Research Request – Repetitive Transcranial Magnetic Stimulation

Brief

1. Is rTMS (repetitive transcranial magnetic stimulation) a clinical treatment for Bipolar Affective Disorder?
2. If yes, is there evidence to indicate that it is recognised as a recommended treatment for Bipolar Affective Disorder? (please include frequency of treatment
3. What are the recommended treatments/therapies (both clinical and non-clinical) for Bipolar Affective Disorder with a focus on diagnosis with Obsessive Compulsive Tendencies?

Date 15/07/2020

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Please note:

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Summary

- rTMS has been proven as an effective treatment for treatment-resistant depression.
    - The Royal Australian and New Zealand College of Psychiatrists states that research specifically focusing on bipolar is in its infancy, however, there is no evidence to suggest that bipolar patients are less likely to respond to rTMS than patients with unipolar depression.
- Precise treatment protocols for bipolar do not have consensus agreement at present. However, recommendations for depression include
    - Monday to Friday over 4 to 6 weeks
    - Daily stimulation for between 30 and 45 minutes
    - Repeated short bursts of high frequency stimulation (~10Hz) to the left dorsolateral prefrontal cortex
- First line treatment for bipolar is pharmacological (Antipsychotics, Mood stabilising agents, Antidepressants), followed by psychotherapy, electroconvulsive therapy or rTMS based on the discretion of the treating medical professional
- The treatment of comorbid bipolar disorder and obsessive compulsive disorder is extremely complex.
    - No consensus regarding the best available evidence-based treatment for OCD in manic, depressed, or remitted phases of BD exists
    - Best treatment based on current evidence is that mood stabilizers along with adjuvant topiramate or with olanzapine-SSRI/clomipramine combination can be used to treat OCD in BD
    - Meta-analysis found that there is no effect of rTMS on OCD

What is Transcranial Magnetic Stimulation?

Transcranial magnetic stimulation (TMS) is a relatively new, non-invasive therapeutic option that involves the application of magnetic pulses on hyperactive or hypoactive cortical brain areas with the aim of modulating brain networks [1]. To administer TMS, the clinician places an electromagnetic coil on a pre-specified region of the patient's scalp. Magnetic pulses from the coil travel through the skull toward a target cortical area, resulting in neural activation changes.

Bipolar disorder types

Bipolar I Disorder (mania or a mixed episode) – This is the classic manic-depressive form of the illness, characterized by at least one manic episode or mixed episode. Usually—but not always—Bipolar I Disorder also involves at least one episode of depression.

Bipolar II Disorder (hypomania and depression) – In Bipolar II disorder, you don't experience full-blown manic episodes. Instead, the illness involves episodes of hypomania and severe depression.

Cyclothymia (hypomania and mild depression) – Cyclothymia is a milder form of bipolar disorder that consists of cyclical mood swings. However, the symptoms are less severe than full-blown mania or depression.

Peer Reviewed Literature Investigating Repetitive Transcranial Magnetic Stimulation for Bipolar Disorder

To date, rTMS has received the most consistent clinical and research application in the treatment of **treatment-resistant depression**. All substantive evaluations of the efficacy of rTMS have been conducted in patients with some degree of treatment resistance with many of the trials including patients who have failed to respond to 2 or more antidepressant medication trials where the likelihood of further medication response is low. These clinical trials have included patients with bipolar depression, however, they were not analysed individually.

In the context of depression, rTMS has established efficacy, as confirmed by multiple meta-analyses [2, 3]. It has also been recommended by the **Royal Australian and New Zealand College of Psychiatrists** [4] for patients with non-psychotic depression. Therefore, it is a sensible treatment option in patients who have failed to respond to initial antidepressant therapy, or who have significant problems with tolerating medication treatment.

Although initial trials did not specifically investigate bipolar, there is no evidence that bipolar patients are less likely to respond to rTMS than patients with unipolar depression [4]. More recently, trials have focused on investigating the efficacy of rTMS for the treatment of bipolar. A recent literature review by Gold et al (2019) [5] is summarised below.

Inclusion criteria: Studies across the various bipolar mood stages were included (bipolar depression, mania, mixed episodes). Articles which didn't separate participants with unipolar and bipolar were excluded.

Results

Bipolar depression

More than >80% of included studies saw improved depression related symptoms, including a reduction in Hamilton Rating Scale for Depression, Montgomery–Åsberg Depression Rating Scale, Clinical Global Impression Score or reduction in beta frequency.

The potential to reduce depressive symptoms is clear, though findings varied in relation to the most effective rTMS treatment protocol (e.g., high-frequency vs. low-frequency, right-sided vs. left-sided, bilateral vs. unilateral). Several studies concluded that older patients with a longer, more refractory, and more severe bipolar depression may require more rTMS sessions than patients with a shorter, less chronic bipolar depression [6].

Mania

TMS for mania has been the focus of fewer clinical trials and yielded more inconsistent findings with three studies finding improvements in depressive symptoms and three finding no difference. The only randomized controlled trial found no benefit of rTMS over a sham treatment for mania.

Side effects of TMS

Side effects have been described as mild. The most common among the studies bipolar depression were headaches and insomnia with other side effects including local pain at the site of administration, fatigue, memory difficulties, and dizziness.

Frequency of treatment

As noted above, consensus has not been reached on precise treatment protocols for varying levels of bipolar depression. The Royal Australian and New Zealand College of Psychiatrists [3] provides the most commonly administered protocols for treatment-resistant depression which has been supported by several meta-analyses (Level I evidence) [2, 3]:

- Monday to Friday over 4 to 6 weeks
- Stimulation is applied daily for between 30 and 45 minutes
- Repeated short bursts of high frequency stimulation (~10Hz) to the left dorsolateral prefrontal cortex (DLPFC).
    - There is also significant evidence to support the antidepressant efficacy of low frequency rTMS (an alternate form of rTMS) applied to the right DLPFC (Level I evidence) [2].
- Patients receiving rTMS do not require a general anaesthetic and are typically able to return to work or drive immediately after
- Effective as a monotherapy or in conjunction with antidepressants
- Bilateral rTMS does not appear to produce better results than unilateral rTMS, and therefore unilateral approaches that can be generally delivered more quickly are preferable [7].

Clinical Management of Bipolar Disorder

Management of Mania [4]

Manic symptoms can occur within depression as mixed features, and with increasing severity from hypomania and mania through to mania with psychosis.

Severe Mania

Acute mania is a medical emergency, and often necessitates use of mental health legislation [4]. Care should be provided in a low stimulus environment with support from health professionals. Treatment usually requires short-term use of a combination of;

- Benzodiazepines
- Antipsychotics
- Electroconvulsive therapy (ECT) (for delirious mania and mania with catatonic features not attributable to an organic cause)

Hypomania

By definition hypomania is self-limiting and often resolves with only modest use of medications and psychosocial interventions, but usually some adjustments to treatment are necessary and these should follow the general principles of managing mania [4].

Mania

It is crucial to taper and cease any agents with mood-elevating properties (e.g. antidepressants, stimulants) and institute general measures such as reducing stimulation, lowering activity level, delaying the individual from making important decisions and maintaining a structured routine [4].

- Pharmacotherapy of mania involves treatment with anti-manic agents (a combination of medications is often necessary). Individual clinical judgement is used to determine specific medications.
- Counselling of family members/carers
- ECT
- rTMS is not recommended for mania due to insufficient evidence
- Unstructured supportive psychotherapy (which may include psychoeducation about bipolar disorder)

Clinical Management of Bipolar Depression

The treatment of bipolar depression is difficult and outcomes are often poor, partly because no medications have been specifically developed to treat this phase of bipolar disorder but also because management requires careful consideration of complex issues, such as treatment emergent affective switching (TEAS) into mania or hypomania, possible cycle acceleration, and the precipitation of mixed symptoms [4].

Pharmacological

Monotherapy

Comprises two groups of medications:

- Second generation antipsychotics (SGAs)
  - quetiapine, lurasidone and olanzapine
- Mood stabilising agents (MSAs)
  - lithium, lamotrigine and valproate

Combination

The SGA's and MSA's with efficacy as monotherapy agents can be combined or used in conjunction with antidepressants.

SGA's: Effective monotherapy options can be added to either mood stabilising agents or antidepressants.

MSA: Lithium can be combined with all other monotherapy options; valproate can similarly be combined with all monotherapy options but should be used with caution in women of childbearing age and when combined with lamotrigine.

Antidepressants: antidepressants can be added to all effective monotherapy options with the exception of lamotrigine, however the benefits of this strategy remain unclear.

Psychological interventions

Strong clinical consensus that the highly prevalent and highly impairing depressive phase of bipolar disorder should be managed in a comprehensive biopsychosocial manner, and adjunctive structured psychological interventions should be offered to help stabilise depressive episodes. These interventions include:

- Cognitive-Behavioural Therapy (CBT)

- Interpersonal and Social Rhythm Therapy (IPSRT)
- Family-Focused Therapy (FFT)

Electroconvulsive therapy and other brain stimulation methods (rTMS)

ECT has been shown to be equally effective for both bipolar and non-bipolar depression with some evidence that the response was more rapid in bipolar depression.

As mentioned previously, rTMS for the treatment of bipolar has only recently been investigated. There is no evidence that bipolar patients are less likely to respond to rTMS than patients with unipolar depression [4].

Complementary therapies

Omega-3-fatty acids [8], N-acetyl cysteine (NAC) [9] and other nutraceuticals [10] may also be considered.

Management of comorbid bipolar and obsessive compulsive disorder

Obsessive-compulsive disorder (OCD) is one of the most frequently associated comorbidities in bipolar disorder. For clinicians, it is a real challenge to manage patients with BD-OCD comorbidity because both mood stabilizing and management of OCD should go hand in hand. However, the serotonin reuptake inhibitors (SRIs) which are the first-line treatment for OCD can induce manic/mixed mood states in BD [11].

Effects of combined pharmacological treatments and psychotherapeutic treatments are less studied, and no convincing upper hand for a specific modality is observed in OCD comorbid with BD. No consensus regarding the best available evidence-based treatment for OCD in manic, depressed, or remitted phases of BD exists [11].

Based on current evidence mood stabilizers along with adjuvant topiramate or with olanzapine-SSRI/clomipramine combination can be used to treat OCD in BD [11]. Furthermore, there is consistent evidence that active treatment of major depression is associated with improvement in personality disorder symptoms [12, 13].

Repetitive Transcranial Magnetic Stimulation for Obsessive Compulsive Disorder

A meta-analysis [3] has found that there is no significant effect (0.15, $p = 0.52$) of rTMS for the treatment of OCD. In spite of the small numbers of studies, the results were homogeneous. This indicates that OCD is not a psychiatric indication for rTMS [3].

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Research – Adverse effects of bidet use

Brief	Does habitual bidet toilet use lead to an increase in adverse health concerns (e.g. urological infections, haemorrhoids, bacterial vaginitis, and aggravation of vaginal microflora)? Does this differ between biological sexes? Is there a significant increase in adverse health concerns from bidet use when compared to the general population (e.g. increased likelihood of infection caused by bidet use, or infections are typically present in general population regardless of bidet use)?
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Requester(s)	Claire M s22(1)(a)(ii) - Senior Technical Advisor (TAB)
Researcher	Jane S - Research Team Leader (TAB)
Cleared	N/A

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1 Contents

2 Summary

- Literature investigating the adverse effects of bidet use is sparse

- There is some evidence to suggest that habitual bidet use can cause haemorrhoids, irritated perianal skin, urological infection, vulvar pruritus and bacterial vaginitis
    - Apart from irritated perianal skin, there are no differences between sexes in infection rate
- There is conflicting evidence around the use of bidet use and pre term birth
- The implementation of bidets in nursing homes has shown that only 50% of residents and nurses are supportive of bidet use, and that in the majority of cases residents remain unclean and still require toileting assistance (duplication of supports)
    - One study found that more 28% of bidet users were still required to wipe using toilet paper multiple times
- A single study has found that bidet use can assist in reducing toileting time for people with spinal cord injury. However, further studies are required to confirm its effectiveness

3 Evidence of infections

There is some evidence of a positive relationship between haemorrhoids, irritated perianal skin, urological infection, vulvar pruritus and bacterial vaginitis in those considered habitual bidet users [1, 2]. These findings were obtained from moderate quality retrospective surveys that included up to 18,000 participants. It was also found that 28 % of the bidet users wiped off excess water with toilet paper many times [3].

When comparing incidence of non-genital related conditions, Asakura, Nakano [1] found that men more commonly reported subjective symptoms of irritated skin around the anus, which were newly experienced during follow-up than non-habitual users (adjusted risk ratio 1.36 (95% confidence interval 1.06–1.75)). Furthermore, Tsunoda, Takahashi [3] found that men were more commonly affected by an “itch on the anus” because they had faecal leakage more frequently (OR = 3.82) and used a bidet more actively. Other than men being more likely to use a bidet, there were no other gender differences found.

A cross sectional study investigating the possible relevancy of bidet usage to changes in vaginal microflora in 268 women found that normal microflora (*Lactobacillus species*) was not present in 42.86% of bidet toilet users, compared to 8.77% of non-users. Faecal bacteria were detected in 50 of the 268 cases (18.66%), 46 cases in users (92%) and only 4 cases in non-users (8%). Contamination by other pathogens was 4 to 6 times higher in users than in non-users.

Various case studies have reported that bidet use can cause:

- Anal fissure in the anterior midline

- Rectal mucosal prolapse syndrome
- Scald burn in the perianal region

4 Hygiene status of bidet toilets

A handful of studies have investigated the hygiene status of bidet toilets in public restrooms such as hospitals and Universities. They have found that:

- Pseudomonas aeruginosa is present on about 2% of the toilet seats. P. aeruginosa was found to remain for long durations in biofilms that formed inside warm-water tanks [4]
- 86.9% of bidet toilets were found to be contaminated by one or more of the following organisms [5]:
    - S. aureus, Streptococcus spp
    - Enterococcus spp
    - Enterobacteriaceae
    - non-glucose-fermenting rods (NFR)
    - other Gram-negative bacteria
- The nozzle surface of 87% and 94% of the spray water were found to be contaminated by one or more of the following organisms [6]:
    - Enterobacteriaceae
    - Enterococcus spp.,
    - Staphylococcus spp.,
    - non-glucose-fermenting rods,
    - other Gram-negative bacteria,
    - other Gram-positive bacteria
    - Candida spp.

5 Association with pre-term birth

Two studies investigated the bidet use and the association with pre term birth. Both came to differing conclusions. Asakura, Nakano [7] found that normal use of bidet toilets by pregnant women does not pose any clinical health risk with regard to preterm birth. In contrast, Kim, Kim [8] found that chronic bidet toilet use, before and during pregnancy, is associated with abnormal vaginal colonization by gram-negative bacteria (mostly by E coli) and preterm birth.

