

**Why you should read this article:**

- To recognise the importance of proactive deprescribing in improving patient outcomes, and saving money, with respect to the cost of the medicines and the unnecessary use of NHS resources
- To understand the barriers and enablers for patients and healthcare professionals in relation to deprescribing
- To consider your role in proactive deprescribing in terms of supporting patients when they trial discontinuation of medicines and require follow-up consultations

# Role of nurses in supporting proactive deprescribing

David John Wright, Sion Scott, Jackie Buck et al

**Citation**

Wright DJ, Scott S, Buck J et al (2019) Role of nurses in supporting proactive deprescribing. *Nursing Standard*. doi: 10.7748/ns.2019.e11249

**Peer review**

This article has been subject to external double-blind peer review and checked for plagiarism using automated software

**Correspondence**

d.j.wright@uea.ac.uk

**Conflict of interest**

None declared

**Accepted**

19 July 2018

**Published online**

January 2019

**Abstract**

Deprescribing is the term used to describe the discontinuation of medicines. It can be either 'reactive', for example in response to an adverse event or therapeutic failure, or 'proactive', when the prescriber and patient decide to discontinue the medicine because its future benefits no longer outweigh its potential for harm. At present, there is a limited amount of proactive deprescribing activity in primary and secondary care. This article provides the rationale for increasing proactive deprescribing activity, lists the medicines this relates to, identifies the barriers and enablers to its implementation, and describes the potential role of the nurse in this process.

**Author details**

David John Wright, professor in pharmacy practice, School of Pharmacy, University of East Anglia, Norwich, England; Sion Scott, PhD student in pharmacy practice, School of Pharmacy, University of East Anglia, Norwich, England; Jackie Buck, lecturer in adult nursing and research, School of Health Sciences, University of East Anglia, Norwich, England; Debi Bhattacharya, senior lecturer in pharmacy practice, School of Pharmacy, University of East Anglia, Norwich, England

**Keywords**

British National Formulary, medicines, medicines management, medicines review, nurse prescribing, polypharmacy, prescribing, prescription medicines

The role of medicines in patient care is to treat acute disease, manage symptoms or prevent further disease; therefore, the focus of healthcare professionals has been on their initiation (Sinnott et al 2013, Anderson et al 2014). At present, discontinuing medicines is usually only considered when the patient is experiencing adverse drug events such as side effects (Anderson et al 2017, Scott et al 2018a). The British National Formulary (BNF) (2018) – the main reference source that informs medicines-related decisions by UK healthcare professionals – focuses primarily on why, when and how to start medicines, with limited information on why, when and how medicines should be discontinued.

Around 29% of UK primary care prescribing is 'potentially inappropriate' (Todd et al 2016). Research into secondary care of patients admitted to six hospitals in Europe found that 35-77% of patients were prescribed potentially inappropriate medicines (Gallagher et al 2011). In Ireland, inappropriate prescribing

has been estimated to account for 9% of the total prescribing budget in patients over the age of 70 years (Cahir et al 2010). This suggests that a significant proportion of the annual prescribing budget is being spent on medicines that are potentially inappropriate and therefore might be suitable for discontinuation. Continuing medicines where the risks outweigh the benefits results in increased adverse drug events (Atkin et al 1999, Davies et al 2009), which can lead to reduced quality of life and preventable medicines-related hospitalisations (Pirmohamed et al 2004, Kalisch et al 2012). Consequently, the cost of inappropriate prescribing is not just the medicine acquisition cost but also the unnecessary use of NHS services.

**Deprescribing**

Deprescribing, or discontinuing medicines, is defined as 'the systematic process of identifying and discontinuing drugs in instances in which



existing or potential harms outweigh existing or potential benefits within the context of an individual patient's care goals, current level of functioning, life expectancy, values and preferences' (Scott et al 2015). If deprescribing is undertaken in response to existing harms, it is considered reactive, whereas if it is undertaken to prevent future potential harms, it is considered proactive (Scott et al 2018b). While reactive deprescribing is relatively straightforward since it is in response to directly observed harm, proactive deprescribing is more challenging because it involves patients and prescribers weighing up the risks and benefits of the medicine. Randomised controlled trials using patient-focused interventions have shown that, in some instances, proactive deprescribing significantly decreases mortality (Page et al 2016). Despite this evidence, proactive deprescribing is not routine behaviour within primary or secondary care (Reeve et al 2017a, Scott et al 2018b).

It could be suggested that discontinuing medicines has always been a part of the medication review process (Barber 1995, General Medical Council 2013); however, it is challenging to implement the proactive deprescribing of medicines that are causing no observed harm and that the patient believes are effective or will have future benefits.

### Classes of medicines identified as priorities for deprescribing

A group of experts identified 14 regularly prescribed classes of medicines as priorities for deprescribing (Box 1) (Farrell et al 2015). Almost all patients prescribed five or more medicines – known as polypharmacy (Turner et al 2016) – are prescribed at least one of these 14 classes of medicines (Farrell et al 2015). Therefore, patients experiencing polypharmacy may be suitable for proactive deprescribing. Similarly, if deprescribing were to become routine practice in the same way that prescribing is, then problematic polypharmacy – for example,

where a patient is taking multiple medicines that are known to cause issues (O'Mahony and Gallagher 2008) – could potentially be minimised or controlled.

