals from partaking in structured, non-alcohol related activities [7]. Furthermore, the attrition of health care workers, issues with transportation as well as a lack of access to technology (especially amongst low socio-economic subsets of the population) made regular outpatient follow up difficult [7]. The long-term effects of such sequelae will be observed in the years to come.

Townsville, unlike other major metropolitan cities where multiple hospitals cater for the needs of its population, has only one tertiary referral center, the Townsville University Hospital (TUH). TUH admits patients from as far north as Cardwell and as west as Richmond and Hughenden. In a recent population based study in QLD, Aboriginal and Torres Strait Islander Australians were 3.4 times more likely to present with cirrhosis than non-indigenous Australians [8].

These statistics correlate with findings that suggests that Indigenous Australians, when compared to their non-Indigenous counterparts, partook in far more “high risk alcohol consumption”, with 35% of Indigenous Australians exceeded the recommended “single occasion of drinking” guidelines compared to 25% of non-indigenous Australians [9]. With 9.0% of the Townsville population identifying as aboriginal or Torres Strait Islanders, this project will provide quantitative data on the burden of ALD within this population in the context of the COVID pandemic. The data produced can in turn be used to serve the TUH catchment and help guide prevention strategies to improve patient outcomes. This clinical audit will investigate the trends in rates of presentation of alcohol associated decompensated liver disease before (March 2019-March 2020), early (March 2020-March 2021) and endemic (March 2021-March 2022) COVID, specifically in the TUH catchment area. Furthermore, data pertaining to precipitants of acute decompensation, complications of cirrhosis as well as length of admission, amongst other factors are also observed in the project.

MATERIALS AND METHODS

Study Design

Prior to data collection, ethics approval was sought from the Townsville hospital and health service ACQUIRE (Audit, Quality and Innovation Review) panel. The timeframe of interest covers a period of time between March 2019; the year prior to the pandemic officially commencing and March 2022. We have divided this timeframe into before pandemic (2019), early (2020) and endemic (2021-March 2022) COVID 19. In order to appropriately construct a population, set, assistance from TUH data analysts was sought. As per their recommendations, the International Classification of Diseases (ICD) codes of K70.0 to K70.4, K70.9 and K74.6 were used to determine our target population.

The aforementioned ICD codes cover patients with alcohol-related fatty liver disease, alcoholic hepatitis, evidence of alcohol related liver fibrosis and cirrhosis. To ensure we properly capture the interested patient population, we also broadened our search to ICD codes K70.9 and K74.6 which includes patients with liver cirrhosis with no specified aetiology and alcoholic liver disease of unclear severity.

Data Collection

Upon approval from the ethics committee, retrospective analysis of the iEMR (electronic records) database of QLD health was used to source patient data. De-identified patient information was analyzed and the results collected were stored in a password protected computer that was only accessible to the authors of this paper. The data set was analyzed and patients with non-alcohol related diagnosis were excluded. Patients with mixed aetiologies such as Metabolic Dysfunction-Associated Fatty Liver Disease (MAFLD) and alcohol-related were included in the clinical audit.

Only patients with decompensation, as defined by an acute deterioration in liver function in a patient with cirrhosis, in conjunction with jaundice, ascites, Hepatic Encephalopathy, hepatorenal syndrome or variceal hemorrhage were included in the analysis.

RESULTS

The patient demographics were categorised based on age, sex, Indigenous status, severity of liver cirrhosis and

Table 1: Presentations by gender each year (March-March).

Year	M	F	Other	Total
2019/2020	54	13	0	67
2020/2021	59	13	1	73
2021/2022	84	36	2	122
	197	62	3	262

A total of 262 admissions for decompensated alcoholic liver cirrhosis was observed at TUH between March 2019 and March 2022. A total of 29% of those that presented were those that identified as Aboriginal or Torres Strait Islanders (ATSI). Interestingly, whilst there was a progressive increase in the total number of presentations throughout the years, the proportion

Table 2: Total number of presentations by year (March-March).

Year	Total	ATSI	ATSI (%)
2019/2020	67	30	45%
2020/2021	73	19	26%
2021/2022	122	27	22%
	262	76	29%

The Child-Pugh scoring system was originally designed to predict all-cause mortality and risk of complications from liver dysfunction. It is classified into Child-Pugh A, B and C, with a denoting the least severe and c, the most severe form of liver disease [10,11]. Conqueringly, our data set highlights that each subset of Child-Pugh presentations increase in frequency

Table 3: Child-Pugh presentations each year (March-March).