6 Implementing bidet in aged care or disability settings

Two studies have investigated the use of bidet toilets in an aged care facility [9] and a spinal cord injury rehabilitation setting [10]. Both of these studies were of low quality with small sample sizes. In the nursing home setting, it was found that only 50% of nurses and residents responded positively to the use of the bidet. Logbook entries revealed that residents were rated as clean only 49% of the time, as slightly dirty 34% of the time, and in the range from somewhat to very dirty for the remaining 17% of the times that they used the wash-and-dry toilets. Therefore, **residents still required cleaning following the use of a bidet in most instances.**

In those with spinal cord injury time needed for bowel management with the modified bidet device was shorter than that with patients' usual manner of bowel care (*P* 0.01). However, residual stools were found in 8 of the 15 patients.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
Evidence of infections				
Asakura, Nakano [1]	To assess the relationship between bidet toilet use and haemorrhoids or urogenital infections.	**Retrospective cross sectional survey** A total of 18,562 people were randomly selected using a computer programme, to whom a web survey questionnaire was randomly delivered until the number of respondents exceed 10 000. A total of 10 305 individuals were involved in the baseline survey. 1-year and 3-year follow up studies were also conducted. See methods given in Kiuchi, Asakura [2] below for full details of questionnaire.	Final number of subjects analysed was 7759, giving a follow-up rate of 75.3%. 50.1% of respondents were habitual bidet users. They were more likely to be older, married and wealthier. In men, more habitual users reported subjective symptoms of irritated skin around the anus, which were newly experienced during follow-up than non-habitual users (adjusted risk ratio 1.36 (95% confidence interval 1.06–1.75)). Risk ratio based on prevalence of haemorrhoids diagnosed by a physician, subjective symptoms of haemorrhoids and subjective symptoms of irritated perianal skin were significantly higher in habitual users. Regarding women, no cumulative incidence of outcomes was significantly associated with bidet toilet use.	**MODERATE** Large sample, followed over many years. Still low prevalence rates of some conditions to determine an effect. Large number of respondents eliminated due to inconsistent outcomes.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
Garg [11]	Preliminary report of various cases of anterior fissure-in-ano.	**Multiple Case Reports**	10 patients of anal fissure in anterior Midline. Two patients presented with acute and eight patients had chronic fissures. 9 men and 1 female patient Age ranged from 22 to 46 years (median 36 years). Duration of symptoms ranged from 4 to 7 days in acute cases and 3–8 months (median 5 months) in patients with chronic fissure. All the patients reported using a bidet-toilet and exposing the perianal region to water stream for a few minutes (range: 1–5 min). They were recommended to stop the usage of such a water stream and were advised to use water poured from a container. Conservative treatment was also continued. All except one patient responded well to the treatment and became asymptomatic within 2–3 weeks. The patient who did not respond to the treatment required an operation.	**VERY LOW** Very brief report. Only descriptions provided. Considering the rarity of anterior fissure in men and the 'cause and effect' relationship seen in these cases, the water stream of the bidet-toilet being the causative factor of anterior fissure in these cases looks probable.
Kiuchi, Asakura [2]	To assess the relationship between habitual bidet toilet use and the incidence of haemorrhoids or urogenital infection.	**Prospective web based survey** 18,562 people were randomly selected from an online database to receive the questionnaire. A	A total of 7637 subjects were analysed using single or multiple logistic regression models. The **prevalence** odds ratios (ORs) between bidet toilet users and non-users	**MODERATE** There is a positive relationship between habitual bidet toilet use and haemorrhoids and urogenital symptoms, except

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
		total of 10,305 individuals were involved in the baseline survey. A follow-up web survey was conducted in February 2014. 8255 of the baseline subjects participated again (follow up rate 80.1%). Survey questions • Frequency of bidet use: "never used", "use less than once a week", "use every day or more than once a week • Physician diagnosis and subjective symptoms of haemorrhoids, irritated perianal skin, cystitis, pyelonephritis, candida vaginitis, bacterial vaginitis, and vulvar pruritus. Baseline included questions about smoking, drinking, fitness, sleeping, showering/bathing, bowel movements, direction of wiping the anus after defecation, menstrual status, sexual activity, academic background, and past/current histories of diseases.	for haemorrhoids, urological infections, and vulvar pruritus were significantly >1.0 but their incidence ORs were not significant. The adjusted incidence OR for bacterial vaginitis symptoms was significant (2.662, 95% confidence interval [CI] [1.315–5.520]). No gender differences in relation to prevalence of disease/symptoms. Males more likely to be habitual bidet users.	bacterial vaginitis, were due to reverse causation. The incidence of bacterial vaginitis might be caused by bidet toilet use, but the incidence rates were too small to make a definite conclusion, and further studies are needed.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
Miura, Kimura [12]	Presentation a case of adverse effect after excessive bidet use.	**Case Study** 14-year-old boy presented to Hospital because of passage of blood and bloody stools for several months. The patient's height was 165 cm, his weight was 45 kg. No physical abnormal findings of anus/rectum on examination. Laboratory data were all within reference ranges. Stool culture was negative. The patient had used a bidet since he was 2 years old. Recently he had been remaining in the bathroom for nearly an hour, using a stream of water at the highest flow setting.	An irregular, elevated, inflamed lesion in the rectal canal was found. At 10 cm from the anus, a raised, haemorrhagic lesion involving the posterior and right rectal wall was also found. Rectal mucosal prolapse syndrome diagnosed and caused by overuse of bidet.	**VERY LOW** Single case study.
Ogino, Iino [13]	The present study was designed to clarify the possible relevancy of bidet usage to changes in vaginal microflora	**Cross Sectional Study** Participants were recruited in a hospital setting, after attending for complaints relating to vaginal discharge. Inclusion criteria	268 women participated 57.6% were habitual bidet users. Normal microflora (*Lactobacillus species*) was not present in 42.86% of bidet toilet users, compared to 8.77% of non-users.	**MODERATE** Cross sectional, uncontrolled study. Relatively small sample to be able to generalise to the greater population.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
		Women of reproductive age (from 19 to 40 years). All patients were questioned whether or not they were habitual bidet toilet users. Habitual users were defined as those who use bidet toilets every time at toileting. An aliquot of cervicovaginal secretion was obtained by a sterilized cotton swab and transferred into culture tubes	Faecal bacteria were detected in 50 of the 268 cases (18.66%), 46 cases in users (92%) and only 4 cases in non-users (8%). Contamination by other pathogens was 4 to 6 times higher in users than in non-users.	
Shulman, Wolf [14]	Presentation a case of scald burn in the perianal region caused by using a bidet	**Single Case Study** 69-year-old female was admitted to the emergency room with a complaint of a pain in the right side of her perineum as a result of hot water from a bidet. Medical history Multiple sclerosis diagnosed 2 years prior to her admission and treated with immunoglobulins. In the last 6 weeks she had received high dose hydrocortisone due to exacerbation of the disease. As	Physical examination on arrival revealed a deep third degree burn in the right perianal region measuring less than 1% of total body surface area. The burn wound was debrided, its margins, close to the anal orifice were sutured. A course of oral antimicrobial treatment was initiated. Conservative treatment was maintained and recovery of the burn occurred within 9 weeks. No infection or other complications were observed.	**VERY LOW** Single case design. Lowest level on evidence hierarchy. In the case described, a **lack of motor coordination in conjunction with sensory problems**, caused a deep third degree burn to the right perianal region.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
		part of her disease she suffered from diminished sensation in the lower part of her body.		
Tsunoda, Takahashi [3]	To investigate the use of bidet toilets among community dwelling Japanese people and explored the correlates for an itch on the anus.	**Cross sectional survey** Convenience sample Subjects were hospital outpatients and employees or students and employees at two technical colleges <u>Inclusion criteria</u> Aged >14 years old Data collection occurred over 2 weeks. <u>Questionnaire</u> • Basic demographic information (age and sex) • General questions on bidet toilet use • Questions targeting those who use bidet toilets before defecation • Questions targeting those who use bidet toilets after defecation	4,963 respondents included in the final analysis (3,190 (64 %) women and 1,773 men) The mean ± standard deviation (SD) (range) age of the respondents was 49.6 ± 20.2 years 55 % (2,724/4,952) of respondents washed the anus either before or after defecation 83 % (2,253/2,724) of the respondents reported that they had a bidet toilet at home Men, and older people (aged >50 years) used bidets more actively. Washing the anus before defecation was associated with constipation (p = 0.005). 28 % (698/2,500) of the respondents wiped off excess water with toilet paper many times.	**MODERATE** Convenience sample, subjective responses

Table 1. Literature Review				
Author	**Aim/Objective**	**Methods**	**Results**	**Level & Quality of evidence**
		• Questions targeting women who use bidet toilets to wash their genitals	Men might be affected by an itch on the anus, because they had faecal leakage more frequently (OR = 3.82) and used a bidet more actively.	
Hygiene status of bidet toilets				
Iyo, Asakura [4]	To survey the state of residual chlorine and microbial indicators in the spray water of warm-water tanks of bidet toilet seats. To evaluated the disinfection status and microbial hygiene of the spray water.	**Prospective survey (of bacterial presence)** Residual chlorine and microorganism indicators in the spray water from the warm-water bidet toilet seats were surveyed twice. <u>Spray water</u> Spray water was collected directly as it came out of the nozzle, and tap water was used as a control. <u>Tap water</u> Approximately 50 mL of tap water was collected for residual chlorine testing in sterilized bottles.	A total of 127 seats were analysed. There were 43 toilet seats for men's use, 71 for women's use, and 13 for barrier-free use. Spray water from the toilet seats had less residual chlorine than their tap water sources. However, the total viable microbial count was below the water-quality standard for tap water. Heat of the toilet seats' warm-water tanks caused bacteria in the source tap water to proliferate inside the nozzle pipes and the warm water tanks. Pseudomonas aeruginosa was detected on about 2% of the toilet seats. P. aeruginosa was found to remain for long durations in biofilms that formed inside warm-water tanks.	**LOW** The existence of P. aeruginosa in spray water, even at low levels is concerning. This has the potential to cause opportunistic infections, especially in immunocompromised individuals.
Kanayama Katsuse, Takahashi [5]	To investigate the distribution of antimicrobial-resistant	**Cross sectional survey**	254 (86.9%) were found to be contaminated by one or more of the	**MODERATE**

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
	bacteria recovered from bidet toilets at a university-affiliated hospital in Japan.	All 292 electronic bidet toilets at a single hospital in Japan were sampled for bacterial contamination. Swabs were used to sample the warm spray jet from nozzles and toilet seats. Chromosomal DNA analysis by pulsed-field gel electrophoresis of S. aureus, E. coli and P. aeruginosa isolates were performed.	following organisms: S. aureus, Streptococcus spp., Enterococcus spp., Enterobacteriaceae, non-glucose-fermenting rods (NFR) and other Gram-negative bacteria. Enterobacteriaceae were isolated from 84 (28.8%) bidet toilets: E. coli, Enterobacter spp., Klebsiella spp., Citrobacter spp. and other Enterobacteriaceae were found in warm-water nozzles of 38 (13.0%), 22 (7.5%), 13 (4.5%), five (1.7%) and six (2.1%) bidet toilets, respectively.	Single cross sectional study. Unable to confirm ongoing contamination. Authors conclude that warm-water nozzles of bidet toilets are contaminated with a wide range of bacteria, making them a potential vehicle for infection. In the hospital setting, shared use of bidet toilets must consider the clinical background of patients. Based on these findings, bidet toilets must be part of the risk management programme, and steps should be included for monitoring and disinfection.
Tsunoda, Otsuka [6]	To evaluate the hygiene status of bidet toilets	**Prospective survey (of bacterial presence)** A total of 192 tank type bidet toilets were surveyed, of those 103 were in an inpatient ward (48 individual, 55 shared), 34 were in an outpatient clinic, and 55 were in a research building for employees. Sampling protocol	Of the 192 toilets sampled, the nozzle surface of 167 (87%) and the spray water of 181 (94%) were found to be contaminated by one or more of the following organisms: • Enterobacteriaceae • Enterococcus spp., • Staphylococcus spp., • non-glucose-fermenting rods, • other Gram-negative bacteria, • other Gram-positive bacteria • Candida spp.	**LOW** Because the interval of scrubbing the toilets did not have an influence on the contamination of the spray water, self-cleaning mechanisms of spray water should be developed to prevent patients' possible infections.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
		• Nozzle surface was sampled using swabs before spray water • Spray water was collected directly as it came out of the nozzle • Tap water for control specimens was collected from faucets in the restrooms which were surveyed	An extended spectrum of β- lactamase producing Escherichia coli was found in one nozzle surface and one spray water. The frequency of colonization from the nozzle surface was significantly greater in the toilets scrubbed every week than that in the units scrubbed every day. The nozzle surface and the spray water in the bidet toilets were contaminated with a wide range of bacteria.	
Association with pre-term birth/pregnancy				
Asakura, Nakano [7]	To estimate the association between bidet toilet use and preterm birth, as well as the effect of bidet toilet use on bacterial vaginosis, in pregnant women.	**Retrospective cross sectional survey** All women who gave birth between 2006 and 2010, at Keio University Hospital in Tokyo were invited to participate. A structured, 6-page questionnaire containing 27 questions about bidet toilet use and other lifestyle factors was sent via mail.	The final response rate was 64.1% Of 1,293 women, 63.3% were users of bidet toilets. The incidence of preterm birth was 15.8% among bidet users and 16.0% among nonusers. Incidence was 9.8% for late preterm birth and 6.0% for early preterm birth. No association between bidet toilet use and the incidence of preterm birth (adjusted OR 1.04, 95% confidence interval [CI] 0.72 – 1.48).	**MODERATE** Big sample, however, retrospective surveys lack reliabilities due to recall bias. Not generalizable to greater female population. Normal use of bidet toilets by pregnant women does not pose any clinical health risk with regard to preterm birth.

