Te Whatu Ora
Health New Zealand

The development and implementation of an enhanced digital alcohol screening algorithm and training package for primary health care settings

Research Report

FEBRUARY 2023

David Newcombe, Andy Towers, John McMenamin, Janie Sheridan, Gillian White and Juma Rahman

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MEDICAL AND HEALTH SCIENCES

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Research Report

A report commissioned by Health Promotion, National Public Health Service, Te Whatu Ora - (previously Te Hiringa Hauora | Health Promotion Agency)

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    - Springvale Medical Centre
    - St Johns Medical Centre
    - Stewart St Surgery
    - Taihape Health
    - Te Waipuna
    - Wicksteed Medical Centre

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Report overview

This technical report provides the detailed information required to develop and implement an enhanced screening algorithm for the assessment of alcohol-related risk in older adults in primary health care contexts. The report also describes a programme of training for busy health professionals on the increased alcohol-related risk evident in older adults who choose to drink alcohol and who also have comorbid health conditions and/or prescription medications. The training programme was designed to be delivered alongside the implementation of the screening algorithm.

This technical report is divided into the following sections:

- **Executive Summary**
- **Section 1**: Overview and Context
- **Section 2**: Development and implementation of the enhanced screening algorithm
- **Section 3**: Development and roll out of training programme for health professionals
- **Section 4**: Project Evaluation – Patterns of screening
- **Section 5:** Project Evaluation – Health professional perspectives
- **Section 6:** Conclusions and recommendations

A summary report is also available here. It features high-level findings and recommendations from this study.

Executive summary

Alcohol use by older adults, particularly hazardous alcohol use, has been shown to be a factor contributing to the burden of disease and injury. Therefore, establishing effective processes to identify hazardous drinking in older adults and deliver effective, personalised, and brief interventions is an important goal in primary health care (PHC) settings.

We report on results from a pragmatic pilot programme of work undertaken to develop an enhanced screening algorithm for the assessment of alcohol-related risk in older adults in PHC contexts. The algorithm included chronic medical conditions and prescription medications known to increase the potential alcohol-related risk for older adult drinkers.

Figure 1 provides an overview of the factors that this programme of work aimed to embed in enhanced primary care screening of alcohol-related harms for older adults.

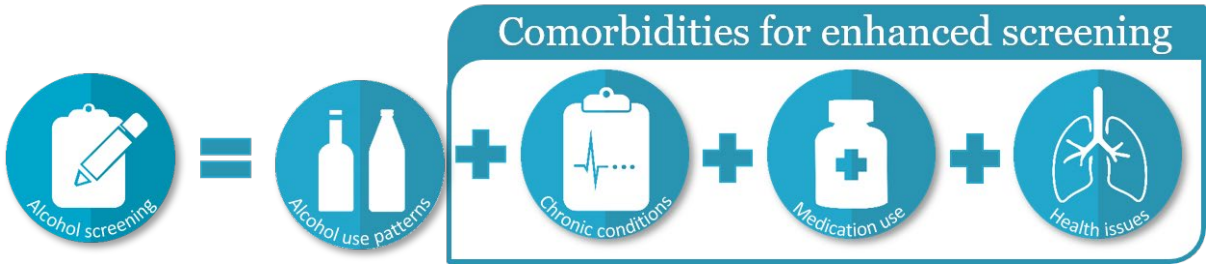


Figure 1. The factors included in an enhanced screen for alcohol risk in older adults

This work was undertaken as three steps:

1) **Screening algorithm development and implementation**: The development of the algorithm based on the Comorbidity Alcohol Risk Assessment Tool (CARET), which has been specifically designed to assess alcohol-related risk in older adults, and the implementation of the new prototype algorithm at Whanganui Regional Health Network (WRHN) at the end of February/beginning of March 2020.
2) **Training**: The development and implementation of a training package to increase health professionals' knowledge and confidence in the assessment and management of alcohol-related risk on older adults.
3) **Screening evaluation**: The evaluation and monitoring of alcohol screening undertaken by health professionals at WRHN following the introduction of the enhanced screening algorithm.

There were three main questions that this project explored. They were:

Question 1: What patterns of alcohol use and health-related conditions were evident in older adult drinkers at baseline?

We examined data extracted from the WRHN health records during November 2019 (baseline, prior to implementation of the algorithm) that included the records for 24,411 older adult patients aged 50+ years. Approximately 15% were Māori and slightly more than half were female (53%). The mean age of the whole sample was 65 years. We found for the whole sample that:

- Most (73%) had been screened for alcohol use using AUDIT-C[a] guidelines. Of these, 56% had screened below guidelines for hazardous alcohol use, 6% had screened above guidelines, and 11% had on at least two occasions screened below and above (i.e., both) the guidelines for hazardous alcohol use whilst at the WRHN. Of the total sample, 27% had never been screened.
- Hypertension was the most common medical condition (39%), with smaller proportions of patients diagnosed with gout, liver diseases, or mental health disorders (10-15%).
- Approximately 40% of those diagnosed with hypertension had screened below the AUDIT-C guidelines for hazardous alcohol use. Smaller proportions of patients with other comorbid health conditions had screened 'below' guidelines (7-14%).
- Varying proportions (7-39%) of patients with a comorbid medical diagnosis had never undergone screening.
- A third of Māori (33%) were more likely than non-Māori (26%) to have never been screened. Approximately half (47%) of Māori screened below AUDIT-C guidelines for hazardous alcohol use, compared to 57% for non-Māori.

Question 2: What was the baseline occurrence of alcohol-related risk amongst older adults attending primary care centres?

- At baseline, approximately 17% of the whole sample were identified as at-risk based on their AUDIT-C score. These were patients who screened above guidelines for hazardous alcohol use (6%; n=1,478), and on at least two occasions in the past had screened both above and below guidelines (11%; n= 2,726).
- Seventy-one percent of those who screened below guidelines (n=13,548) had at least one risk factor (i.e., either a comorbid medical condition or medication).
- Of those patients who had never been screened (n=6,659) approximately 30% were classified as no-risk as they had no risk factors (i.e., no comorbid medical conditions that interact with alcohol or medication), 50% as lower risk as they had one risk factor, and 19% as higher risk as they possessed more than two risk factors.

Question 3: How successful was the implementation of the enhanced screening algorithm in prompting increased screening in primary care centres?

- The number of alcohol-related screens increased during December 2019 and January 2020. This was prior to the implementation of the algorithm but corresponded to the time we delivered initial training. The algorithm went live at the end of February-beginning of March 2020. However, following this the number of screenings decreased as no screening occurred during the first National COVID-19 lockdown (April-May 2020). Screenings then increased back to baseline after lockdown ended.
- Health professional feedback identified that the red flag that popped up on the Patient Dashboard (produced by the screening algorithm) during the appointment was a useful tool

[a] Standardised alcohol screens, such as the Alcohol Use Disorders Identification Test (AUDIT), and its shorter version, the 3-item AUDIT-C, are routinely used to assess for hazardous alcohol use in primary health care contexts. The AUDIT-C comprises three items that assess alcohol consumption: the frequency and quantity of alcohol consumed, and the frequency of binge drinking.

for highlighting alcohol risk and facilitating alcohol conversations and/or screening with clients.

- Health practitioner feedback also identified that the training package on knowledge, identification and management of older adults with potential alcohol-related risks was useful (with both face-to-face and online components). The training was also seen as good for enhancing knowledge and practicing key techniques required for delicate questions about alcohol. However, training components were not as well-utilised as hoped, with many health practitioners unable to attend, citing the significant time commitment required and the need to prioritise other factors in busy working lives.

Conclusions from this project

It is difficult to tell from the available data if this pilot project has succeeded in its key aims. There was obvious disruption to our main project outcome measure (i.e., screening rates) due to the COVID-19 pandemic and the directive for health practitioners to prioritise management of chronic health conditions over screening. In this respect, screening rates at the end of the project were the same as baseline. However, we can clearly state the following:

- Algorithm implementation: The algorithm was successfully developed, tested and embedded in the patient management systems at primary care practices that made up the WRHN.
- Baseline review of cases: Secondary analysis of a large dataset extracted from WRHN revealed a significant proportion of older adults who had not been flagged as '***at-risk* drinkers'** based on their alcohol screening status alone. They however possessed comorbidities (chronic medical conditions and prescriptions) that would place them at potential risk if they were to drink alcohol.
- Observation of screening rates over time: Monitoring of ***alcohol-related*** screening revealed that the implementation of the screening algorithm had an impact on screening rates in the brief initial project phase, but the onset of COVID-19 saw this screening rate drop back to 0 (zero) and post-COVID-19 lockdown screening rates return to baseline.
- Utility of the project for health practitioners: Overall, health practitioners saw utility in an algorithm that helped them identify clients at potential risk of alcohol-related harm that can lead to facilitated alcohol discussions. The training package was well-received by the few who attended, though time constraints meant that many health practitioners did not (or could not) access this training.

Section 1: Overview and context

Aotearoa New Zealand, like many developed nations around the world, is experiencing population ageing. It is expected that by the year 2036, more than one quarter of the country's population will be aged 65 years and over[1]. The impact of population ageing on healthcare systems is significant. It increases the burden imposed not only on acute hospital services, but also primary health care (PHC) services[2]. Alcohol use by older adults, particularly hazardous alcohol use, has been shown to be a factor contributing to the burden of disease and injury[3; 4]. Therefore, establishing effective processes to identify hazardous drinking in older adults and deliver effective, personalised, and brief interventions is an important goal in PHC settings.

Hazardous alcohol consumption

Hazardous alcohol consumption is described as a pattern of alcohol use that increases the risk of harmful consequences for the user or others[5]. Hazardous alcohol use may occur in the absence of a detectable health problem[6] but if it is ongoing, it is likely to result in adverse health consequences.

Standardised alcohol screens, such as the Alcohol Use Disorders Identification Test (AUDIT)[5], and its shorter version, the 3-item AUDIT-C, are routinely used to assess for hazardous alcohol use in PHC contexts. The AUDIT-C (the components of which are depicted in Figure 2) comprise three items that assess alcohol consumption: the frequency and quantity of alcohol consumed, and the frequency of binge drinking. An AUDIT-C score of 4 or more out of a maximum score of 12 has been shown to be a suitable threshold for hazardous drinking in older adults[7]. The AUDIT-C has been found to be equivalent to the full AUDIT in detecting hazardous drinking[8].

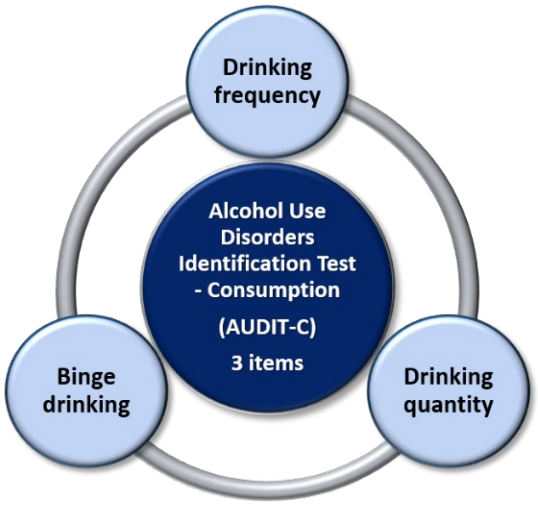


Figure 2. The three components of the Alcohol Use Disorders Identification Test - Consumption (AUDIT-C)

Previous research undertaken by the authors using the AUDIT-C[9] has shown that between 35-40% of older New Zealanders drink at levels considered hazardous to their health. In addition, we identified minor differences in the drinking patterns of older Māori and non-Māori adults. When we controlled for the influence of underlying socioeconomic factors, there were no longer any differences in the rates of hazardous drinking between Māori and non-Māori.

Physiological changes related to ageing

Until recently, alcohol was considered cardio-protective, such that 'moderate' drinking offered some level of health benefits over non-drinking or heavy drinking. However, this evidence has been discounted due to errors in data analyses[10; 11] and recent research specifically identifies that alcohol confers no health benefits for older adults[12]. Indeed, there are many changes related to ageing that increase older adults' risk should they use alcohol. These include several physiological changes such as decreased body water, increased central nervous system (CNS) sensitivity to alcohol, and decreased metabolic activity due to decreased levels of enzyme activity[13]. Older adults may even experience increased alcohol-related risk if they consume alcohol at a level below what might be considered hazardous for younger adults in the presence of an alcohol-related comorbidity[14; 15]. Over

a lifetime, the cumulative effects of consuming alcohol can increase the risk of many chronic disorders, including liver diseases, mental health disorders, cardiovascular disorders, and non-liver cancers, with falls and fractures also significantly associated with alcohol consumption at older ages[16; 17].

In addition to the risk posed by the combination of alcohol use and comorbidities (i.e., chronic health conditions), older drinkers are at significant risk of harm due to the potential for interaction between alcohol and many of their prescribed (or over-the-counter) medications[18]. Slower metabolism and excretion in older adults increase the chance of drug interactions, making them particularly vulnerable to the adverse effects of concurrent alcohol and medication use. There is however limited evidence regarding the prevalence of these adverse outcomes among older adults. Therefore, a consensus approach has been used to develop a list of medications that have potentially serious alcohol/medication interactions in older adults (POSAMINO)[19; 20].

Research highlights that older hazardous drinkers are very likely to use PHC services regularly because of their comorbid health issues[9]. This identifies PHC as a critical context for identification, intervention, and management of at-risk older drinkers. However, despite the danger that alcohol use poses to older adults, the issue of drinking in this population is largely ignored by health professionals, health researchers and the health system[21; 22].

The relative lack of focus on older adult drinking may be due to several reasons. Firstly, given that there may be similarities between the symptoms of alcohol-related disorders and signs of ageing, it may be difficult for health professionals to differentiate them—so-called 'misattribution'[23]. This may lead to an underestimation of older adult drinking and alcohol-related harm[24]. Compounding this is that many of the alcohol-related harms for older adults may occur at lower levels of alcohol consumption, even though no cues are present (i.e., do not meet the criteria for substance use disorder or have diagnosed alcohol-related medical conditions)[6]. Secondly, both general practitioners (GPs) and health service providers may feel uncomfortable discussing alcohol use with older adults[25-27] (thus speaking to the importance of ongoing training and support). Thirdly, there may be issues with the screening tool used. Although standardised screening tools, such as the AUDIT and the AUDIT-C have been reported to perform well in older populations[8], it has been suggested that these tools need lower cut-offs/thresholds for older age groups[28; 29]. Moreover, these tools do not consider the chronic health conditions and alcohol-interactive medications that are likely to increase alcohol-related risk if the older person consumes alcohol. Therefore, for the purpose of this study the Comorbidity Alcohol Risk Evaluation Tool (CARET; Figure 3), which incorporates these elements, will be used to inform the development of a local screening tool for hazardous alcohol use in older adults.

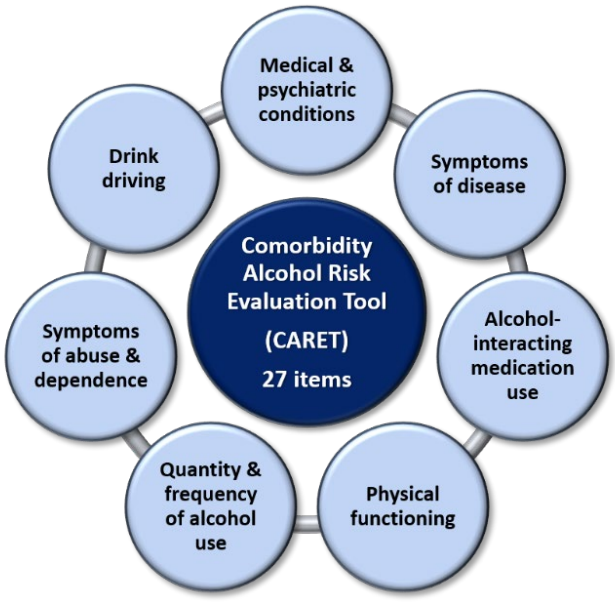


Figure 3. The components of the Comorbidity Alcohol Risk Evaluation Tool (CARET)

The Comorbidity Alcohol Risk Evaluation Tool

The CARET[30; 31] is a validated screening tool for assessing alcohol-related risks specifically

in older adults in PHC contexts. The CARET has been validated and used in older adults who attend PHC in the United States of America (USA), but to date has remained largely a research tool. The components included in the CARET evaluation of alcohol-related risk for older drinkers are identified in Figure 3.

The CARET assesses both the level of consumption of alcohol (quantity and frequency of drinking alcohol) as well as the presence of certain factors that contribute to any alcohol use in older adults that becomes hazardous to their health. Alcohol use either prompts the development, exacerbates the status, or interacts with medication required for the control of their health conditions. These factors include the presence of medical conditions (e.g., liver disease, pancreatitis, gout, depression, high blood pressure, diabetes), health problems (e.g., problems with sleeping, falling, memory, heartburn, stomach pain, nausea, vomiting, feeling sad/blue), and certain alcohol-interactive medications (e.g., heart medications, mental health medications). While the CARET is a validated primary care screen, it is still predominantly used as a research tool for targeted screening[32] or intervention work[33] with older adults attending PHC settings.

Recent New Zealand research[9] compared the utility of the AUDIT-C and the CARET in classifying hazardous versus non-hazardous drinkers in a sample of approximately 4,000 older adults (50-89 years old). Of the 3,050 older adults who indicated they consumed alcohol, a total of 1,565 were classified as non-hazardous drinkers on the AUDIT-C. Approximately 90% of these older drinkers were also classified as non-hazardous drinkers on the CARET. However, the remaining 10% of these drinkers were actually classified by the CARET as hazardous drinkers because of the presence of health-related risk factors that increased the likelihood of harm from their alcohol use. This highlights the potentially unseen sub-sample of older adults whose drinking is assumed to be relatively low-risk due to low consumption, but may still be risky when we consider the presence of medical factors.

Disregarding the sub-sample of non-drinkers in that report, the analyses revealed four distinct groups among all 3,050 who indicated they consumed alcohol:

1) **Non-hazardous drinkers on both screens (46%):** Mainly women who frequently visit their doctor (at least three times a year) and drink small amounts of alcohol infrequently.
2) **Hazardous drinkers on both screens (38%):** Mainly men who visit their doctor frequently and drink high amounts very frequently, with monthly heavy episodic drinking (i.e., six or more drinks on at least one episode).
3) **Hazardous drinkers AUDIT-C only (11%):** Healthy men and women who were less likely to visit their doctor but drink small amounts of alcohol very frequently, with some heavy episodic drinking.
4) **Hazardous drinkers CARET only (5%):** Unhealthy men and women who are likely to visit their doctor quite regularly (three to four times a year), drink small amounts frequently, and are likely to report symptoms related to health issues.

The fourth group was a cohort of older adult drinkers who were categorised as hazardous drinkers on the CARET but were not identified as such by the AUDIT-C. They therefore represent a lost opportunity for health professionals to identify and intervene with a sub-population of older drinkers that are acknowledged to be at risk of harm from their drinking. These people are often frequent users of health services, and therefore could be the target of screening and benefit from brief advice and/or intervention about the potential risk of consuming alcohol in the presence of these risk factors.

The need for enhanced screening

There is a clear need to develop enhanced screening for hazardous alcohol use in adults 50 years and over who attend PHC. Previous NZ research has shown that it is possible to increase alcohol screening rates in primary care via electronic screening processes available in general practices (i.e., the patient dashboard) which offers an opportunity for health professionals (GPs and practice nurses) to deliver an intervention[34]. However, the lack of focus on older adults' alcohol use means that they are less likely than younger adults to be seen as at-risk from any alcohol use[26]. They are therefore also less likely to be talked to about or screened for their alcohol use[35-37], and be identified as experiencing alcohol-related harm, often because alcohol-related issues can be mistaken for age-related illness or decline[38].

The Whanganui pilot context

This programme of work was undertaken in the town and region of Whanganui, New Zealand, with an estimated population of 42,200, and a territory population of 48,100 as of June 2020.

The following data informed the selection of this study site. New Zealand Health Survey statistics show that hazardous drinking is more likely to occur in Māori populations than non-Māori, and in the most deprived areas[39]. Research shows that Whanganui has one of the highest proportions of Māori per head of population in the country[40], has some of the highest levels of health and wealth deprivation in the country[41], and has New Zealand's 5th highest proportion of hazardous drinkers in the total population (illustrated in Figure 4, with no age-related breakdowns available)[42]. As a result, Whanganui has a population with comorbidities and alcohol consumption levels that are likely to include older drinkers at risk of harm.

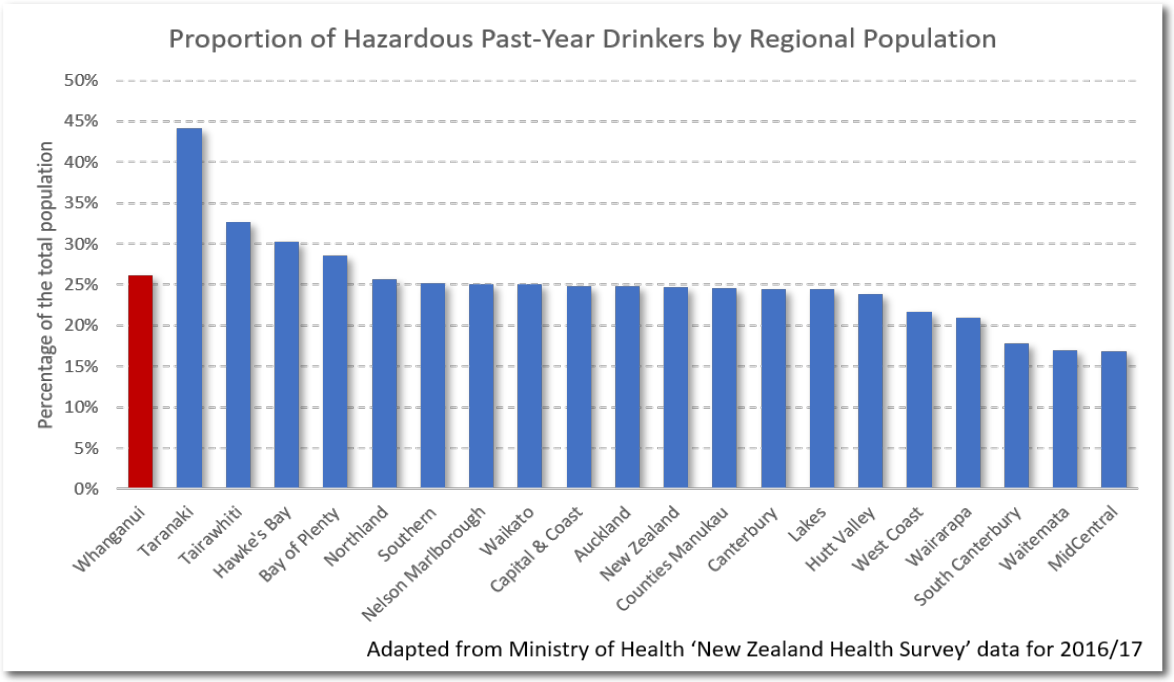


Figure 4. New Zealand Health Survey results indicating hazardous drinking rates as a proportion of the entire population

Furthermore, as McMenamin and colleagues[34] have significant support for such projects in Whanganui Regional Health Network (WRHN) and the region, they have previously shown that electronic screening pilots using WRHN are feasible and effective. In this regard the site has a '*local champion'* that was likely to be able to facilitate engagement with health professionals at WHRN,

hence the planning and rollout of study deliverables. The WRHN is also the largest local Primary Health Organisation (PHO) in the City of Whanganui and its surrounding rural areas. The overall enrolment was 55,900 at the time of writing, with 28% (15,900) identifying as Māori and Pacific ethnicity.