This article will discuss three of these classes of medicines as examples – proton pump inhibitors (PPIs), benzodiazepines, and anticholinergics for urinary incontinence – to demonstrate why deprescribing should become a part of routine practice.

#### BOX 1. Classes of medicines identified as priorities for appropriate deprescribing

- » Benzodiazepines
- » Atypical antipsychotics
- » Statins
- » Tricyclic antidepressants
- » Proton pump inhibitors
- » Urinary anticholinergics
- » Typical antipsychotics
- » Cholinesterase inhibitors
- » Opioids
- » Selective serotonin reuptake inhibitors
- » Bisphosphonates
- » Anticonvulsants
- » Beta blockers
- » Antiplatelets

(Farrell et al 2015)

#### Proton pump inhibitors

PPIs such as omeprazole are prescribed to reduce gastric acid production, which is beneficial when the stomach requires time to heal from ulceration or when acid is being wrongly located in the oesophagus and is causing heartburn. National Institute for Health and Care Excellence (NICE) (2014) guidelines for their use recommend discontinuation once symptoms are controlled, partially because there are concerns regarding their long-term use. PPIs are associated with increased risk of infections such as *Clostridium difficile* and community-acquired pneumonia, both of which can be fatal (Choudhry et al 2008, Abramowitz et al 2016). They are also associated with an increased risk of hip fractures and electrolyte disturbance (Abramowitz et al 2016), and long-term use is known to cause issues when prescribing antiplatelet therapy to prevent future cardiovascular events (Suzuki et al 2015).

Furthermore, researchers are exploring a potential link between PPIs and dementia (Batchelor et al 2017), and premature death (Xie et al 2017). In 2017, around £97.5 million was spent on PPIs in England, representing 59 million individual prescriptions (NHS Digital 2018), of which 61% in older people are potentially inappropriate (Hamzat et al 2012). Therefore, it is important that PPIs that are prescribed inappropriately are discontinued in older people, and evidence suggests that this can be safely achieved in at least 25% of such patients (Walsh et al 2016).

#### Anticholinergics

Anticholinergics such as tolterodine tartrate are frequently prescribed for urinary incontinence; however, they demonstrate limited clinical effectiveness and provide minimal benefit to many patients (Moyson et al 2017). Vouri et al's (2017) systematic review of adverse events in patients who were prescribed anticholinergics found increased rates of dizziness, dyspepsia, urinary retention and incidence of urinary tract infections. Anticholinergics have also been shown to adversely affect cognitive function (Orme et al 2015).

Anticholinergic burden arising from an accumulation of medicines with anticholinergic properties is associated with an increased risk of cardiovascular disease, mortality and use of healthcare services (Myint et al 2015, Campbell et al 2016). In one US study, one third of anticholinergic prescriptions were found to be potentially inappropriate, and this was associated with increased hospitalisation (Suehs et al 2016). Caution is recommended regarding the prescription of anticholinergics for incontinence in older people and they should be avoided in those with dementia (O'Mahony et al 2015). However, Green et al's (2017) large-scale US study reported that one in 20 older people were prescribed anticholinergics and these were more commonly used in individuals with cognitive impairment. The BNF (2018) recommends that anticholinergics are reviewed

after one month and subsequently every six months to minimise the likelihood of inappropriate use.

In 2017, almost £148 million was spent on seven million prescriptions for anticholinergics in England (NHS Digital 2018), and consequently these are relatively expensive medicines (Samuelsson et al 2015, Moyson et al 2017). Because of their potential for significant harm, high cost and limited efficacy, the identification of approaches to discontinue anticholinergics is recommended (Suehs et al 2016). One randomised controlled trial of patients receiving anticholinergics for more than six months found that these could be successfully discontinued in 35% of patients (Lee et al 2011).

### Benzodiazepines

Benzodiazepines are effective hypnotics and anxiolytics; however, their effectiveness rapidly decreases as tolerance develops (Bateson 2002), and they are associated with physical and psychological dependence (NICE 2018). Long-term use of benzodiazepines is associated with increased risk of hip fracture (Donnelly et al 2017), reduced cognitive function (Stranks and Crowe 2014), increased risk of falls (Pollmann et al 2015), impairment of psychomotor skills and driving performance (Verster et al 2011, Gustavsen et al 2012), and reduced quality of life (Lugoboni et al 2014). Consequently, treatment beyond four weeks is not recommended (NICE 2018). However, long-term use of benzodiazepines is common in primary care (Alexander et al 2006, Anthierens et al 2010), suggesting there is scope to deprescribe these medicines.

In 2017, more than £70 million was spent on hypnotics and anxiolytics in England (NHS Digital 2018), of which a large proportion is appropriate for discontinuation because they have an addictive nature, reduce cognitive function and increase the risk of falls (Pollmann et al 2015). Evidence suggests that these medicines can be successfully deprescribed (Furukawa 2004).

These three examples demonstrate that the UK government is spending

a significant amount of money on medicines that can be safely discontinued, avoiding future medicines-related harm and costs. Similar cases can be made for all 14 classes of medicines identified to be suitable for deprescribing (Farrell et al 2015). There are also several additional classes of medicines that are potential candidates for deprescribing because of their propensity to result in harm, such as non-steroidal anti-inflammatory drugs (NSAIDs) (Pirmohamed et al 2004). With evidence increasingly suggesting there is scope for proactive deprescribing of many medicines, it is worth questioning why the initiation of medicines continues to prevail over their discontinuation.

