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SUSTAINABLE PRACTICE

Reducing patient and planetary harms from high anticholinergic burden medication

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What you need to know

- Prescribing medicines with high anticholinergic burden carries significant risk of adverse clinical outcomes for patients
- Anticholinergic burden scores can be a useful way of assessing anticholinergic burden
- Consider tapering when stopping anticholinergic medications to avoid withdrawal effects, which may include nausea and sweating

Overprescribing and polypharmacy have been identified as a risk to patients and the planet.¹ Prescribing medications with a high anticholinergic burden carries significant risk for patients,

particularly older people. The adverse outcomes that result from this also incur substantial carbon and planetary burdens which might be mitigated by deprescribing anticholinergic drugs where appropriate.

Why change is needed

Polypharmacy (the concurrent use of multiple medication items by one individual)² in older people are becoming increasingly common.^{3,4} One common aspect of polypharmacy is high anticholinergic burden.^{5,6} When one or more drugs with anticholinergic properties are prescribed, the risk of adverse events combines and accumulates. Examples of medications with an anticholinergic burden (ACB) are shown in [table 1](#).

Table 1 | Commonly prescribed drugs with anticholinergic burden (ACB)

Drug group	Examples	Common indication	ACB score
Tricyclics	Amitriptyline, trazodone	Pain, headache, insomnia, depression	Amitriptyline 3, trazodone 1
Antimuscarinics	Solifenacin, oxybutynin, tolterodine	Overactive bladder syndrome	3
Opioids	Codeine, tramadol	Pain	Codeine 1, tramadol 2
Loop diuretics	Furosemide, bumetanide	Heart failure, ankle swelling	Furosemide 1 Bumetanide 0
Antimalarials	Quinine	Nocturnal cramps	Quinine 1
Nitrates	Isosorbide mononitrate, dinitrate	Angina	1
Calcium channel blockers	Nifedipine, diltiazem, amlodipine	Angina, hypertension	Nifedipine 1, diltiazem 1, amlodipine 0
Selective serotonin reuptake inhibitors	Citalopram, fluoxetine, sertraline	Anxiety, depression	1

Several different ACB calculators and scoring systems are available, with some variation between them.⁷ Here, the ACB Calculator⁸ is used. This is a composite of two reliable validated scores⁷: the German anticholinergic burden score and the anticholinergic cognitive burden scale. Where discrepancies arise, the higher value of ACB has been selected for safety

Clinical implications

Drugs have different levels of anticholinergic effect. The extent of an individual's ACB can be summarised through their ACB score, for which there are several validated ACB score calculators.⁷ The risks of anticholinergics increase with each additional point scored, with an increase in mortality associated with the number and ACB potency of the medication prescribed.⁹ A combined ACB score of 3+ (using, for example, the ACB calculator⁸) leads to an increased risk of admission for falls and fractures,¹⁰ cognitive decline,¹¹ dry mouth, constipation, and blurred vision,¹² outcomes to which older adults (and particularly those already at higher risk of dementia,

falls, or frailty) are more vulnerable. ACB scores can give a useful guide to the risk of anticholinergic adverse events, although they do not consider drug dose, or offer an estimate of individual risk. A 2023 study¹³ found an association between recently raised anticholinergic burden and increased risk of acute cardiovascular events, with a greater increase in anticholinergic burden conferring higher risk.

Environmental impacts

Prescribing contributes 20% of the NHS's carbon footprint¹⁴ because of the carbon costs of manufacture, packaging, distribution, and disposal. Reducing medications of questionable clinical benefit

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to the patient is one way to reduce the health system's planetary footprint. Direct emissions from anticholinergic prescribing are unquantified.

