RMOC London Polypharmacy Working Group

Medicines Optimisation Reviews to Reduce Inappropriate Polypharmacy and Promote Safe Deprescribing

Update to the report made to the London RMOC in July 2018

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On behalf of the London RMOC Polypharmacy Subgroup

The first stop for professional medicines advice
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Executive Summary

This report was first presented to London Regional Medicines Optimisation Committee (RMOC) in July 2018. The content of the report reflects the views of the authors at that point. It has been reviewed in August 2019 to ensure it remains in line with current policy; the literature review was not repeated.

The London RMOC Polypharmacy Working Group has been established to identify the key features of polypharmacy and to summarise how medication review can be used to address inappropriate polypharmacy. The working group will make a recommendation to the London RMOC on the delivery model necessary to tackle problematic polypharmacy in the region. Addressing problematic polypharmacy is a key component of the World Health Organisation (WHO) report on medication errors.

There is no standard definition of polypharmacy, however **problematic or inappropriate polypharmacy** involves prescribing multiple medicines to a patient, where the risks of treatment using the prescribed combination outweigh the perceived benefits.

Inappropriate polypharmacy and multiple-morbidity exacerbate the risk of a patient experiencing a medication error, which has been shown to result in increased hospitalisations, increased consultations in primary care, and worse patient experience. These have direct cost impact to the National Health Service (NHS).

A structured medication review, critically examining a person’s medicines to reach an agreement with the person about optimal treatment, is recommended by the National Institute of Health and Care Excellence (NICE) for patients taking multiple medicines. Organisations will need to consider how they will use available resources and tools to identify patients who are likely to benefit from a medication review. This may include use of the Electronic Frailty Index, PEONY, ePACT2 polypharmacy dashboard, or another, local tool.

A range of health care professionals may be involved in providing reviews of medication; professionals should have the appropriate skills and competence to identify and resolve medication-related problems to avoid patient harm. As polypharmacy is usually the result of a lifetime of prescribing decisions, this is a highly complex task. Training to conduct medication review should recognise the skills and knowledge each professional needs to exhibit to do this well. There are a range of resources already available that can be used to support this. Consideration should be given to how professionals can be developed to identify and resolve increasingly complex cases of problematic polypharmacy.

Medication review has demonstrated itself as an effective intervention for improving blood pressure control, diabetes control, and medication adherence. There is mixed evidence for the benefits of medication review in terms of avoiding hospitalisations or mortality. As there is no single definition of medication review, drawing firm conclusions from the evidence base can be challenging as the way in which an intervention is delivered is likely to vary from one trial to another. Critiquing the evidence base can provide useful information about what the characteristics that are likely to make a medication review effective or ineffective.
Medication reviews conducted in isolation are likely to be ineffective; therefore the process needs to be embedded into standard clinical care. To ensure stewardship of NHS resources, medication reviews should be targeted towards those who are likely to benefit most. This means using available resources (e.g. ePACT2 Polypharmacy metrics) to identify patients.

Evaluation of the impact of medication review should focus on things that are measurable and achievable. NHS Business Service Authority (BSA) polypharmacy metrics are a widely available measure that has been designed for this purpose. Other useful measures may include reporting number of reviews conducted and any changes to prescribing that arise from the review.

The RMOC Subgroup is now required to:

- Identify how medication reviews to address polypharmacy could be delivered
- Suggest a delivery model and identify barriers / enablers to achieve this
Foreword

This document was prepared in 2018 for the London Regional Medicines Optimisation Committee (RMOC) addressing the challenge of reducing inappropriate polypharmacy. A subgroup of the RMOC was convened and held two meetings to discuss how this could be achieved. Contributors to the meetings are listed in the table below. The resulting paper both captures these discussions and identifies key literature focussing on effective medication review to minimise inappropriate polypharmacy and optimise medicines. It provides recommendations for the competencies and workforce required to do this.