Table 1. Literature Review				
Author	**Aim/Objective**	**Methods**	**Results**	**Level & Quality of evidence**
		Analysis focused on those who had a microbiological screening test conducted at approximately 35 weeks. Bidet toilet use before and during pregnancy, was collected by a self-report questionnaire. Primary outcome of this study was the incidence of preterm birth. Preterm birth, delivery before 33 weeks of gestation was defined as early preterm birth. Secondary outcome was bacterial vaginosis estimated by the balance of lactobacilli and non-lactobacillus microbes.	No association was observed between bidet toilet use and bacterial vaginosis (adjusted OR 0.96, 95% CI 0.70–1.33). No association between bidet toilet use and intestinal bacteria (adjusted OR 0.97, 95% CI 0.68–1.38) or between bidet toilet use and bacterial vaginosis– related bacteria (adjusted OR 1.00, 95% CI 0.73–1.36). Detection rate of fungi was significantly higher among bidet toilet users (adjusted OR 1.68, 95% CI 1.14–2.48)	
Kim, Kim [8]	To evaluate the association of bidet toilet use with abnormal vaginal microbial colonization and preterm birth (PTB) in high-risk pregnancies.	**Prospective Cohort Study** Pregnant women, who were hospitalized in high-risk units from April 2015 to July 2017, in two tertiary hospitals in Seoul, South Korea were recruited. Cases with delivery due to maternal foetal indications (N = 4) were excluded.	32.8% of the patients responded as users of a bidet toilet. There were no significant differences in the maternal baseline characteristics, such as the age, the rate of primiparity, and pre pregnancy BMI. Abnormal vaginal microbial colonization was significantly higher in the bidet user group, compared to the nonuser group (60.7% vs 44.2%, P = 0.036).	**MODERATE** Prospective, more precise questions asked and swabs used to determine infection rather than recall. Authors conclude that chronic bidet toilet use, before and during pregnancy, is associated with abnormal vaginal colonization by gram-negative

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
		Patients completed a questionnaire which included questions, such as bidet use, purpose of use, duration, mode (feminine mode: cleansing genital lesion, general mode: cleansing anus, or both mode), frequency, time, and strength of the bidet toilet. Vaginal cultures were taken at the time of admission.	This higher rate of abnormal vaginal colonization was attributed to the increased colonization of gram negative bacteria (16.4% vs 6.7%, P = 0.039), especially E. coli (13.1% vs 3.3%, P = 0.023). Preterm delivery rate of bidet users was significantly higher than that of non-users (87.3% vs 73.0%, P = 0.040).	bacteria (mostly by E coli) and preterm birth.
Implementing bidet in aged care or disability settings				
Cohen-Mansfield and Biddison [9]	To investigate the feasibility of using a "wash-and-dry" toilet in the nursing home.	**Pseudo randomised trial** Luscence Luxury Lavage toilet used. Recruitment focused on female residents who had been identified by nursing staff as having difficulty with cleanliness or toileting care. Participants randomised to experimental or control group. 15 women received new toilets and were included in the experimental group and 13	14 experimental and 8 comparison participants. 27 nursing assistants, of whom 82% were female were interviewed. 8 (57%) of participants in the experimental group had some difficulty in communicating or could not always answer all the questions. <u>Feasibility</u> 64% (n = 9) of residents were not able to operate the remote control and therefore required staff assistance.	**LOW** Not completely randomised, small sample, significant drop out rate, self-reported questionnaires used, however, high percentage of participants were unable to provide responses. This severely effects the reliability of the study. The toilet offered some help with cleaning and drying residents, it was not sufficiently

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
		women were included in the comparison group <u>Procedure</u> Interviews conducted each week with the nursing assistant and residents participating. Following toilet instillation all baseline assessments were repeated each week, an additional toilet reaction scale was administered to the experimental group. Final assessments administered after 2 months. <u>Outcome measures</u> • Resident questionnaires: toileting experience and reaction • Nursing staff questionnaires: toileting experience • Urine test • Demographic data	Nursing assistants often not willing to use the bidet as easier to change an adult diaper. 50% (n = 7) of residents were reported to be physically or mentally disabled and consequently difficult to either verbally persuade or physically lift onto the toilet. <u>Reaction questionnaire</u> Approximately half of staff and residents responded positively to the use of the bidet. Logbook entries revealed that residents were rated as clean 49% of the time, as slightly dirty 34% of the time, and in the range from somewhat to very dirty for the remaining 17% of the times that they used the wash-and-dry toilets. 86% of participants in the comparison group versus only 36% in the experimental group had significant bacterial growth in their urine. Toilet installation was more complex than anticipated.	thorough in this regard, and it requires further development.

Table 1. Literature Review

Author	Aim/Objective	Methods	Results	Level & Quality of evidence
Uchikawa, Takahashi [10]	To study the effectiveness of a modified washing toilet seat equipped with a CCD camera monitor and an electronic bidet to facilitate precise hitting of the anal area with water streams to stimulate bowel movement in patients with spinal cord injury.	**Multiple Case Study Design** Washing toilet seat equipped with an electronic bidet, a CCD camera and a light. All participants had traumatic SCI. All patients were at least 5 months post-acute injury and could independently transfer to the toilet seat and change their position on it while watching the CCD monitor. The maximum duration of stimulation was set at 30 mins, and the maximum power of the water stream was used. After 30 mins, the amount of residual stool in the rectum was examined using digital evacuation.	20 patients, all males, mean age was 46.3 years (SD 17.9, range 18–73). The level of injury was cervical in 11 patients, thoracic in 7 patients, and lumber in 2 patients. Fourteen of the 20 patients (70%) could not direct the water stream precisely to the anorectal area without the use of the monitor. Bowel movement was successfully induced with the modified device within 30 mins [average time 17mins (range 3–28)] in 75% of patients. Time needed for bowel management with the modified device was shorter than that with patients' usual manner of bowel care (*P* 0.01). Time required for successful bowel movement was shortened in 11 of 13 patients (85%) who had spent more than 30 mins with their usual manner of bowel management. However, residual stools were found in 8 of the 15 patients.	**LOW** Small sample, no control group. No complications were observed, however, further research is needed to confirm positive results.

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Smoke Alarm Regulations by Australian State and Territory Legislation

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Please note:

The research and literature reviews collated by our TAB Research Team are not to be shared external to the Branch. These are for internal TAB use only and are intended to assist our advisors with their reasonable and necessary decision-making. Delegates have access to a wide variety of comprehensive guidance material. If Delegates require further information on access or planning matters, they are to call the TAPS line for advice. The Research Team are unable to ensure that the information listed below provides an accurate & up-to-date snapshot of these matters

Research question: What are the legislated smoke alarm requirements across Australian States and Territories?

Date: 21/3/22

Researcher: Stephanie P s22(1)(a)(ii) - irrelevant

Cleared by: Stephanie P s22(1)(a)(ii) - irrelevant

1. Contents

2. Introduction

Smoke alarm regulations for residential properties vary between Australian States and Territories. This paper provides a description of the legislated requirements and guidance provided by the State Governments in each State and Territory of Australia regarding installation of smoke alarms in residential dwellings.

Residential dwellings include: Class 1a buildings (typically standalone dwellings: detached houses, terrace houses, town houses and villa units), class 1b buildings (shared accommodation with floor area less than 300m2 and less than 12 people living in it), class 2 buildings (typically multilevel residential buildings: apartments, home units, flats), class 3 buildings (shared accommodation as for 1b but greater capacity: boarding house, hostel, backpackers, hotel, bed and breakfast), class 4 buildings (caretakers flats, single residences above shops), and relocatable homes such as campervans and caravans but excluding tents (Australian Building Codes Board, 2020; Fire and Rescue New South Wales, 2021a).

In each state, smoke alarms are regulated by Australian Standard AS3786:2014 – smoke alarms that use scattered light, transmitted light or ionization. This standard includes both ionization and photoelectric smoke detectors, however in some states photoelectric smoke detectors are mandatory.

Most states acknowledge that Deaf and Hard of Hearing people should have specialised smoke alarms that have strobe light and/or vibrating pad that are activated when smoke alarms sound. These devices are regulated by Australian Standard AS1603.17-2011 Automatic Fire Detection and Alarm Systems. Warning equipment for people with hearing impairment includes smoke alarms. However, this standard is not mandatory for Deaf and Hard of Hearing people (Fire and Rescue New South Wales, 2021b). Subsidy schemes provided by Victoria and Queensland for these specialised devices are described within the

state information. The Tasmania Fire Service suggests there is a subsidy scheme, however no details were available at the time of this paper (Tasmania Fire Service, 2022).

In 2014, a National Construction Code was developed that stipulates all new (post-Jan 2014) or renovated dwellings with more than one smoke alarm must have the alarms interconnected to provide one common alarm (Australian Building Codes Board, 2016). There is variability in implementing this code. For example, in Queensland homeowners are required to retrofit interconnected alarms for all residential dwellings by 2027 whereas Victoria only requires new or renovated dwellings to have interconnected alarms.

This paper has been developed to assist TAB advisors who provide advice on fire safety assistive technology and should be read in conjunction with:
RES 2020/0077 Access, Egress and Fire Safety

3. Australian Capital Territory

- Working smoke alarms that meet requirements of Australian Standard AS3786 are compulsory in the ACT (ACT Emergency Services Agency, 2019). Where possible, alarms should be interconnected. Photoelectric smoke alarms are recommended but not mandatory.
- Properties must comply to the Building Code of Australia 3.7.2. – homes must have at least one smoke alarm per floor, and one in each space between bedrooms as illustrated in Appendix 1 (Smoke Alarm Testing Services, 2022a).
- Minimum smoke alarm requirements (Smoke Alarm Testing Services, 2022a):
    - Residential, constructed **pre-Aug 1994:** Stand-alone 9V battery powered smoke alarms
    - Residential, constructed, renovated or extended **after Aug 1994:** Hard wired smoke alarms connected to 240V mains with back up battery

4. New South Wales

- Clause 146A of the Environmental Planning and Assessment Act 1979 and Division 7A or Part 9 of the Environmental Planning and Assessment Regulation 2000 state that at least ***one working smoke alarm must be installed on each level in all buildings in NSW where people sleep*** (Fire and Rescue New South Wales, 2021c). This is a

minimum level of protection; Fire and Rescue NSW recommend higher levels of protection for homeowners and occupants.

- For rental properties, smoke alarms should be installed on or near the ceiling in each hallway connected to a bedroom or, if no hallway, then between the section of the home between the bedroom and rest of the dwelling (Smoke Alarm Testing Services, 2022b).
- Landlords are responsible for the installation of smoke alarms; tenants are responsible for testing the batteries. For battery operated alarms the tenant is responsible for changing the battery; landlords are responsible for changing the battery in hard-wired battery backup alarms (Fire and Rescue New South Wales, 2021b).
- Prior to June 2017, New South Wales had a Smoke Alarm Subsidy Scheme for Deaf and Hard of Hearing people, however the scheme ended 31 May 2017 (Combined Pensioners and Superannuants Association, 2018).

5. Northern Territory

- Photoelectric smoke alarms must be installed in all residential premises or movable dwellings (e.g. caravans); they can be either hardwired to the home's power supply or have a sealed lithium battery unit with 10-year life (Northern Territory Government, 2022).
- Minimum smoke alarm requirements (Northern Territory Government, 2022):
    - Residential, constructed **pre-Jan 1998:** 10-year battery or hard-wired photoelectric alarm
    - Residential, constructed, renovated or extended **post-Jan 1998:** Hard wired photoelectric smoke alarm with back up battery
- Homeowners with non-approved smoke alarms are not required to replace them until they stop working. If ionisation alarms have been installed, they do not need to be replaced with hardwired photoelectric alarms until: the ionisation alarm fails, the premises are sold or rented, a tenancy agreement is renewed or extended, or a hire agreement for the premises is entered into, renewed or extended (Northern Territory Government, 2022).
- Property owners who sell or lease must have an approved photoelectric smoke alarm installed. Tenants are required to test each smoke alarm at least once every 12 months.

- Recommended placement is illustrated in Appendix 1 (Northern Territory Government, 2022):
    - It is recommended that smoke alarms are installed on or near the ceiling. For cathedral ceilings, install the alarm between 50cm and 150cm from the apex to the top of the alarm. If it is necessary to install on a wall, the smoke alarm should be 30cm to 50cm below the ceiling.
    - Smoke alarms should be placed between each bedroom area and the rest of the house; if a person sleeps with their door closed, there should be an alarm in that bedroom. For multilevel homes, an additional alarm should be in the stairway between each level.

6. Queensland

- From ***January 2017***, all smoke alarms manufactured more than 10 years ago must be replaced with photoelectric smoke alarms which comply with AS3786-2014 (Queensland Fire and Emergency Services, 2021).
- Existing battery smoke alarms that need replacing must be replaced with a photoelectric smoke alarm. Existing hardwired smoke alarms that need replacement must be replaced with a hardwired photoelectric smoke alarm (Queensland Fire and Emergency Services, 2021).
- From ***January 2022***, landlords must install interconnected smoke alarms in all residential properties (Queensland Fire and Emergency Services, 2021). From ***January 2027*** all homeowners must install interconnected photoelectric smoke alarms in every bedroom, hallway and every level (see Appendix 2); these must either be hardwired into 240V mains or have a non-removable 10yr battery (Queensland Fire and Emergency Services, 2021). A combination of mains powered and battery powered smoke alarms is allowed, and interconnectivity can be wired or wireless.
- Queensland Fire and Emergency Services recommend that smoke alarms be installed on the ceiling close to the centre of the room and at least 30cm away from a wall. If the ceiling is not possible, then install on a wall between 30cm and 50cm from the ceiling.
- Queensland have a smoke alarm subsidy scheme for Deaf or hard of hearing people. A specialised smoke alarm retails for $754.60 however can be provided for $50 without a concession, or $20 with a concession (Deaf Connect, 2022). Additional smoke alarms

are available for $209.80 to comply with new Queensland legislation. Deaf Connect support NDIS participants who want to use their plan funding to access the subsidy scheme (Deaf Connect, n.d.).

7. South Australia

- Homes or residential rental properties purchased ***pre-Feb 1998*** require a replaceable battery powered smoke alarm (Government of South Australia, 2022)
- Homes or residential rental properties purchased on or ***post-Feb 1998***, as per Regulation 76B of the Development Regulations 2008 and Regulation 95 of the Planning, Development and Infrastructure (General) Regulations 2019, require a smoke alarm(s) to be installed within six months of title transfer. The smoke alarm(s) must be either: a) 240V mains powered or b) 10-year life, non-replaceable, non-removeable, permanently connected battery powered smoke alarm (Government of South Australia, 2022).
- For homes or residential rental properties built ***post-Jan 1995***, a 240V mains powered smoke alarm is required (Government of South Australia, 2022).
- From ***May 2014***, smoke alarms are required to be interconnected in all new Class 1 dwellings, within sole-occupancy unit of a class 2 or 3 building and in a class 4 part of a building (Department of Planning, Transport and Infrastructure, 2014). This also applies to new additions to existing dwellings, although they do not need to be interconnected with the older section of the dwelling. Subsequent building additions will need to have interconnected alarms (Department of Planning, Transport and Infrastructure, 2014).
- Smoke alarms should be placed strategically, such as hallways outside of bedrooms, and there may be a need for more than one smoke alarm. One smoke alarm is required per level (Government of South Australia, 2022).
- Monitored smoke detecting/security systems utilising smoke detectors and sounders may not comply with AS3786 and therefore not comply with regulation 76B. In these cases, owners and installers need to ensure that one or more AS3786 complying smoke alarms are also installed within each dwelling (Department of Planning, Transport and Infrastructure, 2014).

8. Tasmania

- From ***1 August 1997***, all new residential buildings and residences that have had renovations requiring a building permit are required to have at least one smoke alarm on each level and be connected to mains power supply (Master Electricians Australia, 2022).
- Legislation requires that there is a smoke alarm in every hallway and at the top of stairways (Tasmania Fire Service 2022). It is recommended that smoke alarms are in bedrooms (see Appendix 1).
- Smoke alarms should be replaced after 10 years.
- Residential Tenancy (Smoke Alarm) Regulations 2012 outline the requirements for rental properties. From ***1 May 2016***, all residential rental properties must have smoke alarms installed on every level and either mains powered or use a 10-year non-removable battery (Master Electricians Australia, 2022; Tasmania Fire Service, 2022).
- Subsidised smoke alarm packages for the Deaf and hard of hearing may be available from Expression Australia.