### Barriers and enablers to deprescribing

As the number of studies on deprescribing has accumulated over time (Parr et al 2009, Gould et al 2014, Black et al 2017, Boghossian et al 2017), it has become possible to identify factors that prevent patients and healthcare professionals from wanting to discontinue patients' medicines (barriers) and factors that make it easier (enablers). These barriers and enablers for patients are summarised in Box 2 (Reeve et al 2013a) and those for healthcare professionals are summarised in Box 3 (Fried et al 2011, Anderson et al 2014). There are several barriers and enablers to

## Key points

- Deprescribing, or discontinuing medicines, is defined as 'the systematic process of identifying and discontinuing drugs in instances in which existing or potential harms outweigh existing or potential benefits within the context of an individual patient's care goals, current level of functioning, life expectancy, values and preferences' (Scott et al 2015)
- Randomised controlled trials using patient-focused interventions have shown that, in some instances, proactive deprescribing significantly decreases mortality (Page et al 2016)
- Patients are increasingly likely to agree to deprescribing if they are offered a trial; for example, an option to return to the medicine can be provided if they experience any adverse effects or worsening of the condition for which it was originally prescribed (Reeve et al 2013a)
- Regardless of whether or not they are able to prescribe, most nurses are involved in medicines administration, which provides an opportunity to discuss patients' attitudes towards their medicines with them

deprescribing in both groups, and unless the barriers are addressed and the enablers are used effectively, proactive deprescribing will not become routine practice.

Education outreach visits to GPs have a small effect on improving the quality of prescribing (O'Brien et al 2007), as do small group discussions, interactive workshops, reminders

### BOX 2. Patient-related barriers and enablers to deprescribing

#### Barriers

- » Beliefs regarding future benefits associated with continuation of a medicine
- » Scepticism about the reasons for deprescribing
- » Lack of confidence in the prescriber's knowledge of how to deprescribe
- » Concerns about insufficient guidance on how to discontinue medicines
- » Fear of withdrawal reactions
- » Fear of relapse

#### Enablers

- » Lack of perceived ongoing need for the medicines
- » Lack of perceived effectiveness of the medicines
- » Experience of side effects
- » Use of a GP to initiate the discussion
- » Fear of addiction
- » Discontinuation trial to test the medicine's ongoing effectiveness
- » Provision to enable return to the original medicine if the discontinuation trial is unsuccessful
- » Dislike of taking medicines
- » Inconvenience associated with taking medicines

(Adapted from Reeve 2013a)

(Sohn et al 2004), and audits (Ivers et al 2014), but evidence for successful deprescribing has shown that only interventions centred around the patient consultation, for example focused on both the patient and prescriber, are likely to be effective (Page et al 2016). There is a shortage of doctors across all healthcare sectors in the UK, and increasing demands on their time, so involving other healthcare professional groups with the appropriate knowledge and skills in the deprescribing process is recommended (Reeve et al 2013a). The role of the nurse in this process is not well considered, and it may be that they are equally effective at discussing a trial of medicine discontinuation with patients; however, evidence syntheses of patient and practitioner views on deprescribing suggest that the process should at least be initiated by the patient's doctor (Reeve et al 2013a, Anderson et al 2014).

Patients are increasingly likely to agree to deprescribing if they are offered a trial, for example an option to return to the medicine if they experience any adverse effects or worsening of the condition for which it was originally prescribed (Reeve et al 2013a). One major concern for medical prescribers is the additional workload that may be associated with initiating conversations with patients about deprescribing, and having to provide follow-up care, particularly if deprescribing had been offered

as a trial (Anderson et al 2014). To reduce the burden on GPs of following up patients who have agreed to trial discontinuation, other healthcare practitioners such as nurses could provide follow-up consultations, monitoring and support. Additionally, those who have prescribing rights can offer to restart the medicine.

One of the main concerns of prescribers regarding deprescribing is that it has the potential to negatively affect their relationship with the patient, particularly if discontinuation results in symptom return or unanticipated adverse events (Anderson et al 2014). Therefore, it is important that patients who trial discontinuation of medicines are able to contact a healthcare professional in a timely manner to discuss their concerns and obtain advice. This may be a role that nurses working in GP settings could undertake.

While deprescribing has been shown to be effective at reducing the use of potentially inappropriate medicines (Thillainadesan et al 2018), the cost of its implementation should be considered. Consequently, evidence that demonstrates the value or cost-effectiveness of deprescribing would justify the additional time and resources required by prescribers and other members of the healthcare team. It is important for prescribers to find the time to talk and listen to patients, since patients are more willing to trial

discontinuation when they do so (Anderson et al 2014).

There are patient attributes that can be used to identify individuals who are increasingly likely to be amenable to deprescribing. These include identification of individuals who dislike taking medicines, those who fear addiction and those who are sceptical about future benefits (Reeve et al 2017b). Simple questions to ascertain patient attitudes towards long-term use of medicines could readily be introduced into routine medicines-related consultations to identify individuals who are most amenable to the suggestion of deprescribing.