The aim for this project

The aim for this pilot project was to explore whether a validated primary care alcohol screening tool for older adults (i.e., The CARET) could be integrated within PHC settings. This aims to enhance the capacity of health professionals to identify and manage older adults who may be at risk of alcohol-related harm.

This required the following:

1. The development of an enhanced electronic screening algorithm to be embedded in the existing patient dashboard available at WRHN practices. This algorithm was designed to include key indicators of comorbidities and alcohol use for each patient, and provide personalised alcohol risk profiles for the health professional (Figure 5).

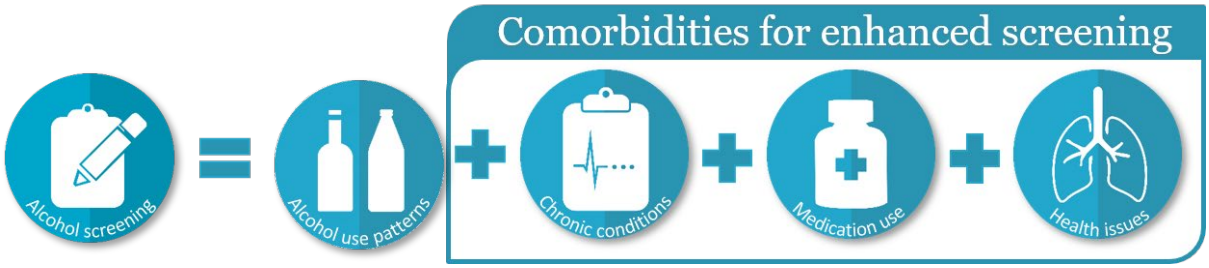


Figure 5. The factors included in an enhanced screen for alcohol risk in older adults

2. A programme of training to be developed and delivered to health professionals. The programme encompasses: an overview of the increased risk consuming alcohol in the presence of comorbid health conditions and/or alcohol-interactive prescription medications poses for older people, and training on using a culturally responsive approach to 'talking' to patients about their increased alcohol-related risk to enable clinical management.

3. Monitoring of alcohol screening rates before (baseline) and after the implementation of the enhanced alcohol screening algorithm in PHC. This assessed the impact of introducing the enhanced screening algorithm and training on health professionals' screening behaviour.

By undertaking this programme of work, we addressed three main questions:

- Question 1: What patterns of alcohol use and health-related conditions were evident in older adult drinkers at baseline?

- Question 2: What was the baseline occurrence of alcohol-related risk amongst older adults attending PHCs?

- Question 3: How successful was the implementation of the enhanced screening algorithm in prompting increased screening in primary care centres?

Section 2: Development and implementation of the enhanced screening module

Engagement with Whanganui Iwi & Māori public health leaders

Engagement with Whanganui Iwi and Māori health leaders was critical to the success of the Whanganui pilot project. The team (led by Dr John McMenamin) held a hui with the following groups to consult on the project concept, identify iwi need and desire for the project, request input from Māori health leadership in shaping the project to fit local needs, and increase support for implementation of the project:

- Te Hau Ranga Ora (DHB Māori Directorate)
- MOHAG (Māori Outcomes Health Advisory Group)
- Regional AOD network (led by Sharon Crosbie Manager Mental Health)
- Addictions Te Oranganui (iwi provider).

The consensus feedback from these groups suggested that more needs to be done to tackle alcohol-related harms and alcohol-related risk for Māori within the Whanganui region. This project also aligned with existing aspirations to focus on the health system's responsiveness (i.e., modifying health professionals' approaches) rather than changing affected populations' behaviours (i.e., providing information to enhance behaviour change).

The context for screening older adults for alcohol use in PHC

PHC professionals commonly rely on cues thought to reflect the problematic use of alcohol use (e.g., relationship breakdown, liver disease, dishevelled appearance) to prompt screening for alcohol use in patients. However, as discussed earlier, there are several reasons why this strategy is likely to miss some older adults who are at increased risk due to alcohol use in the presence of certain comorbidities, health conditions and medications.

1. Many harms from alcohol for older adults occur at far lower levels of alcohol consumption than their younger counterparts, and can occur in the presence of less obvious or no cues[6].
2. GPs may be reluctant to discuss alcohol use with older adults[27; 43].
3. Where screening does occur, it usually involves screening tools like the AUDIT-C, which while sensitive and reliable in detecting hazardous alcohol use in younger adults, do not address the comorbidities, medication use, and health conditions that increase the risk of harm of alcohol consumption in older adults.

Ideally, screening should provide alcohol risk profiles personalised to an individual patient's alcohol use and comorbid health problems. Although the automated 'patient dashboard' systems currently used in PHC do facilitate increased screening capacity, these need augmenting to enhance their sensitivity for detecting older adults at increased risk. The CARET was specifically developed as a sensitive measure of older adult alcohol use risk in PHC contexts[31]. It incorporates indicators of key comorbidities (i.e., chronic medical condition, medication use) that increase alcohol risk levels in adults aged 50 years and over.

Specifically, the CARET assesses an older adult's consumption of alcohol, which includes frequency (days drinking per week), quantity (drinks per occasion) and the presence of heavy episodic drinking/bingeing. It then determines whether this level of drinking is risky based on the pattern of consumption itself or based on the presence of key factors known to place older adults at risk of harm, such as chronic health conditions (e.g., heart disease, diabetes, liver disease), physical and psychological impairment (e.g., mobility issues, depression, memory and sleep problems), the use of

alcohol-interactive medications (e.g., analgesics and anxiolytics) and other alcohol-related risk behaviours (i.e., drink driving).

The CARET has been shown to have good psychometric characteristics (face, criterion, and content validity) when used to assess hazardous drinking in older adults[30; 44; 45]. It also has proven sensitivity in identifying low-level drinking as hazardous, which the AUDIT-C does not[9].

In Aotearoa New Zealand, screening for alcohol use in PHC contexts is commonly undertaken via an 'Electronic Dashboard' system, or practice management system (PMS) that prompts primary care practitioners to ask about alcohol use as part of a more general health-related screen[b]. Other than this, health professionals are unlikely to ask about alcohol use unless there is a clear indicator of increased risk, such as a chronic medical condition (i.e., liver disease).

Therefore, the main aim of this module of work was to enhance existing alcohol screening practices in PHC in relation to older adults' drinking. We aimed to achieve this by developing and embedding an algorithm (based on the CARET) into the screening process that would:

i. reduce the potential gaps in screening for older adults
ii. generate a personalised alcohol-related risk threshold for each patient
iii. enhance the likelihood that health practitioners would detect at-risk older adult drinkers.

Development of the enhanced screening algorithm

The prototype screening algorithm was developed by the study team (including Professor Alison Moore, UCLA, San Diego), at a 2-day workshop in March 2019. The main objectives of the workshop were to:

1) **Explore best evidence underpinning alcohol/condition interactions:** We undertook a pragmatic scoping of current peer-reviewed medical research literature to identify the most comprehensive and recent evidence concerning the interactions between alcohol use and each medical condition and health problem listed in the CARET. This involved a targeted keyword search of the international medical research databases (e.g., Medline; SCOPUS) for recent systematic reviews, Cochrane Reviews, and/or large-scale studies clearly identifying the association between alcohol use and each chronic condition.

2) **Determine how best to define alcohol-interactive medications within an Aotearoa New Zealand context:** The team reviewed the alcohol-interactive medications listed by the CARET to determine their relevance within the New Zealand context and inclusion in the prototype algorithm. This involved a review of country-specific medication classifications and labelling (i.e., via Medsafe and NZ Formulary database search) and medication specification and grouping procedures within the PMS (MedTech 32).

3) **Explore CARET thresholds for Aotearoa New Zealand context:** The team reviewed the CARET thresholds for hazardous drinking specific to each medical condition and interactive medication. This was to determine their relevance to New Zealand primary care alcohol screening knowledge and practices, and to identify if any such thresholds required adjustment prior to inclusion in the algorithm.

[b] https://www.procon.co.nz/patient-dashboard.html

Health conditions and related problems

Appendix 1 summarises the evidence identified during the workshop regarding the relationship between alcohol and each medical condition and health-related problem listed in the original CARET (see/refer section 1). Evidence confirms that increased alcohol-related risk is likely to occur with all medical conditions listed in the CARET, i.e., high blood pressure, gout, depression, diabetes, and liver conditions (but not specifically pancreatitis). In consideration of the available evidence (see Table 6 in Appendix 1), it was decided that this needed to be more inclusive of other mental health conditions (to add to just depression). A broader category of any mental health and central nervous system (CNS) issues was therefore added.

Sufficient evidence was found for the inclusion of most CARET health problems (problems sleeping, memory problems and falling/accidents). However, 'feeling sad or blue' was excluded due to its overlap with the already included 'mental health and CNS issues' category. Also, 'heartburn and other gastrointestinal problems' was excluded from consideration due to a lack of sufficient evidence of a significant causal or interactive link with alcohol use.

Alcohol-interactive medications

The CARET lists 11 groups of medications known to place older adults at risk of alcohol-related harm. The potential for significant interaction between these medication groups and alcohol is strongly supported by recent research[19; 20]. The CARET provides multiple exemplars for each medication group (with some tradenames provided only marketed in the USA), for example:

- Non-prescription medicines for allergies or sleep problems such as Benadryl, Tylenol PM, Chlortimenton, or others at least 3-4 times a week
- Prescription sedatives or sleeping medicines such as Valium, Dalmane, Xanax, Ativan, Ambien, or others at least 3-4 times a week.

Four broad alcohol-interactive medicine groups were created (for the purpose of simplifying the algorithm) for use within the existing PMS in this pilot project. The medicines included in each group are likely to pose similar levels of alcohol-related harm. These groups were:

- Musculoskeletal (all except rubefacients[c]) – included medications for arthritis and pain
- Cardiovascular (all) – included medications for blood pressure, nitrates, and blood thinners
- Analgesia (all) – included stronger prescription medications
- Central nervous system (all) – included medications for depression, antipsychotics, seizure, sedatives, and sleeping.

The screening process

The new screening process still includes alcohol use patterns but does not rely solely on alcohol use to determine risk for older adults. Instead, the new screening process integrates key conditions and medications that place older adults at risk from different levels of alcohol use. This generates a screening outcome more sensitive to individual risk profiles and specific alcohol use patterns.

[c] *Rubefacients are topically applied substances that cause redness of the skin through dilation of the capillaries in the skin and an increase in blood circulation*

Quantifying 'hazardous drinking'

The CARET provides thresholds for hazardous drinking for each medical condition, health-related problem, and category of alcohol-interactive medicine[31; 44]. These thresholds are derived from the consideration of the quantity (drinks per occasion) and frequency (days drinking/week).

For each comorbid health factor (medical condition, health-related problem and medication), the research team considered the set of originally assigned CARET thresholds and given the evidence, came to a consensus about whether to retain or change the thresholds (see Appendix 2 for the final Algorithm).

The original CARET provides descriptions of typical drinks in ounces (e.g., a shot of spirits (whisky) as 1.5 oz (equivalent to 44ml), and a glass of wine 4-6 oz (equivalent to 118-177ml)). As the enhanced algorithm is designed to be used in conjunction with AUDIT-C data collected at PHC agencies, we used the NZ standard drink measure (i.e., one standard drink contains 10 g/12.7 ml of pure alcohol[46]). Compared to the equivalent USA measure of a standard drink, this standard drink measure equated to smaller volumes (i.e., 30 ml and 100 ml, for a shot of spirits and a glass of wine, respectively).

We adopted the original CARET quantity and frequency thresholds, acknowledging that the different definitions of a standard drink between the USA and Aotearoa New Zealand resulted in this algorithm applying a more conservative threshold for defining hazardous drinking in Aotearoa New Zealand than in the USA.

In addition, we specified in the algorithm the definition of heavy episodic drinking as 6+ drinks on one occasion for men, and 5+ drinks on one occasion for women. This is based on existing definitions of a binge as being 6+ drinks for adult populations[47] and more recent findings that a lower threshold for women more accurately reflects gender distinctions in risk of harms[7]. This pattern of alcohol use frequency, quantity and bingeing should, for each comorbid condition, result in the patient being classified as over the 'hazardous' drinking threshold.

An example of the application of this algorithm is provided in Table 1. In the presence of high blood pressure, having an average of three drinks on each occasion on four or more days per week is considered hazardous. Alternatively, having an average of four drinks on each occasion at least twice per month is considered hazardous. However, any level of binge drinking is considered potentially hazardous in the presence of high blood pressure.

Table 1. Hazardous drinking thresholds for high blood pressure

	CARET 'Hazardous' Threshold		
	Quantity	**Frequency**	**Binge**
Conditions	Drinks per occasion	Days drinking per week	Men: 6+ Women: 5+
High blood pressure	3	4+	Any
	4	2+ month	Any
	5+	Any	Any

Identifying 'hazardous drinking'

The patient's diagnostic information (comorbid medical condition, health-related problems and medications) embedded in the primary care e-system can be operationalised as a decision tree in two ways to identify either:

- **Current hazardous drinking** (for those with alcohol use information in the system), or
- **Potential for hazardous alcohol interaction** (for those lacking alcohol use information in the system).

Current hazardous drinking*:* If information about alcohol use is present in the system—likely to be obtained from the past administration of the AUDIT-C (or full AUDIT)—the enhanced algorithm will classify the patient as being in the 'hazardous' drinking range if the drinking thresholds for any of the comorbid health problems are exceeded. This will appear as a prompt (red flag) on the patient dashboard. The prompt allows the health professional to rescreen the patient to confirm that the patient is still at risk, and to engage the patient in a conversation about their alcohol use and the increased risk of drinking in the presence of comorbid conditions. A simplified version of this decision tree is provided in Figure 6 below.

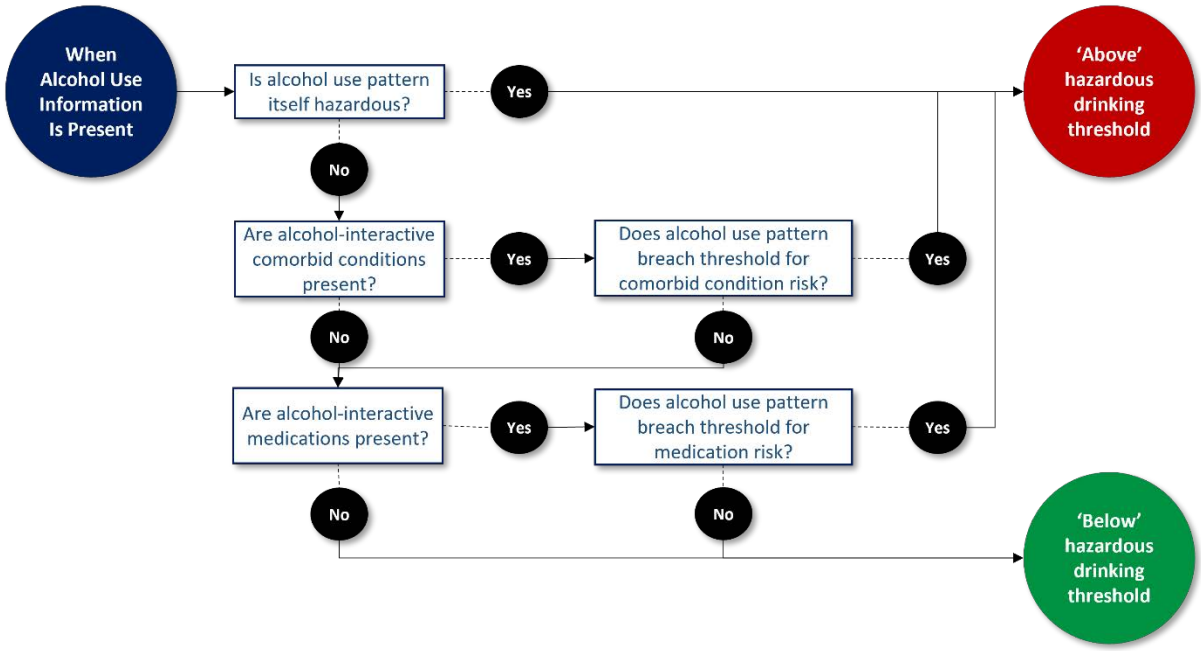


Figure 6. An alcohol screening decision tree for identifying alcohol-related risk factors for older adults who currently drink

Potential for hazardous alcohol interaction: If there is no current information about alcohol use stored in the e-system, the algorithm will identify older adults who should be screened for alcohol use. This is based on existing information relating to any diagnosis of chronic medical conditions, health-related problems and prescription of alcohol-interactive medications likely to increase the risk of alcohol-related harm. A simplified version of this decision tree is provided in Figure 7 below.

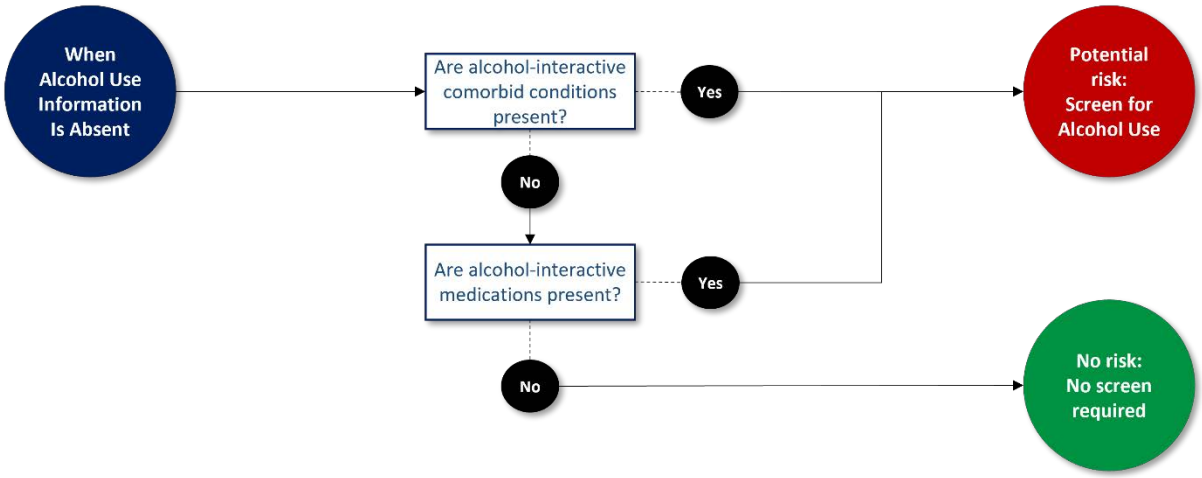


Figure 7. An alcohol screening decision tree for identifying potential alcohol-related risk for older adults with no alcohol use data

Once patients have been screened for alcohol use (and that information is in the system) the detection of hazardous or non-hazardous use is automatically determined via the system using the process explained in Figure 6.

In the event that a patient is identified as a 'hazardous drinker' the system will produce a 'red flag' that intends to prompt the health practitioner to conduct the traditional full 10-item AUDIT screen for alcohol use to clarify the patient's status.

Rather than providing an algorithm in a specific coding language, which would limit its applicability, the enhanced screening algorithm is presented in the form of a high-level algorithmic format that outlines the decision thresholds for hazardous drinking. These can be adapted into specific coding languages as required by the PHC agency and are presented in Appendix 2.

Embedding the algorithm into the PMS

At the time of this project, the WRHN PHO utilised Medtech 32 as its PMS. This PMS has a built-in patient dashboard displaying patients' clinical information to enable routine management, prompts for collection of clinical information that is either not recorded or out of date, prompts for clinical tasks that should be considered, and to allow access to clinical forms (including an alcohol screen – see Appendix 3). The status of all clinical information is identified in the PMS using a colour-coded traffic light system (see Figure 8).

	Priority issues for resolution when appropriate
	Worth noting
	No action needed today

Figure 8. Traffic light system utilised in PMS

We worked with the computer systems specialists supporting the PMS to build a custom algorithm based on the CARET screening logic (See Appendix 2) and embed it in the PMS. For each patient record accessed in the PMS, this algorithm created a personalised risk profile which specifies (if present in their records) the patient's comorbidities, medications, and health problems that could interact with alcohol and increase their risk of harm. Regardless of whether they had been screened

for alcohol use previously, this new risk information was then utilised as a prompt for the health professional to screen for alcohol use.

Pilot testing

Prior to the rollout of the enhanced screening algorithm to the WRHN PHO, the embedded algorithm was pilot tested at one GP practice affiliated with WRHN for necessary quality control testing, i.e., to ensure that the algorithm was adequately sensitive (i.e., acceptable true positive rates), and specific (acceptable true negative rates) in assessing older adults accessing PHC contexts.

Three pilot (simulated) cases were developed and run through the PMS at the practice, with the dashboard information assessed for accuracy by the study team (See Appendix 4 for an overview of these cases). The algorithm included specified alcohol use patterns, alcohol-interactive medications, and alcohol-interactive conditions. Testing of all possible combinations of these factors was neither feasible nor required.

Three cases were considered by the team as satisfactory to assess the ability of the PMS to identify the overall combination of factors (i.e., alcohol use + medication; alcohol use + condition; medication + condition) likely to trigger prompts to screen based on identified risk. If one or all the simulated cases failed, then the issue was unlikely to be about specific alcohol use patterns, medication, or conditions. Instead, it was likely to be an algorithm process issue.

In all three cases, the PMS correctly indicated the alcohol screening status of the simulated patient (not screened or not recently screened, screened and below AUDIT-C guidelines for hazardous alcohol use, screened and above AUDIT-C guidelines for hazardous alcohol use). It also indicated the comorbid health condition(s) and/or medications present that placed the patient at potentially greater health risk if they drank alcohol.

A note on issues encountered during the algorithm development process

The algorithm development and embedding it in the PMS was a technically straightforward process. However, several issues significantly delayed this process:

- The lack of consistent availability of key team members at critical times due to their key roles. Specifically, this was one of many projects that required the attention of the single computer systems specialist supporting the PMS. Further, the team member designing the algorithm and the team member connecting the PMS specialist with the algorithm designer were both inundated with critical work that stalled this project (both prior to and during the onset of COVID-19).

- There was further delay in communicating to practitioners that the algorithm was embedded in the PMS and ready to go. This was primarily due to the lack of adequate PHO-wide messaging systems to engage extremely busy practitioners across multiple clinics and services.

Section 3: Development and roll out of training programme

Overview

The development of the training programme on the assessment and management of alcohol-related risk in older adults in PHC contexts was guided by the following steps:

1. The need to scope the training needs of the health professionals participating in the training.
2. The incorporation of adult learning principles in developing and delivering the training.
3. The development of learning objectives to guide participants in their learning.
4. The development of relevant and appropriate training material.
5. The implementation and evaluation of training.

Programme development

Needs assessment

We scoped staff training needs with assistance from staff from Health Solution Trust, a charity set up to support and work with staff at WRHN. Through their long association with WRHN, Health Solution Trust staff are cognisant of the PHO and Te Pou (Matua Raki – Addiction Workforce Development)'s staff training needs.