Year	Child-Pugh A (%)	Child-Pugh B (%)	Child-Pugh C (%)	Total
2019/2020	4 (6.0)	26 (38.8)	37 (55.2)	67
2020/2021	3 (4.1)	28 (38.4)	42 (57.5)	73
2021/2022	6 (4.9)	59 (48.3)	56 (45.9)	122
	13 (5.0)	113 (43.1)	135 (51.5)	262

The overwhelming majority of patients presented with Ascites (49.69%) and hepatic encephalopathy (34.59%). Many patients had multiple manifestations of decompensation before or during their in-patient stay, accounting for the number of complications being larger than the overall number

complications. We also utilized the Child-Pugh and MELD scores which are useful prognostic tools and validated predictors of survival in cirrhotic patients.

As per the data collected, 75.19% of total presentations were male, whilst 23.66% were females and 1.14% being non-binary. The trends once again, display an overall upward trajectory in presentations in all genders from 2019 to 2022 (**Table 1**).

of Aboriginal and Torres Strait Islander reduced yearly. However, this cohort remains over-represented when compared to the 9% of individuals in Townsville that identify themselves as Indigenous Australians (**Table 2**).

during each year of study. Understandably, the majority of patients presented with Child-Pugh B and C, as the severity of their cirrhosis makes them more prone to decompensation and subsequent hospital presentation (**Table 3**).

of patients that presented. Interestingly, the frequency of Ascites in particular, had consecutively increased in cases through 2019 and 2022 (**Table 4**). It was noted that from every 1000 presentations of alcohol related decompensated liver cirrhosis, 50% of presentations will be associated with ascites,

closely followed by hepatic encephalopathy with 35% of presentations.

Table 4: Presentations of cirrhosis complications each year (March-March).

Year	Ascites	SBP	Variceal heamorrhage	HE	HRS	HCC	Total
2019/2020	35	8	6	30	0	0	79
2020/2021	48	8	3	23	4	3	89
2021/2022	75	6	4	57	0	8	150
	158	22	13	110	4	11	318

Note: SBP (Spontaneous Bacterial Peritonitis); HE (Hepatic Encephalopathy); HRS (Hepatorenal Syndrome); HCC (Hepatocellular Carcinoma)

Unlike the number of Child-Pugh B and C scores, which increased consecutively each year, it can be noted that the MELD score averages varied each period, with 2020/2021 having the highest average score of 23.0. It is important to note that outliers in presentations, *i.e.*, MELD

scores>40, were noted in 2020, which in turn would have skewed the results. However, even with outliers accounted, there does not appear to be significant variation in MELD scores each year (Table 5).

Table 5: Average MELD score per year (March-March).

Year	MELD score
2019/2020	21.4
2020/2021	23
2021/2022	19.6

The median length of stay per year did not vary significantly between years. The median, rather than the average length of stay was calculated to account for significant outliers as

depicted by the difference in length of admissions observed from shortest to longest (Table 6).

Table 6: Median length of stay for each year, including range of days from lowest to highest (March-March).

Year (March-March)	Median length of stay (range of days from shortest to longest)
2019/2020	6 (2 to 128)
2020/2021	6 (1 to 82)
2021/2022	7 (1 to 83)

Although all patients were identified as having a pre-existing diagnosis of alcohol related decompensated liver disease, specific precipitants for the recorded presentations were analyzed. Infections triggering decompensation (e.g. spontaneous bacterial peritonitis) was the main contributor for the longest in-hospital stay, with an average of 10.88 days (median number of 8.00 days) per admission. This is closely followed by ongoing alcohol consumption, which contributed to 10.34 days on average (median number 6.00 days).

Closely behind in this category was "other" causes, which contributed a total of 10.03 days on average, as an in-patient. The cases that contributed to these included Constipation, Gallstone Pancreatitis and Ileus amongst other causes. It can be seen that mortality increased each consecutive year studied, with only 8 deaths occurring in the 2019-2020 period,

when compared to 14 deaths in the 2021-2022 period (Table 7). A total of 34 deaths were noted throughout the time-frame analyzed in this project. Alcohol once again proved to be the most detrimental precipitant amongst the patients analyzed, with a total of 25 deaths associated with ongoing consumption. This was closely followed by Gastro-Intestinal (GI) bleeding, which contributed to 11 deaths and infections, which contributed to 10 deaths. It is important to note that multiple precipitants were noted to contribute to each case, accounting for more precipitants than cases that resulted in death.

Table 7: Deaths associated with alcoholic cirrhosis per year (March-March).