Prescribers and patients are often concerned about whether the prescriber has sufficient knowledge to discontinue the medicines safely (Reeve et al 2013a, Anderson et al 2014). This is reasonable, since the available evidence regarding when and how to discontinue medicines is limited and, until this gap in knowledge is addressed, it will be challenging to implement proactive deprescribing. Improvements could include the BNF (2018) containing additional information regarding safe deprescribing, or the publication of a separate document in the same format as the BNF, which states when deprescribing is indicated, cautioned and contraindicated, how to implement it with respect to dose reduction, and what signs and symptoms to monitor for. Such information should provide prescribers with the confidence to deviate from traditional prescribing guidance and be sufficient to enable them to accurately quantify the harms and benefits of deprescribing. Deprescribing networks are being set up internationally, and information for patients and prescribers is being developed. However, at present this information is directed at a small number of classes of medicines, such as proton pump inhibitors, and is focused on when and why to deprescribe, rather than providing precise details regarding how (Canadian Deprescribing Network 2018).

Patients are often concerned that they will not be given enough information to enable them to

### BOX 3. Healthcare professional-related barriers and enablers to deprescribing

#### Barriers

- » Inertia because of a fear of negative consequences, for example litigation
- » Fear of a negative effect on the professional relationship with the patient
- » Fear of the unknown, for example potential consequences of withdrawal
- » Perceived patient ambivalence or resistance to change
- » Lack of time to discuss and implement deprescribing with patients
- » Concern about undermining interprofessional relationships

#### Enablers

- » Patient receptivity to deprescribing
- » Capacity to change prescribing
- » Guidance on how to deprescribe
- » Quantification of the benefits and harms of medicines
- » Confidence to deviate from prescribing guidelines
- » Greater dialogue with patients to increase understanding and shared decision-making
- » Previous experience of deprescribing

(Fried et al 2011, Anderson et al 2014)

confidently trial discontinuing the medicine. For this to occur, it is important for patients to know how to tailor dosages, what signs and symptoms to be aware of, and who to contact if anything goes wrong. Additionally, such information should be provided in a manner that addresses any fears they have of withdrawal symptoms and adverse effects. Further research is required for most medicines to ascertain this information, and it could be suggested that when medicines are given licences, manufacturers should be required to provide information on safe deprescribing.

### Role of the nurse in the deprescribing process

Nurses have an important role in medicines management. For example, community matrons frequently undertake medication reviews in patients' homes, while many patients in outpatient clinics will discuss their medicines with a nurse during medication reviews.

The active role of nurses in most stages of the medicines process has been consolidated in the new standards of proficiency for registered nurses (Nursing and Midwifery Council (NMC) 2018a), which all UK nurse education providers will adopt in their programmes by September 2020. At the point of registration, nurses will be expected to 'understand the principles of safe and effective administration and optimisation of medicines in accordance with local and national policies' (Standard 4.14) and 'demonstrate knowledge of pharmacology and the ability to recognise the effects of medicines, allergies, drug sensitivities, side effects, contraindications, incompatibilities, adverse reactions, prescribing errors and the impact of polypharmacy' (Standard 4.15). This presents an opportunity for both prescribing and deprescribing to be embedded in undergraduate nurse curricula.

Furthermore, the NMC's (2018b) new standards for prescribing programmes, also due to be adopted by all UK nurse education providers by September 2020, state that nurses must have been registered with the NMC for at least one year

before undertaking supplementary/independent prescribing programmes (Standard 1.7) (NMC 2018b). This is a shift away from the three years' experience previously required for nurses to become independent prescribers, perhaps reflecting the recognition that nurses will routinely take a more active role in medicines management in the future.

Any interaction a nurse has with a patient can provide an opportunity for discussions regarding medicines (Frank and Weir 2014). There are many aspects of medicines management in which nurses can have a pivotal role in initiating and supporting deprescribing. For example, when medicines are initiated, it may be necessary to develop a culture whereby patients do not expect to take them for the rest of their lives and therefore are encouraged to actively discuss medicines discontinuation with their prescriber. People who dislike taking medicines, fear addiction or are sceptical about the future benefits of their medicines, can be identified and a note placed in their medical records so that future prescribers have the confidence to initiate discussions regarding deprescribing.

During patient reviews, it is useful for nurses to be aware of the 14 classes of medicines listed in Box 1, so that deprescribing can be suggested where appropriate. Similarly, it is beneficial for nurses to be aware of emerging guidance that can inform the deprescribing process, including deprescribing algorithms for target medicines such as proton pump inhibitors (Farrell et al 2017), and the screening tools available to assist in identifying inappropriate medicines (Masnoon et al 2018).

Administering medicines where the risks may outweigh the benefits represents a suboptimal use of the nurses' time and potential suboptimal outcomes for the patient. Nurses could use the opportunity to discuss the patient's beliefs about their medicines and identify their willingness to discontinue inappropriate medicines. Non-leading questions designed to elicit negative attitudes to medicines such as 'What do you think about having to take medicines?' may assist in quickly

identifying patients who are willing to trial discontinuation.