Using this process, we identified two important areas of training need:

1. Background information describing the increased alcohol-related risk experienced by older people who consume alcohol in the presence of comorbid health conditions and/or prescription medications; the process of case finding (screening), and the subsequent management of older patients identified as at increased alcohol-related risk

2. The applied skills (and confidence) to use elements of motivational interviewing (MI) with Māori concepts and practices when talking to older people about their alcohol consumption.

Based on this analysis, we believed that the training programme should incorporate all of the following elements/activities:

1. **Online elements** (eLearning, webinars, podcasts) easily accessible by busy health professionals that could provide the necessary background information, case examples/vignettes, and short videos of interviews illustrating how to talk to older people found to be at increased alcohol-related risk

2. **Face-to-face** applied workshops designed to provide health professionals with practice in talking to older people

3. **Follow-up** peer group presentations designed to consolidate learning and practice.

Adult learning principles

Participants in this training were busy health professionals. To increase the likelihood that the training programme would be effective, we considered adult learning principles[48] when developing the training resources and delivering the training.

The learning principles considered were:

- adults are self-directed and therefore should be provided with flexible and easy access to training resources

- adults come to training with a lifetime of existing knowledge, experience, and opinions. Therefore, learning activities (particularly face-to-face workshops) should permit participants to reflect on their experience, express their opinions, and proceed with training at their own pace and the level they wish
- adults are goal-oriented and therefore very clear outcomes and rewards should be offered (particularly in the form of professional recognition for training completed)
- adults want training that is relevant to them. Therefore, a variety of resources should be made available to cater for different learning styles and levels of knowledge
- adults want training that is practically-oriented and so we planned to include a staircase approach to delivering training, starting with the necessary theory followed by applied workshops
- adults want to be, and feel, respected.

Learning objectives

The following learning objectives were developed for the essential components of the training programme, i.e., the eLearning online course and face-to-face applied workshops. It was expected that at the completion of the eLearning course, the health professional should know:

- The factors that place older adults at increased risk should they consume alcohol.
- How to assess older adults' drinking using standardised screening tools.
- The different treatment options for older adults who are identified as at increased risk from consuming alcohol (hazardous use), and those who are consuming alcohol in a harmful/dependent way.
- The extent and nature of alcohol interactions with prescription medications.

Following the face-to-face workshops, participants should be able to demonstrate how to talk to older adults about the increased health risk posed by them consuming alcohol.

Development of training material

Curriculum

The following academic and clinical content was identified as important and therefore included in the training:

- The theoretical foundation required to understand the risk posed by alcohol use in older people who have comorbid health and prescription medication use, specifically:
    - Definitions of harmful and hazardous drinking.
    - The epidemiology of ageing and the effect of ageing on human physiology (metabolism, body water and effect on resultant blood alcohol concentration (BAC)).
    - The general biological aspects of alcohol use, in particular the long-term effects of alcohol use.
    - The health risk of using alcohol with increasing age:
        - Ageing and co-existing diseases
        - Alcohol-interactive medications.
    - Evidence-based practice:
        - Current evidence-based practice for the detection of and intervention for hazardous and harmful alcohol use in the primary care context (Screening and interventions - Efficacy, cost-benefit, evidence for the use of AUDIT, AUDIT-C).

- The knowledge and clinical practice skills needed to identify and manage older people identified as at high alcohol-related risk**.**
    - Screening of older adults for alcohol use (CARET vs AUDIT).
    - Brief interventions and referral (using elements of MI Open-ended questions, Affirmations, Reflective listening, and Summary reflections (OARS)).
    - Management of older adults at increased risk from consuming alcohol.
    - Social and cultural issues relating to alcohol use among Māori and Pacific patients and their family/whānau (The use of Takitaki Mai: Engaging Māori[49]).

Training components and delivery

The following components comprise the training programme on the assessment and management of alcohol-related risk in older adults in primary care (see Table 2 for a summary description of each component).

Online learning components

E-learning course:

This comprises the theoretical content described in the previous section, and material concerning the theory of MI and screening and brief intervention in a flexible and easily accessible format (Appendix 5). The course is designed to be interactive, so participants can engage more deeply with the material if they wish, by clicking on appropriate hyperlinks (e.g., links to peer reviewed articles and clinical resources extend the participants' reading on the management of substance use disorder). Participants can exit at any time and re-enter the e-learning course at the same spot they left. A series of case scenarios and related self-test questions were presented at the end of the course.

The material was peer reviewed and successful completion of these self-test questions is recognised by the Royal New Zealand College of General Practitioners (RNZCGP) as Continuing Medical Education.

Participants were encouraged to complete the e-learning course prior to attending face-to-face workshops as further applied training was designed to build upon this foundation training. The e-learning course and other online elements of the programme (described below) were hosted by the Goodfellow Unit at the University of Auckland.

Filmed clinical scenarios:

By clicking on YouTube links embedded in the e-learning course, participants are also able to view two short videos that demonstrate the use of OARS in a conversation with patients with comorbid health conditions. In the first video the conversation is about alcohol and gout; in the second video the conversation is about alcohol and hypertension.

Webinars:

Two webinars are accessible via hyperlinks in the online course or via external links on the Goodfellow Unit website. These provide more in-depth clinical information about managing alcohol and older adults. The webinars are:

1. Talking about alcohol
2. Conversations on alcohol with older patients: assessment and management.

Podcast:
A podcast on opportunities for alcohol conversations by video or phone was developed over the COVID lockdown (March/April 2020).

Face-to-face learning components

Whanganui Interprofessional Education programme (WIPE):
A general introduction to the enhanced screening algorithm to primary care practitioners was presented at an evening seminar as part of WIPE. Screenshots of the enhanced screening patient dashboard reminder and tool were shared via the regional eNewsletter; and the PHO practice liaison staff were available to explain the form update and answer questions from primary care staff.

Face-to-face workshops:
These were designed to build on the content delivered in the e-learning course and focused on developing cultural competency working with Māori, and were designed in association with Te Pou (Matua Raki – addiction workforce development). Participants were instructed on how to incorporate Te Ao Māori concepts or practices in the way they engage with Māori, and in the way they deliver the brief intervention. 'Takitaki mai: a guide to motivational interviewing for Māori' was used to guide these sessions. An initial three-hour workshop was delivered, with a follow-up two-hour workshop several months later. Several "how to" videos were provided about using the skills in alcohol conversations with links sent via the weekly eNewsletter.

Additional training events:
In response to requests and identified training needs, additional training events were delivered on an ad hoc basis over the study period. These included the following:

- One general practice instituted a weekly consultation process review meeting which included alcohol case reviews and motivational skills.
- One rural practice requested an onsite workshop that followed the face-to-face workshop outline.
- Alcohol cases arising from the programme were presented at a primary care practitioners' peer review meeting hosted by RNZCGP Whanganui sub-faculty.

Individualised dashboard training:
Training on the use of the enhanced screening algorithm was offered, either onsite or via video conferencing, to each health professional working at the PHO using the enhanced screening algorithm.

The individualised training entailed 'walking' through the rationale for the enhanced screening algorithm and running a pilot case to illustrate and identify the prompts produced by the patient dashboard as a result of running the algorithm.

Advice regarding the interventions that would be appropriate for those identified as potentially at risk by the screening due to their alcohol use and/or the presence of comorbid medical conditions and alcohol-interactive medications was also provided.

Table 2. Summary of the components of the training programme on the assessment and management of alcohol-related risk in older adults in primary care

Title	Descriptor	Notes
Online components		
e-learning course	Interactive, peer reviewed content on factors contributing to increased alcohol-related risk in older adults, and the assessment and management of older people identified as at-risk. Links are provided to short video clips on interviewing older people with alcohol-related risk and two webinars on assessment and management of alcohol-related risk (see below) Course URL: https://www.goodfellowunit.org/courses/older-adults-and-drinking-assessment-and-management	Freely accessible via Goodfellow Unit (University of Auckland) web platform. CME points obtained for successful completion of the course.
Filmed clinical scenarios	Two short videos that demonstrate the use of OARS in a conversation with patients with comorbid health conditions; the scenarios feature patients with gout and hypertension.	Embedded within e-learning course. Freely accessible via Goodfellow Unit (University of Auckland) web platform.
Webinars	1. Talking about alcohol: https://www.goodfellowunit.org/events/talking-about-alcohol 2. Conversations on alcohol with older patients: assessment and management: https://www.goodfellowunit.org/events/conversations-alcohol-older-patients	Freely accessible via Goodfellow Unit (University of Auckland) web platform.
Podcast	Opportunities for alcohol conversations by video and phone: https://protect-au.mimecast.com/s/2zYpCD1vOJHnjqjVSWrjBH?domain=goodfellowunit.org	Developed over COVID-19 lockdown.
Face-to-face components		
WIPE evening seminars	Provided an initial general introduction to the rationale for, and design of, the project, and presented screenshots of the enhanced screening patient dashboard reminder.	Screenshots of the enhanced screening patient dashboard reminder and tool were shared via the regional eNewsletter.

Title	Descriptor	Notes
Face-to-face applied workshops	The workshops were designed to develop the theory presented in the e-learning course on incorporating Te Ao Māori cultural concepts, and the use of OARS in conversations with older adults. Participants were also required to demonstrate these skills through role play.	Developed in association with Te Pou. 'Takitaki mai: a guide to motivational interviewing for Māori' was used to guide these sessions. Two short videos that demonstrate the use of OARS in a conversation with older patients with comorbid health conditions were also developed. 31 clinicians (GPs, Nurse Practitioners, Practice nurses) attended workshop training out of an estimated 80 regional primary care clinical staff.
Dashboard Training	Individualised training delivered as part of the implementation of the enhanced screening algorithm.	Delivered either onsite or via video conferencing.
Additional training events	Ad hoc events designed to address the needs of staff at certain practices, and included: 1. Weekly consultation process and case review meetings 2. Additional onsite workshops on the use of OARS in conversation with older adults 3. Peer review of cases at RNZCGP Whanganui sub-faculty.	

Evaluation of training

The success of this targeted training was assessed via the following methods:

1. By comparing the monthly alcohol screening rates pre- and post-implementation of the screening algorithm at WRHN practices.

2. Feedback was also sought via an online survey and face-to-face interviews with health professionals on the resources they used, the training event they participated in, and their experience (pros and cons) of engaging in the training provided.

These results are presented in Sections 4 and 5 of this report.

Section 4: Evaluation of the project – Patterns of screening

This project reflects a pragmatic research translation study focused on changing health professionals' existing alcohol screening practice in situ (i.e., the context of this change was PHC settings). As such, the focus was on the utilisation of existing health practice data systems and data collection to monitor the impact of our intervention and resulting practice change in a 'real world' medical environment.

To examine the impact of both embedding the enhanced screening algorithm in the PMS at chosen PHC settings and of the targeted training programme on health professionals' screening practice, we carried out the following evaluation activities:

1. Patient data from WRHN practices were extracted pre- and post-implementation of the training programme and enhanced screening algorithm to monitor screening rates.

2. Feedback was sought via an online survey and face-to-face interviews with health professionals on their perspectives of managing older adults who have identified alcohol-related risk, and their experience (pros and cons) using the enhanced screening algorithm and engaging in the training provided.

Impact of embedding the enhanced screening algorithm in primary care

Design and measures

We utilised a simple pre-post study design (i.e., pre-post implementation of the electronic screening algorithm at WRHN practices and following the delivery of training) and carried out secondary data analysis of older adult patient health data from the health records. This permitted an analysis of the baseline characteristics (co-existing health conditions, baseline occurrence of alcohol-related risk) for all patients based on the existing medical information on file. Following implementation of the screening algorithm, screening rates across PHOs in the project were monitored monthly.

For the purposes of understanding the feasibility of implementing and tracking the success of an alcohol screening enhancement intervention in a real-world PHC context, we adopted an 'ecological' research approach for data collection and analysis. This involved working with data that are already collected within PHC services (i.e., we did not design our own data collection for this project).

Reliance on existing health service data provided a strength to our project. By using existing health service data, we would be able to illustrate the success (or lack thereof) of a screening enhancement project that could then be implemented in health services across the country with no extra requirement for complex data collection and analysis procedures.

However, such an approach included an inherent weakness in the project design as well. While some health service data were fit for descriptive and tracking purposes (i.e., identification of key health conditions and medications), other health system variables collected as part of the standard service were less definitive indicators (i.e., alcohol screening data. See the sub-section below for further discussion).

We worked with data managers at the WRHN to identify the variables located in the existing PHC network (i.e., real-world patient health data from GP services) that best reflected our focus on observing patients':

- Location and demographics
- Indication of alcohol use screening
- Existing health conditions
- Prescribed medications.

Ethics approval was obtained for all modules of work (Health and Disability Ethics Committees: Ref. 19/STH/65).

Definition of older age

The definition of what constitutes older age is not standardised in the literature[50]. Studies examining the effects of alcohol on people as they age have increasingly used 50 years of age as the lower cut-off for defining older adults[51-54]. This approach acknowledges the importance of considering countries or cohorts with shorter life expectancies than in developed countries[55].

Furthermore, this 50-year-old age cut-off for defining older adults reflects an increasing recognition that alcohol-related harm may occur at lower levels of alcohol consumption as people age, and that alcohol consumption often occurs in the presence of comorbid health conditions and alcohol-interactive medications that potentially place the person at increased risk. The use of the 50-year-old age cut-off also permitted the comparison of younger older adults (50-64 years) with those middle/older-older adults aged 65+ years. We adopted the definition of older adults being 50+ years and included all adults aged 50+ years of age (n= 24,411) registered as patients with WRHN for these analyses.

Monitoring timeline

The enhanced screening algorithm had been rolled out at WRHN by the end of February 2020. To conduct the baseline analyses necessary to describe the patterns of alcohol use and health-related conditions, patient data were extracted in November 2019. Further data extractions at the beginning of December 2019 and January 2020 were completed to monitor and describe the pattern of comorbidity and potential burden of alcohol-related risk in new enrolments to the PHO. To monitor the success of implementing the enhanced screening algorithm, data were extracted monthly from March to December 2020.

COVID-19 disruption to this project

The New Zealand COVID-19 National Emergency Alert Levels 4 and 3 were enforced from 26th March to 13th May 2020, which occurred during the monitoring period for this project. An additional period of COVID-related restrictions (Alert 2 for regions outside Auckland) was enforced from 12th August to 21st September 2020. No face-to-face training occurred during these periods of COVID-19 restrictions. By necessity, the focus of health professionals during this period and for the following months was on managing COVID-related issues, rather than routine health monitoring. Nevertheless, health professionals were still free to undertake the screening of patients. Patient data continued to be extracted from the PHO throughout this period.

Measuring hazardous alcohol use

The AUDIT-C was a component of the existing PMS used by health practitioners to assess hazardous alcohol consumption, with those who scored below 4 considered non-hazardous drinkers, and those who scored 4 or above as hazardous drinkers[7]. However, the specific variables within the AUDIT-C (i.e., patient identified frequency of drinking, quantity consumed per typical occasion, and instance of binge drinking) were not available to the researchers as standard variables within the WRHN data

system. Instead, AUDIT-C data for each patient remained embedded in each PHO system and WRHN only received indications of the final outcome of that screening. Specifically, the only alcohol-related variable we were able to extract from the WRHN system was whether (and when) a patient has screened:

- Above the 'hazardous drinking' threshold
- Below the 'hazardous drinking' threshold

Further, patients may have been screened for their alcohol use multiple times across their lifespan within the PHC service. We were able to identify whether patients had multiple instances of being screened 'above' the hazardous threshold, 'below' it, or even instances where some patients had records indicating that they have been screened 'above' and 'below' on different occasions.

This alcohol screening variable allows us to identify when new screens were undertaken (and for whom) each month, facilitating our tracking of screening rates across the life of the project. However, inherent limitations in this screening data mean that we are unable to provide much more nuanced information regarding alcohol use itself (i.e., dates at which baseline screening was first undertaken for each participant; indications of the frequency/quantity patterns more or less likely to result in alcohol screening, etc.).

Patient health data

The following patient health data were extracted:

- Encrypted patient identification numbers (National Health Index) – this enabled the tracking of individuals from baseline (prior to implementation of the enhanced screening algorithm), to the implementation of the screening algorithm, and then to the end of the project.

- Demographic information – limited demographic variables (age, gender, ethnicity [Māori[d], non-Māori]) were collected to protect patient anonymity.

- Alcohol screening status – any previous screening for hazardous alcohol use using the AUDIT or AUDIT-C, above or below guidelines for hazardous alcohol use whilst enrolled at the WRHN.

- Health conditions ever diagnosed – the following data regarding health conditions commonly found to increase alcohol-related risk and that were coded and listed in the PMS: hypertension, anxiety and depression (captures some dementia), gout, CNS disorders (captures degenerative and hereditary CNS disorders), liver diseases (captures all liver diseases and infections, including cirrhosis and chronic liver disease), hepatitis (captures hepatitis infections B and C), and mental health disorders (psychiatric disorder, including cognitive impairment).

- Prescribed medications – current (as coded and listed in the PMS) that can be either a proxy for a medical disorder that increases alcohol-related risk, or adversely interact with alcohol.

[d] Māori ethnic identity was a prioritised, dichotomised ethnicity indicator in this system. This is based on self-report of their identity where the reporting of Māori descent automatically counts the individual as Māori, including where the individual may indicate descent from multiple ethnic groups.

Examples include (but are not limited to): angiotensin converting enzyme inhibitors, calcium channel blockers, addiction medications such as methadone or acamprosate, antipsychotics, antidepressants, antithrombotics, beta blockers, diuretics, antihypertensives, and statins.

General data management and analysis

Patient data with encrypted National Health Index (NHI) numbers were received in Excel format from WRHN on a monthly basis from November 2019 to November 2020. The data were transferred to SAS® software for data screening, manipulation, and analysis. The following data transformations/combinations were undertaken to facilitate data analysis and interpretation.

Co-existing medical conditions

- CNS disorders were excluded due to very few cases.

- Mental health – Cases of anxiety/depression and hospital admission for mental health disorders were combined due to small numbers for the latter condition.

- Liver disorder – Liver disease and hepatitis were combined to form one category because of the similarity in medical pathology.

Prescription medications

Cardiovascular (CVD) medication – the following were combined to create this medication category group: ACE inhibitors, calcium channel blockers, antihypertensive medications, and diuretics.

Alcohol drinking status

Patients were categorised into one of four groups according to data on their drinking status (AUDIT-C score) for the following analyses:

1) ***Never screened*** – patients whose health records indicated that they had never previously been screened for alcohol use at the WRHN.

2) ***Screened above*** – patients who had been screened with the AUDIT-C either once or more than once but were found to be above the guideline for hazardous alcohol use at each screen.

3) ***Screened below*** – patients who had been screened with the AUDIT-C either once or more than once but were found to be below the AUDIT-C guideline for hazardous alcohol use at each screen.

4) ***Screened both*** – patients who had been screened more than once and whose scores on these occasions included indications of being above the AUDIT-C guideline for hazardous alcohol use at one time and below this guideline at another time. Hence, they have at one point in time had both hazardousness classifications in their medical records.

Patients were categorised into one of three age group categories – *younger older* adults (50-64 years), *middle older* aged adults (65-79 years), and *older-older* aged adults (80+ years). This allowed for comparison of the relative burden of risk (co-existing health condition and medications) and patterns of alcohol use with increasing age.

Cross tabulations were used to examine associations between key demographic variables (gender, ethnicity (Māori/non-Māori), age groups (50-64, 65-79, 80+ years) and drinking status (never, above, below, both)); between ethnicity and co-existing medical conditions and prescription medications;

between co-existing medical conditions and prescription medications and drinking status; and co-existing medical conditions and prescription medications and age groups.

Chi square (χ^2) was used to test for potential differences in proportions of older adults within the groups being examined. Fisher's exact test was used with small cell sizes (below 5). The conventional probability value of less than 0.05 was used to indicate significance. This indicates a 95% probability that the difference between groups in this sample reflects actual differences. Further, as an indicator of effect size (for Chi square) we used the Phi coefficient (φ) – with values of 0.1 considered a small effect, 0.3 a medium sized effect and 0.5 a large effect. We accepted any significant result as clinically meaningful if it was of medium or large effect size.

Data analysis plan

We utilised the following data analysis plan to address the questions.

Question 1. What were the patterns of alcohol use and health-related conditions in older drinkers at baseline?

Data for these analyses were extracted initially in November 2019, prior to the implementation of the enhanced screening algorithm, and represent a cross-section of all older adult patients enrolled at WRHN at baseline. Specifically, cross tabulations were used to examine associations between alcohol screening status, key demographic variables (gender, ethnicity (Māori/non-Māori)), and co-existing medical condition and prescription medication. The associations between increasing age (50-64 years; 65-79 years; 80+ years) and co-existing medical conditions and prescriptions were also explored.

It is important to note that the data used for baseline analyses are cross-sectional which permits us to examine associations between variables, but not to infer cause and effect relationships.

Question 2. What was the baseline occurrence of alcohol-related risk amongst older adults attending the primary care centres?

Baseline data were examined to determine what proportion of older adults could be considered at-risk drinkers prior to implementing the enhanced screening algorithm. This was determined by looking at the proportion of older adults who were screened as drinking above AUDIT-C guidelines, and who have co-existing medical problems and/or are prescribed alcohol-interactive medications, which we explored when addressing research question 1.

We were also interested in the proportion of older drinkers NOT flagged as at-risk drinkers based on their AUDIT-C status alone either, because 1) they were categorised as drinking below the AUDIT-C guidelines for hazardous alcohol use, or 2) because they had never been screened.

Each patient who had never been screened or who screened below AUDIT-C guidelines for hazardous drinking was allocated to one of three groups based on the number of co-existing risk factors they possessed:

a) No risk (no co-existing alcohol-interactive medical condition or no alcohol-interactive prescription medication)
b) Lower risk (one co-existing alcohol-interactive medical condition or alcohol-interactive prescription medication)
c) Higher risk (more than two alcohol-interactive medical conditions and/or alcohol-interactive prescription medications).

Question 3. How successful was the implementation of the enhanced screening algorithm in prompting increased screening in primary care centres?

The use of a pre-post design (i.e., patient health data were extracted before and after the implementation of the enhanced screening algorithm) allowed us to examine and monitor trends in screening across time using the following metrics:

a) The number of screens undertaken at WRHN general practices for the months of November 2019 to January 2020 provided an indication of baseline (pre-implementation) monthly screening numbers.

b) The number of screens undertaken at WRHN general practices for the months of February through to December 2020 provided an indication of screening activity following the implementation of the electronic screening algorithm.

Baseline results

For brevity, only a summary of the data pertaining to each question will be presented in the body of this report. The full data tables can be found in Appendix 6.

Question 1. What were the patterns of alcohol use and health-related conditions in older drinkers at baseline?

Description of baseline sample

All adults aged 50+ years (n= 24,411) registered as patients with WRHN in December 2019 were included for these analyses. Descriptive statistics for the baseline sample are reported in Table 9 (Appendix 6). The majority were aged 50-64 (53%), with sample mean age being 65 years. Approximately 15% of participants were Māori and slightly more than half were female (53%).

Seventy-three percent of the sample had been screened for alcohol use at least once in the past, with over half (56%) of the total sample screening below the AUDIT-C threshold for hazardous alcohol use. Only 17% of the sample had ever been screened above guidelines for hazardous alcohol use. This was more prevalent in men (23%) than in women (12%) (Figure 9). While 27% of this sample had never been screened for alcohol, this was far more common in women (32%) than in men (22%).