9. Victoria

- All Victorian residential properties must have smoke alarms on every level that comply with AS3786 (Fire Rescue Victoria, 2020). Minimum requirements are listed in Table 1.
- Minimum requirements for smoke alarms (Fire Rescue Victoria, 2020):
    - Residential, constructed **pre-Aug 1997** - stand-alone 9V battery powered smoke alarms
    - Residential, constructed, renovated or extended **post-Aug 1997** - Hard wired smoke alarms connected to 240V mains with back up battery
    - Mandatory placement of smoke alarms and further recommendations are illustrated in Appendix 1.
- Optimal placement of smoke alarms (Fire Rescue Victoria, 2020):
    - outside each sleeping area and on each level in a multi-storey home
    - on the ceiling close to the centre of the room and at least 30cm away from a wall. If the ceiling is not possible, then install on a wall between 30cm and 50cm from the ceiling

  - cathedral ceilings need further consideration: smoke alarms should be between 50cm and 150cm of the apex, or on a side wall between 30cm and 50cm from the level ceiling
  - consideration also needs to be given to placement of windows, doors, air conditioners, heaters, fans, air vents and other temperature control devices that may impact the performance of the smoke alarm
  - smoke alarms should not be installed in kitchens or bathrooms
- Interconnected smoke alarms provide the best protection. These can be hardwired by an electrician or wireless connecting via a blue-tooth connection.
- If using a 9V battery it needs to be replaced every year. Smoke alarms should be replaced every 10 years maximum.
- In rental properties, it is the landlord's responsibility to install smoke alarms, ensure they are kept in good repair, and replace batteries each year. Tenants are responsible for testing smoke alarms monthly (Fire Rescue Victoria, 2020).
- Residents of public housing have a smoke alarm powered by mains with 10yr lithium back up battery (Fire Rescue Victoria, 2020). The battery cannot be changed but should be tested monthly.
- People who are deaf or hard of hearing should have specialised smoke alarms. Some have vibrating pads, strobe lights or emit different sounds. Each alarm should have at least two sensory alert types (Fire Rescue Victoria, 2020).
  - The Victorian Government provides a subsidy for smoke alarms that alert via flashing light and vibrating pad (Expression Australia, 2022). To be eligible:
    - severe to profound loss or a severe high frequency hearing loss ≥ 70dB (2, 3 & 4kHz).
    - resident of Victoria
    - not eligible for other funding such as NDIS
  - This unit retails at $629; eligible people will be $50 out of pocket; concession card holders can have the fee waived.
- No subsidy scheme is highlighted for people with other disabilities. It is suggested that smoke alarms in residences of people with a disability should be connected to a personal alarm system that is monitored externally (Fire Rescue Victoria, 2020).

10. Western Australia

- Smoke alarms must comply with the Building Code of Australia, which specifies the relevant Australian Standard for residential smoke alarms (AS 3786) and the location of installation (Department of Fire and Emergency Services, n.d.). Appendix 1 illustrates mandatory and recommended placement of additional smoke alarms.
- Smoke alarms can be either ionisation or photoelectric as they both comply with the Building Code of Australia, however photoelectric are recommended (Department of Mines, Industry Regulation and Safety, n.d.).
- Compliant smoke alarms are not older than 10yrs, are in working order, and are permanently connected to mains power supply (Department of Mines, Industry Regulation and Safety, n.d.).
- Battery powered smoke alarms may be approved where mains power is not connected to the dwelling or there is no hidden space in the existing dwelling for wiring in existing dwellings. Battery powered smoke alarms must have a non-removable 10yr life battery (Department of Mines, Industry Regulation and Safety, n.d.)
- Smoke alarms connected to home security may not comply with the code – smoke alarms need to be permanently connected to mains power (some home security systems can be disconnected and therefore are not suitable for smoke alarm systems) (Department of Mines, Industry Regulation and Safety, n.d.).
- Interconnection of smoke alarms is not applicable to dwellings with construction approval prior to ***1 May 2015*** (Department of Mines, Industry Regulation and Safety, n.d).
- Owners are required to maintain the smoke alarm: ensure working order, permanently connected to mains power, less than 10yrs old or has not reached the expiry printed on the back, has a 10yr battery in the event mains power is not available (Department of Mines, Industry Regulation and Safety, n.d.).
- The owner of a dwelling must have compliant smoke alarms installed prior to the sale of the property or if being made available under tenancy agreement.

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12. Appendix 1

Illustration of mandatory and optional smoke alarm placement diagrams as indicated by Victoria, ACT, Northern Territory, Tasmania, and Western Australia (Country Fire Authority, 2021; Department of Fire and Emergency Services, n.d.; Fire Rescue Victoria, 2020; Northern Territory Government, 2018; Tasmania Fire Service, 2022)

Diagram 1

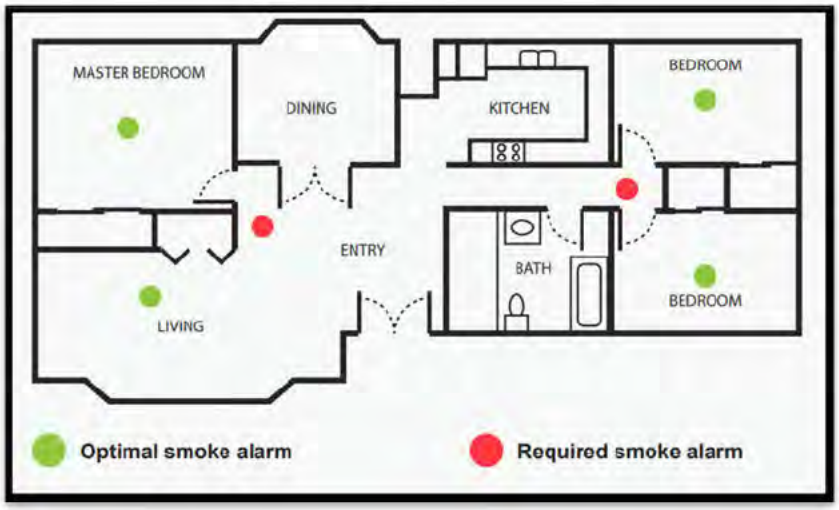


Diagram 2

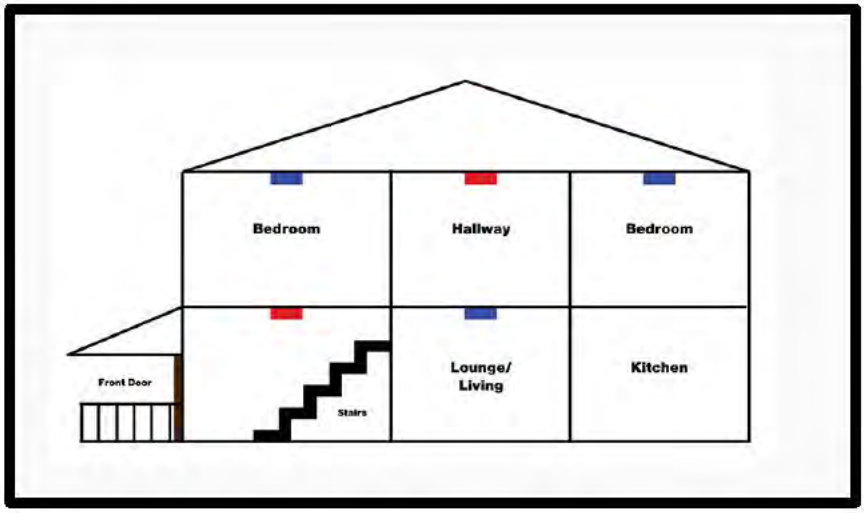
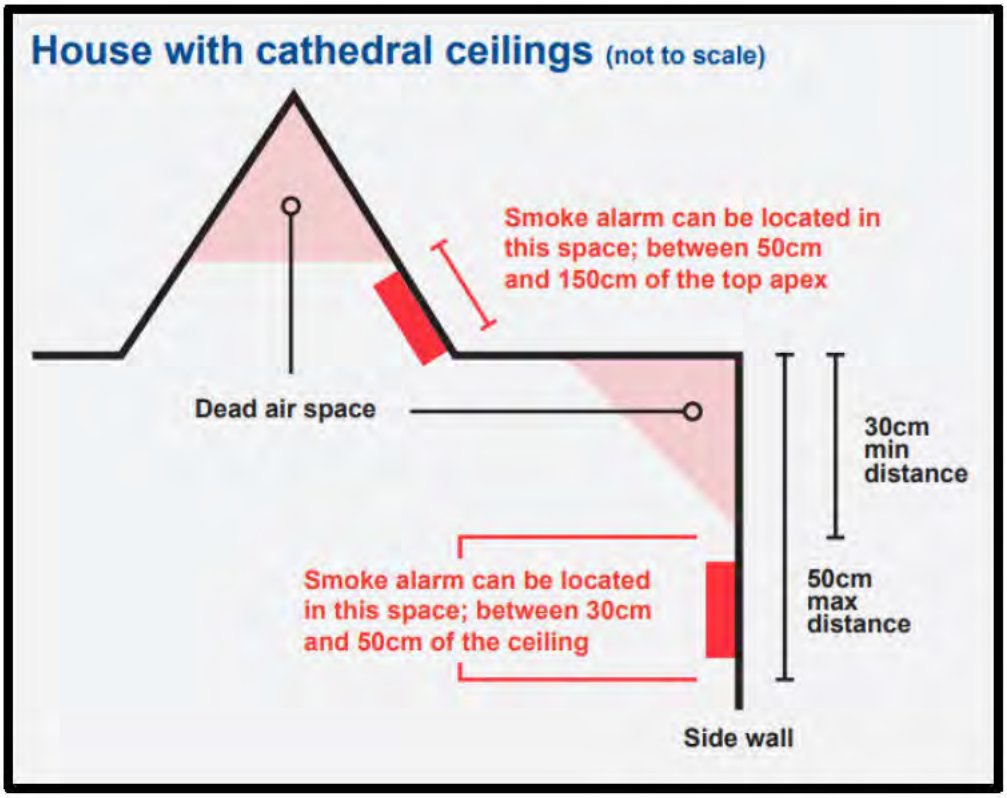


Diagram 3



13. Appendix 2

Mandatory placement of smoke alarms in all residential dwellings as per Queensland legislation from 1 January 2027 (Queensland Fire and Emergency Services, 2021)

Diagram 4

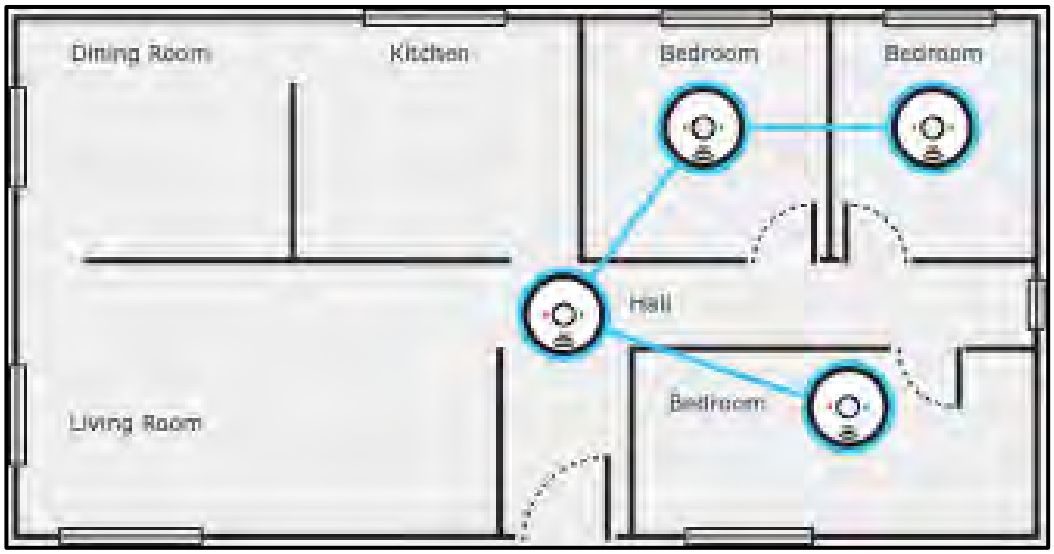
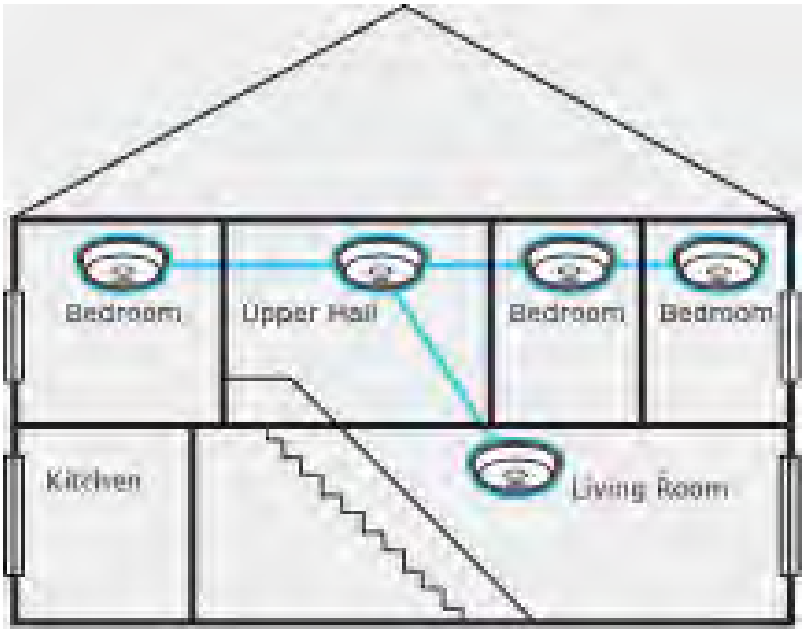


Diagram 5



14. Version control

Version	Amended by	Brief Description of Change	Status	Date
0.1	SJP131	Initial draft	Draft	11/3/22
0.2	SJP131	Draft revision	Draft	17/3/22
0.3	AHR908	Draft review	Draft	17/3/22
0.4	SJP131	Draft revision	Draft	18/3/22
1.0	SJP131	Clearance		21/3/22

Machine translation and speech to text technology for Deaf and hard of hearing

The content of this document is OFFICIAL.

Please note:

The research and literature reviews collated by our TAB Research Team are not to be shared external to the Branch. These are for internal TAB use only and are intended to assist our advisors with their reasonable and necessary decision-making.

Delegates have access to a wide variety of comprehensive guidance material. If Delegates require further information on access or planning matters, they are to call the TAPS line for advice.

The Research Team are unable to ensure that the information listed below provides an accurate & up-to-date snapshot of these matters

Research questions:

What is the accuracy of translation technology including text-to-text (English-to-Mandarin, Mandarin-to-English) and speech-to-text software (English-to-English, English-to-Mandarin, Mandarin-to-English) compared to a live translator?

What are the benefits or drawbacks of using translation technologies to navigate everyday encounters for a Deaf person with a limited knowledge of AUSLAN compared to using a live AUSLAN interpreter?

Date: 15/2/2024

Requestor: Sam V[redacted]

Endorsed by: Naomi R[redacted]

Researcher: Aaron H[redacted]

Cleared by: Stephanie P[redacted]

1. Contents

2. Summary

Automated Speech Recognition (ASR) and machine translation are artificial intelligence tools used to convert one type of linguistic input into a different type of linguistic output. ASR converts spoken language into text. Machine translation converts an input from one language into another. These tools may be combined in applications that translate spoken utterances of one language into text of another language.

Some ASR tools approach human levels of accuracy in certain scenarios, such as simple words or phrases delivered in environments free from noise. Performance of these tools is significantly worse in environments with lower signal to noise ratios. Commercially available ASR tools are currently used by people who are Deaf or hard of hearing. Usefulness of these tools varies by context and goals of the user.