It has been found that if a patient's doctor recommends deprescribing, patients are likely to accept the recommendation (Reeve et al 2013a, 2013b). There is no research considering the attitude of patients to nurses taking on this role; however, there is no reason to believe that they would receive a significantly different response. For example, research with non-medical prescribers in Scotland suggests that they are likely to have more time during consultations than medical colleagues, and patients may be more likely to openly discuss concerns regarding their medicines with them than with their doctor (Brodie et al 2014), so they are in an optimal position to discuss discontinuing medicines. All suggestions to patients about considering the discontinuation of their medicines will increase the chances of them discussing it with their GP in the future.

At present, nurses are relatively new to prescribing and ongoing medicines management, and it remains the remit of a minor proportion of those on the professional register in the UK. Qualitative research suggests that some nurses who undertake independent and supplementary prescribing education use it in a limited capacity, if at all (Maddox et al 2016). Even experienced GPs report that their knowledge gaps and lack of confidence negatively affect their willingness to deprescribe (Linsky et al 2015), so it will likely take some time for nurses to develop their understanding and confidence in this area. However, there is some indication that having robust evidence-based guidelines for deprescribing can lead to increased self-efficacy across various groups of healthcare professionals – including nurses – in their ability to develop, implement and monitor deprescribing (Farrell et al 2018).

Regardless of whether or not they are able to prescribe, most nurses are involved in medicines administration, which provides an opportunity to discuss patients' attitudes towards their medicines with them (Farrell et al 2018),

which can be shared within the multidisciplinary team. Nurses undertaking these discussions require effective communication skills, and should frame these conversations within a shared-decision-making model that enables concordance.

There is a lack of research in the area of nurse deprescribing, particularly in the UK. With the opportunities that deprescribing provides in terms of improving patient outcomes and making time and cost savings, and the increasing expansion of the nurse's role to

support medicines optimisation, there is a clear need for evidence-based practices that can support nurses to initiate and monitor deprescribing in primary and secondary care.

### Conclusion

Increasing activity around proactive deprescribing is important for patients and the NHS. It can improve patient outcomes and save money, not only with respect to the cost of the medicines, but also regarding the unnecessary use of NHS resources resulting from adverse drug events. Nurses

can have an important role in the deprescribing process by being aware of the medicines that are most appropriate for deprescribing, and by ensuring that patients are aware that it may be necessary to discontinue such medicines when the benefits no longer outweigh the risks. Nurses can identify patients who might be increasingly amenable to deprescribing, suggest to them that they may wish to discuss medicines discontinuation with their prescriber, and support patients when they trial discontinuation and require follow-up consultations.