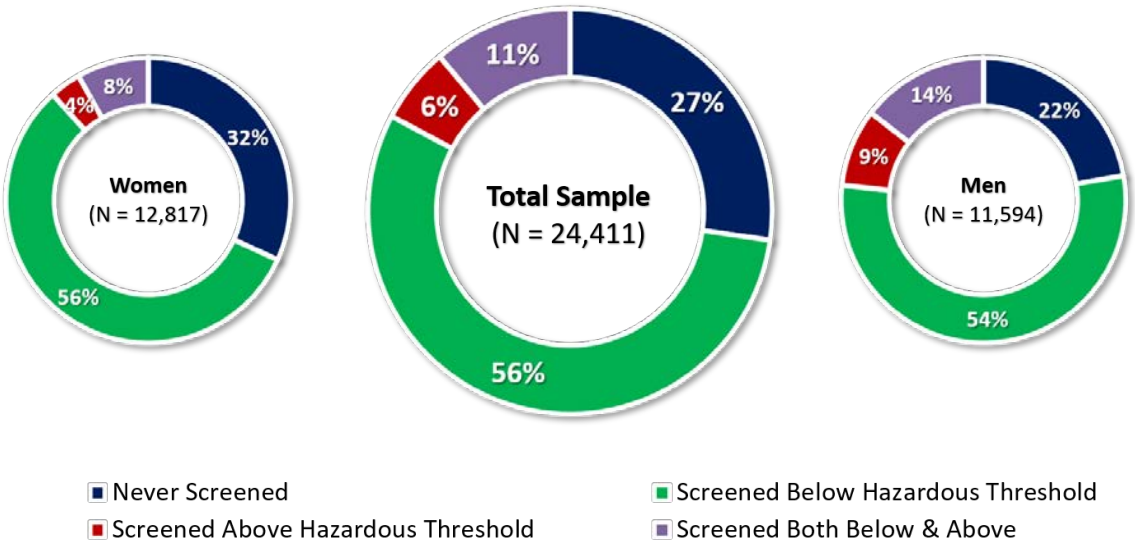


Figure 9. Baseline sample broken down by AUDIT-C screening category (total & by gender)

Figure 10 illustrates the patterns of alcohol screening by age group. The patterns of screening were similar between the ages of 50-79, with approximately a quarter of each age category never having been screened for alcohol use, the majority being screened below the AUDIT-C threshold for hazardous alcohol use, and relatively fewer screening above the threshold. However, the distributions shifted for those aged 80+. While far fewer had been screened above the threshold for hazardous alcohol use (11%), 37% of this age group had never been screened for alcohol use.

Further information on demographic patterns in baseline screening is available in Table 9 (Appendix 6).

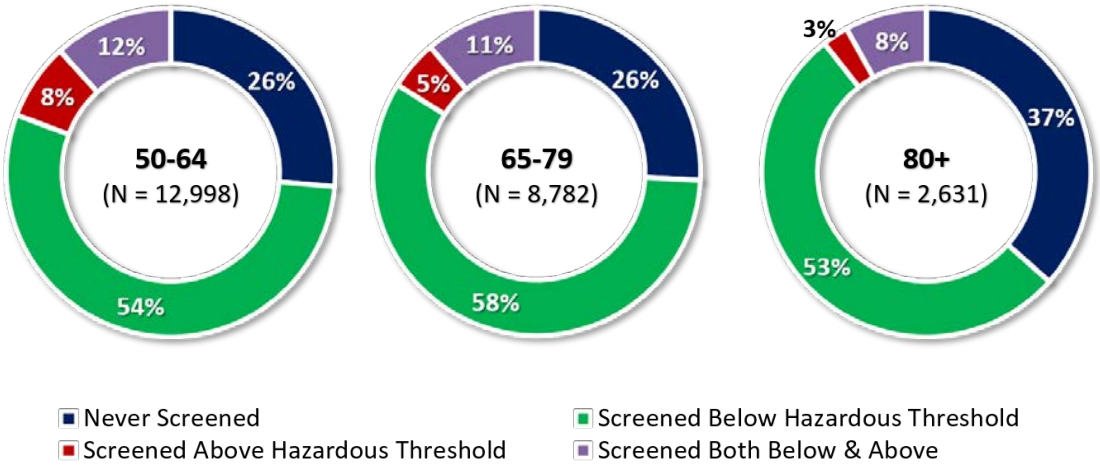


Figure 10. Baseline sample broken down by screening category (by age group)

Co-existing medical conditions as a potential risk factor for alcohol-related harm

We explored the extent of alcohol-related health conditions among the sample as these increase the potential alcohol-related risk. Overall, the results show that in this sample of older adults:

1. Hypertension was the most common existing medical condition, with approximately one third of older patients in each alcohol screening group diagnosed with the condition.

2. While other existing conditions were less common, there were still older adults diagnosed with gout, liver disease, and/or mental disorders who had never been screened or screened below the threshold for hazardous alcohol use.

Figure 11 illustrates the proportion of the four most common health conditions experienced by each of the four alcohol screening groups. There is very little difference in the proportion of adults across screening categories experiencing these alcohol-related health conditions. This suggests that health conditions are a significant and present risk for harm for many who have never been screened for alcohol use.

Further information on the pattern of health conditions by screening category is available in Table 10 (Appendix 6).

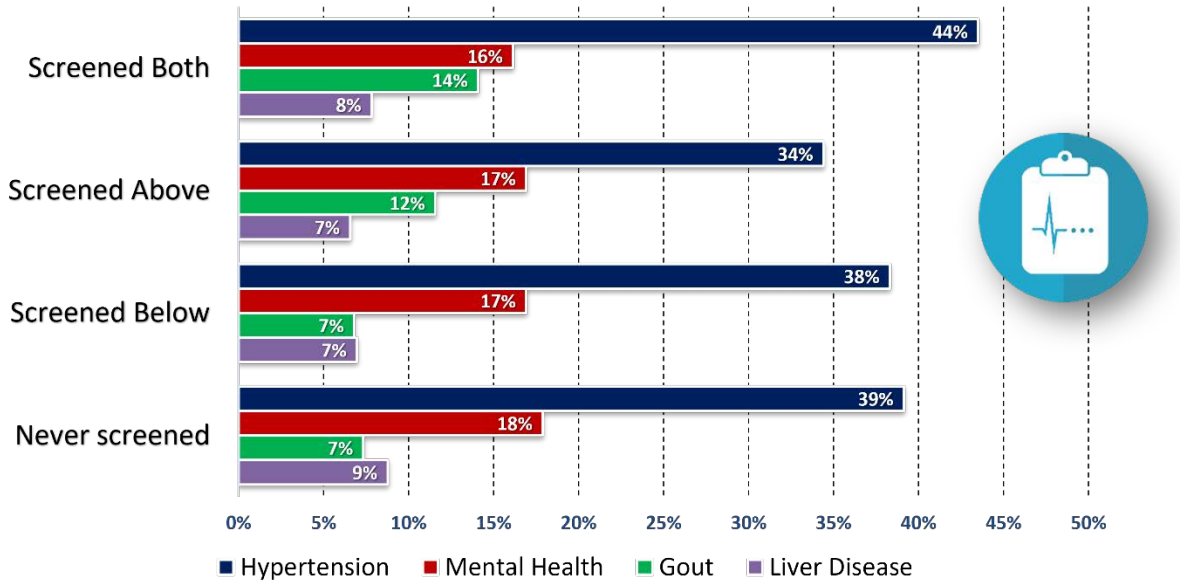


Figure 11. Proportion of the baseline sample experiencing alcohol-related health conditions (by screening category)
Note that individuals may have experienced more than one of the conditions depicted.

Co-occurring prescription medication use as a potential risk factor for alcohol-related harm

We explored the extent to which alcohol-interactive prescription medication was used in this sample. Overall, the results suggest that:

1. The most common medications prescribed were CVD drugs.

2. The next most common medications prescribed were analgesics, anti-thrombotic and statin medications.

Figure 12 illustrates the breakdown of alcohol-interactive medications by each of the four screening categories. This shows that regardless of category, approximately half of older adults had been prescribed at least one CVD drug, and approximately one-quarter of older adults had been prescribed analgesic, anti-thrombotic and statin medications.

Similar to Figure 11, the findings for prescription medications suggest that alcohol-interactive prescription medications are a significant and present risk for harm for many who have never been screened for alcohol use.

Further information on the pattern of alcohol-related prescription medications by screening category is available in Table 11 (Appendix 6).

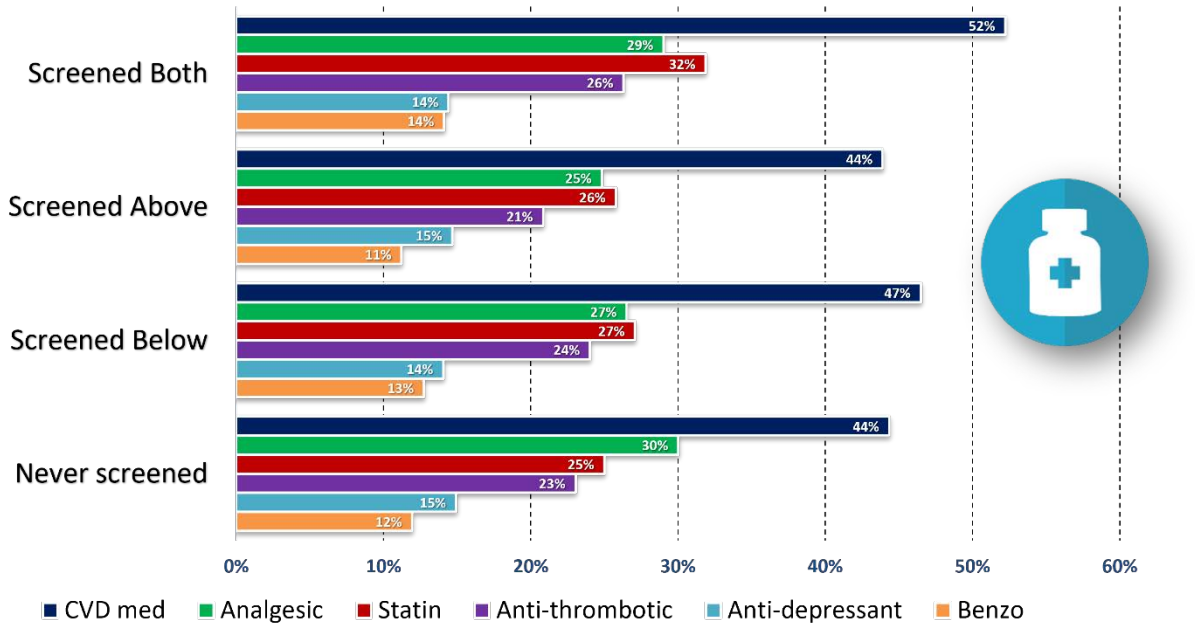


Figure 12. Proportion of the baseline sample using alcohol-interactive prescription medications (by screening category) Note that individuals may have experienced more than one of the conditions depicted.

Māori vs non-Māori

Cross tabulations were used to examine associations between key demographic variables (gender, Māori/non-Māori ethnicity), and co-existing medical condition and prescription medication. It is important to note that the data used for baseline analyses are cross-sectional which permits us to examine association between variables, but not to infer cause and effect relationships. Older Māori patients were more likely to be female, and younger than non-Māori patients (Appendix 6, Table 12). The proportion of Māori and non-Māori in each of the screening categories were very similar (Appendix 6, Table 9).

Question 2. What was the baseline occurrence of alcohol-related risk amongst older adults attending the primary care centres?

As presented previously (Figure 9), there are patients who scored above the AUDIT-C guidelines for hazardous alcohol use (6%), and those categorised in the 'Screened Both' category (11%; i.e., who had undergone screening on more than one occasion and were found to be above or below guidelines on these occasions). These patients would be identified and considered 'at-risk drinkers' by health professionals based on the AUDIT-C screen alone. Furthermore, the presence of comorbid conditions further increases the potential alcohol-related risk for these patients.

In this section we are interested in those older adults who were not flagged as at risk based on AUDIT-C guidelines only, but who are likely to be based on the CARET algorithm because of their comorbid condition, and/or prescription medications. This is explored by looking at:

1. older adults who were flagged as drinking below the AUDIT-C guidelines for hazardous alcohol use (i.e., score below 4 on the AUDIT-C)
2. those older adults who had never been screened to examine the presence of comorbidities that are likely to increase their alcohol-related risk if they consumed alcohol.

Who has been screened 'below' AUDIT-C guidelines and might still be at risk of alcohol-related harm?

Table 9 (Appendix 6) shows that 56% of the patient cohort at baseline screened below these guidelines. Although this pattern of alcohol use is associated with reduced alcohol-related risk relative to drinking above guidelines, any alcohol consumption in the presence of comorbidities will increase risk.

In Table 10 (Appendix 6), among those who screened as drinking below hazardous alcohol use, one-third were diagnosed with hypertension and the prevalence of other medical conditions ranged from 7-14%. High proportions of those who screened below guidelines were also prescribed CVD drugs (46%), analgesics (27%), antithrombotics (24%) and statins (27%) (Appendix 6, Table 11).

To better gauge what proportion of patients screening below guidelines are realistically at increased risk of alcohol-related harm, and to what degree, we categorised those patients who had been diagnosed with one medical condition and/or prescription medication as at 'lower risk', and those patients with two or more conditions/medications as at 'higher risk'. Table 3 (below) presents the results of this analysis.

Of the total number of patients who screened below guidelines, approximately 29% had no diagnosed medical condition and/or prescription medication. 71% had at least one of these comorbid conditions (Table 3). Of these, almost three quarters (73%) of this cohort could be considered as lower risk, and 27% as higher risk. The benefit of this differential approach is that it should assist health professionals to tailor their health messages to reflect the level of apparent risk patients have.

Table 3. Proportion of patients at each risk level by alcohol screening status

Alcohol screening status		
Risk groups	**Screened Below (n, column %)**	**Never Screened (n, column %)**
No risk *(no comorbid condition)*	3,909 (29)	1,968 (30)
Lower risk *(one comorbid condition/medication)*	7,041 (52)	3,455 (52)
Higher risk *(two or more comorbid conditions/medications)*	2,598 (19)	1,236 (19)
Total	13,548	6,659

Who has never been screened but might be at risk of alcohol-related harm?

Of these patients who had never been screened for alcohol-related risk, approximately 30% could be categorised as at 'no risk' because they did not possess any comorbidities, but some may still be hazardous drinkers. Fifty-two percent could be categorised as at 'lower risk', and 19% at 'higher risk' because of the presence of comorbidities that place them at increased risk should they consume alcohol (Table 3).

Table 4 presents the demographic characteristics of patients who had never been screened at any time. They were predominantly female (61%), non-Māori (82%) and younger (50-64 years of age: 52%). There were similar proportions of Māori and non-Māori in each risk category.

However, the proportion of patients in the middle and older-older age bracket classified as lower risk increased with age, but not for those in the higher risk group. This reflects the tendency for adults to acquire medical comorbidities as they age, but the greater likelihood that older-older

adults will succumb if they have multiple comorbidities. Thus, patients in the lower and higher risk categories, considered at potential risk based on the presence of comorbidities, require screening to clarify the nature of their alcohol-related risk.

Table 4. Demographic characteristics of patients who had never been screened for alcohol using the AUDIT-C and categorised according to risk level at baseline

Never Screened cases across risk groups N (row %)						
	No risk	**Lower risk**	**Higher risk**	**Total**	$\chi^2(df2)$	φ
Total	1968 (29.6)	3455 (51.9)	1236 (18.6)	6659		
Gender						
Female	1073 (26.3)	2254 (55.2)	755 (18.5)	4082	60.73 (2)***	0.10
Male	895 (34.73)	1201 (46.6)	481 (18.7)	2577		
Age						
50-64	1416 (41.3)	1173 (34.2)	840 (24.5)	3429	918.11 (4)***	0.37
65-79	440 (19.4)	1535 (67.7)	293 (12.9)	2268		
80+	112(11.6)	747 (77.6)	103 (10.7)	962		
Ethnicity						
Māori	313 (26.2)	680 (57.0)	201 (16.8)	1194	15.03 (2)**	0.05
Non-Māori	1655 (30.3)	2775 (50.8)	1035 (18.9)	5465		

*Notes: χ^2 (df2) = Chi Square (2 degrees of freedom); * p < .05; ** p < .01; *** p < .001; φ = phi coefficient; no risk = no comorbid condition; low risk = one comorbid condition/medication, higher risk = two or more comorbid conditions/medications.*

Screening results

Question 3. How successful was the implementation of the enhanced screening algorithm in prompting increased screening in primary care centres?

The aim here was to describe the success of the implementation of the screening algorithm at the PHO in terms of prompting screening. We took the number of screens undertaken in November 2019 as the baseline level of screening activity as indicated by the horizontal orange line in Figure 13. This accounted for the fact that we implemented the algorithm during December 2019 to January 2020, which included delivering face-to-face training, so we expected some increase in screening during this time. This baseline estimate reflected the pragmatic approach utilised by this study, but was unable to account for any possible seasonal variation in screening that might be expected across a typical year. We took any increase above the baseline level that occurred during the months of February to November 2020 as an indication of success of the implementation of the screening algorithm.

The results illustrated in Figure 13 suggest that screening activity increased immediately post-baseline (November 2019 – orange line) and with the implementation of the algorithm and training.

However, the number of screenings decreased with the impending COVID-19 crisis. In the transition to lockdown (March – May 2020, August – September 2020), the Ministry of Health directed GPs to focus primarily on the management of chronic health conditions and to forego screening. Consequently, no screening occurred during the first National COVID-19 lockdown. After lockdown eased to COVID Level 1, screening resumed and on average, rebounded to baseline levels.

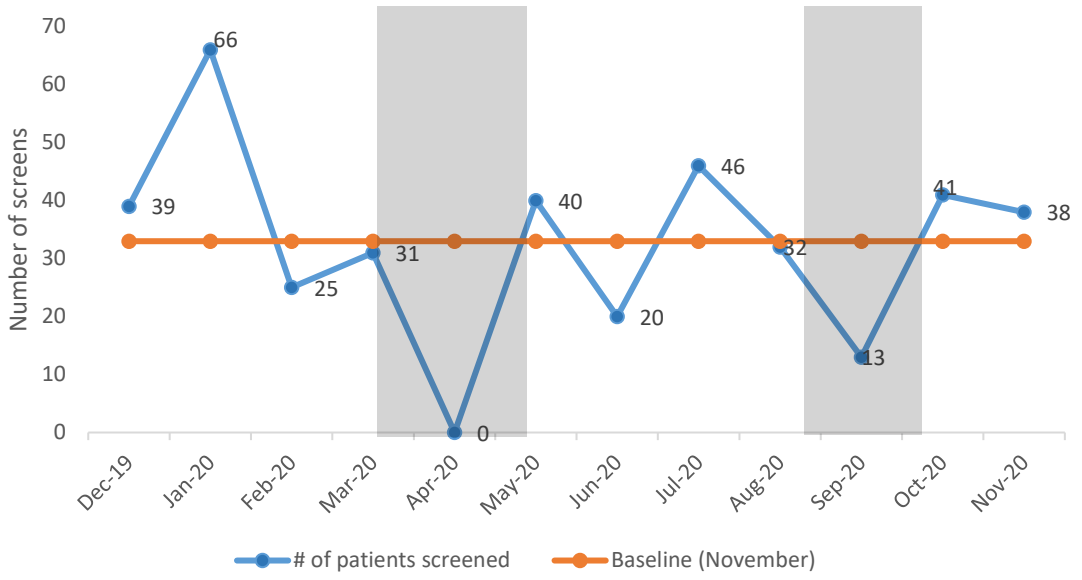


Figure 13. Number of patients screened each month (December 2019 to November 2020) compared to the number of patients screened at baseline (i.e., November, 2019)
Note baseline is depicted by the horizontal orange line. Periods of COVID-19 restrictions indicated by shaded bars.

Section 5: Evaluation of the project – Health professional perspectives

Outline

In this section, we report on the development and evaluation of the enhanced digital alcohol screening tool and related training through feedback from health professionals in WHRN. The objectives of this evaluation were to explore participant views on:

- the implementation of the screening protocol
- the training package
- the use of the enhanced screening protocol in routine practice, and impact on practice
- changes that would enhance the programme for further implementation.

This evaluation comprised two components: an online survey (quantitative) and one-on-one interviews (qualitative). Interviews allowed the researchers to delve into the reasons behind the survey findings and allowed for a greater depth of information to be obtained.

Ethics approval was obtained from the *Health and Disability Ethics Committees* (HDEC) reference 19/STH/65/AM04.

The survey

Methods

A survey instrument was developed and administered using Qualtrics, an online survey tool[e]. Questions in the survey were either (a) closed questions with fixed options for responses, or (b) open 'free text' response-type questions where participants could expand on issues.

The survey covered participant demographics, awareness of the enhanced screening tool project, impact of the enhanced screening tool on their practice, and views on the training provided. Participants were also asked whether they would be interested in participating in one-on-one interviews.

An invitation to complete an online survey was sent to all GPs (N=36), the three practice nurses and the two nurse practitioners in PHC services where the enhanced alcohol screening algorithm was active. Participants were recruited via email, with reminder emails sent after four weeks. Closed question data were analysed descriptively, and free text question data were analysed thematically by looking for meaningful patterns relevant to each question.

Results

Twenty-one participants responded to the survey – 14 GPs, three practice nurses, two nurse practitioners, and two other health professionals (see Table 5).

Dashboard Traffic Light Flag (flag)

Responses regarding the implementation of a Traffic Light Risk Indicator on the Patient Dashboard indicated that:

- 62% were aware of the implementation of the alcohol screening algorithm and that a Red Light on the patient dashboard signals the presence of alcohol-related risk factors

[e] https://www.qualtrics.com/

- only 43% of respondents indicated that this system changed the way they worked with patients.

Training

Responses regarding the implementation of training on the identification and management of at-risk older adult alcohol use indicated that:

- half of the respondents hadn't attended any of the training, and most had not accessed the e-learning resources available due to prioritising webinars, other opportunities for online learning (that were also related to the identification and management of at-risk older adults' alcohol use) or time issues, though they had intended to complete the e-module at some time.
- consequently, 1/3 or fewer respondents indicated improvements in their attitudes, knowledge, understanding and confidence in discussing older adults' alcohol use. A similar number indicated increased comfort in the practice of screening, management and follow-up of older drinkers.