Since the publication of this report both the NHS Long Term Plan and the Community Pharmacy Contractual Framework have been published. Both publications introduce important changes to pharmacy service provision in the NHS. These include the introduction of more pharmacists in General Practice, inclusion of medication review services in the GP contract, and the establishment of Primary Care Networks. New services such as Structured Medication Review and medicines reconciliation in community pharmacy provide additional opportunities to reduce inappropriate pharmacy. It is interesting to note that our 2018 document recommended both embedding medication review into routine practice and medicines reconciliation on discharge from hospital as measures to address polypharmacy. The profile of polypharmacy and deprescribing have also been raised nationally, with the launch of the Chief Pharmaceutical Officer’s National Overprescribing Review, publication of the Royal Pharmaceutical Society guidelines for tackling polypharmacy and establishment of the English Deprescribing Network. Finally, there have been developments around workforce and expertise to create medicines specialist hubs to address the varying complexity of polypharmacy medication reviews.

The following paper should therefore be read in the context of these developments and we are confident that its contents are still both relevant and useful in developing new services to address the challenge of inappropriate polypharmacy through medication review.

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The organisations the contributors work for were correct at time of writing the report in July 2018.
Introduction

In 2018, the London RMOC established a Working Group to consider how polypharmacy could be tackled with the following objectives:

**Objectives of Working Group**

1. Describe contextual background
2. Identify key features of the polypharmacy pathway – how does someone end up on multiple medicines?
3. Summarise links to medication review evidence base for minimising inappropriate polypharmacy
4. Identify how medication reviews to address polypharmacy could be delivered
5. Suggest a delivery model

This document has been produced after purposive sampling of the extensive literature on polypharmacy and medication review. A systematic review of the literature was not performed as these have previously been conducted several times by various authors in the past. Many of these systematic reviews have been considered in the production of this discussion document. An overview of systematic reviews of pharmacist-led medication review in community settings, published by Jokanovic et al in 2017, for example, provides a good starting point to see the breadth of research that has been conducted in this area [1].
Introduction to Polypharmacy: Why is it important?

Much has been written about polypharmacy over the years. It can broadly be separated into appropriate polypharmacy (prescribing where medicines use has been optimised) and problematic/inappropriate polypharmacy (prescribing multiple medicines where harm outweighs benefit, or where intended benefit is not realised). Although previous work on polypharmacy has attempted to define the phenomenon based on the number of medicines taken, there is no consistent approach, and very little has been written to advocate using appropriateness rather than number of medicines. [2] Primary research published between 2000 and 2016 has used a range of numerical values to define polypharmacy, with “≥ 5 medicines” occurring most frequently. 8% of studies used “≥ 10 medicines” to describe a state of more severe polypharmacy (hyperpolypharmacy, excessive polypharmacy and severe polypharmacy). [2] The focus of the London RMOC Polypharmacy Working Group will be to minimise problematic polypharmacy, so that polypharmacy required in the appropriate in pursuit of medicines optimisation continues.

Two key documents, NICE Key Therapeutic Topic [KTT18] “Multimorbidity and polypharmacy” [3] and The King Fund’s “Polypharmacy and medicines optimisation” [4], provide comprehensive reviews of the phenomena of polypharmacy.

NHS England Regional Medicines Optimisation Committees were mandated to support the Medicines Value Programme to optimise use of medicines, which involves tackling inappropriate polypharmacy. [5] Addressing polypharmacy is a key component of the World Health Organisation (WHO) report on Medication Errors. [6] This is important because there is a clear link between polypharmacy, multiple-morbidity, and exacerbating the risk of experiencing medication errors. [7] For example, the number of drug-related problems a patient experiences increases approximately linearly with increasing number of drugs prescribed. [8]

Offering patients with polypharmacy and multimorbidity a medication review is a key intervention identified by NICE through its Key Therapeutic Topics. Local strategic medicines optimisation plans should incorporate an action plan to address this. [3]

Impact of harm from medicines

The estimated cost to the NHS of avoidable adverse drug reactions, which are also more prevalent when someone is taking multiple medicines, is £98.5 million/annum, with the majority of this cost originating in primary care. [7]