## References

- Abramowitz J, Thakkar P, Isa A et al (2016) Adverse event reporting for proton pump inhibitor therapy: an overview of systematic reviews. *Otolaryngology – Head and Neck Surgery*, 155, 4, 547-554. doi: 10.1177/0194599816648298.
- Alexander GC, Sayla MA, Holmes HM et al (2006) Prioritizing and stopping prescription medicines. *Canadian Medical Association Journal*, 174, 8, 1083-1084. doi: 10.1503/cmaj.050837.
- Anderson K, Foster M, Freeman C et al (2017) Negotiating "unmeasurable harm and benefit": perspectives of general practitioners and consultant pharmacists on deprescribing in the primary care setting. *Qualitative Health Research*, 27, 13, 1936-1947. doi: 10.1177/1049732316687732.
- Anderson K, Stowasser D, Freeman C et al (2014) Prescriber barriers and enablers to minimising potentially inappropriate medications in adults: a systematic review and thematic synthesis. *BMJ Open*, 4, 12, e006544. doi: 10.1136/bmjopen-2014-006544.
- Anthierens S, Tansens A, Petrovic M et al (2010) Qualitative insights into general practitioners views on polypharmacy. *BMC Family Practice*, 11, 65. doi: 10.1186/1471-2296-11-65.
- Atkin PA, Veitch PC, Veitch EM et al (1999) The epidemiology of serious adverse drug reactions among the elderly. *Drugs and Aging*, 14, 2, 141-152. doi: 10.2165/00002512-199914020-00005.
- Barber N (1995) What constitutes good prescribing? *BMJ*, 310, 6984, 923-925. doi: 10.1136/bmj.310.6984.923.
- Batchelor R, Gilmartin JF, Kemp W et al (2017) Dementia, cognitive impairment and proton pump inhibitor therapy: a systematic review. *Journal of Gastroenterology and Hepatology*, 32, 8, 1426-1435. doi: 10.1111/jgh.13750.
- Bateson AN (2002) Basic pharmacologic mechanisms involved in benzodiazepine tolerance and withdrawal. *Current Pharmaceutical Design*, 8, 1, 5-21. doi: 10.2174/1381612023396681.
- Black CD, Thompson W, Welch V et al (2017) Lack of evidence to guide deprescribing of antihyperglycemics: a systematic review. *Diabetes Therapy*, 8, 1, 23-31. doi: 10.1007/s13300-016-0220-9.
- Boghossian TA, Rashid FJ, Thompson W et al (2017) Deprescribing versus continuation of chronic proton pump inhibitor use in adults. *Cochrane Database of Systematic Reviews*. Issue 3. CD011969. doi: 10.1002/14651858.CD011969.pub2.
- British National Formulary (2018) *British National Formulary*. No. 75. BMJ Group and the Royal Pharmaceutical Society of Great Britain, London.
- Brodie L, Donaldson J, Watt S (2014) Non-medical prescribers and benzodiazepines: a qualitative study. *Nurse Prescribing*, 12, 7, 353-359. doi: 10.12968/npre.2014.12.7.353.
- Cahir C, Fahey T, Teeling M et al (2010) Potentially inappropriate prescribing and cost outcomes for older people: a national population study. *British Journal of Clinical Pharmacology*, 69, 5, 543-552. doi: 10.1111/j.1365-2125.2010.03628.x.
- Campbell NL, Perkins AJ, Bradt P et al (2016) Association of anticholinergic burden with cognitive impairment and health care utilization among a diverse ambulatory older adult population. *Pharmacotherapy*, 36, 11, 1123-1131. doi: 10.1002/phar.1843.
- Canadian Deprescribing Network (2018) *Deprescribing Algorithms*. www.deprescribingnetwork.ca/algorithms (Last accessed: 1 November 2018.)
- Choudhry MN, Soran H, Ziglam HM (2008) Overuse and inappropriate prescribing of proton pump inhibitors in patients with Clostridium difficile-associated disease. *QJM*, 101, 6, 445-448. doi: 10.1093/qjmed/hcn035.
- Davies EC, Green CF, Taylor S et al (2009) Adverse drug reactions in hospital in-patients: a prospective analysis of 3695 patient-episodes. *PLoS One*, 4, 2, e4439. doi: 10.1371/journal.pone.0004439.
- Donnelly K, Bracchi R, Hewitt J et al (2017) Benzodiazepines, Z-drugs and the risk of hip fracture: a systematic review and meta-analysis. *PLoS One*, 12, 4, e0174730. doi: 10.1371/journal.pone.0174730.
- Farrell B, Pottie K, Thompson W et al (2017) Deprescribing proton pump inhibitors: evidence-based clinical practice guideline. *Canadian Family Physician*, 63, 5, 354-364.