Table 5. Quantitative descriptive data from Qualtrics survey (N=21)

Variable	N	%
Role within WRHN		
General Practitioner	14	66.7
Practice Nurse	3	14.3
Nurse Practitioner	2	9.6
Other	2	9.6
Is aware that a new alcohol screening protocol has been implemented at WRHN practices		
Yes	13	61.9
No	8	38.1
Has noticed that if a patient is assessed as potentially at greater alcohol-related risk a red traffic light will pop-up on the patient dashboard		
Yes	13	61.9
No	8	38.1
The 'dashboard traffic light' has changed way in which they work with patients		
Yes	9	42.9
No	4	19.0
N/A Did not use/notice protocol/dashboard	8	38.1
Attended training sessions delivered by WRHN (multiple response options)		
Alcohol WIPE presentation on evidence for enhanced alcohol screening	6	28.6
Motivational interviewing training sessions	3	14.3
Peer review meeting	4	19.0
None of the above	10	47.6
Has accessed and looked at the e-learning training resource *Older Adults and Drinking: Assessment and management* available on the Goodfellow Unit website		
Yes	2	9.5
No	18	85.7
Missing	1	4.8
Has completed the Quiz at the end of the e-learning resource		
Yes	1	4.8
No	19	90.5
Missing	1	4.8

Variable	N	%
Confirmed that training on alcohol in older adults has improved the following (multiple response options) :		
Awareness of the increased risk of alcohol use for older adults	7	33.3
Knowledge of alcohol risk in older adults	1	4.8
Understanding of the need to screen older adults for alcohol use	5	23.8
Confidence in having a discussion with older adults about their alcohol use	3	14.3
As a result of the training confirms they are more comfortable with the following (multiple response options):		
Screening older adults for alcohol use	7	33.3
Managing older adults' alcohol use problems	3	14.3
Following up with older adult patients regarding their alcohol use (and potential problems)	3	14.3

Notes: There are missing data on several questions above. WRHN – Whanganui Regional Health Network.

Free text comments revealed that despite the provision of training resources, the time commitments and the timing of training still posed barriers for health professionals to engage with this training. Further, health professionals sought further resources for provision to patients, including resources highlighting the risks of drinking to older patients and information regarding avenues for community support.

Interviews

Methods

Data were collected via one-on-one interviews using a semi-structured interview guide. All GPs active in WHRN PHO over the study period and several nurse practitioners and nurses were invited by email to take part in interviews, with a follow-up email sent after four weeks. All potential participants had received training on how to use the dashboard. Participants were interviewed either face-to-face, via telephone or via video call. Interviews were carried out by one of the research team, audio recorded with the permission of participants, and transcribed verbatim. All interviewees were guaranteed anonymity.

Thematic analysis of the interviews was undertaken using a deductive coding framework based on the semi-structured interview guide.

Seven practitioners (five general medical and two nurses) from a mix of urban and rural practices were interviewed. The median length of time in their roles was five years. All had seen the dashboard flags and were keen on using the dashboard.

Results

The following broad themes emerged from interviews. Interviewees were assigned a code (e.g., P.1) to protect their anonymity.

The dashboard and red flag

The red flag was described as a useful prompt to ask the patient about frequency and amount of drinking. It also provided an opportunity to have a conversation with patients at their individual point of readiness.

> **P.2** *"I pay attention when I see the red comes up… I am more likely to discuss the effect of alcohol on their general conditions"*

The dashboard flag also provided legitimacy for discussions with patients, allowing the health professionals to use it as a reason for starting the conversation, offer information and open discussions on the health issues. It also reminded the practitioner to update the individual patient's information and gave an immediate cautionary warning to obtain further information, review medications and inquire about alcohol intake.

P.3 *"It's made it much easier to bring it up with people because you can say "Hey it's flashing up red…um…can I quickly ask you about alcohol? We do this routinely. Tell me a bit about your drinking. Well this tells me that your alcohol use is harmful, and did you know that it actually acts with your medication as well or it can be additive in the first x number of hours after drinking but long term drinking will have lot effects like putting [sic] your blood pressure?"*

The effect of the red flag on patient engagement

Discussions with patients revealed interesting insights into patient experiences, and at times the red flag could provide objective evidence to patients that their drinking was problematic.

P.6 *"There is a perception that patients probably know their drinking is a problem, but faced with the 'red flag' makes it real"*

The overwhelming theme, however, concerned obtaining buy-in from the patient and this entailed patient willingness to connect drinking alcohol with their presenting problem and the risk drinking could mean to their health.

One participant noted that the flag raised the importance of the issue, although some patients could be nervous about discussing their drinking. Another noted that patients were interested in obtaining support.

P.6 *"Ahhhm, I think it varies; I think most people are a little bit apprehensive, but it probably depends on what their health is like. They already have some idea that they are not sitting in a place that we consider healthy. I think that it is probably that they are aware, and it makes it more real and makes them a bit more accountable."*

The effect of the red flag on patient management

The flag being visible to practitioners indicated the need to 'do something'. For some, the red flag provided a teachable moment where they reflected on how the information flagged could change the way they managed a patient's condition. The red flag allowed the practitioner to 'legitimise' conversations or the use of screening tools.

P.7 *"I might say "the computer is recommending this based on expert advice"."*

P.6 *"I think it came up, has there been an interaction with the medicine, and it made me think maybe I should manage their condition differently so that it would be more safely managed. It made me more aware of the potential, yep, the interaction with the alcohol and that medicine and was that the right medicine for them to take."*

Practitioners noted a lack of motivation in patients to address alcohol use unless it was directly related to the presenting problem. However, one participant noted the utility of the red flag as one of a number of tools that could help push home the message.

P.5 *"I guess it's just reiterating you know the concerns with the medications or with the behaviour or with the decline in liver or just sort of working on with what you've got and being able to sort of demonstrate it in whichever way you can, whether that's labs or something like the tool flashing up the red area or yeah. It's all based on buy in I guess."*

Training

Positive comments included the usefulness of role playing, and the desire for refresher training. The Goodfellow Unit has an excellent reputation and for those who accessed it, the experience was positive. Participants noted an intention to access the online platform, but had not done so. The ability to access training in one's own time was a positive factor of online training.

P.3 *"…we did some role plays and so on which gave people the opportunity to try out their skills and get some feedback on their communication."*

P.4 *"…peer meetings also have been great for discussion."*

Peer meetings included the sub-faculty of the RNZCGP sessions and regular practice sessions, and provided useful opportunities for discussion. The usefulness of the OARS framework for guiding discussions with patients was noted.

P.2 *"It is much easier to undertake training sessions when I am off site in my own time. I actually prefer the audios rather than the video."*

P.5 *"We did some motivational interviewing…I think mostly we talked about the OARS…so it's always good to have those things in the back of your mind I guess when speaking to someone and you might even be a little bit stuck or trying to work out where to go next then you can kind of work through that or where am I at in the conversation."*

Of the seven interviewees, three practitioners did not attend any training. They noted several reasons which might explain non-attendance or participation, including distance, timing and generally being 'burned out'.

P.2 *"…there is a continual struggle with work life balance. The tool is useful. Always about people and their needs and what is priority."*

P.4 *"There are times and seasons and there are focuses in your practice and that will change over time, and certainly for me, um, its not to say that I wouldn't engage more actively in that process but it's one thing at a time."*

Summary

The following points summarise the key feedback from health practitioners regarding the implementation of the enhanced digital alcohol screening tool (the intervention) and related training.

The red flag on the Patient Dashboard (produced by the screening algorithm) was identified as a useful tool for:

- highlighting for practitioners that alcohol was a potential risk for this patient
- facilitating alcohol conversations and/or screening with patients
- supporting further discussion around alcohol/medication risks with patients.

The training on knowledge, identification and management of older adults with potential alcohol-related risks was:

- well-received by many who undertook it, particularly the blend of options including face-to-face (synchronous) and online (asynchronous)
- good for practising the critical face-to-face motivational interviewing techniques required for delicate questions about alcohol
- not as well-attended as hoped by the research team, with many health practitioners unable to attend citing the significant time commitment required and the need to prioritise other factors in busy working lives.

Limitations of these findings

In interpreting our findings, a number of limitations are of note:

- Only a small number of health professionals attended the training.
- The small number of participants participating in the survey (N = 21) and the number of incomplete questions means that the results should be taken with caution and that we cannot generalise to all WRHN staff involved in this project.
- It is also likely that those with an interest in the project or in alcohol screening may be more likely to engage with the survey. As only seven participants (who were keen on using the dashboard) engaged in interviews, the full breadth of views are not encompassed here, likely again due to self-selection bias.

Section 6: Conclusions and recommendations

Conclusions

Training

What worked

The training package was broad in its scope and covered understanding of alcohol-related risk for older adults, the proportion of potential at-risk older adults missed from usual alcohol screening, what the algorithm does and what practitioners will see, and brief interventions and communicating about drinking. In addition, the package was delivered using multiple methods (e.g., online, face-to-face, peer meetings).

Group work/role-playing was received well. Motivational interviewing (including OARS) rated well. Continued feedback from the trainers to health professionals on their skills training was identified as helpful. Knowledge of alcohol-related issues had increased post-training.

What didn't work so well

Health professional uptake of training was challenged by availability. Workshop attendance was 37 out of ~80 people. It was also unclear how many healthcare practitioners utilised all, some or none of the available training options and what therefore was the most influential.

The Goodfellow webinars were rated highly, but time pressures meant lower uptake than desired. This reflects an ongoing issue with reducing attendance at WIPE professional activities over the past three years. It also appears that rural GPs are much less likely to be able to attend.

The later in time since the training activities were first offered or provided online, the less likely GPs were to engage with them (i.e., the greatest uptake was when the training was initially offered). Practitioners noted the need for ongoing skills training to maintain what they had learned and keep 'fresh'.

Algorithm

What worked

An algorithm specific to older adult risk can be created and implemented in primary care which identifies older adults who are at potential alcohol-related risk and prompts intervention.

Participants had noticed the flag on the dashboard, and it raised awareness of the need to screen for potentially harmful drinking and/or engage in an intervention. They also noted that the flag could legitimise the need to talk about alcohol.

What didn't work so well

There were potential biases at play in the development of the algorithm as it shifted from a research to clinical tool and therefore future validation studies are recommended. It is unclear the degree to which the algorithm prompts helped screening as the roll-out coincided with COVID and screening drop. Indeed, levels of screened older adults at baseline were already high (around 73%) due to the roll-out of alcohol screening in the PHO in 2013. Nonetheless, there remained a significant at-risk group who had not been screened, and who had one or more risk factors such as taking alcohol-interactive medicines, or had a health condition where drinking alcohol could be detrimental.

Screening

What worked

Screening rates showed an initial rise within the first two months of the project after training but before the algorithm went live, indicating the positive influence of training.

What didn't work so well

The initial rise in screening was not sustained. We consider this is largely due to COVID and GP directives to focus on the management of long-term conditions and not on screening. As a result, further validity testing will be necessary before widespread scale-up of the algorithm. Access to more detailed AUDIT data breakdowns would be useful for these validation processes.

In addition, feedback from participants indicated several barriers to screening and fully engaging in any interventions around drinking, such as time to discuss drinking, difficulties in obtaining accurate information from patients on drinking, difficulty in making sense of alcohol guidelines to patients, and financial costs to patients if an intervention requires follow-up.

Recommendations

Overall project approach recommendations

The following are a set of recommendations for any group wishing to replicate this project in their own community:

- An essential component of this type of project is a local champion (with clear mana in the local community) to lead, and to facilitate initial and sustained buy-in from PHOs and GP practices.

- Whilst not part of this project, the wider PHC team should also be included in awareness of the aims of such a project, its implementation and be part of local training initiatives. For example, community pharmacists are another important point of contact with patients, where alcohol and medicines can be discussed. A future project could explore embedding an algorithm within the pharmacist PMS which alerts a pharmacist to discuss levels of drinking, which could supplement the routine advice on not drinking with specific medicines.

- Clear and regular communication about the change to the PMS, what it means and what people will see, is required. This would benefit from more integrated messaging systems across the PHO. Awareness raising needs to be an ongoing feature.

- Accessible and timely training is essential, and this needs to be repeated regularly, even if it is raising awareness of online resources for practitioners new to the PHO.

- Easy access to clear and understandable resources to explain alcohol-related risk to patients is required, in particular around the relationships between drinking, comorbid health conditions and alcohol-interactive medicines.

- Local funding should be made available to support "no-cost to patient" follow-up appointments with at-risk older adults to reduce access disparities based on cost.

- Whilst not a focus of this project, the use of telemedicine for the follow-up of patients can be considered. This reduces the patients' requirements for travel back to the practice, and facilitates faster engagement and management for health professionals.
- The cultural safety of the training and implementation of the algorithm must be ensured. This includes reviewing data sovereignty processes in working with patient information.

Training recommendations

- A potential factor undermining uptake of our screening-based training package is whether an alternative model might have been preferred by a medical audience (e.g., a package focused instead on clinical assessment).

- The competition between skills enhancement opportunities and time constraints in health practitioners' working lives very likely undermined completion of training for this project. Subsequent projects would be best served in ascertaining how attendance at such training could be enhanced. The General Practice Education Programme (toward fellowship) might be an ideal medium through which we deliver this training, via the structured seminar programme. A local project champion would be needed to push this.

Algorithm

- It costs very little to develop, implement and maintain an algorithm in the medical data systems that can help prompt screening.

  However, there is a need for technical support from computer systems experts and data managers to ensure the algorithm functions accurately in selecting at-risk patients and that it is embedded into the PMS in a manner which appropriately alerts practitioners.

Screening

- Within WHRN, screening rates were already high among older adults, but this had been undertaken using the AUDIT-C which did not take into account health and medicine risks.

  Utilising a screening tool which takes account of these risk factors can provide legitimacy for discussing drinking with older adult patients. It can also provide a framework for discussion which starts with clinical issues as opposed to starting with drinking. Therefore, regardless of whether the algorithm is embedded into the dashboard, there needs to be a change in the way drinking is perceived and discussed by health professionals, with a clinical rather than drinking focus.

Appendices

Appendix 1: Current evidence supporting the increase in risk of harm posed by alcohol use and CARET comorbidities

Table 6. Identification of the key peer-reviewed research findings linking alcohol use to comorbid medical conditions and medications in the CARET

Comorbidity	Nature of relationship
Medical condition	
High blood pressure (Hypertension)	• There is consistent evidence for a dose-response relationship (i.e., a positive (linear) relationship between alcohol consumption and the instance and significance of hypertension[56-58]) • Reductions in alcohol use result in dose-response reductions in hypertension[59] • Multiple studies identify a clear gender-related difference in the association between alcohol and hypertension; hypertension is clearly associated with any alcohol consumption in men whereas for women the strongest association is currently for consumption above 2 drinks [56-58] • Recent comprehensive systematic reviews identify that there is no protective effect of alcohol on hypertension for men or women[56; 57]
Active or chronic gout	• There is a dose-response relationship between alcohol consumption and the incidence of gout[60; 61]. The strength of the relationship is very strong between both the development of gout and exacerbation of gout in the presence of alcohol (higher alcohol diet, increase in gout prevalence) • High alcohol intake is identified as a critical predisposing or exacerbating factor in the development of gout in individuals in the Asia/Pacific region[62] • There is no protective effect of 'light/moderate' alcohol use on the incidence of gout[61] • There is a dose-response relationship between alcohol consumption and recurrent gout attacks[63]
Mental health & Central Nervous System (CNS) issues	• Increasing the quantity of alcohol used (rather than frequency of use) results in a higher likelihood of self-reported depression in a dose-response fashion[64] • Alcohol use has a consistent association with major depressive disorders, and both Diagnostic and Statistical Manual (DSM) and International Classification of Diseases (ICD)-10 clinical classification systems highlight the presence of 'alcohol-induced' depression disorders[65] • Anxiety in early life can be a vector for the development of disordered drinking in later life[66] • Anxiety disorders and disordered drinking often co-occur in adult populations[67; 68]

	• The association between alcohol use and depression appears to be clearer at high levels of consumption, with binge drinking associated with long-term depressive outcomes[69] • In populations with bipolar or unipolar depression, the presence of an Alcohol Use Disorder (AUD) significantly increases the odds of mortality in comparison to those without an AUD[70] • Alcohol has a clear dose-response effect on the functioning of the CNS (specifically attention and control processes)[71] including a linear relationship between the amount of alcohol consumed and risk of epileptic seizure[65; 72]
Diabetes	Research on the link between alcohol use and the development of diabetes has been somewhat mixed, with a general finding of a 'protective effect' for 'moderate drinking'. However, more recent research suggests: • There is a dose-response relationship between alcohol consumption and the risk of diabetes for men, but little apparent risk for women who drink at or below 'moderate' levels[73; 74] • However, there is caution concerning the notion of a 'protective effect' for 'moderate' alcohol use on diabetes development[73; 75]. Specifically, the role of alcohol use on the development of diabetes is complex and appears to be heavily influenced by contextual and demographic confounding
Active/chronic hepatitis, cirrhosis, or other liver condition	• Alcohol is clearly associated with multiple ICD-10 diagnosis codes associated with the liver, including hepatitis, fibrosis and cirrhosis[65] • There is an exponential dose-response relationship between alcohol use and liver cirrhosis both for men and women, with greater drinking increasing the odds of morbidity[76-79]. This indicates that there is no 'protective effect' of 'moderate' or regular drinking for the prevention of liver cirrhosis • The odds of liver cirrhosis are significantly higher for daily drinkers than for those consuming less frequently but in similar quantities[76]

Health problems	
Problems sleeping	There is considerable debate concerning the specific association between levels of alcohol use and sleep disorders, particularly given the variation in measures used for both. However, in general there are clear associations between alcohol use and sleep as follows: • In women there is a dose-response relationship between alcohol use and problems sleeping, such that higher alcohol consumption levels are associated with poorer sleep quality including shorter durations and snoring[80; 81] • The risk of sleep apnoea increases by 25% in those who consume alcohol compared to those who do not or consume very little[82] • Drinking in general (not specifically disordered drinking) is associated with the presence of sleep disorders[83]
Falling/accidents (combined with tripping/bumping into things)	• Existing evidence indicates a dose-response relationship between acute alcohol consumption and unintentional falls among young to middle-aged people[16; 84; 85] • There is also strong evidence for a 'monotonic' (i.e., increasing in strength) dose-response relationship between acute alcohol consumption and falls, and acute alcohol consumption and motor vehicle accidents[86] • For older adults specifically, there is strong evidence for increased falls risk being associated with increases in polypharmacy (i.e., more than one prescribed medication)[87]. Further, benzodiazepines and anti-depressants (commonly used with alcohol) are specifically associated with an increased risk of falls in older adults[88]

Appendix 2: The CARET algorithm logic

CARET Enhanced E-Screening Algorithm

The format of the screening algorithm derived from the *Comorbidity Alcohol Risk Evaluation Tool* (CARET) and embedded in the health service e-screening system will vary depending on the specific type of system used. In this respect, a single algorithm in a specific coding language would have limited-to-no utility for PHOs running different e-systems. Rather than provide an algorithm in a specific coding language, what we present below is a high-level algorithmic format outlining the decision thresholds for CARET-derived 'hazardous drinking'. This provides individual system operators with the capacity to develop the CARET algorithm in a coding language specific to their system.

Specifying presence of hazardous drinking

Highlighting potential hazardous drinkers in the absence of drinking information

Where the e-system does not contain historic information on patients' existing levels of alcohol consumption, the CARET algorithm aids the health professional in identifying potentially at-risk drinkers by highlighting individuals whose existing diagnostic information indicates the presence of health conditions/problems and medications that are alcohol-interactive. This is applied as a prompt to the health professional to screen the patient for updated alcohol consumption information to confirm potential risk.

Highlighting potential hazardous drinkers in the presence of drinking information

Where the e-system does contain historic information on patients' existing levels of alcohol consumption, the CARET algorithm places the individual in the hazardous drinking range based on the combination of drinking pattern and alcohol-interactive comorbidity and medication use. This indication of the patient as a potential hazardous drinker based on historic data prompts the health professional to re-screen the patient for alcohol consumption to confirm that updated alcohol consumption data still identify these patients as hazardous drinkers.

A matrix outlining the CARET algorithm logic

The table on the following page (Table 7) provides a list of the alcohol-interactive health conditions, health problems and medications that the CARET specifies as placing older drinkers at risk of alcohol-related harm. The table then provides a matrix that highlights the various combinations of drinking quantity, frequency and bingeing that place the older drinker into the hazardous drinking range.

Table 7. CARET-specific thresholds for alcohol-related harm per condition & medication group

	CARET 'Hazardous' Threshold		
	Quantity	**Frequency**	**Binge**
Conditions	**Drinks per occasion**	**Days drinking per week**	**Men: 6+ Women: 5+**
High blood pressure	3	4+	Any
	4	2+ month	Any
	5+	Any	Any
Gout	2	4+	Any
	3	2+	Any
	4+	Any	Any
Diabetes AND on insulin (Therapeutic Group Endocrine & Metabolic Disorders/insulin preparations)	3	4+	Any
	4	2+ month	Any
	5+	Any	Any
Any mental health diagnosis	2	4+	Any
	3	2+	Any
	4+	Any	Any
Active/chronic hepatitis or cirrhosis/liver condition	Any	Any	Any
Hereditary & degenerative problems of the CNS	2+	2+	Any
	Any	4+	Any
Problems	**Drinks**	**Days**	**Binge**
Problems sleeping	2+	4+	Any
Memory problems	2+	2+	Any
	Any	4+	Any
Falling/Accidents	2+	2+	Any
	Any	4+	Any
Medications	**Drinks**	**Days**	**Binge**
Musculoskeletal (all *except* rubefacients) *This includes meds for arthritis & some pain*	2	4+	Any
	3	4+	Any
	4+	Any	Any
Cardiovascular (all) *This includes meds for blood pressure, nitrates, blood thinners*	2	4+	Any
	3	4+	Any
	4+	Any	Any
Analgesia (all) *This includes stronger prescription pain meds*	2	4+	Any
	3	4+	Any
	4+	Any	Any
Central nervous system (all) *This includes meds for depression, antipsychotic, seizure, sedatives, sleeping*	2	4+	Any
	3	4+	Any
	4+	Any	Any

The CARET algorithm decision tree for identifying hazardous drinkers

The table on the previous page illustrates in matrix form the combination of drinking and comorbid factors that indicate potential hazardous drinking for older adults. This translates into a matrix that can be provided in a high-level format for e-system operators to operationalise in the development of their own system-specific algorithm.