Machine translation tools generally produce less accurate translations than human interpreters. Accuracy varies by source and target language. Machine translation tools are generally more accurate in translating between European language rather than between European and Asian languages. Studies evaluating accuracy of translations between English and Mandarin find accuracy rates of between 36% and 82%. No research was found that addresses use of machine translation technologies for people who are Deaf or hard of hearing.

Researchers and users suggest machine translation and ASR may be useful in situations where human interpreters are not available or where the risks associated with miscommunication are low. Additional safeguards are recommended in situations where accuracy is important (such as educational, medical or legal contexts). These tools may be more useful in situations that do not require immediate response, for example, situations where a transcript is produced and might be considered for accuracy.

Research shows that accuracy of both machine translation and ASR is improving with refinements of individual tools and advances in artificial intelligence.

3. Sign language recognition technology

Sign language recognition technology (SLR) is … Implementations of SLR vary widely, with emphasis on different features and purposes. The technology is often still in an experimental phase. There are some commercially available options which may be useful in some specific situations. However, SLR has certain drawbacks and often shows a lack of understanding of sign language grammar and Deaf cultural considerations. For further details on SLR, refer to RES ### for further information about Sign Language Recognition technology.

4. Speech to text

Automatic Speech Recognition (ASR) tools convert speech into text using advanced machine learning tools and sophisticated language models. These models employ grammatical rules alongside statistical analyses and predictive algorithms to disambiguate the speech signal and produce the most likely arrangement of words (Pucci, 2023; O'Shaughnessy, 2023; Dhanjal & Singh, 2023). The technology is also used widely in other commercial products. Most mobile phones have built in speech to text features (e.g. Siri, Alexa). Microsoft Teams, Zoom and YouTube use ASR to generate captions for meetings, calls or videos (Kustritz et al, 2023; O'Shaughnessy, 2023; Millet et al, 2021).

ASR is often assessed using word error rate. This is an objective measure that tracks how many words in a speech are incorrectly transcribed. However, this measure does not differentiate between high risk and low risk errors (Pucci, 2023; Kustritz et al, 2023; O'Shaughnessy, 2023; Weigel, 2021). Some studies attempt to differentiate between raw word error rate and meaningful error rate. For example, Kustritz et al (2023) differentiate between raw word error rate and medically significant error rate. A medically significant error is one which would have changed the meaning of a sentence and taught the student something medically incorrect. Millet describes the experience of encountering a meaningful error in a real-life situation:

> Poor captioning produced by speech recognition software is in fact worse than no captioning, in my opinion, as it is distracting and requires extra processing time on the part of the reader to identify whether it is in fact an error, to decide whether to ignore it or not. If it is a meaning-laden word or term, the listener must then use precious time

and cognitive processing resources to figure out what was actually said. I used an example in a recent presentation of a “real-time” YouTube-provided caption (from a video produced by a university), which showed “anxiety is particularly important because it is one of the Communist mental health problems” instead of what was actually said, which was “anxiety is particularly important because it is one of the commonest mental health problems.” Audience members reported being immediately distracted by the error, and noted that it took them a few seconds to get back to paying attention to the actual text (by which time, they had missed a sentence or two of content) (Millet, 2022).

Generally, ASR is found to be less accurate than human speech recognition when measured by word error rate, especially in environments with lower signal to noise ratios or when input includes words and phrases that sound similar (e.g. like, likes, liked). Humans are skilled at disambiguating words based on meaningful context, but this is still a hurdle for ASR tools (Kustritz et al, 2023; O’Shaughnessy, 2023; Pragt et al, 2022; Millet, 2022; Ngueajio & Washington, 2022). However, ASR tools vary widely in accuracy. Studies have found mixed results for variables such as accent, gender and speech velocity (Dhanjal & Singh, 2023; Kustritz et al, 2023; Ferrero et al, 2023; Millet, 2022; Ngueajio & Washington, 2022; Pragt et al, 2022). Some tools may approach human level accuracy in certain contexts, such as single words and short phrases or environments with clear sound quality (such as audio recorded in a studio) (Dhanjal & Singh, 2023; Kustritz et al, 2023; Ferrero et al, 2023; Millet, 2021). For example, ASR is effective when identifying strings of numbers when used in telephone Interactive Voice Response services (O’Shaughnessy, 2023). Millet et al (2021) found ASR used by YouTube, Otter, Google Slides and Microsoft Stream could reach 98-99% in optimal conditions. Kustritz et al (2023) found no statistically significant difference between raw word error rate or medically significant error rate between human generated captions and YouTube generated captions. However, word error rate was doubled in tools used by Zoom and Kaltura. Ferrero et al (2023) assessed 10 ASR tools and found word error rate was significantly linked to type and quality of input. Different tools performed better when tested on different datasets, but no tool performed best all round.

4.1 Speech to text for people who are Deaf or hard of hearing

ASR may be useful for people who are deaf or hard of hearing, though this will depend on the person’s level of hearing loss, their goals and the speech situation. ASR users prefer speed of transcription over accuracy in low-risk situations, whereas in situations requiring high levels of understand (educational environments, legal or medical contexts), accuracy is prioritised over speed of transcription (Pucci, 2023). In one study of ASR accuracy, Pragt et al note that in high signal-to-noise environments “ASR apps performed similarly to a person with a moderate hearing loss. In noise, the ASR apps performed more poorly than most profoundly deaf people using a hearing aid or cochlear implant” (2022, p.1).

ASR might also be used as a supplemental tool and not the only communication tool by some sign language users. For example, this could involve a sign language interpreter and ASR app working simultaneous (Pucci, 2023; Burner et al, 2023). An early study comparing the effect of sign language interpretation and human generated transcription in a classroom found no significant differences in levels of understanding of the Deaf or hard of hearing students (Marschark et al, 2006). They suggest that using both signed interpretation and text supports did not improve understanding in an educational context. However, no other studies were found that compare efficacy of signed and text supports.

5. Combined translation and speech to text

Machine translation tools are programs which automate features of the translation process aiming to produce a complete translation of a text from one language to another (Bowker, 2023; Yang et al, 2023). Machine translation has progressed rapidly in recent years. Earlier systems worked using a combination of vocabulary and grammatical rules to construct translation. Modern systems employ technology like that used by ASR, including advanced machine learning techniques and statistical analyses to predict a correct translation. These systems require very high volumes of digital texts to improve the accuracy of translations. They work better for languages or domains where these resources are available. For languages with less available data or for specialist or niche subject matters, modern machine translation tools may be less reliable (Bowker, 2023; Phrase, 2023). For example, a 2021 study found Google Translate's accuracy rate for Spanish to English translation was 94%, but 67.5% for Farsi to English and 55% for Armenian to English (Phrase, 2023).

In some cases, output may be edited by a professional translator before it is used. Combining human and machine translation saves time and reduces possibility of error. However, this would not be practical in situations where real-time translation is required, such as medical appointments or social interactions (Bowker et al, 2023; Yang et al, 2023; Herrera-Espejel & Rach, 2023).

Machine translation tools can be combined with ASR to offer real-time speech-to-text translation. Such technology combines the errors acquired in the ASR process with the errors acquired in the machine translation process. Acceptability of a translation depends on the context. In situations where misunderstanding is likely to have significant consequences, such as legal or medical contexts, the threshold for acceptable translation may be higher than for low stakes social contexts (Bowker et al, 2023).

Several studies caution that machine translation technology is not a suitable replacement for professional interpretation services (Bowker, 2023; Lee et al, 2023; Taira et al, 2021; Panayiotou et al, 2019). Some studies recommend qualified use of the technology in higher stakes situations such as healthcare (Hunter et al, 2023; Herrera-Espejel & Rach, 2023). For example, an Australia review into translation apps looked at 15 different apps and found only 2 that may be suitable for everyday communication in the healthcare setting (CALD Assist and

TalkToMe). However, these apps were only found to be suitable when including simple preset health phrases (Panayiotou et al, 2019).

5.1 Mandarin-English translations

Translation technology is strongest between related languages. For example, translations from English using Google Translate were shown to be most accurate when translated into other European languages and lowest when translated into African or Asian languages (Yang et al, 2023; Phrase, 2023; Hunter et al, 2023; Panayiotou et al, 2019). Assessments of the accuracy of translations between English and Mandarin vary widely between 36% to 81.7% (Hunter et al, 2023; Lee et al, 2023; Tiara et al, 2021).

Lee et al (2023) compared the translations between Mandarin and English by three machine translation apps (Google Translate, Apple iTranslate, and Microsoft Translator). They found translation was more accurate when translated from English rather than to English. Overall Microsoft Translator had the highest accuracy when translating from English to Mandarin at 76% and equal highest accuracy (with Apple iTranslate) from Mandarin to English at 39% (refer to Table 1). Hunter et al suggest English-Mandarin translation are especially problematic "due to linguistic differences such as divergent syntactic structures, omitted pronouns in Mandarin, and a higher prevalence of English morphology" (2023, p.2).

Table 1 Accuracy (%) of Mandarin-English translations using three machine translation apps (Source: Lee et al, 2023, p.2335)

Translation app	From English	To English
Apple iTranslate	62	39
Google Translate	74	36
Microsoft Translator	76	39

5.2 Combined translation and speech to text for people who are Deaf or hard of hearing

No papers were found that addressed the use of machine translation combined with ASR tools for Deaf people or those with a hearing impairment. One study (Saloni & Singh, 2020) mentions that these technologies may be of use to the Deaf community, however no detail is provided.

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Research Request – Audio Description Televisions

Brief	Information on which TV's have the ability to turn on the audio description function
Date	08/10/2020
Requester	Kate A[redacted] (Director –TAB)
Researcher	Jane S[redacted] (Research Team Leader)

Please note:

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Delegates have access to a wide variety of comprehensive guidance material. If Delegates require further information on access or planning matters they are to call the TAPS line for advice.

The Research Team are unable to ensure that the information listed below provides an accurate & up-to-date snapshot of these matters

Audio description (AD) capability is generally not listed within the specifications section on a supplier's website. Participants will have to check the instruction manual of their current television or on-screen settings menus. Retailers or manufacturers may also be able to provide advice when purchasing a new device.

Some older devices (manufactured before 2014) may not support (AD). However, a set top box capable of receiving AD may be required to connect to an existing TV.

The ABC and Vision Australia have independently tested television brands in Australia to determine which receive AD (See table below).

A quick internet search shows that a 24 inch Ffalcon television can be purchased from JB HiFi for $169 or a 24 inch Hisense for $195 at Harvey Norman.

TV brand	Compatible with universal remotes?
Samsung	Yes
Panasonic	Yes
JVC TV	Yes
Sony	Yes
LG	Yes
Hisense	Yes
Kogan	Yes
TLC	Yes
Soniq	Yes
Hitachi	Yes
Philips	Yes
Seiki	Yes
Ffalcon	Yes
Linsar	Yes
Blaupunkt	Yes
ChiQ	Yes

Research Request – Customised visual alert system for hearing loss

Brief (Lauren M s22(1)(a)(ii) - irrelevant material):

s47F - personal privacy The participant is seeking a customised visual alert system for hearing loss. The participant resides in a detached house in Queensland.

1. Can you please collate the relevant applicable QLD state based legislation, regulations, rules etc applying to domestic fire alarm systems (relevant to the building type of the participant - she resides in a detached house - class 1a)
2. In response to q 1, can you please summarise the key points of domestic fire alarm requirements for residential houses Queensland. Including, but not limited to the following key details.
    a. Power source rules (e.g. hard wired only, hard wired after 2017, 10 year lithium battery etc.)
    b. Type of smoke alarm required (e.g. photoelectric only, ionisation or Photoelectric etc.)
    c. Minimum number of detectors and required locations (e.g. one per floor, in each bedroom etc.)
    d. Replacement rules (e.g. all detectors must be replaced after 10 years, can only replace hard wired with hard wired, must replace with hardwired or 10 year lithium battery by 2027 or whenever it is replaced after 2017 etc.)
3. Can you please collate the following Australian Standards: (no need to summarise at this stage. Based on what I have read in the past, I anticipate the following may be the most relevant ones to have access to for this advice since I am doing a bit more technical digging than I usually have time for. s47F - personal privacy it might be worth having an official copy rather than me using other access I have outside of work)
    a. AS1603.17-2011 “Warning equipment for people with hearing impairment”
    b. AS 1670.1:2018 “Fire detection, warning, control and intercom systems - System design, installation and commissioning - Fire”
    c. AS 1603.11-2018 “Automatic fire detection and alarm systems Visual warning devices”
4. Can you please contact one or more suppliers of Bellman and Brooks hearing alert systems (e.g. Word of Mouth Technologies) and ask the following:
    a. On the Bellman and Symfon website they advertise coloured silicone slips that can be purchased to put on the flash receiver. Can these be purchased in Australia. If not available, why not?
    b. On the Bellman and Symfon website they advertise a signal repeater (code: BE1510), can this be purchased in Australia. If not available, why not?
    c. Is there an option for a signal repeater/range extender (other than the one BE1510) that can be purchased and used to improve the Radio Frequency signals used by Brooks and Bellman products

d. Are they aware of any common problems with Bellman and/or Brooks products, including, but not limited to:
    i. Reliability of the radio frequency system used to connect transmitters and receivers/components?
    ii. Reliability of power sources, either primary and/or backup sources.
    iii. If so, what are the common solutions that they might suggest for each problem a person might commonly experience?
    iv. Fragility of the strobe lights (if there used to be an issue, has this changed, if so when)
    v. Reliability of the bed shaker to alert the person to the triggering of the fire alarm during sleep.
    vi. Can any receivers be worn or placed for visibility from outdoor and wet areas, if not, any additional comments.

Date	June, 2020
Requesters	Jane S[redacted], Shannon A[redacted], Lauren M[redacted]
Researcher	Craig O[redacted] (Tactical Research Advisor – TAB/AAT) Jane S[redacted] (Research Team Leader)

Contents

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1. Participant's dwelling

The Participant resides in a class 1a dwelling defined as a single dwelling being a detached house or one or more attached dwellings, including a row house, terrace house, town house or villa unit. The Queensland domestic smoke alarm legislation applies to Class 1a and Sole Occupancy Units in Class 2 Buildings. [1]

2. Queensland Smoke Alarm Legislation

Existing Dwellings from January 01, 2017

Source: Queensland Government, Queensland Fire & Emergency Services, For Existing Dwellings, https://www.qfes.qld.gov.au/community-safety/smokealarms/Pages/existing-properties.aspx. Accessed 10 June 2020. [2]

Replacement and Upgrading

- Existing smoke alarms manufactured more than 10 years ago must be replaced with photoelectric smoke alarms which comply with Australian Standards (AS) 3786-2014.
- Smoke alarms that do not operate when tested must be replaced immediately.
- When replacing smoke alarms, they must be of a photoelectric type which complies with Australian Standard (AS) 3786-2014.
- When being replaced or upgraded they must be interconnected with every other 'required' smoke alarm in the dwelling so all activate together.
- Existing hardwired smoke alarms that need replacement, must be replaced with a hardwired photoelectric smoke alarm.
- In existing domestic dwellings, it is possible to have a combination of smoke alarms (240v and battery operated) and interconnectivity can be both wired and/or wireless.
- Legislation for existing dwellings after January 01, 2017 and prior to January 01, 2027, does not indicate an option for alarms to be powered by a non-removable 10-year battery.