- Farrell B, Richardson L, Raman-Wilms L et al (2018) Self-efficacy for deprescribing: a survey for health care professionals using evidence-based deprescribing guidelines. *Research in Social and Administrative Pharmacy*, 14, 1, 18-25. doi: 10.1016/j.sapharm.2017.01.003.
- Farrell B, Tsang C, Raman-Wilms L et al (2015) What are priorities for deprescribing for elderly patients? Capturing the voice of practitioners: a modified delphi process. *PLoS One*, 10, 4, e0122246. doi: 10.1371/journal.pone.0122246.
- Frank C, Weir E (2014) Deprescribing for older patients. *Canadian Medical Association Journal*, 186, 18, 1369-1376. doi: 10.1503/cmaj.131873.
- Fried TR, Tinetti ME, Towle V et al (2011) Effects of benefits and harms on older persons' willingness to take medication for primary cardiovascular prevention. *Archives of Internal Medicine*, 171, 10, 923-928. doi: 10.1001/archinternmed.2011.32.
- Furukawa TA (2004) Withdrawal of benzodiazepines in elderly long term users does not produce significant adverse effects in the short term. *Evidence-Based Mental Health*, 7, 2, 46. doi: 10.1136/ebmh.7.2.46.
- Gallagher P, Lang PO, Cherubini A et al (2011) Prevalence of potentially inappropriate prescribing in an acutely ill population of older patients admitted to six European hospitals. *European Journal of Clinical Pharmacology*, 67, 1175-1188. doi: 10.1007/s00228-011-1061-0.
- General Medical Council (2013) *Good Practice in Prescribing and Managing Medicines and Devices*. GMC, London.
- Gould R, Coulson M, Patel N et al (2014) Interventions for reducing benzodiazepine use in older people: meta-analysis of randomised controlled trials. *British Journal of Psychiatry*, 204, 2, 98-107. doi: 10.1192/bjp.bp.113.126003.
- Green AR, Segal J, Tian J et al (2017) Use of bladder antimuscarinics in older adults with impaired cognition. *Journal of the American Geriatrics Society*, 65, 2, 390-394. doi: 10.1111/jgs.14498.
- Gustavsen I, Hjelmeland K, Bernard JP et al (2012) Individual psychomotor impairment in relation to zopiclone and ethanol concentrations in blood: a randomized controlled double-blinded trial. *Addiction*, 107, 5, 925-932. doi: 10.1111/j.1360-0443.2011.03693.x.
- Hamzat H, Sun H, Ford JC et al (2012) Inappropriate prescribing of proton pump inhibitors in older patients: effects of an educational strategy. *Drugs and Aging*, 29, 8, 681-690. doi: 10.2165/11632700-000000000-00000.
- Ivers NM, Grimshaw JM, Jamtvedt G et al (2014) Growing literature, stagnant science? Systematic review, meta-regression and cumulative analysis of audit and feedback interventions in health care. *Journal of General Internal Medicine*, 29, 11, 1534-1541. doi: 10.1007/s11606-014-2913-y.
- Kalisch LM, Caughey GE, Barratt JD et al (2012) Prevalence of preventable medication-related hospitalizations in Australia: an opportunity to reduce harm. *International Journal for Quality in Health Care*, 24, 3, 239-249. doi: 10.1093/intqhc/mzs015.
- Lee YS, Choo MS, Lee JY et al (2011) Symptom change after discontinuation of successful antimuscarinic treatment in patients with overactive bladder symptoms: a randomised, multicentre trial. *International Journal of Clinical Practice*, 65, 9, 997-1004. doi: 10.1111/j.1742-1241.2011.02728.x.
- Linsky A, Simon SR, Marcello TB et al (2015) Clinical provider perceptions of proactive medication discontinuation. *American Journal of Managed Care*, 21, 4, 277-283.
- Lugoboni F, Mirijello A, Faccini M et al (2014) Quality of life in a cohort of high-dose benzodiazepine dependent patients. *Drug and Alcohol Dependence*, 142, 105-109. doi: 10.1016/j.drugalcdep.2014.06.020.
- Maddox C, Halsall D, Hall J et al (2016) Factors influencing nurse and pharmacist willingness to take or not take responsibility for non-medical prescribing. *Research in Social and Administrative Pharmacy*, 12, 1, 41-55. doi: 10.1016/j.sapharm.2015.04.001.
- Masnoun N, Shakib S, Kalisch-Ellett L et al (2018) Tools for assessment of the appropriateness of prescribing and association with patient-related outcomes: a systematic review. *Drugs and Aging*, 35, 1, 43-60. doi: 10.1007/s40266-018-0516-8.
- Moyson J, Legrand F, Vanden Bossche M et al (2017) Efficacy and safety of available therapies in