Identifying CARET drinking thresholds for specific health conditions

The following physical health conditions place older patients at risk of alcohol-related harm. The patient is classified as 'over the hazardous drinking' threshold based on any of the following combination of conditions and drinking quantity/frequency/binge:

High blood pressure

- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 4 drinks per occasion) & (Drink Frequency ≥ 2 drinks per month)
- IF (Drink Quantity = 5 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Gout

- IF (Drink Quantity = 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 2 days per week)
- IF (Drink Quantity ≥ 4 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Diabetes AND indications patient is on insulin

- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 4 drinks per occasion) & (Drink Frequency ≥ 2 drinks per month)
- IF (Drink Quantity ≥ 5 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Any mental health diagnosis

- IF (Drink Quantity = 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 2 days per week)
- IF (Drink Quantity ≥ 4 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Active/chronic hepatitis or cirrhosis/liver condition

- IF (Drink Quantity = any instance) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Hereditary and degenerative problems of the CNS

- IF (Drink Quantity ≥ 2 drinks per occasion) & (Drink Frequency ≥ 2 days per week)
- IF (Drink Quantity = any instance) & (Drink Frequency ≥ 4 days per week)
- IF (Binge Drinking = any instance)

Identifying CARET drinking thresholds for specific health problems

The following health problems place older patients at risk of alcohol-related harm. The patient is classified as 'over the hazardous drinking' threshold based on any of the following combinations of problems and drinking quantity/frequency/binge:

Problems sleeping

- IF (Drink Quantity ≥ 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Binge Drinking = any instance)

Memory problems

- IF (Drink Quantity ≥ 2 drinks per occasion) & (Drink Frequency ≥ 2 days per week)
- IF (Drink Quantity = any instance) & (Drink Frequency ≥ 4 days per week)
- IF (Binge Drinking = any instance)

Falling/accidents

- IF (Drink Quantity ≥ 2 drinks per occasion) & (Drink Frequency ≥ 2 days per week)
- IF (Drink Quantity = any instance) & (Drink Frequency ≥ 4 days per week)
- IF (Binge Drinking = any instance)

Identifying CARET drinking thresholds for specific medication groups

The following alcohol-interactive medication groups place older patients at risk of alcohol-related harm. The patient is classified as 'over the hazardous drinking' threshold based on any of the following combination of medication and drinking quantity/frequency/binge:

Musculoskeletal (excluding rubefacients)

- IF (Drink Quantity = 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity ≥ 4 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Cardiovascular (all)

- IF (Drink Quantity = 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity ≥ 4 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Analgesia (all)

- IF (Drink Quantity = 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity ≥ 4 drinks per occasion) & (Drink Frequency = any instance)
- IF (Binge Drinking = any instance)

Central nervous system (all)

- IF (Drink Quantity = 2 drinks per occasion) & (Drink Frequency ≥ 4 days per week)
- IF (Drink Quantity = 3 drinks per occasion) & (Drink Frequency ≥ 4 days per week)

- IF (Drink Quantity $\geq$ 4 drinks per occasion) & (Drink Frequency $=$ any instance)
- IF (Binge Drinking = any instance)

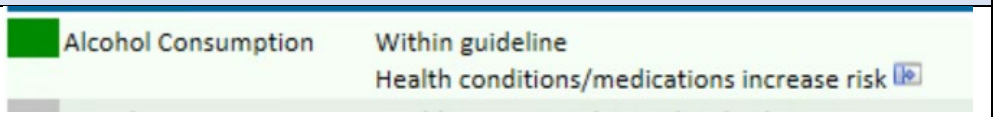
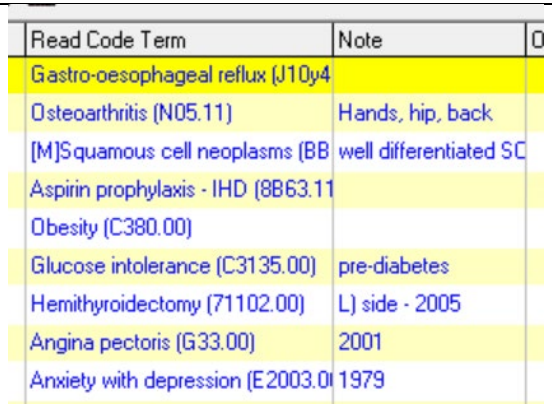
Appendix 3: The interview materials and measures

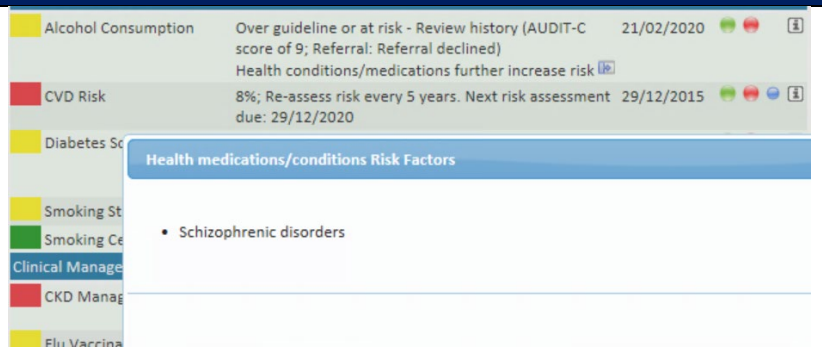
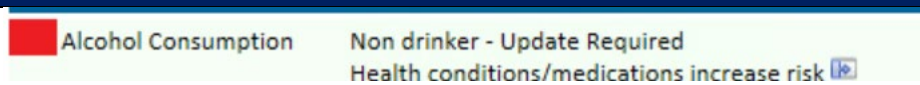
Screenshots of Dashboard showing alcohol screening

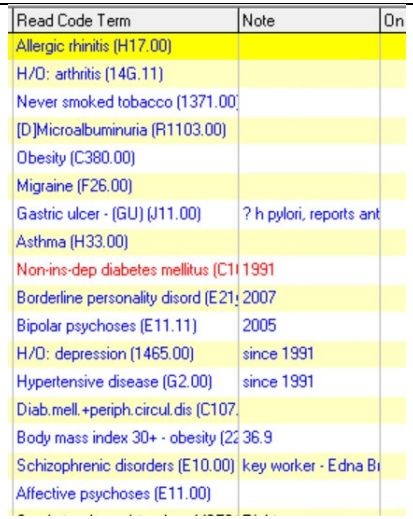
See https://www.procon.co.nz/patient-dashboard.html for an explanation of Patient Dashboard.

Appendix 4: Pilot testing of the enhanced screening algorithm

Table 8. Pilot cases of older adults used for quality testing of the enhanced screening algorithm

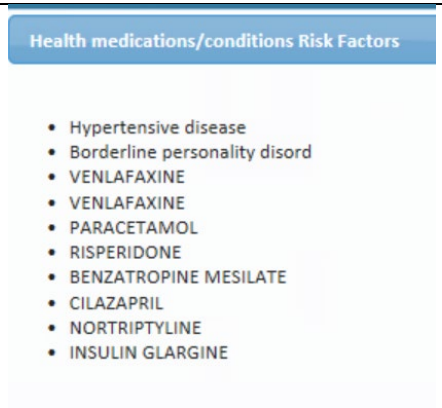
Case 1: An older patient is screened and found to be drinking below the AUDIT-C threshold (AUDIT-C score ≤ 3) for hazardous drinking, but with several comorbid factors. This person should be identified as potentially an at-risk drinker due to the presence of these comorbid conditions.	
Clinical description	**PMS Display/prompts**
This Patient Dashboard has a green traffic light indicating screening is completed and patient was assessed as drinking within recommended guidelines, but has condition/medications that increase risk in the presence of alcohol.	
Medical conditions and comorbid factors evident	

Clicking on the blue arrow identifies the conditions/medications that increase alcohol risk for this patient	
Case 2: An older adult patient who drinks above the AUDIT-C threshold (AUDIT-C score ≥ 4) for hazardous drinking with comorbid conditions. This patient should be identified as drinking above the AUDIT-C guideline for hazardous alcohol use, and of having several comorbid factors that places them at increased risk because of their alcohol use.	
This patient has a yellow traffic light which indicates screening completed and patient is drinking above the recommended guidelines; clicking on the blue arrow shows the condition which increases risk	
Case 3: An older adult patient who was last screened for alcohol use over 5 years ago, when they were reported to be a non-drinker. The patient has several comorbid conditions that potentially place them at risk if they were to drink alcohol. The PMS should prompt (Red Flag) the health practitioner to re-screen the patient and consider the comorbid factors.	
This patient has a red traffic light indicating a re-screen is due; blue arrow identifies that there are conditions/medications that increase alcohol risk for this patient	

These are the medical conditions for this patient shown on the Patient Dashboard	
These are the prescribed medications for this patient shown on the Patient Dashboard	

Read Code Term	Note	On
Allergic rhinitis (H17.00)		
H/O: arthritis (14G.11)		
Never smoked tobacco (1371.00)		
[D]Microalbuminuria (R1103.00)		
Obesity (C380.00)		
Migraine (F26.00)		
Gastric ulcer - (GU) (J11.00)	? h pylori, reports ant	
Asthma (H33.00)		
Non-ins-dep diabetes mellitus (C1(	1991	
Borderline personality disord (E21(	2007	
Bipolar psychoses (E11.11)	2005	
H/O: depression (1465.00)	since 1991	
Hypertensive disease (G2.00)	since 1991	
Diab.mell.+periph.circul.dis (C107.		
Body mass index 30+ - obesity (22	36.9	
Schizophrenic disorders (E10.00)	key worker - Edna Bi	
Affective psychoses (E11.00)		

Rep	Date	Drug Name	Qty	Directions
☐	20 Oct 2020	Caresens N Test Strips	0	test QID daily
☐	12 Oct 2020	Flixonase Allergy & Hayfever 2 50mcg/1dose N	1	use OD
☐	7 Oct 2020	Lantus 100IU/1mL Inj (SoloStar disposable pen	0	Take 50 units once daily same
☐	6 Oct 2020	Ibuprofen 800mg Sustained Release Tab	0	1 tab po BD/PRN
☐	6 Oct 2020	Norflex Sr 100mg Tab	0	1 tab BD prn for pain
☐	6 Oct 2020	Nortriptyline 25mg Tab	0	2 tabs, Nocte in weekly blis
☐	6 Oct 2020	Ferro-Tab 200mg Tab (equiv. Fe 65 mg)	90	Take 1 tab daily (when supply
☐	6 Oct 2020	Cilazapril 5mg Tab	0	1 tab OD increased 5 mg on 18
☐	6 Oct 2020	Omeprazole 20mg Cap	0	1 caps, twice daily blister pa
☐	6 Oct 2020	Pizotifen Malate 0.5mg Tab	0	one tabs twice daily, in week
☐	6 Oct 2020	Benzatropine Mesilate 2mg Tab	0	half a tablet once daily in w
☐	6 Oct 2020	Risperidone 3mg Tab	0	take two tablets each night i
☐	6 Oct 2020	Simvastatin 10mg Tab	0	1 pill PO nocte in weekly blis
☐	6 Oct 2020	Paracetamol 500mg Tab	0	2 tablets QID in weekly blist
☐	6 Oct 2020	Venlafaxine 75mg Modified Release Cap	0	1 tab OD , increased 18/12/20
☐	6 Oct 2020	Venlafaxine 37.5mg Modified Release Cap	0	1 tab OD, to a total of 112.5
☐	8 Sep 2020	Symbicort 200/6 Turbuhaler 120dose (suitable f	1	2 puffs twice a day short scr
☐	8 Sep 2020	Needeles Nova Fine For Penmix	100	For use with insulin
☐	26 Aug 2020	Lorafix 10mg Tab	30	1 tab OD
☐	2 Aug 2017	Ventolin Cfc Free 100mcg/1dose Inhaler 200do	3	2 puffs as required No substi

These are the conditions/medications shown on this patient's dashboard that increase alcohol risk	

Appendix 5: E-learning course: Assessment and management of older adults' drinking in primary care settings (2020)

Welcome/Introduction

Problem drinking is often considered a youth problem, but recent research has shown that a large proportion (up to 40%) of older adults in New Zealand can be categorised as hazardous drinkers. A number of physiological changes that accompany ageing make older adults more sensitive to the effects of alcohol. This, coupled with the presence of comorbid health conditions, places them at increased risk should they drink alcohol.

The World Health Organisation states that older adults are an at-risk population for alcohol-related harm. Despite the increased awareness of the dangers of excessive alcohol use in a growing ageing population, this issue is largely ignored by health professionals.

International research shows that older adults are less likely than younger adults to be screened by their general practitioner for alcohol use. Further research from the Health Promotion Agency shows that approximately 35-45% of older adult drinkers in New Zealand drink at levels hazardous to their health due to the combination of drinking patterns, comorbid chronic health conditions and prescription medications that may place them at risk if they should consume alcohol. However, very few of these at-risk older adults were asked about their drinking despite being more likely to use primary care health services.

General Practitioners and other primary care staff are in a good position to ask their older patients about their alcohol use, and depending on the results of the screen, have a conversation about the risk of consuming alcohol.

The focus of this course is older adults who are likely not to be identified as at risk because they drink alcohol. This course will provide an overview of the assessment and management of drinking and its consequences in older adults. We will review the basis for older adults' increased sensitivity to alcohol, the epidemiology of older adult alcohol drinking, and the health effects of drinking alcohol. We will discuss the tools used to assess alcohol use and interventions to reduce hazardous and harmful drinking among older adults.

Resources

Alcohol and Older Adults in New Zealand. A literature review (this is a comprehensive review).

https://www.hpa.org.nz/sites/default/files/Alcohol%20%20older%20adults%20in%20NZ%20-%20A%20literature%20review%20-%20October%202014_0.pdf

A brief summary of the above review – see pages 7-11.

https://www.alcohol.org.nz/sites/default/files/field/file_attachment/AlcoholNZ_June%202014-single%20page.pdf

HPA low risk drinking guidelines

https://www.alcohol.org.nz/help-advice/advice-on-alcohol/low-risk-alcohol-drinking-advice

Learning Outcomes

After completing this course, you should know:

- The factors that place older adults at increased risk should they consume alcohol
- How to assess older adults' drinking using standardised screening tools
- The different treatment options for older adults who are identified as at increased risk from consuming alcohol (Hazardous use), and those who are consuming alcohol in a harmful/dependent way.
- The extent and nature of alcohol interactions with prescription medications.

Right hand panel (Contents)

Statement about Certification [CME]

Course pages/modules

Definitions

Definition of Hazardous drinking

Hazardous drinking is a pattern of alcohol consumption that places individuals at risk for adverse health events and may also place others at risk as well. The quantity and pattern of alcohol consumed that is consider hazardous is typically specified by setting threshold amounts for an individual's number of alcoholic drinks consumed per week or per occasion.

Definition of Harmful drinking

Harmful use refers to alcohol consumption that results in observed consequences to physical and mental health. Some would also consider social consequences among the harms caused by alcohol.

Definition of Substance Use Disorder

Alcohol dependence is a cluster of behavioural, cognitive, and physiological phenomena that may develop after repeated alcohol use. The DSM-5 describes 11 criteria for Substance Use Disorder. Substance use disorders are classified as mild, moderate, or severe, depending on how many of the diagnostic criteria are met. The 11 DSM-5 criteria for a substance use disorder are listed in Information **Box #1** and are divided into four categories of behaviour related to the substance use:

- Impaired control
- Social impairment
- Risky use
- Pharmacological indicators (tolerance and withdrawal)

The severity of the substance use disorder is determined by the number of criteria the person meets:

- Mild: 2 or 3 criteria out of 11
- Moderate: 4 or 5 criteria out of 11
- Severe: 6 or more criteria out of 11.

Refer to **Information Box #1. DSM-5 Criteria for Substance Use Disorder**

Information Box #1. DSM-5 Criteria for Substance Use Disorder

A. A problematic pattern of substance use leading to clinically significant impairment or distress, as manifested by at least two of the following, occurring within a 12-month period:

1. The substance is often taken in larger amounts or over a longer period than was intended.

2. There is a persistent desire or unsuccessful efforts to cut down or control the substance use.

3. A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects.

4. Craving, or a strong desire or urge to use the substance.

5. Recurrent substance use resulting in a failure to fulfill major role obligations at work, school, or home.

6. Continued substance use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of the substance

7. Important social, occupational, or recreational activities are given up or reduced because of substance use.

8. Recurrent substance use in situations in which it is physically hazardous.

9. Substance use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.

10. Tolerance, as defined by either of the following:

a. A need for markedly increased amounts of the substance to achieve intoxication or desired effect.

b. A markedly diminished effect with continued use of the same amount of the substance.

11. Withdrawal, as manifested by either of the following:

a. The characteristic withdrawal syndrome for the substance (refer to criteria A and B of the criteria set for alcohol or other substances withdrawal).

b. Substance (or closely related substance, such as benzodiazepine with alcohol) is taken to relieve or avoid withdrawal symptoms.

APA, 2013

Drinking and older adults

The ageing of the population is a worldwide phenomenon. From 1950 to 2013, the number of older adults has increased worldwide by 400%, and it is predicted to triple by 2050[89]. For the first time in human history, those aged 65 years and over around the world will soon outnumber those aged under 5[90].

Similar population ageing patterns are evident in New Zealand. The number of Kiwi older adults doubled from 1980 to 2014, and is expected to double again by 2036[91]. This means New Zealanders

aged 65+ have shifted from being approximately 10% of the population in the 1980s to 25% of the population by the 2030s. This unprecedented demographic shift since World War Two in New Zealand has had immense consequences on economic and social aspects of society[92].

Hazardous drinking is a key concern for the health of a rapidly ageing population. Recent estimates from the New Zealand Health Survey indicate that around 20% of adults aged 55-64 and 16% of adults aged 65-74 might be drinking hazardously[93]. However, recent reports specifically exploring alcohol use in a large cohort of New Zealanders aged 50+ provide significant cause for concern.

The reports recently released by the Health Promotion Agency (HPA) highlight that:

- 37% of Māori and 43% of non-Māori aged 50-84 may be categorised as hazardous drinkers[94];
- Older New Zealanders are more likely to drink, to consume frequently, and in greater amounts than their international counterparts[94];
- ~13% of older New Zealanders are heavy episodic drinking (consuming 5+ drinks per occasion) moderately or very frequently[95];
- Many older drinkers have significant comorbidities and medication usage that increases their risk of alcohol-related harm[96];
- Up to 1/3 of older New Zealand drinkers may have been drinking hazardously since their early 20s[97].

Factors contributing to increased risk in older adults who drink alcohol

Older adults have increased physiological sensitivity to alcohol

The proportion of older adults who are drinking alcohol in a manner considered hazardous is a growing concern given that older adults have higher physiological sensitivity to alcohol. This means that even a moderate amount of alcohol consumption may place older adults at increased risk of alcohol-related harm. There are three age-linked changes that may affect the response to alcohol in this population group:

- Decreased body water
- Increased sensitivity to alcohol
- Decreased metabolic ability

Ageing does not affect the rate of absorption or elimination of alcohol. However, lean body mass decreases as a consequence of the decrease in total body water and increase in body fat. Since alcohol is a water-soluble drug, this ageing-related process means that, an identical alcohol dose administered to a younger person of the same size and gender will result in a higher blood alcohol concentration in the elderly. The same amount may be responsible for increased intoxication in adults when they are older compared to when they were younger.

Sensitivity to alcohol increases as people age due to higher blood alcohol concentration and increased sensitivity in the target tissues (e.g., neural substrate). Central nervous system sensitivities to alcohol have been reported to increase with age[98].

Decreased level of gastric alcohol dehydrogenase in the elderly causes slowing of metabolism of alcohol in the stomach. Given that, more strain is placed on the liver and alcohol remains in the blood for a prolonged time[99].

Resources:

https://www.alcohol.org.nz/alcohol-its-effects/body-effects/effects-on-the-body

https://www.alcohol.org.nz/alcohol-its-effects/effects-on-populations/older-people

Long Term Health Effects of Alcohol

Until recently alcohol was thought to be cardio-protective, in that moderate drinkers present with relatively good health compared to those who abstain. However, this evidence has been discounted on methodological grounds (i.e., no consistent approach to measuring alcohol consumption, no common definition of binge drinking), and because many studies have considered sick quitters as abstainers. The latter results likely reflect the greater burden of ill health among abstainers present in these studies[100].

Over a life-time the culminate effect of consuming alcohol can increase the risk of numerous disorders and mortality including:

- Hypertension
- Immune suppression
- Insomnia
- Liver diseases
    - Steatosis
    - Alcoholic steatohepatitis
    - Fibrosis
    - Cirrhosis
    - Hepatocellular carcinoma
- Mental health
    - Depression
    - Anxiety
    - Social isolation
- Non-liver cancers
    - Breast (in females)
    - Colorectal (in males)
    - Oesophagus, larynx and pharynx
    - Oral cavity
- Pancreatitis
- Stroke
- Wernicke's encephalopathy.

From: https://bpac.org.nz/BPJ/2016/May/docs/BPJ75.pdf

Although a low level of alcohol consumption appears to promote social life among older people, careful attention to chronic diseases are recommended because of the direct effects of alcohol on ageing organs.

Link with alcohol consumption and injuries

Falls and fracture are significantly associated with alcohol consumption, and particular causes of morbidity and hospitalisation among older populations. The risk of falls increases among those who drink ≥14 drinks per week. The cost related to fracture among this population is projected to

increase 50% by 2025. Alcohol has important contributions in road traffic accidents, accidental drowning, workplace injuries, violence, and physical assault as well[101; 102].

Interaction with medicines

Some of the medication that older adults are prescribed, or purchase over the counter, for their acute and chronic health conditions, may interact with alcohol. Slower metabolism and excretion in older adults increase the chance of drug interactions, which includes side effects. Some examples are, paracetamol can enhance the process of hepatotoxicity, and heparin may increase the chance of bleeding, and so on. Even some medicinal herbs, such as chamomile, kava, valerian, lavender interact with alcohol[102].

Older adults are particularly vulnerable to adverse effects from concurrent alcohol and medication use. However, there is limited evidence regarding the prevalence of these adverse outcomes among older adults. A consensus approach has developed a list of medications that have potentially serious interactions with alcohol[103]. This article is available online: https://bmjopen.bmj.com/content/bmjopen/7/11/e017453.full.pdf

Te Hiringa Hauora/Health Promotion Agency low risk drinking guidelines

The HPA has produced general guidelines for low risk consumption of alcohol, but which do not state specific age-related guidelines. These levels are framed as low risk, in that for those who choose to consume alcohol, they should do so in a way that reduces the long-term health risks of alcohol consumption. However, even then several factors may contribute to increased risk, including increasing age, gender, the existence of certain comorbidities, genetic make-up, medication, etc. The guidelines refer to the consumption of standard drinks, with one standard drink equalling 10 grams of pure alcohol. However, it can be difficult to measure out a standard drink at home and therefore to be able to implement these guidelines.

Table 1 HPA guidelines for older people to reduce long-term health risks of alcohol consumption.

Frequency	Healthy Men	Healthy Women
Daily	No more than 3 standard drinks	No more than 2 standard drinks
Weekly	No more than 15 standard drinks	No more than 10 standard drinks
Alcohol-free day/ week	At least 2 days	At least 2 days

Lack of focus on older adults' drinking

Problems with misattribution

Research shows that relatively few older adults recall being asked by their general practitioner about their alcohol use. This is despite approximately 35-45% of older adult drinkers in New Zealand drinking at hazardous levels to their health due to the combination of drinking patterns and comorbid chronic health conditions and prescription medications that may place them at risk if they should consume alcohol[96].

Disregarding alcohol issues in older patients has been put forward as one reason for health professionals being less likely to detect alcohol-related problems in older adults[104; 105]. Related to this is the misattribution of alcohol-related physiological and psychological problems to other disorders and illness related to ageing. The lack of appropriate screening tools for alcohol use in older adults is one factor proposed to contribute to the difficulty with detecting hazardous alcohol use in older adults.

Assessment of alcohol use in older adults

Assessment of alcohol use in primary care settings

The World Health Organization (WHO) Alcohol Use Disorders Identification Test (AUDIT) consists of 10 items and is the most valid screening test to evaluate hazardous drinking. It has been used with older adults and is recommended for use in primary care.

The brief version of the AUDIT (AUDIT-C), which consists of three questions, focuses on frequency and quantity of alcohol use (Information Box #2). It is also a highly validated screening tool and is considered equivalent to the full AUDIT in identifying hazardous drinkers. It is highly recommended for use in primary care. Scores ≥4 out of 12 for both older men and women are measured as hazardous drinking[94].

Table 2 **shows the AUDIT-C questions.**

Table

Table 2 shows the AUDIT-C questions.

Table 2 AUDIT-C questions

Questions	0	1	2	3	4
Frequency: How often do you drink?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
Quantity: How many drinks do you have on a typical day?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
Binge: How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

Problems with screening

Commonly used alcohol screening tools, such as the Alcohol Use Disorders Identification Test (AUDIT) and brief version of the AUDIT – the AUDIT-C, perform well in detecting hazardous and harmful drinking in older adults.