The adverse clinical outcomes of high anticholinergic burden may also add to the carbon burden of care owing to increased healthcare usage; with healthcare attendances (to address side effects and the consequences of other serious harms), investigations (eg, blood tests and imaging for cognitive decline), more prescribing (of mouth care and constipation products, for example), and hospital admissions. A bed-day in hospital is estimated to have a carbon footprint of 125 kg CO₂e, an outpatient appointment for acute care 77 kg CO₂e, and a GP visit 66 kg CO₂e.¹⁵

Evidence for the solution

The likely environmental benefits of reviewing anticholinergic burden have not been studied directly, hence are drawn from the known harms of anticholinergic medications and conclusions drawn from a systematic review undertaken in 2022.¹⁶ One study found that healthcare practitioner oriented interventions, such as structured medication reviews, were most effective in reducing ACB and drug burden, and promoted the discontinuation or reduction of anticholinergic medications. Another review found that ACB

deprescribing resulted in a significant reduction in Drug Burden index scores, falls, and adverse drug reactions after six months.¹⁷

In the absence of direct evidence, potential alternatives to medication with anticholinergic burden can be considered. The carbon footprints of these alternative interventions are themselves unquantified, but modelling suggests that deprescribing offers economic benefits and a reduced carbon burden. For example, hospital admissions are costly in both financial and carbon terms.

What you can do

Medications with anticholinergic properties have a wide range of clinical benefits that may outweigh their side effects and potential risks for some patients. However, anticholinergic burden should be considered when first prescribing and at medication reviews.

Consider anticholinergic burden at initial prescription

Being aware of the anticholinergic burden of commonly used drugs can help clinicians bring this into shared decision making about treatment options at first presentation, and to consider alternative strategies. Consider specifically the patient's frailty and their risk factors for falls and cognitive impairment. [Table 2](#) outlines some alternatives to ACB medication for commonly prescribed indications.

Table 2 | Examples of potential alternatives to medication with anticholinergic burden for specific indications

Indication	ACB drugs commonly prescribed	Alternatives to ACB medication	Notes
Overactive bladder syndrome	Oxybutynin, tolterodine, solifenacin	Bladder training ¹⁸	Add medication for persistent symptoms, and review efficacy. Consider mirabegron, which has an ACB score of 0
Anxiety and depression	Citalopram, sertraline, fluoxetine	Talking therapies ^{19 20} Consider also social prescribing initiatives	Adjunctive benefit (particularly in frailty and dementia) from wellbeing advice, eg, physical activity (especially outdoors), healthy eating, sleep hygiene ²¹
Chronic pain	Codeine, tramadol, amitriptyline	Structured exercise programmes. ²² Consider other self-management interventions, eg, acceptance and commitment therapy, although evidence of long term benefit is unclear ²³	Opioids not recommended for treatment of chronic pain
Ankle swelling	Furosemide	Compression hosiery, physical activity, leg elevation when possible if caused by venous insufficiency	Furosemide only indicated as part of treatment for heart failure
Idiopathic leg cramps	Quinine	Stretching, massage ²⁴	Quinine not recommended unless refractory/severe symptoms. Review every three months and consider trial discontinuation
Sleep	Amitriptyline (unlicensed use), benzodiazepines	Sleep hygiene, CBT ²⁵	Consider short term use of a Z drug only if other measures unsuccessful for short term insomnia

Early review of patients after initiating anticholinergic medication

New medications that are not having a clinically meaningful benefit, or where side effects are outweighing benefits, can be stopped. Ask specifically about common anticholinergic side effects such as dry mouth, constipation, and falls.

Identify and review patients with a high anticholinergic burden

A patient centred consultation focusing on high ACB medication may identify areas for safe, gradual reduction or substitution of low ACB alternatives. Anticholinergic burden scores can be calculated ahead of a planned medication review using an online tool, and some electronic health records also include these calculators. Note that scores do not consider medication dosage or individual renal function, which may influence the anticholinergic burden in

practice. A systematic review of ACB scores⁷ was unable to perform a meta-analysis to quantify the clinical risks of high scores.

Anticholinergic withdrawal syndrome, a clinical picture including nausea, sweating, agitation, confusion, and urinary urgency, can occur when people stop taking anticholinergic medications. Detailed guidance on tapering regimens for different groups of ACB drugs is available,²⁶ but in general the longer the patient has been on the medication, the longer the tapering period.

Education into practice

- Who at your practice could support you in implementing regular or more frequent anticholinergic medication reviews?

- What potential barriers do you foresee in offering alternative interventions (as listed in [table 2](#)) rather than a medication with associated ACB?

How patients were involved in the creation of this article

No patients were directly involved in the creation of this article.

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