- the management of idiopathic overactive bladder: a systematic review of the literature. *Progres en Urologie*. 27, 4, 203-228. doi: 10.1016/j.purol.2016.12.011.
- Myint PK, Fox C, Kwok CS et al (2015) Total anticholinergic burden and risk of mortality and cardiovascular disease over 10 years in 21,636 middle-aged and older men and women of EPIC-Norfolk prospective population study. *Age and Ageing*. 44, 2, 219-225. doi: 10.1093/ageing/afu185.
- National Institute for Health and Care Excellence (2014) Gastro-Oesophageal Reflux Disease and Dyspepsia in Adults: Investigation and Management. Clinical guideline No. 184. NICE, London.
- National Institute for Health and Care Excellence (2018) Hypnotics and Anxiolytics. [bnf.nice.org.uk/treatment-summary/hypnotics-and-anxiolytics](https://www.nice.org.uk/treatment-summary/hypnotics-and-anxiolytics). html (Last accessed: 11 October 2018).
- NHS Digital (2018) Prescription Cost Analysis: England 2017. 2017 Data Tables. <https://digital.nhs.uk/data-and-information/publications/statistical/prescription-cost-analysis/prescription-cost-analysis-england-2017> (Last accessed: 11 October 2018).
- Nursing and Midwifery Council (2018a) Future Nurse: Standards of Proficiency for Registered Nurses. [www.nmc.org.uk/globalassets/sitedocuments/education-standards/future-nurse-proficiencies.pdf](http://www.nmc.org.uk/globalassets/sitedocuments/education-standards/future-nurse-proficiencies.pdf) (Last accessed: 11 October 2018).
- Nursing and Midwifery Council (2018b) Realising Professionalism: Standards for Education and Training. Part 3: Standards for Prescribing Programmes. [www.nmc.org.uk/globalassets/sitedocuments/education-standards/programme-standards-prescribing.pdf](http://www.nmc.org.uk/globalassets/sitedocuments/education-standards/programme-standards-prescribing.pdf) (Last accessed: 11 October 2018).
- O'Brien MA, Rogers S, Jamtvedt G et al (2007) Educational outreach visits: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*. Issue 4. CD000409. doi: 10.1002/14651858.CD000409.pub2.
- O'Mahony D, Gallagher PF (2008) Inappropriate prescribing in the older population: need for new criteria. *Age and Ageing*. 37, 2, 138-141. doi: 10.1093/ageing/afm189.
- O'Mahony D, O'Sullivan D, Byrne S et al (2015) STOPP/START criteria for potentially inappropriate prescribing in older people: version 2. *Age and Ageing*. 44, 2, 213-218. doi: 10.1093/ageing/afu145.
- Orme S, Morris V, Gibson W et al (2015) Managing urinary incontinence in patients with dementia: pharmacological treatment options and considerations. *Drugs and Aging*. 32, 7, 559-567. doi: 10.1007/s40266-015-0281-x.
- Page A, Clifford R, Potter K et al (2016) The feasibility and effect of deprescribing in older adults on mortality and health: a systematic review and meta-analysis. *British Journal of Clinical Pharmacology*. 82, 3, 583-623. doi: 10.1111/bcp.12975.
- Parr JM, Kavanagh DJ, Cahill L et al (2009) Effectiveness of current treatment approaches for benzodiazepine discontinuation: a meta-analysis. *Addiction*. 104, 1, 13-24. doi: 10.1111/j.1360-0443.2008.02364.x.
- Pirmohamed M, James S, Meakin S et al (2004) Adverse drug reactions as cause of admission to hospital: prospective analysis of 18 820 patients. *BMJ*. 329, 7456, 15-19. doi: 10.1136/bmj.329.7456.15.
- Pollmann AS, Murphy AL, Bergman JC et al (2015) Deprescribing benzodiazepines and Z-drugs in community-dwelling adults: a scoping review. *BMC Pharmacology and Toxicology*. 16, 19. doi: 10.1186/s40360-015-0019-8.
- Reeve E, To J, Hendrix I et al (2013a) Patient barriers to and enablers of deprescribing: a systematic review. *Drugs and Aging*. 30, 10, 793-807. doi: 10.1007/s40266-013-0106-8.
- Reeve E, Wiese MD, Hendrix I et al (2013b) People's attitudes, beliefs, and experiences regarding polypharmacy and willingness to deprescribe. *Journal of the American Geriatrics Society*. 61, 9, 1508-1514. doi: 10.1111/jgs.12418.
- Reeve E, Thompson W, Farrell B (2017a) Deprescribing: a narrative review of the evidence and practical recommendations for recognizing opportunities and taking action. *European Journal of Internal Medicine*. 38, 3-11. doi: 10.1016/j.ejim.2016.12.021.
- Reeve E, Ong M, Wu A et al (2017b) A systematic review of interventions to deprescribe benzodiazepines and other hypnotics among older people. *European Journal of Clinical Pharmacology*. 73, 8, 927-935. doi: 10.1007/s00228-017-2257-8.
- Samuelsson E, Odeberg J, Stenzelius K et al (2015) Effect of pharmacological treatment for urinary incontinence in the elderly and frail elderly: a systematic review. *Geriatrics and Gerontology International*. 15, 5, 521-534. doi: 10.1111/ggi.12451.
- Scott S, Clark A., Farrow C et al (2018a) Deprescribing admission medication at a UK teaching hospital; a report on quantity and nature of activity. *International Journal of Clinical Pharmacy*. doi: 10.1007/s11096-018-0673-1.
- Scott S, Clark A, Farrow C et al (2018b) Deprescribing practice at a UK teaching hospital: reactive or proactive? *International Journal of Pharmacy Practice*. 26, 1, 4-20.
- Scott IA, Hilmer SN, Reeve E et al (2015) Reducing inappropriate polypharmacy: the process of deprescribing. *JAMA Internal Medicine*. 175, 5, 827-834. doi: 10.1001/jamainternmed.2015.0324.
- Sinnott C, McHugh S, Browne J et al (2013) GPs' perspectives on the management of patients with multimorbidity: systematic review and synthesis of qualitative research. *BMJ Open*. 3, e003610. doi: 10.1136/bmjopen-2013-003610.
- Sohn W, Ismail A, Tellez M (2004) Efficacy of educational interventions targeting primary care providers' practice behaviors: an overview of published systematic reviews. *Journal of Public Health Dentistry*. 64, 3, 164-172. doi: 10.1111/j.1752-7325.2004.tb02747.x.
- Stranks EK, Crowe SF (2014) The acute cognitive effects of zopiclone, zolpidem, zaleplon, and eszopiclone: a systematic review and meta-analysis. *Journal of Clinical and Experimental Neuropsychology*. 36, 7, 691-700. doi: 10.1080/13803395.2014.928268.
- Suehs BT, Davis C, Franks B et al (2016) Effect of potentially inappropriate use of antimuscarinic medications on healthcare use and cost in individuals with overactive bladder. *Journal of the American Geriatrics Society*. 64, 4, 779-787. doi: 10.1111/jgs.14030.
- Suzuki Y, Suzuki H, Umetsu R et al (2015) Analysis of the interaction between clopidogrel, aspirin, and proton pump inhibitors using the FDA adverse event reporting system database. *Biological and Pharmaceutical Bulletin*. 38, 5, 680-686. doi: 10.1248/bpb.b14-00191.
- Thillainadesan J, Gnjidic D, Green S et al (2018) Impact of deprescribing interventions in older hospitalised patients on prescribing and clinical outcomes: a systematic review of randomised trials. *Drugs and Aging*. 35, 4, 303-319. doi: 10.1007/s40266-018-0536-4.
- Todd A, Husband A, Andrew I et al (2016) Inappropriate prescribing of preventative medication in patients with life-limiting illness: a systematic review. *BMJ Supportive and Palliative Care*. 7, 2, 113-121. doi: 10.1136/bmjspcare-2015-000941.
- Turner JP, Jansen KM, Shakib S et al (2016) Polypharmacy cut-points in older people with cancer: how many medications are too many? *Supportive Care in Cancer*. 24, 4, 1831-1840. doi: 10.1007/s00520-015-2970-8.
- Verster JC, Spence DW, Shahid A et al (2011) Zopiclone as positive control in studies examining the residual effects of hypnotic drugs on driving ability. *Current Drug Safety*. 6, 4, 209-218. doi: 10.2174/157488611798280933.
- Vouri SM, Kebodeaux CD, Stranges PM et al (2017) Adverse events and treatment discontinuations of antimuscarinics for the treatment of overactive bladder in older adults: a systematic review and meta-analysis. *Archives of Gerontology and Geriatrics*. 69, 77-96. doi: 10.1016/j.archger.2016.11.006.
- Walsh K, Kwan D, Marr P et al (2016) Deprescribing in a family health team: a study of chronic proton pump inhibitor use. *Journal of Primary Health Care*. 8, 2, 164-171. doi: 10.1071/HCI15946.
- Xie Y, Bowe B, Li T et al (2017) Risk of death among users of proton pump inhibitors: a longitudinal observational cohort study of United States veterans. *BMJ Open*. 7, 6, e015735. doi: 10.1136/bmjopen-2016-015735.