However, these screens do not consider medication-alcohol interactions, increased physiological sensitivity due to ageing, and pre-existing chronic illnesses that are likely to place older adults at increased risk from drinking alcohol.

Furthermore, the AUDIT tends to focus on current drinking patterns, and so overlooks the impact that heavy drinking in early life has on health later on. Consequently, older adults who may have drank heavily early in their life are less likely to meet the criteria for alcohol dependence despite the impact this drinking has had on their health. Cognitive age-related decline may also result in misunderstanding of questions and issues with recall.

Screening for alcohol use in older adults attending Primary Health Care

As people age, they are more likely to develop health conditions that can be exacerbated by their alcohol use – not just because of the level of current alcohol use, and history of alcohol use, but also because of the age-related changes that result in older adults becoming increasingly sensitive to the effect of alcohol. Therefore, it is important to be able to identify older adults who are using alcohol in a hazardous manner.

The Alcohol-Related Problems Survey (ARPS) and the Comorbidity Alcohol Risk Evaluation Tool (CARET) were created to more accurately assess hazardous drinking in older patients.

The ARPS was created to assess alcohol-related risk on levels of alcohol consumption and the presence of the factors that increase harm in the presence of alcohol use (i.e., health conditions associated with alcohol use, use of alcohol-interactive medications, frailty, alcohol use risk behaviours). The ARPS has the capacity to identify older individuals who, according to existing screens may be considered as drinking below hazardous levels, but whose risk behaviour, comorbid health conditions, and medications make their alcohol use potentially hazardous to their health.

The CARET is a brief version of the ARPS created for primary health care settings[14; 15]. Although brief it still assesses:

- Quantity and frequency of drinking
- Presence of medical and psychiatric conditions
- Symptoms of disease
- Alcohol-interactive medication use
- Physical functioning
- Symptoms of alcohol use and dependence
- Drink driving

The CARET has been widely used in the United States in a variety of clinical settings to assess hazardous drinking older adults and as a basis for intervention to reduce hazardous drinking[106-108].

A recently funded project aims to enhance primary healthcare professionals' capacity to identify and manage older adults who are drinking in a hazardous manner. The project includes the development of an enhanced screening protocol. Elements of the CARET have been incorporated into an algorithm that is embedded in the General Practitioners' patient dashboard and which will search through the individual patients' health records. A flag will be presented on the dashboard if a patient meets any of the CARET criteria. In addition, if information on alcohol consumption is not available a recommendation to screen the patient for alcohol will be presented.

The combined results of this screen will inform the primary healthcare professional's response.

Management of older adults at increased risk from consuming alcohol

Aspects of this section have been taken from two previous Goodfellow Unit Webinars presented by Dr John McMenamin.

1. 'Talking about alcohol' https://www.goodfellowunit.org/events/talking-about-alcohol.
2. 'Conversations on alcohol with older patients' https://www.goodfellowunit.org/events/conversations-alcohol-older-patients

In the first webinar, John generally explores how you can talk about alcohol in general practice, and in the second John specifically discusses talking about alcohol use with older patients.

The ABC (Ask, Brief Intervention and Counselling) approach commonly used for smoking cessation can be adopted for use with alcohol misuse. This is likely to incorporate the following steps:

- Ask a few simple questions or use a validated screening tool (AUDIT)
- Engage in a conversation with the patients about their alcohol use (Brief advice or Brief intervention)
- Referral for specialist/comprehensive assessment and management if required

Note: Older adults consuming alcohol at quantities considered low risk according to the HPA guidelines, but with comorbid health conditions and/or taking alcohol-interactive medicines, will benefit from advice around reducing the increased risk of consuming alcohol.

When to ask about alcohol use:

Ideally routine screening for alcohol use and monitoring of alcohol consumption in older adults should be routine practice.

Pragmatic case finding [https://bpac.org.nz/BPJ/2016/May/docs/BPJ75.pdf]

The presence of the following should increase the suspicion that an individual may be misusing alcohol in a risky way:

- Unintentional injuries
- Abnormal liver function tests or elevated mean cell volume (MCV)
- Dyspepsia
- Depression
- Relationship problems
- Hypertension

In addition, the presence of **co-existing health conditions** (e.g., hypertension, gout, mental health problems (such as depression), diabetes)) and the **use of medicines** that interact with alcohol (indicated via the patient history or a screening tool such as the CARET) can also prompt a conversation about alcohol use and increased risk should the person consume alcohol.

Initiating the conversation – ask permission, such as 'Can I ask you some health questions'.

In order to normalise asking about alcohol use it is often useful to embed such questions in general questions about health. Relate to general comorbid conditions, for example in the case of someone with Hypertension.

- What do you understand about how alcohol affects your health (in this case high blood pressure)?
- What is the effect of alcohol on this problem?
- Alcohol can affect this problem – what are your thoughts on this?

Asking about alcohol use - Ask AUDIT-C questions. Provide indication of consumption – is the person likely or not to be drinking under/over low risk guidelines (refer to Table 2).

- Frequency: How many days in a week do you drink alcohol
- Quantity: When you are drinking, how many drinks do you have
- Binge: How often would you drink more than 4 (F) 5 (M)

When time is limited - ask one question:

*How often do you have **x** or more drinks on one occasion?*

Where **x** is 5 for men and 4 for women. This item has 81.8% sensitivity and 79.3% specificity. A response of greater than one is considered positive and so ask the remaining two AUDIT-C questions.

Introduce the HPA low risk guidelines [see Table 2].

People who drink above low risk guidelines complete the full AUDIT. With older adults consider other coexisting conditions and how they impact on their risk profile.

Management differs according to;

1. Results of AUDIT screen
2. Existence of co-existing health conditions
3. Existence of dependency features

Interventions related to AUDIT Score:

- Low risk [AUDIT Score 0-7] – deliver brief advice/education around maintaining low risk drinking**. In the presence of coexisting health conditions and alcohol-interactive medicines this conversation should be around raising awareness of the increased risk of consuming alcohol.**
- Low risk [AUDIT Score 8-15] – Advice and education (ask above)
- Moderate risk [AUDIT Score 16-19] – brief intervention, monitoring
- High risk [AUDIT Score 20+] – referral to specialist addiction service may be warranted for comprehensive assessment and specialist treatment.

For information about the medical management of substance related withdrawal refer to: https://www.matuaraki.org.nz/uploads/files/resource-assets/substance-withdrawal-management-guidelines-for-medical-and-nursing-practitioners.pdf

Brief Interventions

Brief interventions (BI) are typically short (5-15 minute) structured conversations around a patient's alcohol use. They typically include:

- Feedback on alcohol use and health-related harms (commonly the results of a screening test, such as the AUDIT)
- Identification of high-risk situations for heavy/risky drinking – **the existence of coexisting health conditions and alcohol-interactive medicines are relevant in this context**
- Simple advice about how to cut down drinking and reduce risk - see below [practical ideas to reduce alcohol intake]
- Strategies that increase motivation to change drinking behaviour
- Development of a personal plan to reduce drinking

In recent Cochrane reviews BI have been shown to be an effective way of motivating patients to reduce risky or harmful drinking[109]. Longer interventions probably make no difference to heavy drinking compared to brief intervention.

When undertaking a BI, incorporate the spirit of Motivational Interviewing, the use of open questions, affirmations, reflective listening, and summary reflection (OARS) and a culturally responsive approach. A useful guide is The Takitaki Mai framework for motivational interviewing for Māori, which is also a very useful general guide for how we might approach delivering a BI. https://www.matuaraki.org.nz/resources/takitaki-mai-a-guide-to-motivational-interviewing-for-mori/537

The following links will take you through to two short videos demonstrating the use of OARS in a conversation with a patient about their alcohol use and a co-existing medical condition.

In the first video (https://youtu.be/nMHmCsO53Vg) the conversation is about alcohol and gout; in the second video (https://youtu.be/QASUum0_Y2k) the conversation is about alcohol and hypertension.

Practical ideas to discuss how to reduce alcohol intake:

- Keep a drinking diary (convert to standard drinks)
- Keep to personal drinking rules
- Keep under a daily cut-off
- Pace my drinking
- Sip more slowly
- Take smaller sips
- Occupy myself while drinking
- Change my type of drink (to lower alcohol content drinks)\Drink for taste
- Don’t mix beer and spirits
- Put my glass down and out of reach between sips
- Tell my friends I buy my own drinks
- Buy one round and then go solo
- Give myself material reward for success
- Order a spacer
- Refuse drinks during rounds
- Dilute my drinks
- Buy soft drinks between alcoholic drinks
- Start drinking later

Presence of features of substance use disorder

Presence of physical and behavioural symptoms including withdrawal, tolerance, and craving symptoms may confirm the diagnosis of alcohol dependence according to the Diagnostic and Statistical Manual (DSM) of mental disorders-5. If these are present, especially in association with a high AUDIT score [AUDIT Score 20+], consider referral to a specialist service for comprehensive assessment and management.

Scenario /case studies

Case studies.

Case 1: Mr A is a 55-year-old European man who attends a follow-up for his lab tests in order to update his cardiovascular risk (CVR). You have been monitoring him for a while. His blood pressure varies between 150-160/95-100 when his BP is measured at home. He is obese (BMI = 33). His other laboratory results: TC = 33, HDL = 1.3, LDL = 4.8; Hb1C = 45. Cardiovascular risk = 6%.

You ask him questions about his alcohol use using the AUDIT-C questions and he responds accordingly:

Quantity = 5 drinks
Frequency = most days (5-6 days per week)
Binge (weekly)
This amounts to 25-30 drinks per week (cf. recommended low risk guidelines <15 per week for men). AUDIT–C score = 9.

Questions:

- What clinical features of this case study place this person at increased risk?
- What other questions might you ask to clarify his situation?
- How important is it for you to discuss alcohol use with this patient?
- What message might you convey to this patient about his alcohol use?

Case 2: Mrs B is a 52-year-old European woman with an appointment to see you that was made by the practice nurse after she scores positive on the Patient Health Questionnaire (PHQ9) and Generalised Anxiety Disorder questionnaire (GAD7). She also completed a wellness check, which showed that she was a non-smoker, and alcohol use was about half a bottle of wine at night.

Questions:

- What clinical features of this case study place this person at increased risk?
- What other questions might you ask her to clarify her situation?
- How important is to for you to discuss alcohol use with this patient?
- What message might you convey to this patient about her alcohol use?

Case three: Mr C is a Māori male who is generally in good health. He has family history of gout in his whānau. On presentation he has apparent inflammation and swelling of his left big toe and reports intense pain.

Questions:

- What is the relationship between alcohol use and gout?
- How might you approach asking this patient about their alcohol use?
- What message might you convey to this patient about his alcohol use?

Case four: Mrs D is a 68-year-old European woman in for a routine review of her type 2 diabetes. Her diabetes is controlled by metformin and glibenclamide. She is also hypertensive on metoprolol. She has mild hip and knee osteoarthritis and takes regular paracetamol. She use zopliclone 2-4 times per week for insomnia.

Questions:

- What is the relationship between alcohol use and type 2 diabetes?
- How might you approach asking this patient about their alcohol use?
- What message might you convey to this patient about her alcohol use?

Appendix 6: Baseline data analysis tables

Table 9. General demographic characteristics of patients enrolled at WRHN – baseline dataset

	Alcohol Screening Groups N (row %)						
	Screened Both	**Screened Below**	**Screened Above**	**Never Screened**	**Total**	***χ²(DF)***	***φ***
Total Sample	2726 (11.2)	13548 (55.5)	1478 (6.1)	6659 (27.3)	24411		
Gender							
Female	1046 (8.2)	7234 (56.4)	455 (3.6)	4082 (31.9)	12817	708.86 (3)***	0.17
Male	1680 (14.5)	6314 (54.5)	1023 (8.8)	2577 (22.2)	11594		
Age							
50-64	1528 (11.8)	7060 (54.3)	981 (7.6)	3429 (26.4)	12998	257.77 (6)***	0.10
65-79	986 (11.2)	5099 (58.1)	429 (4.9)	2268 (25.8)	8782		
80+	212 (8.1)	1389 (52.8)	68 (2.6)	962 (36.6)	2631		
Ethnicity							
Māori	480 (13.1)	1713 (46.9)	265 (7.3)	1194 (32.7)	3652	128.58 (3)***	0.07
Non-Māori	2246 (10.8)	11835 (57.0)	1213 (5.8)	5465 (26.3)	20759		

Notes: χ^2(DF) = Chi Square (degrees of freedom); * p < .05; ** p < .01; *** p < .001; *φ = phi coefficient*

Explanation of the alcohol screening groups:

- ***Both**: Individuals who have previously been screened at least twice and whose results at one point in time were 'below' the threshold for hazardous alcohol use and at another point in time 'above' the threshold for hazardous alcohol use (hence they have at one point in time had 'both' hazardousness classifications on their records).*
- ***Below**: Individuals who have previously been screened at least one point in time and were found to be 'below' the threshold for hazardous alcohol use on all screening occasions.*
- ***Above**: Individuals who have previously been screened at least one point in time and were found to be 'above' the threshold for hazardous alcohol use on all screening occasions.*
- ***Never**: Individuals who have never previously been screened for hazardous alcohol use.*

Table 10. Relationship between alcohol screening status and co-existing medical conditions

	Alcohol Screening Groups N (column %)						
	Screened Both	**Screened Below**	**Screened Above**	**Never Screened**	**Total**	***χ^2(df3)***	***φ***
Hypertension							
Present	1186 (43.5)	5184 (38.3)	509 (34.4)	2606 (39.1)	9485	39.18***	0.04
Absent	1540 (56.5)	8364 (61.7)	969 (65.6)	4053 (61.9)	14926		
Gout							
Present	384 (14.1)	920 (6.8)	171 (11.6)	488 (7.3)	1963	192.83***	0.09
Absent	2342 (85.9)	12628 (93.2)	1307 (88.4)	6171 (92.7)	22448		
Liver Disease							
Present	213 (7.8)	941 (6.9)	97 (6.6)	584 (8.8)	1835	23.68***	0.03
Absent	2513 (92.2)	12607 (93.1)	1381 (93.4)	6075 (91.3)	22576		
Mental Health Conditions							
Present	440 (16.1)	1915 (14.1)	250 (16.9)	1191 (17.9)	3796	51.14***	0.05
Absent	2286 (83.7)	11633 (85.8)	1228 (83.1)	5468 (82.1)	20615		

Notes: χ^2 = Chi Square; df3 = 3 degrees of freedom; * p < .05; ** p < .01; *** p < .001; *φ = phi coefficient*
Screening groups: Both – screened at least twice and found to be 'above' and 'below' the threshold for hazardous alcohol use; Below – screened below threshold for hazardous alcohol use; Above - screened below threshold for hazardous alcohol use; Never Screened – Never been previously screened for hazardous alcohol use.

Table 11. The relationship between alcohol screening status and prescription medication use

	Alcohol Screening Groups N (column %)						
Medication Type	**Screened Both**	**Screened Below**	**Screened Above**	**Never Screened**	**Total**	***χ^2(df3)***	***φ***
CVD medication							
Present	1451 (52.2)	6300 (46.5)	649 (43.9)	2954 (44.4)	11354	65.83***	0.05
Absent	1275 (46.8)	7248 (53.5)	829 (56.1)	3705 (55.6)	13057		
Analgesics							
Present	791 (29.0)	3594 (26.5)	367 (24.8)	2000 (30.0)	6752	35.86***	0.04
Absent	1935 (70.9)	9954 (73.5)	1111 (75.2)	4659 (70.0)	17659		
Statin							
Present	869 (31.9)	3667 (27.1)	381 (25.8)	1665 (25.0)	6582	47.55***	0.04
Absent	1857 (68.1)	9881 (72.9)	1097 (74.2)	4994 (75.0)	17829		
Anti-thrombotic							
Present	717 (26.3)	3256 (24.0)	308 (20.8)	1535 (23.0)	5816	18.10**	0.03
Absent	2009 (73.7)	10292 (76.0)	1170 (79.2)	5124 (77.0)	18595		
Anti-depressant							
Present	393 (14.4)	1905 (14.1)	217 (14.7)	995 (14.9)	3510	29.40	0.01
Absent	2333 (85.6)	11643 (85.9)	1261 (85.3)	5664 (85.1)	20901		
Benzodiazepines							
Present	385 (14.1)	1728 (12.7)	166 (11.2)	795 (11.9)	3074	11.20*	0.02
Absent	2341 (85.9)	11820 (87.3)	1312 (88.8)	5864 (88.1)	21337		

Anti-psychotic							
Present	99 (3.6)	426 (3.1)	40 (2.7)	310 (4.7)	875	33.00***	0.04
Absent	2627 (96.4)	13122 (96.9)	1438 (97.3)	6349 (95.3)	23536		
Addiction							
Present	35 (1.3)	125 (0.9)	29 (2.0)	90 2.0)	279	17.64**	0.03
Absent	2691 (98.7)	13423 (99.1)	1449 (98.0)	6569 (98.0)	24132		

*Notes: χ^2 = Chi Square; df3 = 3 degrees of freedom; * p < .05; ** P < .01; *** p < .001; φ = phi coefficient*
Screening groups: Both – screened at least twice and found to be 'above' and 'below' the threshold for hazardous alcohol use; Below – screened below threshold for hazardous alcohol use; Above - screened below threshold for hazardous alcohol use; Never Screened – Never been previously screened for hazardous alcohol use

Table 12. Demographic characteristics of patients according to ethnicity.

Ethnicity N (row %)					
	Non-Māori	**Māori**	**Total**	***χ^2(df)***	*φ*
Gender					
Female	10766 (84.0)	2051 (16.0)	12817	23.02 (1) ***	0.03
Male	9993 (86.2)	1601 (13.8)	11594		
Age group					
50-64	10508 (80.8)	2490 (19.2)	12998	433.39 (2) ***	0.13
65-79	7776 (88.5)	1006 (11.5)	8782		
80+	2475 (94.1)	156 (5.9)	2631		

*Notes: χ^2(DF) = Chi Square (Degrees of Freedom); * p < .05; ** p < .01; *** p < .001; φ = phi coefficient*

Table 13. Co-existing medical conditions according to ethnicity.

Ethnicity N (Column %)					
Medical Conditions	**Māori**	**Non-Māori**	**Total**	***χ^2(df1)***	*φ*
Hypertension					
Present	1627 (44.6)	7858 (37.9)	9485	58.64***	0.05
Absent	2025 (55.4)	12901 (62.1)	14926		
Gout					
Present	584 (16.0)	1379 (6.6)	1963	299.75***	0.12
Absent	3068 (84.0)	19380 (93.4)	22448		
Liver Disorders					
Present	339 (9.3)	1496 (7.2)	1835	19.25***	0.03
Absent	3313 (90.7)	19263 (92.3)	22576		
Mental Health Conditions					
Present	536 (14.7)	3260 (15.7)	3796	2.50	0.01
Absent	3116 (85.3)	17499 (84.3)	20615		

*Notes: χ^2 = Chi Square (degrees of freedom = 1); * p < .05; ** p < .01; *** p < .001; φ = phi coefficient*

Table 14. Ethnicity and prescription medication

Ethnicity (Column %)					
	Māori	**Non-Māori**	**Total**	***χ²(df1)***	*φ*
CVD Medications					
Present	1699 (46.5)	9655 (46.5)	11354	0.01	0.0
Absent	1953 (53.5)	11104 (53.5)	13057		
Analgesic Medication					
Present	1011 (27.7)	5741 (27.7)	6752	0.01	0.0
Absent	2641 (72.3)	15018 (72.3)	17659		
Statin Medication					
Present	1096 (30.0)	5486 (26.4)	6582	20.26 ***	0.03
Absent	2556 (70.0)	15273 (73.6)	17829		
Anti-thrombotic Medication					
Present	874 (23.9)	4942 (23.8)	5816	0.03	0.0
Absent	2778 (76.1)	15817 (76.2)	18595		
Antidepressant Medication					
Present	332 (9.1)	3178 (15.3)	3510	97.45 ***	0.06
Absent	3320 (90.9)	17581 (84.7)	20901		
Benzodiazepine Medication					
Present	265 (7.3)	2809 (13.5)	3074	111.11	0.07
Absent	3387 (92.7)	17950 (86.5)	21337		
Antipsychotic Medication					
Present	116 (3.2)	759 (3.7)	875	2.07	0.01
Absent	3536 (96.8)	20000 (96.3)	23536		
Addiction Medication					
Present	63 (1.7)	216 (1.0)	279	12.88 **	0.02
Absent	3589 (98.3)	20543 (99.0)	24132		

*Notes: χ^2(df) = Chi Square (degrees of freedom = 1); * p < .05; ** p < .01; *** p < .001; φ = phi coefficient; Designation of Māori ethnicity is based on prioritised self-report of Māori descent, even where the individual may indicate descent from multiple ethnic groups*.

References

1. Statistics New Zealand. (2013). How will New Zealand's ageing population affect the property market.
2. Palladino, R., Tayu Lee, J., Ashworth, M., Triassi, M., & Millett, C. (2016). Associations between multimorbidity, healthcare utilisation and health status: evidence from 16 European countries. *Age and Ageing, 45*(3), 431-435.
3. Room, R., Babor, T., & Rehm, J. (2005). Alcohol and public health. *The Lancet, 365*(9458), 519-530.
4. World Health Organization. (2009). *Global health risks: mortality and burden of disease attributable to selected major risks.* Geneva, World Health Organization.
5. Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *The Alcohol Use Disorders Identification Test (AUDIT): Guidelines for use in Primary Care*. Geneva, World Health Organization.
6. Blow, F. C., & Barry, K. L. (2012). Alcohol and substance misuse in older adults. *Current Psychiatry Reports, 14*(4), 310-319.
7. Dawson, D. A., Grant, B. F., Stinson, F. S., & Zhou, Y. (2005). Effectiveness of the derived Alcohol Use Disorders Identification Test (AUDIT-C) in screening for alcohol use disorders and risk drinking in the US general population. *Alcoholism: Clinical and Experimental Research, 29*(5), 844-854.
8. Aalto, M., Alho, H., Halme, J. T., & Seppä, K. (2009). AUDIT and its abbreviated versions in detecting heavy and binge drinking in a general population survey. *Drug and Alcohol Dependence, 103*(1–2), 25-29.
9. Towers, A., Szabó, Á., Newcombe, D. A., Sheridan, J., Moore, A. A., Hyde, M., . . . Kowal, P. (2019). Hazardous drinking prevalence and correlates in older New Zealanders: A comparison of the AUDIT-C and the CARET. *Journal of Aging and Health, 31*(10), 1770-1789.
10. Goulden, R. (2016). Moderate alcohol consumption is not associated with reduced all-cause mortality. *The American Journal of Medicine, 129*(2), 180-186.e4.
11. Stockwell, T., Zhao, J., Panwar, S., Roemer, A., Naimi, T., & Chikritzhs, T. (2016). Do "moderate" drinkers have reduced mortality risk? A systematic review and meta-analysis of alcohol consumption and all-cause mortality. *Journal of Studies on Alcohol and Drugs, 77*(2), 185-198.
12. Towers, A., Philipp, M., Dulin, P., & Allen, J. (2018). The "health benefits" of moderate drinking in older adults may be better explained by socioeconomic status. *Journals of Gerontology Series B-Psychological Sciences and Social Sciences, 73*(4), 649-654.
13. Heuberger, R. A. (2009). Alcohol and the older adult: a comprehensive review. *Journal of Nutrition for the Elderly, 28*(3), 203-235.
14. Moore, A. A., Beck, J. C., Babor, T. F., Hays, R. D., & Reuben, D. B. (2002). Beyond alcoholism: identifying older, at-risk drinkers in primary care. *Journal of Studies on Alcohol, 63*(3), 316-324.
15. Moore, A. A., Giuli, L., Gould, R., Hu, P., Zhou, K., Reuben, D., . . . Karlamangla, A. (2006). Alcohol use, comorbidity, and mortality. *Journal of the American Geriatrics Society, 54*(5), 757-762.
16. Chen, C. M., & Yoon, Y.-H. (2017). Usual alcohol consumption and risks for nonfatal fall injuries in the United States: results from the 2004–2013 National Health Interview Survey. *Substance Use and Misuse, 52*(9), 1120-1132.
17. Nichols, M., Scarborough, P., Allender, S., & Rayner, M. (2012). What is the optimal level of population alcohol consumption for chronic disease prevention in England? Modelling the impact of changes in average consumption levels. *BMJ open, 2*(3).
18. Moore, A. A., Whiteman, E. J., & Ward, K. T. (2007). Risks of combined alcohol-medication use in older adults. *The American Journal of Geriatric Pharmacotherapy, 5*, 64-74.