Location of Alarms

Alarms should be placed:

- on each storey
- in each bedroom
- in hallways that connect bedrooms and the rest of the dwelling
- if there is no hallway, between the bedroom and other parts of the storey; and
- if there are no bedrooms on a storey, at least one smoke alarm must be installed in the most likely path of travel to exit the dwelling.

Existing Dwellings from January 01, 2027

- All existing private homes, townhouses and units will require photoelectric interconnected smoke alarms.
- Alarms must be either a hardwired (eg. 240v) or non-removable 10 year battery powered type alarm.
- From January 01, 2027 legislation requires smoke alarms must be installed as outlined above for existing dwellings from January 01, 2017.

3. Responses from Word of Mouth Technology

Below are responses from Andrew Willis at Word of Mouth Technology

a) On the Bellman and Symfon website they advertise coloured silicone slips that can be purchased to put on the flash receiver. Can these be purchased in Australia? If not available, why not?

Word of Mouth Technology did have some stock of the silicone covers for the Flash Receiver, however we did not sell one cover in the time that we had them. In our own testing, we found that the covers actually reduced the visibility of the flashing light, with some colours being barely noticeable unless you are directly looking at the receiver (blue in particular). The normal operation of the bright white light and coloured LED is suitable for most clients as you can clearly identify the colours from a distance of a few metres (this allows you to determine which alert is being activated)

b) On the Bellman and Symfon website they advertise a signal repeater (code: BE1510), can this be purchased in Australia. If not available, why not?

The repeater is not available in Australia as it uses the frequency of 868MHz. This frequency is not permitted to be used in Australia for these devices. It is reserved by the ACMA for other applications.

c) Is there an option for a signal repeater/range extender (other than the one BE1510) that can be purchased and used to improve the Radio Frequency signals used by Brooks and Bellman products

We can only advise on Bellman products and there is no repeater option. If a client has a specific need we can provide work around solutions – i.e. if they are having issues with coverage of the door transmitter only we can resolve this by using a third party door chime and placing our transmitter in a central position in the house. We don't have a very high incident of complaints around transmission distance, in most cases when reported it is the users of the push button doorbell transmitter used in a house with brick façade and some internal brick walls or a large home.

d) Are they aware of any common problems with Bellman and/or Brooks products, including, but not limited to:

i) Reliability of the radio frequency system used to connect transmitters and receivers/components?

Word of Mouth Technology have been distributing Bellman products for 15 years. We have some clients whose products would be over 10 years old and still working, even when new or additional components are purchased. All Bellman devices are backwards compatible with previous products. We believe this makes it a very reliable system.

Transmission range for Bellman Visit products is approximately 40m. This is true for all transmitters except the Bellman Push Button Transmitter, which has a reduced range of approximately 20m. Range is also affected by barriers such as metals or thick walls in client's homes.

The system operates on a frequency that is approved for such devices. While other equipment uses this frequency the products have specific coding which means interference from external sources is not common. When it does occur we can change the radio key of the product to limit possibility of interference.

This question is sometimes asked by clients, we advise that our system being a closed platform is more stable than some systems that use wifi and rely on third parties allowing their systems to work together. I think there was an issue with this between Google and the Nest products. Some users had found their systems didn't work anymore because Google and Amazon were not

allowing/sharing their coding. We advise that the Bellman system does not rely on an internet connection, and provides a battery backup for all devices in the instance of a power failure.

I can't provide comment on the Brooks products, we don't sell them.

ii) Reliability of power sources, either primary and/or backup sources.

All Bellman receivers have a battery back up in them, which allows them to work without connection to mains power. For all products the backup battery is replaceable by the user. The power supplies are rated conservatively, and therefore not subject to a high failure rate. Battery backup in receivers will operate for up to three days in normal use.

We are currently recalling (voluntarily) The Bellman Flash Receiver (BE1442) for units purchased between 2016 and 2019 due to a software fault which relates to the charging of the backup batteries, this fault has been rectified in the current production models. Recalled units are also being fixed by an update to the firmware. There is information about this recall here https://bellman.com/en/for-professionals/be1442-product-recall-overview-page/

iii) If so, what are the common solutions that they might suggest for each problem a person might commonly experience?

1 – If a person requires greater range than the standard doorbell push button BE1250 we suggest a normal doorbell with our BE1023 transmitter.

2 – If a person finds they are getting false alarms we advise them to reset their receiver (we refer them to our YouTube channel which has captioned videos)

3 – False alarms from smoke alarms. Usually because the alarm chamber is contaminated with Dust. We tell the user to clean the alarm or return to us for service if they cannot complete that task.

iv) Fragility of the strobe lights (if there used to be an issue, has this changed, if so when)

The Flash Receiver (BE1442) has a xenon globe that we have found to be very durable over the years. The Bellman Alarm Clocks all use LED technology for strobe alerts, so they are even more long lasting than the xenon globe. There has been no change to the reliability of the strobe in any of our Bellman products over time. We would deem the failure rate of the flash receiver globe/Zenon to be extremely low (less than 1%)

v) Reliability of the bed shaker to alert the person to the triggering of the fire alarm during sleep.

This is quite subjective, and depends on the individual person. We recommend placing the bedshaker between the mattress and the sheet under the pillow area, and this tends to provide good strength vibrations for most people. Some clients prefer to put the bedshaker under the mattress, which can give a reduced vibration, but can still be felt with most mattresses. Alternatively people can place it in the pillowcase, or directly under the pillow, however this could be prone to falling out if the person moves around a lot in their sleep.

In summary the bed shaker is very reliable as it works every time, if a user states they are a heavy sleeper we will always suggest they use our flash receiver or alarm clock with the bed shaker. Lights and vibration are going to increase the reliability of alerting the user.

vi) Can any receivers be worn or placed for visibility from outdoor and wet areas, if not, any additional comments.

Bellman has a Pager Receiver (BE1230) that can be used all over the home. The Bellman Flash Receiver (BE1442) and Bellman Portable Receiver (audible alerts – BE1033) both have battery backup, so can be easily unplugged and moved around the home or outside as needed. With regard to placement in wet areas, the Bellman Visit range has no Ingress Rating, and should be protected from direct contact with water. It would be acceptable to place the receivers in a bathroom on a shelf, or outside if they are protected from the weather.

4. Responses from Brooks Australia

a) Is there an option for a signal repeater/range extender that can be purchased and used to improve the Radio Frequency signals used by Brooks products

There is a product to extend the range to overcome perceived interference and improve radio frequency performance to EN 300220-3. Part number EIB420RF

b) Are you aware of any common problems with Brooks products, including, but not limited to:

i) Reliability of the radio frequency system used to connect transmitters and receivers/components?

The Brooks radio frequency system is a proprietary radio link using multi-path, multi repeater mesh architecture on the 926 Mhz radiolink protocol which is a very reliable system.

ii) Reliability of power sources, either primary and/or backup sources.

The Brooks alarms are either 240v mains powered and have battery backup or are battery powered only. The products that we have supplied to the deaf and hearing impaired are 10 year lithium battery powered alarms which are guaranteed for life of the alarm.

iii) If so, what are the common solutions that they might suggest for each problem a person might commonly experience?

If the customer maintains the alarms as per guidelines the probability of failure is greatly diminished and is almost non-existent.

iv) Fragility of the strobe lights (if there used to be an issue, has this changed, if so when)

The strobe light fitted with the vibration patrice are plugged into a 240v mains powered product with an SLA battery and is very robust and if maintained will last for the life of the product.

v) Reliability of the bed shaker to alert the person to the triggering of the fire alarm during sleep.

The vibration patrice is an additional pad designed for use with alarms for the hearing impaired and provides additional warning and will activate awakening the occupant.

vi) **Can any receivers be worn or placed for visibility from outdoor and wet areas, if not, any additional comments.**

All of the Brooks alarms and ancillary products are for indoor use only however your local electrician maybe be able to help with connecting alarms with other Brooks products for visibility from outside.

5. References

[1]	Classification of Buildings and Structures. Queensland Fire & Emergency Services, https://www.qfes.qld.gov.au/community-safety/smokealarms/Documents/QFES-IS-SABuildingClassification.pdf. Accessed 6 Oct. 2020.
[2]	Queensland Government, Queensland Fire & Emergency Services, For Existing Dwellings, https://www.qfes.qld.gov.au/community-safety/smokealarms/Pages/existing-properties.aspx. Accessed 10 June 2020.
[3]	Queensland Government, Queensland Fire & Emergency Services, New dwellings and dwellings being renovated, https://www.qfes.qld.gov.au/community-safety/smokealarms/Pages/new-properties.aspx. Accessed 10 June 2020.

Research Request – Medicinal Cannabis

Brief	Provide research on Medicinal Cannabis in Australia with a focus on : • What conditions can medical cannabis be used to treat? • Evidence of efficacy • How is the medication prescribed? • Does prescription and access differ between states? • What access schemes are available in each state? • Clinical guidelines.
Date	03 March 2020
Date of review	
Requester	Karyn M[redacted] (Director – TAB)
Researcher	Craig O[redacted] (Tactical Research Advisor – TAB/AAT)
Reviewer	Stephanie P[redacted]

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Research Summary

- Developments and research into this subject is steadily gathering momentum. Users of this document will need to acknowledge the date of this research paper.
- This paper concludes that given the available information on the subject, there is insufficient research measuring the effectiveness of medicinal cannabis for the management of different medical conditions as a first-line treatment.
- The Commonwealth Department of Health has researched the efficacy of Medicinal Cannabis for the treatment of various health conditions and has provided guideline documents for several health conditions including multiple sclerosis, epilepsy, chronic pain, palliative care and chemotherapy induced nausea and vomiting.
- Most medicinal cannabis products are 'unregistered products' and therefore do not appear on the Australian Register of Therapeutic Goods (ARTG).
- Patients wanting to access the treatment must do so via the 'unregistered medicines' regulatory route, which can be a complicated process, however there are recent trends to fast track the process which mainly involves access via specialist clinics.
- Medicinal cannabis can be prescribed by medical practitioners. Currently, there are no limits to the symptoms and conditions for which a cannabis medicine may be prescribed. Prescription and dispensing may vary slightly in each Australian state or territory.

- Medical cannabis products are not listed on the Pharmaceutical Benefits Scheme (PBS). Annual treatment costs must be met by the patient or a third party and can be considerably high.

What is Medicinal Cannabis?

Medicinal cannabis products are legal, high quality medicines that can be prescribed for people by their doctor. Medicinal cannabis is derived from cannabis plants and can be used to treat the symptoms of certain medical conditions, and the side effects of some treatments.

There are different medicinal cannabis products available to treat different conditions.

The active ingredients in medicinal cannabis are called 'cannabinoids'. There are between 80 and 100 cannabinoids in medicinal cannabis.

Currently, most medicinal cannabis products contain the cannabinoids cannabidiol (CBD) and tetrahydrocannabinol (THC). [1]

THC and CBD have different pharmacological actions and therapeutic application: THC influences pain, spasticity, sedation, appetite and mood while CBD has anxiolytic, anti-convulsant and anti-inflammatory effects reported (MacPhail et al, 2022).

Evidence of efficacy of medicinal cannabis is continuing to build with increasing randomised controlled trials and preclinical research, however there is still minimal or ambiguous evidence for many conditions (MacPhail et al, 2022).

Current Status of Medicinal Cannabis in Australia

- In 2017 the Commonwealth Department of Health, with financial support from several state governments, commissioned a team from the Universities of New South Wales, Sydney and Queensland under the coordination of the National Drug and Alcohol Research Centre (NDARC) to review the available evidence for the use of medicinal cannabis in **palliative care, chemotherapy-induced nausea and vomiting, chronic pain, multiple sclerosis and epilepsy**.

- A series of guidance documents have been developed for palliative care, epilepsy, chemotherapy-induced nausea and vomiting (CINV), multiple sclerosis (MS) and chronic pain.

- The guidance documents are based on evidence available at the time of publication and will be regularly updated as new evidence emerges.

- Working groups have been established for the five different settings and will meet yearly to review evidence and make updates where required.

- It is hoped that sufficient data on the safety and efficacy will emerge in coming years to enable registration of more medicinal cannabis products on the Australian Register of

Therapeutic Goods (ARTG). [2]

Clinical Guidelines

Resulting from the review for clinical evidence the Commonwealth Department of Health has developed a series of guidance documents to assist health professionals and patients, especially medical practitioners, who choose to prescribe medicinal cannabis in Australia under current access schemes. [2]

The scope of the guidance is broad, and not specific with regard to the use of medicinal cannabis for particular symptom clusters, but includes some suggestions for the use of single products or mixtures of cannabinoids and their routes of administration. [3]

There are five guidance documents for health care professionals for each of: ***multiple sclerosis, epilepsy, chronic pain, palliative care and chemotherapy induced nausea and vomiting***, as well as an overview document for prescribers. There is also a consumer-oriented brochure intended for patients and their carers.

Overview Documents

- Medicinal cannabis products: Patient information
- Guidance for the use of medicinal cannabis in Australia: Patient information
- Guidance for the use of medicinal cannabis in Australia: Overview

Guidelines for Health Care Professionals

- Guidance for the use of medicinal cannabis in the treatment of multiple sclerosis in Australia
- Guidance for the use of medicinal cannabis in the treatment of palliative care patients in Australia
- Guidance for the use of medicinal cannabis in the treatment of epilepsy in paediatric and young adult patients in Australia
- Guidance for the use of medicinal cannabis for the prevention or management of nausea and vomiting in Australia
- Guidance for the use of medicinal cannabis in the treatment of chronic non-cancer pain in Australia

Evidence of Efficacy

Currently there is only limited evidence about the effectiveness of medicinal cannabis for use in different medical conditions. There is also little known about the most suitable doses of individual cannabis products.

Following are the Commonwealth Department of Health's findings of evidence of efficacy, and its recommendations for the use of medicinal cannabis placement in the therapeutic hierarchy. [3]

Epilepsy - in paediatric and young adult patients

In patients with paediatric-onset drug-resistant epilepsy, cannabidiol products reduced seizure frequency by 50 per cent or more in up to half of the patients and achieved seizure freedom in a

small number of patients. This is when cannabidiol products are used as an add-on to current treatments in drug-resistant epilepsy in children and young adults. There are few studies of whether cannabidiol is effective in treating adult epilepsy.

General Recommendations Summary

- Epilepsy treatment with medicinal cannabis or cannabinoids is only recommended as an adjunctive treatment - that is, in addition to existing anti-epileptic drugs.
- Patients and prescribing clinicians should be aware of likely adverse events such as diarrhoea, drowsiness, and changes to appetite. Adverse events such as a worsening of seizures, convulsions, severe diarrhoea or behavioural difficulties may affect the aims of the epilepsy treatment and increase the likelihood of treatment withdrawal, and should be evaluated on a case by case basis. If treatment is likely to be long-term, it is important that any side-effects from medicinal cannabis are not greater than side effects experienced with other AEDs, and that their response to treatment is regularly assessed.
- In the absence of strong evidence for dosing and specific preparations of cannabis or cannabinoids in epilepsy treatment, it is recommended that should the treating physician elect to initiate medicinal cannabis therapy in epilepsy patients, patients should be re-evaluated after 12 weeks for evidence of response to treatment.
- In the absence of strong evidence for dosing and specific preparations of medicinal cannabis in epilepsy treatment, it is recommended that CBD be used and re-evaluated after twelve weeks of therapy, to ascertain whether there has been any benefit from its introduction.
- Prescribing clinicians should also be aware of the potential drug-drug interactions with CBD and anti-epileptic drugs.