Year	Deaths
2019/2020	8
2020/2021	12
2021/2022	14

DISCUSSION

As per our data, it is clear that there was a steady increase in rates of presentations of decompensated alcoholic liver cirrhosis during COVID-19. This rise correlates with data from the Australian Foundation of Alcohol Research and Education which demonstrates an increase in expenditure on alcohol during the COVID pandemic. As per their data, \$12.3 billion was spent by the general public in 2019, which increased to \$15.6 billion in 2020 and \$15.9 billion in 2021 [12]. It is important to note that the healthcare burden and the diseases' economic impacts are beyond the realm of this study, yet, it was observed in our project that the average length of stay for all presentations was approximately 10.41 days (median admission of 6.00 days). With presentations of decompensation increasing every year that was assessed, concerns regarding resource allocation and funding can be foreseen. Upstream factors including policy change and laws/restrictions on access to alcohol must be modified in order to mitigate this increased demand on the healthcare sector.

Interestingly, the Aboriginal and Torres Strait Islander population contributed to 29% of all presentations in the timeframe of interest. This is a sharp increase from a QLD based study conducted by Powell, et al., in 2019, in which Indigenous Australians accounted for only 7.4% of admissions. It is important to note that in the aforementioned study, alcohol was not the sole etiology of focus, with many presenting with NASH (Non-Alcoholic Steato-Hepatitis) and other forms of cirrhosis. Nevertheless, in a town with 9% of the population identifying as Indigenous, this data suggests a gross over representation in the number of indigenous Australians being admitted to hospital for decompensated alcoholic liver cirrhosis. Additionally, the identification of Aboriginal and Torres Strait Islanders may present as an issue. Many members of the population with cirrhosis may yet to formally identify themselves as Aboriginal or Torres Strait Islander or have only done so in the later years that were not assessed in the project. Regardless, the data which we have collected, clearly aligns with Powell, et al., findings, that Indigenous Australians are over-represented in presentations of decompensated alcohol liver cirrhosis.

As per the Australian Institute of Health and Welfare, there was a significant reduction in clients treated by Alcohol and Other Drugs (AOD) treatment services (139,271 in 2020/21 to 130,525 in 2021/22). This was reported to be significantly affected by social distance measures, lack of outreach clinics, in patient bed-based rehabilitations services and specialist availabilities [13].

It can thus be ascertained that limitations in services and specialist care may play a key role in the consecutive increases in decompensated ALD presentations in TUH during the COVID pandemic, although no formal study in service delivery has been undertaken as of date in a Townsville context.

CONCLUSION

The population being served by the Townsville university hospital experienced a consistent rise in presentations of decompensated alcoholic liver cirrhosis through the COVID pandemic. As per the results of this project, it was identified that ongoing alcohol consumption and infection were the predominant precipitant that contributed to the rising rates of presentations. Concerningly, the rise in presentations in the 2021-2022 periods, which were post the main lockdowns in QLD, may reflect an ongoing increase in habitual alcohol consumption. This could potentially be seen as a reflection of the drinking habits established during the isolation period, however, further research is needed to validate this assumption.

Irrespective, the findings from this project indicate a rising demand from patients presenting with decompensated alcoholic liver cirrhosis that will benefit from further support and government funding.

LIMITATIONS AND FUTURE AREAS OF RESEARCH

Certain limitations are noted within this study. One potential limitation could be the specific ICD 10 coding that was used to pool potential participants in the project. There is a possibility the selected ICD codes may not have picked up all the potential patients that meet the inclusion criteria.

Additionally, as aforementioned, there may have been patients who may have not identified as aboriginal or torres strait islander during their admission. This may have resulted in an under representation of Indigenous populations within this study.

Future areas of research that could be undertaken include the effect that COVID has had on the number of liver transplant cases for those suffering from alcoholic liver cirrhosis. Given the increased consumption of alcohol throughout the "early" and "endemic" phases of COVID, as per our data, it would be interesting to assess the number of individuals who have been removed from transplant lists due to their relapse with alcohol consumption.

Furthermore, a review/Likert based survey of patients on the ease of access to support and follow up during the COVID pandemic may be an area of interest, as it may identify potential barriers to care.

Finally, although we were able to identify median length of stay for presentations, it would be valuable to identify the numerical cost associated with each day of admission at TUH for patients with alcohol related liver cirrhosis. Valery, et al., estimates that the total hospitalization costs for cirrhosis admissions in Queensland can vary from \$87,363 to \$431,242 per person days, based on their unmet psychosocial needs, however, these figures may not reflect the Townsville narrative, especially given the significant catchment area TUH has to cater for and the associated costs for patient transport.

Once identified, the monetary costs associated with cirrhosis admissions can be used in lobbying for policy change and resource allocation for the gastroenterology department of Townsville university hospital.

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No funding was received for the completion of this project.

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