19. Holton, A., Boland, F., Gallagher, P., Fahey, T., Kenny, R. A., & Cousins, G. (2019). Longitudinal prevalence of potentially serious alcohol-medication interactions in community-dwelling older adults: a prospective cohort study. *European Journal of Clinical Pharmacology, 75*(4), 569-575.
20. Holton, A. E., Gallagher, P. J., Ryan, C., Fahey, T., & Cousins, G. (2017). Consensus validation of the POSAMINO (potentially serious alcohol–medication interactions in older adults) criteria. *BMJ open, 7*(11).
21. Benshoff, J. J., Harrawood, L. K., & Koch, D. S. (2003). Substance abuse and the elderly: unique issues and concerns. *Journal of Rehabilitation, 69*(2), 43-48.
22. Wadd, S., Holley-Moore, G., Riaz, A., & Jones, R. (2017). *Calling Time: Addressing ageism and age discrimination in alcohol policy, practice and research*. United Kingdom, Drink Wise Age Well. Retrieved from: https://www.drinkwiseagewell.org.uk/wp-content/uploads/2017/11/DWAW_Yr3_Report-FOR-WEB4.pdf
23. Dufour, M., & Fuller, R. K. (1995). Alcohol in the elderly. *Annual Review of Medicine, 46*, 123-132.
24. Caputo, F., Vignoli, T., Leggio, L., Addolorato, G., Zoli, G., & Bernardi, M. (2012). Alcohol use disorders in the elderly: a brief overview from epidemiology to treatment options. *Experimental Gerontology, 47*(6), 411-416.
25. Bareham, B. K., Stewart, J., Kaner, E., & Hanratty, B. (2021). Factors affecting primary care practitioners' alcohol-related discussions with older adults: qualitative study. *British Journal of General Practice, 71*(711), e762-e771.
26. Bareham, B. K., Kaner, E., Spencer, L., & Hanratty, B. (2020). Health and social care providers' perspectives of older people's drinking: a systematic review and thematic synthesis of qualitative studies. *Age and Ageing, 49*(3), 453-467.
27. Mules, T., Taylor, J., Price, R., Walker, L., Singh, B., Newsam, P., . . . Ryan, J. (2012). Addressing patient alcohol use: a view from general practice. *Journal of Primary Health Care, 4*(3), 217-222.
28. Berks, J., & McCormick, R. (2008). Screening for alcohol misuse in elderly primary care patients: a systematic literature review. *International Psychogeriatrics, 20*(06), 1090-1103.
29. Towers, A., Stephens, C., Dulin, P., Kostick, M., Noone, J., & Alpass, F. (2011). Estimating older hazardous and binge drinking prevalence using AUDIT-C and AUDIT-3 thresholds specific to older adults. *Drug and Alcohol Dependence, 117*(2), 211-218.
30. Barnes, A. J., Moore, A. A., Xu, H., Ang, A., Tallen, L., Mirkin, M., & Ettner, S. L. (2010). Prevalence and correlates of at-risk drinking among older adults: The Project SHARE Study. *Journal of General Internal Medicine, 25*(8), 840-846.
31. Moore, A. A., Blow, F. C., Hoffing, M., Welgreen, S., Davis, J. W., Lin, J. C., . . . Gould, R. (2011). Primary care-based intervention to reduce at-risk drinking in older adults: a randomized controlled trial. *Addiction, 106*(1), 111-120.
32. Duru, O. K., Xu, H., Tseng, C. H., Mirkin, M., Ang, A., Tallen, L., . . . Ettner, S. L. (2010). Correlates of alcohol-related discussions between older adults and their physicians. *Journal of the American Geriatrics Society, 58*(12), 2369-2374.
33. Kuerbis, A. N., Yuan, S. E., Borok, J., LeFevre, P. M., Kim, G. S., Lum, D., . . . Moore, A. A. (2015). Testing the initial efficacy of a mailed screening and brief feedback intervention to reduce at-risk drinking in middle-aged and older adults: The Comorbidity Alcohol Risk Evaluation Study. *Journal of the American Geriatrics Society, 63*(2), 321-326.
34. Gifford, H., Paton, S., Cvitanovic, L., McMenamin, J., & Newton, C. (2012). Is routine alcohol screening and brief intervention feasible in a New Zealand primary care environment. *New Zealand Medical Journal, 125*(1354), 17-25.
35. Lid, T. G., Karlsson, N., Thomas, K., Skagerström, J., O'Donnell, A., Abidi, L., & Nilsen, P. (2021). Addressing patients' alcohol consumption–A population-based survey of patient experiences. *International Journal of Public Health, 66*.

36. Sharp, L., & Vacha-Haase, T. (2011). Physician attitudes regarding alcohol use screening in older adult patients. *Journal of Applied Gerontology, 30*(2), 226-240.
37. McKnight-Eily, L. R., Okoro, C. A., Turay, K., Acero, C., & Hungerford, D. (2020). Screening for alcohol use and brief counseling of adults—13 States and the district of Columbia, 2017. *Morbidity and Mortality Weekly Report, 69*(10), 265.
38. Alpert, P. T. (2014). Alcohol abuse in older adults: an invisible population. *Home Health Care Management & Practice, 26*(4), 269-272.
39. Ministry of Health. (2017). Tier 1 statistics 2015/16: New Zealand Health Survey. Retrieved from http://www.health.govt.nz/publication/tier-1-statistics-2015-16-new-zealand-health-survey
40. Statistics New Zealand. (2018). Quickstats about Māori: Census 2013. Retrieved from http://archive.stats.govt.nz/Census/2013-census/profile-and-summary-reports/quickstats-about-maori-english.aspx
41. Yong, R., Browne, M., Zhao, J., Chi Lun Lee, A., Shackleton, N., Crengle, S., & Exeter, D. (2017). *A deprivation and demographic profile of the Whanganui DHB*. University of Auckland, University of Auckland. Retrieved from https://www.fmhs.auckland.ac.nz/assets/fmhs/soph/epi/hgd/docs/dhbprofiles/Whanganui.pdf
42. Ministry of Health. (2018). Regional results 2014–2017: New Zealand Health Survey. Retrieved from https://www.health.govt.nz/publication/regional-results-2014-2017-new-zealand-health-survey
43. Bareham, B. K., Stewart, J., Kaner, E., & Hanratty, B. (2021). Factors affecting primary care practitioners' alcohol-related discussions with older adults: qualitative study. *British Journal of General Practice, 71*(711), e762-e771.
44. Moore, A. A., Kuerbis, A., Sacco, P., Chen, G. I., & Garcia, M. B. (2016). Screening and assessment of unhealthy alcohol use in older adults. In: Kuerbis, A., Moore, A., Sacco, P., Zanjani, F. (eds) *Alcohol and Aging*. Springer, Cham.
45. Sacco, P., Burruss, K., Smith, C. A., Kuerbis, A., Harrington, D., Moore, A. A., & Resnick, B. (2015). Drinking behavior among older adults at a continuing care retirement community: affective and motivational influences. *Aging & Mental Health, 19*(3), 279-289.
46. Health Promotion Agency. (2021). What's a standard drink? Retrieved from https://www.alcohol.org.nz/help-advice/standard-drinks/whats-a-standard-drink
47. Bush, K., Kivlahan, D. R., McDonell, M. B., Fihn, S. D., & Bradley, K. A. (1998). The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. *Archives of Internal Medicine, 158*(16), 1789-1795.
48. Knowles, M. (1984). *The adult learner: A neglected species.* Houston, Texas: Gulf Publishing.
49. Britt, E. F., Gregory, D., Tohiariki, T., & Huriwai, T. (2014). *Takitaki mai: a guide to motivational interviewing for Māori*: Matua Raki, The National Addiction Workforce Programme.
50. Orimo, H., Ito, H., Suzuki, T., Araki, A., Hosoi, T., & Sawabe, M. (2006). Reviewing the definition of "elderly". *Geriatrics & Gerontology International, 6*(3), 149-158.
51. Clausen, T., Martinez, P., Towers, A., Greenfield, T., & Kowal, P. (2015). Alcohol consumption at any level increases risk of injury caused by others: data from the Study on Global AGEing and Adult Health. *Substance Abuse: Research and Treatment, 9*(Suppl 2), 125.
52. Roche, A. M., Harrison, N. J., Chapman, J., Kostadinov, V., & Woodman, R. J. (2020). Ageing and alcohol: drinking typologies among older adults. *Journal of Aging and Health, 32*(10), 1486-1497.
53. Roche, A. M., & Kostadinov, V. (2019). Baby boomers and booze: we should be worried about how older Australians are drinking. *Medical Journal of Australia, 210*(1), 38-39.
54. Towers, A., Sheridan, J., & Newcombe, D. (2017). *The drinking patterns of older New Zealanders: national and international comparisons*. Health Promotion Agency:

https://www.hpa.org.nz/research-library/research-publications/2017-the-drinking-patterns-of-older-new-zealanders-national-and-international-comparisons
55. World Health Organization. (2016). Proposed working definition of an older person in Africa for the MDS Project. Retrieved from http://www.who.int/healthinfo/survey/ageingdefnolder/en/
56. Puddey, I. B., Mori, T. A., Barden, A. E., & Beilin, L. J. (2019). Alcohol and hypertension—new insights and lingering controversies. *Current Hypertension Reports, 21*(10), 1-10.
57. Roerecke, M., Tobe, S. W., Kaczorowski, J., Bacon, S. L., Vafaei, A., Hasan, O. S., . . . Rehm, J. (2018). Sex-specific associations between alcohol consumption and incidence of hypertension: a systematic review and meta-analysis of cohort studies. *Journal of the American Heart Association, 7*(13), e008202.
58. Taylor, B., Irving, H. M., Baliunas, D., Roerecke, M., Patra, J., Mohapatra, S., & Rehm, J. (2009). Alcohol and hypertension: gender differences in dose–response relationships determined through systematic review and meta-analysis. *Addiction, 104*(12), 1981-1990.
59. Roerecke, M., Kaczorowski, J., Tobe, S. W., Gmel, G., Hasan, O. S., & Rehm, J. (2017). The effect of a reduction in alcohol consumption on blood pressure: a systematic review and meta-analysis. *The Lancet Public Health, 2*(2), e108-e120.
60. Kuo, C.-F., Grainge, M. J., Zhang, W., & Doherty, M. (2015). Global epidemiology of gout: prevalence, incidence and risk factors. *Nature Reviews Rheumatology, 11*(11), 649.
61. Wang, M., Jiang, X., Wu, W., & Zhang, D. (2013). A meta-analysis of alcohol consumption and the risk of gout. *Clinical Rheumatology, 32*(11), 1641-1648.
62. Li, R., Yu, K., & Li, C. (2018). Dietary factors and risk of gout and hyperuricemia: a meta-analysis and systematic review. *Asia Pacific Journal of Clinical Nutrition, 27*(6), 1344.
63. Zhang, Y., Woods, R., Chaisson, C. E., Neogi, T., Niu, J., McAlindon, T. E., & Hunter, D. (2006). Alcohol consumption as a trigger of recurrent gout attacks. *The American Journal of Medicine, 119*(9), 800.e13-18.
64. Churchill, S. A., & Farrell, L. (2017). Alcohol and depression: evidence from the 2014 health survey for England. *Drug and Alcohol Dependence, 180*, 86-92.
65. Rehm, J., Gmel Sr, G. E., Gmel, G., Hasan, O. S., Imtiaz, S., Popova, S., . . . Samokhvalov, A. V. (2017). The relationship between different dimensions of alcohol use and the burden of disease—an update. *Addiction, 112*(6), 968-1001.
66. Wolitzky-Taylor, K., Operskalski, J. T., Ries, R., Craske, M. G., & Roy-Byrne, P. (2011). Understanding and treating comorbid anxiety disorders in substance users: review and future directions. *Journal of Addiction Medicine, 5*(4), 233-247.
67. Smith, J. P., & Book, S. W. (2010). Comorbidity of generalized anxiety disorder and alcohol use disorders among individuals seeking outpatient substance abuse treatment. *Addictive Behaviors, 35*(1), 42-45.
68. Morris, E. P., Stewart, S. H., & Ham, L. S. (2005). The relationship between social anxiety disorder and alcohol use disorders: a critical review. *Clinical Psychology Review, 25*(6), 734-760.
69. Paljärvi, T., Koskenvuo, M., Poikolainen, K., Kauhanen, J., Sillanmäki, L., & Mäkelä, P. (2009). Binge drinking and depressive symptoms: a 5-year population-based cohort study. *Addiction, 104*(7), 1168-1178.
70. Hjorthøj, C., Østergaard, M. L. D., Benros, M. E., Toftdahl, N. G., Erlangsen, A., Andersen, J. T., & Nordentoft, M. (2015). Association between alcohol and substance use disorders and all-cause and cause-specific mortality in schizophrenia, bipolar disorder, and unipolar depression: a nationwide, prospective, register-based study. *The Lancet Psychiatry, 2*(9), 801-808.
71. Zoethout, R. W., Delgado, W. L., Ippel, A. E., Dahan, A., & van Gerven, J. M. (2011). Functional biomarkers for the acute effects of alcohol on the central nervous system in healthy volunteers. *British Journal of Clinical Pharmacology, 71*(3), 331-350.

72. Samokhvalov, A. V., Irving, H., Mohapatra, S., & Rehm, J. (2010). Alcohol consumption, unprovoked seizures, and epilepsy: a systematic review and meta-analysis. *Epilepsia, 51*(7), 1177-1184.
73. Kerr, W. C., Williams, E., Li, L., Lui, C. K., Ye, Y., Greenfield, T. K., & Lown, E. A. (2018). Alcohol use patterns and risk of diabetes onset in the 1979 National Longitudinal Survey of Youth Cohort. *Preventive Medicine, 109*, 22-27.
74. Knott, C., Bell, S., & Britton, A. (2015). Alcohol consumption and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of more than 1.9 million individuals from 38 observational studies. *Diabetes Care, 38*(9), 1804-1812.
75. Knott, C. S., Bell, S., & Britton, A. (2018). The stability of baseline-defined categories of alcohol consumption during the adult life-course: a 28-year prospective cohort study. *Addiction, 113*(1), 34-43.
76. Askgaard, G., Grønbæk, M., Kjær, M. S., Tjønneland, A., & Tolstrup, J. S. (2015). Alcohol drinking pattern and risk of alcoholic liver cirrhosis: a prospective cohort study. *Journal of Hepatology, 62*(5), 1061-1067.
77. Rehm, J., Taylor, B., Mohapatra, S., Irving, H., Baliunas, D., Patra, J., & Roerecke, M. (2010). Alcohol as a risk factor for liver cirrhosis: a systematic review and meta-analysis. *Drug and Alcohol Review, 29*(4), 437-445.
78. Roerecke, M., Vafaei, A., Hasan, O. S., Chrystoja, B. R., Cruz, M., Lee, R., . . . Rehm, J. (2019). Alcohol consumption and risk of liver cirrhosis: a systematic review and meta-analysis. *Official Journal of the American College of Gastroenterology| ACG, 114*(10), 1574-1586.
79. Simpson, R. F., Hermon, C., Liu, B., Green, J., Reeves, G. K., Beral, V., . . . for the Million Women Study Collaborators. (2019). Alcohol drinking patterns and liver cirrhosis risk: analysis of the prospective UK Million Women Study. *The Lancet Public Health, 4*(1), e41-e48.
80. Inkelis, S. M., Hasler, B. P., & Baker, F. C. (2020). Sleep and alcohol use in women. *Alcohol Research: Current Reviews, 40*(2), 1-15.
81. Zheng, D., Yuan, X., Ma, C., Liu, Y., VanEvery, H., Sun, Y., . . . Gao, X. (2020). Alcohol consumption and sleep quality: a community-based study. *Public Health Nutrition, 24*, 4851-4858.
82. Simou, E., Britton, J., & Leonardi-Bee, J. (2018). Alcohol and the risk of sleep apnoea: a systematic review and meta-analysis. *Sleep Medicine, 42*, 38-46.
83. Hu, N., Ma, Y., He, J., Zhu, L., & Cao, S. (2020). Alcohol consumption and incidence of sleep disorder: a systematic review and meta-analysis of cohort studies. *Drug and Alcohol Dependence*, *217*, 108259.
84. Kool, B., Ameratunga, S., & Jackson, R. (2009). The role of alcohol in unintentional falls among young and middle-aged adults: a systematic review of epidemiological studies. *Injury Prevention, 15*(5), 341-347.
85. Thornley, S., Kool, B., Marshall, R. J., & Ameratunga, S. (2014). Alcohol intake, marijuana use, and sleep deprivation on the risk of falls occurring at home among young and middle-aged adults: a case-crossover study. *New Zealand Medical Journal, 127*(1406), 32-38.
86. Taylor, B., Irving, H., Kanteres, F., Room, R., Borges, G., Cherpitel, C., . . . Rehm, J. (2010). The more you drink, the harder you fall: a systematic review and meta-analysis of how acute alcohol consumption and injury or collision risk increase together. *Drug and Alcohol Dependence, 110*(1-2), 108-116.
87. Dhalwani, N. N., Fahami, R., Sathanapally, H., Seidu, S., Davies, M. J., & Khunti, K. (2017). Association between polypharmacy and falls in older adults: a longitudinal study from England. *BMJ open, 7*(10), e016358.
88. Laberge, S., & Crizzle, A. M. (2019). A literature review of psychotropic medications and alcohol as risk factors for falls in community dwelling older adults. *Clinical Drug Investigation, 39*(2), 117-139.

89. United Nations Department of Economic and Social Affairs - Population Division. (2013). *World Population Ageing 2013*. New York, United Nations, Department of Economic and Social Affairs, Population Division. Retrieved from http://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2013.pdf
90. Kowal, P., Goodkind, D., & He, W. (2016). *An aging world: 2015, international population reports*. Washington DC: US Government Printing Office. https://www.census.gov/content/dam/Census/library/publications/2016/demo/p95-16-1.pdf
91. Bascand, G., & Dunstan, K. (2014). New Zealand's demographics and population ageing. *New Zealand Economic Papers, 48*(2), 129-138.
92. Davis, N., & Fabling, R. (2002). *Population aging and the efficiency of fiscal policy in New Zealand*. Wellington, New Zealand.
93. Ministry of Health. (2019). Annual Update of Key Results 2017/18: New Zealand Health Survey. Retrieved from https://www.health.govt.nz/publication/annual-update-key-results-2017-18-new-zealand-health-survey
94. Towers, A., Sheridan, J., & Newcombe, D. (2017). *The drinking patterns of older New Zealanders: national and international* comparison. Wellington, Health Promotion Agency.
95. Towers, A., Sheridan, J., Newcombe, D., & Szabo, A. (2018). *The longitudinal patterns of alcohol use in older New Zealanders*. Wellington, Health Promotion Agency.
96. Towers, A., Sheridan, J., Newcombe, D., & Szabo, A. (2018). *The prevalence of hazardous drinking in older New Zealanders*. Wellington, Health Promotion Agency.
97. Towers, A., Sheridan, J., Newcombe, D., & Szabo, A. (2018). *New Zealanders' alcohol consumption patterns across the lifespan*. Wellington, Health Promotion Agency.
98. Vogel-Sprott, M., & Barrett, P. (1984). Age, drinking habits and the effects of alcohol. *Journal of Studies on Alcohol, 45*(6), 517-521.
99. Center for Substance Abuse Treatment. (1998). *Substance abuse among older adults*. Rockville, MD, Substance Abuse and Mental Health Services Administration (US). Retrieved from https://pubmed.ncbi.nlm.nih.gov/22514832/
100. Sarich, P., Canfell, K., Banks, E., Paige, E., Egger, S., Joshy, G., . . . Weber, M. (2019). A prospective study of health conditions related to alcohol consumption cessation among 97,852 drinkers aged 45 and over in Australia. *Alcoholism: Clinical and Experimental Research, 43*(4), 710-721.
101. Tait, R. J., French, D. J., Burns, R. A., Byles, J. E., & Anstey, K. J. (2013). Alcohol, hospital admissions, and falls in older adults: a longitudinal evaluation. *International Psychogeriatrics, 25*(6), 901-912.
102. Sorocco, K. H., & Ferrell, S. W. (2006). Alcohol use among older adults. *The Journal of General Psychology, 133*(4), 453-467.
103. Holton, A. E., Gallagher, P. J., Ryan, C., Fahey, T., & Cousins, G. (2017). Consensus validation of the POSAMINO (POtentially Serious Alcohol–Medication INteractions in Older adults) criteria. *BMJ open, 7*(11), e017453.
104. Benshoff, J. J., Harrawood, L. K., & Koch, D. S. (2003). Substance abuse and the elderly: unique issues and concerns. *Journal of Rehabilitation, 69*(2), 43-48.
105. Wilkinson, C., Allsop, S., & Dare, J. (2016). Alcohol, ageing and Australia. *Drug and Alcohol Review, 35*(2), 232-235.
106. Barnes, A. J., Xu, H., Tseng, C.-H., Ang, A., Tallen, L., Moore, A. A., . . . Duru, O. K. (2016). The effect of a patient–provider educational intervention to reduce at-risk drinking on changes in health and health-related quality of life among older adults: The Project SHARE Study. *Journal of Substance Abuse Treatment, 60*, 14-20.
107. Borok, J., Galier, P., Dinolfo, M., Welgreen, S., Hoffing, M., Davis, J. W., . . . Karno, M. (2013). Why do older unhealthy drinkers decide to make changes or not in their alcohol

consumption? Data from the Healthy Living as You Age Study. *Journal of the American Geriatrics Society, 61*(8), 1296-1302.

108. Ettner, S. L., Xu, H., Duru, O. K., Ang, A., Tseng, C.-H., Tallen, L., . . . Moore, A. A. (2014). The effect of an educational intervention on alcohol consumption, at-risk drinking, and health care utilization in older adults: the Project SHARE study. *Journal of Studies on Alcohol and Drugs, 75*(3), 447-457.

109. Kaner, E. F., Dickinson, H. O., Beyer, F., Pienaar, E., Schlesinger, C., Campbell, F., . . . Heather, N. (2009). The effectiveness of brief alcohol interventions in primary care settings: a systematic review. *Drug and Alcohol Review, 28*(3), 301-323.