For more specific information on the recommendation please see the research summary.

Multiple Sclerosis (MS)

There is some evidence to suggest that medicinal cannabis products may be effective for treating the pain symptoms of MS although this is inconsistent. Studies differ as to whether medicinal cannabis products can help improve bladder function, sleep, quality of life, ataxia/tremor and disability/disease progression. There are currently no studies that compare medicinal cannabis products with commonly-used medications for MS pain and spasticity, so medical cannabis products are more suitable for those who have not responded adequately to other anti-spasticity medication.

General Recommendations Summary

- There is some evidence that dronabinol or THC extracts may be effective at reducing pain associated with multiple sclerosis. There is also some evidence (although inconsistent) that nabiximols and other THC:CBD extracts may reduce muscle spasticity and improve patient quality of life.

- Recommendations are limited by lack of quality evidence. Currently available studies demonstrate no evidence of an effect of cannabinoids on MS disease activity or disability progression. There have been no studies comparing cannabinoids against current standard treatments for multiple sclerosis.

- In the absence of evidence comparing cannabinoids to first line treatments for pain and spasticity in MS, including baclofen, dantrolene, and benzodiazepines, there is no basis for using cannabinoids as a monotherapy or first line treatment. If pain and spasticity are not properly controlled by standard therapies, doctors may discuss with their patients the use of nabiximols or dronabinol as an adjunctive therapy.

- In the absence of strong evidence for dosing and particular preparations of cannabis or cannabinoids in the treatment of symptoms of multiple sclerosis (other than nabixomols), it is recommended that any treating physician who elects to initiate cannabinoid therapy should re-evaluate patients after four to six weeks for evidence of response to treatment.

- For patients who may benefit from the use of cannabinoids in treating pain or spasticity from multiple sclerosis, it is recommended that a physician who elects to initiate cannabinoid therapy use standardised products, and pharmaceutical-grade nabiximols, dronabinol, or THC extract produced with GMP (good manufacturing practice) which have the greatest evidence for efficacy based on the review.

- If treatment is likely to be long term, it is important that any side-effects from cannabinoids are not greater than the side effects experienced with other medications. This requires their response to treatment to be regularly assessed. Measures of tolerability include experience of adverse event and patient assessment of treatment efficacy.

For more specific information on the recommendation please see the research summary.

Chronic Non-Cancer Pain

There is some evidence that the delta-9 tetrahydrocannabinol (THC) extract of cannabis can reduce pain in both MS-related neuropathic pain and other forms of neuropathic pain, but for many people the reduction in pain may be modest. There is, however, insufficient information to make a conclusion about cannabinoids for the treatment of pain associated with arthritis and fibromyalgia. While some individuals with pain have reported that their use of opioids has been reduced when they also use medicinal cannabis, clinical studies in this area are still ongoing.

General Recommendations Summary

- A comprehensive sociopsychobiomedical assessment of the patient with CNCP is appropriate; The use of medications, including medicinal cannabis, is not the core component of therapy for CNCP; Patient education is a critical component of therapy for CNCP, particularly with respect to expectations of drug therapy; and
- There is a need for larger trials of sufficient quality, size and duration to examine the safety and efficacy of medicinal cannabis use in CNCP.
- In terms of mode of delivery there are concerns about the safety of smoked or vapourised cannabinoids. Delivery of pharmaceutical grade products such as nabiximols, dronabinol or THC extracts is safer.
- Most evidence on medicinal cannabis use in CNCP is derived from studies where cannabinoids were adjuvant interventions. Cannabinoids should not replace current approved first-line treatments for pain and there is significant potential for drug interactions which needs further study.
- Adverse effects of long term medicinal cannabis use is poorly understood. Long term studies are required to explore this issue.
- In the absence of strong evidence for dosing and specific preparations of cannabis or cannabinoids in the treatment of CNCP, it is recommended that any treating physician who elects to initiate cannabinoid therapy should assess response to treatment, effectiveness and adverse effects after 1 month. This is best achieved as part of a research project or clinical audit.
- Pain patients and their prescribing clinicians should be aware of common adverse events such as dizziness, nausea, drowsiness, effects upon mood, cognition and attention. Clinicians considering medicinal cannabis therapy for CNCP patients should consider the individual's risks in using these products for long periods of time.

For more specific information on the recommendation please see the research summary.

Chemotherapy - induced nausea and vomiting in cancer

High-THC medicinal cannabis products were as effective as many of the prescription medicines they were compared with when most of the studies were carried out (1980s/90s). In recent years, much more effective prescription medicines for nausea and vomiting have become available but there have been very few comparisons of medicinal cannabis products with these medicines. Therefore, medicinal cannabis products should only be prescribed only after newer standard approved treatments have failed.

General Recommendations Summary

- High-THC medicinal cannabis products can sometimes be effective for nausea and vomiting and should only be prescribed only after newer standard approved treatments have failed and where otherwise not contraindicated.

For more specific information on the recommendation please see the research summary.

Palliative Care

There was little evidence of benefit to advanced cancer patients with chronic pain. The published studies also showed little effect on appetite, nausea/vomiting, pain, dizziness, mental health or sleep problems. There is no evidence that medicinal cannabis has any anti-cancer activity in human studies or that it can slow the progression of these conditions.

General Recommendations Summary

- As there are very few studies on medicinal cannabis treatment in palliative care, it should be used only after standard treatments have failed. It is possible that medicinal cannabis will interact with chemotherapy and other medications used in palliative care. More studies are needed to better understand this.

- Patients and prescribing clinicians should be aware of possible adverse events such as somnolence, nausea and dizziness. Adverse events such as confusion, pain, diarrhoea or hallucinations may impact the overall aims of the palliative medicine and reduce quality of life, and should be evaluated on a case-by-case basis.

For more specific information on the recommendation please see the research summary.

Confirmed and Potential Conditions for Treatment

Below is a summary of the confirmed and potential conditions which current research shows that medical cannabis could assist with, as detailed by the white paper developed by the University of Sydney. [4]

The tables summarise the conditions which THC and CBD are known to be able to treat. This list is neither exhaustive nor definitive. It is here only to provide a snapshot of the current state of cannabis research.

Confirmed Conditions for Treatment

NOTE: Sativex® (nabiximols) is the only medicine currently registered in Australia on the ARTG.

Condition	Treatment	Source of Treatment			
		CBD	THC	Both	Strength of evidence
AIDS/HIV	Pain reduction			Sativex	High
Alzheimer's Disease	Appetite stimulation and weight gain		Dronabinol (Marinol)		High
Alzheimer's Disease	Inhibition of neurodegeneration		Injected (still in experimental phase)		High
Arthritis	Joint destruction suppression	Oral or injected			High
Nausea and vomiting due to chemotherapy	Reduce nausea and vomiting		Oral: Nabilone and dronabinol (Marinol)	Sativex	High
Cancer	Pain reduction		Smoked	Nabiximols	High
Diabetic peripheral neuropathy	Pain reduction		Aerosolized, Oral: Nabilone		High
Multiple Sclerosis	Improve spasticity		Oral: Dronabinol (Marinol) and Nabilone	Sativex	High
Anxiety and depression	Improvement in mood scale		Dronabinol (Marinol) and Nabilone	Sativex	High

Potential Conditions for Treatment

NOTE: Sativex® (nabiximols) is the only medicine currently registered in Australia on the ARTG.

Condition	Treatment	Source of Treatment			
		CBD	THC	Both	Strength of evidence
Arthritis	Symptomatic relief of joint pain	Oral			Moderate
Chronic non-cancer pain	Pain reduction			Oral mucosal cannabis spray	Moderate

Condition	Treatment	Source of Treatment			
		CBD	THC	Both	Strength of evidence
Epilepsy	Reduction in seizure frequency			CBD-enriched cannabis oil	Moderate
Glaucoma	Ocular therapeutic support			Orally, intravenously, or inhalation	Moderate
Schizophrenia	Reduced psychotic symptoms	Oral			Low
Tourette syndrome	Improvement in tic severity		Capsules: Dronabinol and Nabilone	Sativex	Moderate
Inflammatory bowel disease (including Crohn's disease)	Decrease Crohn's disease Activity Index (CDAI) scores		Smokeable		Low
Sleep disorders	Improvement in insomnia		Nabilone	Sativex	Moderate

Prescription of Medicinal Cannabis

Currently, there are no limits to the symptoms and conditions for which a cannabis medicine may be prescribed. The body of clinical evidence continues to grow daily, meaning a variety of other conditions may be recognized to have positive associated outcomes with cannabinoid medications. [13]

Accessing Treatment

Australia's Therapeutic Goods Administration (TGA) regulates the supply of medicinal cannabis. Most medicinal cannabis products are 'unregistered products' and therefore do not appear on the Australian Register of Therapeutic Goods (ARTG).

Access to other medicinal cannabis products must be done via the 'unregistered medicines' regulatory route. To access unregistered medicines a doctor must lead an application to the TGA on a patient's behalf. In addition to TGA approval, a separate permission will need to be obtained by doctors from the Health Department of the State or Territory in which the patient resides. This requirement varies depending on what type of medicinal cannabis product the doctor is looking to prescribe. [5]

Someone can gain access to medicinal cannabis by either of the following:

- **Authorised Prescriber Scheme (AP).** APs are medical practitioners that can prescribe drugs such as medicinal cannabis for the treatment of conditions without the need for approval from the Therapeutic Goods Administration (TGA). [6]

As an Authorised Prescriber the medical practitioner must have the training and expertise appropriate for the condition being treated and the proposed use of the product, be able to best determine the needs of the patient, and be able to monitor the outcome of therapy. An Authorised Prescriber is allowed to supply the product directly to specified patients under their immediate care. [9].

- **Special Access Scheme (SAS).** SAS is available to medical practitioners who wish to treat patients with drugs such as medicinal cannabis that is not currently in the Australian Register of Therapeutic Goods (ARTG). [6]

Health practitioners who are considering treating a patient with an unapproved therapeutic good need to acknowledge that it has not been evaluated for quality, safety or efficacy and it has not been approved by the TGA. The prescribing health practitioner is best placed to determine the needs of the patient, including whether or not treatment with a particular unapproved good is required. Health practitioners are expected to be up to date with all relevant and available information about the unapproved good before choosing to prescribe it for their patient. [10]

- **Clinical trials.** Participation in Clinical trials.

Clinical trials conducted in Australia are subject to various regulatory controls to ensure the safety of participants. The TGA regulates the use of therapeutic goods supplied in clinical trials in Australia under the therapeutic goods legislation. [11]

Prescription Guidelines by State

Prescription and dispensing of medicinal cannabis may vary depending on each Australian state or territory. The table below summarizes variations. [13]

STATE	Who can prescribe?	State Approval	State Approval Times	Physician Information	Patient Information
WA	Specialist Medical Practitioners and General Practitioners can make an application for their patients under the Special Access or Authorised Prescriber Scheme.	No state-based approval required for Schedule 4 CBD products. THC Schedule 8 drugs still require a State Approval for WA Practitioners.	Less than a week	Western Australia Department of Health	Western Australia FAQ Sheet
NT	Specialist Medical Practitioners and General Practitioners can make an application for their patients under the Special Access or Authorised Prescriber Scheme.	No state-based approval required for Schedule 4 CBD or Schedule 8 THC products.	Usually a few days unless more information is required	Northern Territory Department of Health	Nil
QLD	Australian Registered Specialist Medical Practitioners (including Specialist General Practitioners) can make an application for their patients under the Special Access or Authorised Prescriber Scheme.	No state-based approval required for Schedule 4 CBD products. Doctors who do not hold a specialist registration need approval from Queensland Health if prescribing a Schedule 8 medicinal cannabis product that is not	Two business days unless more information is required.	Queensland Department of Health	Queensland Patient Information

STATE	Who can prescribe?	State Approval	State Approval Times	Physician Information	Patient Information
		registered on the ARTG. All Queensland doctors can prescribe Schedule 4 (CBD only) products without a State Approval.			
NSW	Any Australian Registered doctor who is authorised under the Special Access or Authorised Prescriber Scheme can make an application for their patient.	No state-based approval required for Schedule 4 CBD products. Schedule 8 products require a State Approval for children under the age of 16 and for patients with drug dependencies or a history of drug use.	Up to one week unless more information is required	Centre for Medicinal Cannabis Research and Innovation	New South Wales Department of Health
ACT	Australian Registered Medical Practitioners must have approval from the ACT Chief Health Officer (CHO) to prescribe cannabis as a controlled substance as a single patient prescriber. A Category Approval states you may only apply to prescribe medicinal cannabis for patients with the following conditions: Spasticity in multiple sclerosis / Nausea and vomiting related to cancer chemotherapy / Pain and/or anxiety in patients with active malignancy of a life-limiting disease where (in either case) the prognosis might reasonably be expected to be 12 months or less / Refractory paediatric epilepsy / Prescribers may also apply for approval to prescribe medicinal cannabis for other indications.		Less than one week unless more information is required	ACT Health – Medicinal Cannabis	ACT Health – Medicinal Cannabis
VIC	Australian Registered Specialist Medical Practitioners and General Practitioners can make an application for their patients under the Special Access or Authorised Prescriber Scheme.	No state-based approval required for Schedule 4 CBD products. Schedule 8 medicinal cannabis products require a Schedule 8 Treatment Permit under the Victorian Drugs Poisons and Controlled Substances Act.	Less than a week unless more information is required	Victorian Department of Health – Medicinal Cannabis	Victoria Patient Information
TAS	General Practitioners (GPs) are unable to prescribe in Tasmania; referral to a relevant medical specialist is required who then applies to the Department of Health and Human Services for a legal authorisation to prescribe under the Cannabis Access Scheme (CAS).	All applications are reviewed by a delegate of the secretary of the Tasmanian Department of Health and Human Services in accordance with the usual pathways for Schedule 8 substances under Section 59E of the Act or for Schedule 4	Not available	Department of Health and Human Services – Medicinal cannabis	Department of Health and Human Services – Medicinal cannabis

DOCUMENT 9

Research Request – Learner Driver in Australia

Brief	**Statistics and research to support the development of an NDIS funding position or at least and advice position.** For a Learner (Class C – car) driver in Australia – What are the percentage of learners who access driving lessons (as opposed to learning from family/friends)? 1.) For Learner (Class C – car) driver's doing the log book system – How many driving lessons do they usually require? 2.) For a Learner (Class C – car) driver, not doing a log book system but instead the state on-road licensing test - How many driving lessons do they usually require? 3.) Are there any differences (patterns) between different Australian states regarding driving instructor usage? 4.) Is there any evidence regarding the number of lessons an adult usually requires to learn to drive with a left accelerator in auto car as a new driver? 5.) Is there any evidence regarding the number of lessons an adult usually requires to re-learn to drive with a left accelerator in auto car (rather than a right one) as an existing driver? 6.) Is there any evidence regarding the maximum number of driving lessons funded by other funding agencies (eg TAC, Lifetime support scheme, DVA etc…) prior to them requiring further evidence (- if so what is the required evidence - ? a Driver Trained OT on -road assessment review) 7.) Is there any evidence regarding the position in regard to funding Learner driving lessons for other funding agencies (eg TAC, Lifetime support scheme, DVA etc…). Do they consider whether some or all of this is an everyday cost for consumers and therefore not cover it.
Date	July, 2020
Requester	Shannon [redacted] (Assistant Director – TAB)
Researcher	Craig [redacted] (Tactical Research Advisor – TAB/AAT)

Please note:

The research and literature reviews collated by our TAB Research Team are not to be shared external to the Branch. These are for internal TAB use only and are intended to assist our advisors with their reasonable and necessary decision-making.

Delegates have access to a wide variety of comprehensive guidance material. If Delegates require further information on access or planning matters they are to call the TAPS line for advice.

The Research Team are unable to ensure that the information listed below provides an accurate & up-to-date snapshot of these matters.

Contents

Australia's National Driver Licensing Scheme

In 1997, Australia implemented a National Driver Licensing Scheme (NDLS), establishing a single driver licence classification structure, eligibility criteria and a uniform set of requirements for key driver licensing transactions including the issue, variation, renewal, suspension and cancellation of licences.

Although Australia operates a federated licensing scheme (administered by the individual states and territories), the NDLS has been adopted by all Australian jurisdictions and, as a result, facilitates the mutual recognition between Australian jurisdictions of driver licences when transferring between jurisdictions. [1]

Australia's standard graduated licensing system (GLS) for cars

All Australian jurisdictions have introduced a GLS for novice drivers. The fundamental components of Australia's standard GLS policy framework are outlined below. All Australian jurisdictions currently meet or exceed these requirements. [1]

GLS requirements:

- Learner permit at 16 years – supervised driving required

- 12 months minimum holding of learner permit
- Requirement to undertake at least 50 hours supervised driving recorded in a log book
- Practical on-road test to achieve solo unsupervised licence
- Hazard Perception Test as part of GLS
- Solo licensing from 17 years
- Zero Blood Alcohol Content (BAC) and no hand held mobiles during entire learner/provisional period
- Lower demerit point threshold for novice drivers
- Community education about risks associated with:
  - Novice drivers and late night driving and carrying multiple passengers
  - Young drivers on a full licence and drink driving
- Support programs to assist disadvantaged drivers to progress.

Learners who access driving lessons with professional instructors as opposed to family/friends

No research or statistics could be sourced indicating learners who access driving lessons with professional instructors as opposed to family/friends.

In 2013 The Centre for Accident Research & Road Safety – Queensland, published a series of three reports which examined education and training for novice drivers. The third and final report [2] provided an overview of the graduated driver licensing (GDL) system and outlines the expert opinion of four international novice driver experts about the potential road safety impacts of different training approaches if applied to the GDL system in place within Queensland.

In looking at supervised on road practice the report indicated that *"All of the experts were in agreement that this is an effective way for the learner to gain experience and that there is strong potential for positive road safety effects in particular because of the potential to extend the learner phase using a mandated hours requirement. It was recognised that a certain amount of practice will be necessary before road safety effects can be realised, however, experts noted that there is no clear consensus in the literature as to how many hours this should be".*

The report also looked at the advantages and disadvantages of professional instructor lessons as opposed to supervision by family/friends with the following observations:

<u>Advantages</u>

- Exposes learners to practice driving under supervision which has a low crash risk.
- Allows gradual progression of practice from low crash risk (e.g. car parks) to higher risk conditions (e.g. night time driving).
- Allows parents to judge if the novice is ready to take their test.
- Increasing quantity of private supervision during learner phase is the most investigated and promoted way to reduce P1 crashes and has been shown to be effective at reducing crash risk in the first 2 unsupervised years.

- Without private supervision learners would likely rely on professional lessons, which often lack variety.
- Research suggests bad habits picked up from private supervisors does not outweigh the overall benefits, and likely could be addressed by good professional instruction.
- Required 100+ hours has potential to delay licensing which has safety benefits.

Disadvantages

- Parents do not always have sufficient tools to assist them as supervisors.
- Not all parents are good drivers or good teachers. Learners may adopt poor/unsafe/risky driving from a private supervisor.
- It is not clear from research the extent to which supervised driving experience translates into safer driving when unsupervised.
- Effects are only found if supervised practice is for a longer rather than shorter time/distance travelled.
- Required 100+ hours results in more practice of novices but puts a strain on some families.

Number of Lessons: Log Book System/State on-road Licensing Test and Driving Instructor Usage

- No state stipulates the number of driving lessons required. Instead, most states stipulate the minimum number of hours of supervised driving which needs to be recorded in a log book.

- It appears to be recognized that the number of lessons required depends on the individual driver's skills, confidence and other factors.

- The number of hours required varies from state to state and varies according the age of the driver. In some states a log book does not need to be completed if the driver is over a certain age.

- For all states, it appears there are no requirements regarding number of driving lessons for Learner Drivers not doing a log book system but instead the state on-road licensing test.

- In all states anyone holding an appropriate licence can supervise/instruct the learning driver. No states stipulate the use a professional driving instructor. Only one state (NSW) gives an incentive to drivers to use a professional instructor by offering bonus log book hours.

Below is table summarizing the general requirements per state for log book systems and driver instructor usage.

Australian State & Link to authority responsible for driver licensing functions	LOG BOOK SYSTEM	Driving Instructor Usage
NSW: Roads and Maritime Services New South Wales	**AGE**: Under the age of **25** must complete a minimum of 120 hours of supervised driving experience (including at least 20 hours at night). Aged 25 or older doesn't need to fill out a log book or complete any minimum amount of supervised driving. **LOG BOOK:** Hours must be recorded in a paper log book or log book app. Exemptions to the 120 hours include Previously held a NSW or interstate driver licence, other than a learner licence Previously held an overseas licence, other than a learner licence Hold an overseas licence, other than a learner licence, and are issued with a learner licence after failing one driving test Are specifically exempted by Roads and Maritime Services.	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor No stipulation to use a professional driving instructor. There is a 3 for1 bonus hours incentive: If Lerner has lessons with a professional driving instructor: for every 1 hour structured driving lesson, Lerner can record 3 hours driving experience in their log book.
VIC: VicRoads	**AGE**: Under the age of **21** must complete a minimum of 120 hours of supervised driving experience (including at least 20 hours at night). Aged 21 or older doesn't need to fill out a log book or complete any minimum amount of supervised driving. **LOG BOOK:** Hours must be recorded in a paper log book or log book app. Exemptions to the 120 hours include: If the nature of your essential activities, occupation, employment or family circumstances means that 120 hours of supervised driving would cause you or your family undue hardship. If you have sufficient previous driving experience (interstate and overseas experience will be considered).	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor No stipulation to use a professional driving instructor
QLD: Department of Transport and Main Roads Queensland	**AGE**: Under the age of **25** must complete a minimum of 100 hours of supervised driving experience (including at least 10 hours at night).	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor

Australian State & Link to authority responsible for driver licensing functions	LOG BOOK SYSTEM	Driving Instructor Usage
	Aged 25 or older doesn't need to fill out a log book or complete any minimum amount of supervised driving. **LOG BOOK:** Hours must be recorded in a paper log book or log book app. Exemptions to the 100 hours: Will need to prove that at least one of the following circumstances applies to you: No car available, No supervisor available. Limited access to a road network. Source>	No stipulation to use a professional driving instructor
WA: Department of Transport Western Australia	**AGE**: Under the age of **25** must complete a minimum of 50 hours of supervised driving experience (including at least 5 hours at night). Aged 25 or older doesn't need to fill out a log book or complete any minimum amount of supervised driving. **LOG BOOK:** Hours must be recorded in an app log book only. No paper log book. Exemptions: none sourced	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor No stipulation to use a professional driving instructor
SA: Department of Planning, Transport and Infrastructure South Australia	**AGE**: **Any age** must complete a minimum of 75 hours of supervised driving experience (including at least 15 hours at night). Any age required to fill out a log book or complete any minimum amount of supervised driving **LOG BOOK:** Hours must be recorded in a paper log book or log book app Exemptions: Exemption to hours of supervised driving may be granted if learner has driving experience from other states.	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor No stipulation to use a professional driving instructor
TAS: Department of State Growth Tasmania	At least 80 hours of supervised driving experience (including at least 15 hours at night). Two stages to learner Driving: **L1 Stage**: No log book required, Supervisory Driver required. **L2 Stage**: Includes Driving Assessment, then Supervisory Driver required, and completion of log book (no app log) Source>	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor No stipulation to use a professional driving instructor

Australian State & Link to authority responsible for driver licensing functions	LOG BOOK SYSTEM	Driving Instructor Usage
NT: Department of Transport Northern Territory	**AGE**: If under 25 years old need to hold provisional licence for at least two years before upgrading to a full licence. If you are 25 or older provisional licence needs to be held for at least one year. No minimum driving hours required. **LOG BOOK**: None required	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor No stipulation to use a professional driving instructor
ACT: Road Transport Authority Australian Capital Territory	**AGE**: Under the age of **25** must complete a minimum of 100 hours of supervised driving experience (including at least 10 hours at night). Aged 25 or older required to complete 50 supervised driving hours including 5 at night. **LOG BOOK:** Hours must be recorded in the paper log book only. There is no app log. Exemptions: none sourced	Anyone holding an appropriate licence can supervise/instruct the learning driver. Professional Driving Instructor For the first 10 hours, 3 hours of supervised driving hours will be applied for each singular hour driven whilst supervised by an ACT Accredited Driving Instructor.

Number of Lessons: Adults learning to drive with a left accelerator in auto car as a new driver

No research or statistics could be sourced indicating the number of lessons required for adults learning to drive with a left foot accelerator in auto car as a new driver.

Below is table summarizing the general requirements per state for adults learning to drive with a left accelerator in auto car.

Australian State & Link to information regarding the left accelerator requirement	Summary of requirement
NSW: Roads and Maritime Services New South Wales **Driving with a disability: Leg disabilities**	In an automatic vehicle, the accelerator and brake can be used by either the right or left leg, or both (one for each pedal). If you only use your left leg, the accelerator should be fitted to the left of the brake pedal (unless Roads and Maritime approves operation with the pedals in their normal position).
VIC: VicRoads **Guidelines for Occupational Therapy (OT) Driver Assessors.**	A person who has no functional use of their right foot or leg needs to use a left foot accelerator unless they can demonstrate appropriate control by use of prosthesis (if relevant). VicRoads will not test an applicant if the left foot is used to operate an accelerator fitted to the right of the brake pedal. Where an additional accelerator pedal is fitted to the left of the existing brake pedal, both the right and left accelerator pedal must be independently capable of being rendered inoperable.
QLD: Department of Transport and Main Roads	While there are no requirements which specifically cover the location of a left foot brake or accelerator pedal, attention should be paid to the

Australian State & Link to information regarding the left accelerator requirement	Summary of requirement
Queensland Code of Practice Vehicle Modifications Version 4.2 | February 2020	operator's needs. Due care should also be taken to ensure there is sufficient clearance from the brake pedal, to reduce the risk of the driver accidentally depressing the incorrect pedal. Where a vehicle is fitted with an additional accelerator pedal, the accelerator pedal not in use must be able to be: fitted with a cover; or, folded away; or disconnected/rendered inoperative.
WA: Department of Transport Western Australia	Not found
SA: Department of Planning, Transport and Infrastructure South Australia	Not found
TAS: Department of State Growth Tasmania	Not found
NT: Department of Transport Northern Territory	Not found
ACT: Road Transport Authority Australian Capital Territory	Not found

Number of Lessons: Adults re-learning to drive with a left accelerator in auto car (rather than a right one) as an existing driver

No research or statistics could be sourced indicating the number of lessons required for adults re-learning to drive with a left foot accelerator in auto car as an existing driver.

Number of Lessons: maximum number of driving lessons funded by other funding agencies

Other than a Victorian program funded by TAC, no evidence from other funding agencies could be found indicating a maximum number of driving lessons.

Traffic Accident Commission L2P Program

The TAC L2P Program is a state wide program funded by the TAC that matches young learner drivers with supervising driver mentors. The purpose of the program is to enable the learner driver to meet the mandated 120 hours of driving practice required to gain a probationary licence.

Participants are eligible for up to 7 professional driving lessons from a registered driving instructor. [3]

Funding learner driving lessons for other funding agencies

Traffic Accident commission TAC

TAC do not indicate the number of lessons or hours of instruction they will fund.

TAC pay the reasonable cost of a driving program, when recommended by an occupational therapist and overseen by a qualified driving instructor, in the following circumstances:

- The transport accident injury imposes physical, psychological or cognitive restrictions on your client, and
- Driving and participation will enable your client to commence, or return to, safe and competent driving.

TAC can pay for:

- driving instructor fees.
- lessons and training on how to use adaptations in modified vehicles.
- travel for a specialised driving instructor when:
  - your client with special needs requires a suitably modified vehicle, and
  - an instructor with the necessary skills and experience is not located near your client's home.

TAC will not pay for:

- driving lessons for your client if their driver's licence or learner permit is under suspension or has been cancelled for reasons which are not directly related to their transport accident injuries
- driving permit and licence fees
- driving programs that are not conducted safely
- driving programs conducted by an occupational therapist with no specialist training in driver assessment [4]

TAC Driving assessment (Instructor) services provided on or after 1 July 2020 [5]

Service Description	TAC Item Number	Maximum Payment Rate
Driving Assessment By Driving School - Driving Instructor Fees		
For 30 Minutes	ED0015*	$51.70
For 45 Minutes	ED0015*	$77.55
For 60 Minutes	ED0015*	$103.39
Pro-Rata For Longer Periods		

Department of Veteran Affairs (DVA)

No evidence could be found with regard to funding for learner driving lessons.

Lifetime Support Scheme

No specific evidence could be found regarding learner driving lessons other than an indication that the scheme "facilitated driving lessons and modifications to a vehicle" for a SCI participant [6], and that another participant is "is undergoing lessons to learn how to drive a modified vehicle". [7]

Cohorts

Although an extensive search was not carried out with regard to particular disability cohorts and driving education, there appears to be some research available in this area on learning methods, which may give insight into the number of hours/lesson requirements.

For example a study on learner drivers with cerebral palsy suggested a need for better methods for teaching CP learners search strategies, as problems increased for CP learners in those parts of training where high demands are set on visual search abilities. [8]

A 2017 study set out to explore the facilitators or barriers to driving education experienced by individuals with ASD or ADHD who obtained a learner's permit, from the perspective of the learner drivers and their driving instructors. It found that driving license theory was more challenging for individuals with ADHD, whilst individuals with ASD found translating theory into practice and adjusting to "unfamiliar" driving situations to be the greatest challenges. [9]

References

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[2] The Centre for Accident Research & Road Safety Queensland(CARRS), How would changing driver training in the Queensland licensing system affect road safety?: Deliverable 3: Evidence-based driver education policy options, 2013, https://www.tmr.qld.gov.au/-/media/Safety/roadsafety/Road-safety-research-reports/report-3-evidence.pdf?la=en

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