Supporting the decision to address medication harm through providing medication review, a recent, prospective study of medication-related harm has reported the person-centred and financial impact from medication-related harm (MRH). A MRH event rate of 556 per 1000 discharges was calculated, with 79% of cases of MRH associated with further use of an NHS service with 8 weeks of hospital discharge, included GP consultation and hospital readmission. The study authors estimated that each case of MRH cost the health economy approximately £550; approximately 62% of costs associated with MRH are possibly or definitely preventable and therefore the aim should be to avoid these. MRH identified by this study included adverse drug reactions (73%), non-adherence (11%) and medication error alone (3%). [9]
Pathway to polypharmacy
The pathway in Figure 1 highlights how polypharmacy occurs in an individual. Polypharmacy results from a lifetime of prescribing decisions. These prescribing decisions, taken independently, may have been based on the best available evidence or on expert guidelines, approaches encouraged by evidence-based practice. “Organ-based” specialists are likely to follow best practice for their condition and may not be fully aware of the impact of their prescribing decisions on a person taking other medicines, with multimorbidity, or with frailty. When people are on multiple medicines, the marginal benefit from any additional medicine is likely to be smaller than anticipated through clinical trial evidence. This highlights the importance of an holistic approach to tackling polypharmacy, and employing a person-centred approach to medicines selection.

Pathways to polypharmacy

![Pathways to polypharmacy](image)

*Figure 1 Pathways to polypharmacy. Courtesy of Prof E Baker [10]*

Figure 1: In health, most prescriptions are for short term illnesses, symptom relief and primary prevention. As long term conditions develop, prescriptions are increasingly for secondary prevention and disease control. As side effects develop, more medicines are added through the prescribing cascade. The figure indicates the ideal scenario of appropriate deprescribing by medication review to prevent inappropriate polypharmacy in frail elderly with limited life expectancy. Drivers of polypharmacy along the medicines pathway

The medicines pathway shown in Figure 2 describes the process of identifying a need for a medicine (diagnosis), deciding which medicine to use (prescribing or purchase), obtaining the medicine (supply) and taking the medicine (administration). It also demonstrates potential outcomes after starting treatment including stopping the medicine, monitoring effect of the medicine and adjusting the prescription or continuing it without monitoring.
This pathway requires interaction of the person taking the medicine with many different people and agencies. These may include prescribers (e.g. doctors, pharmacists, nurses, dentists), suppliers (e.g. pharmacies, shops, internet, families and friends), help with administration (e.g. nurses, carers, families and friends) and monitoring (e.g. nurses, doctors, pharmacists). Along this pathway there are many drivers that could lead to polypharmacy (see Table 1). The key issue is that the person taking the medicines should be empowered to be an active decision maker and in control of their own medicines. The multiple agencies involved in the medicines pathway mean that tackling polypharmacy is an issue for everyone.
<table>
<thead>
<tr>
<th>Diagnosis</th>
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<tbody>
<tr>
<td>● Wrong diagnosis: treatment doesn’t work so escalates</td>
</tr>
<tr>
<td>● Provisional diagnosis: subsequently is refined but treatment isn’t changed appropriately</td>
</tr>
<tr>
<td>● Diagnosis changes e.g.</td>
</tr>
<tr>
<td>○ recovers but treatment is not stopped</td>
</tr>
<tr>
<td>○ deteriorates, but ineffective treatment is not stopped as other treatment is started</td>
</tr>
<tr>
<td>● Multimorbidity</td>
</tr>
<tr>
<td>● Specialty/single organ focussed, no general overview</td>
</tr>
<tr>
<td>● Diagnoses poorly documented</td>
</tr>
<tr>
<td>○ Link to original indications for treatment is lost</td>
</tr>
<tr>
<td>● Drug side effects wrongly diagnosed, leading to prescribing cascade</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prescribing</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Multiple prescribers, poorly coordinated</td>
</tr>
<tr>
<td>● Professional fragmentation</td>
</tr>
<tr>
<td>● Lack of patient centred approach to prescription</td>
</tr>
<tr>
<td>● Lack of shared health records</td>
</tr>
<tr>
<td>● Poor awareness of evidence base in making prescribing decisions</td>
</tr>
<tr>
<td>● Prescriptions from multiple sources including private practice and overseas – more likely to be outside NICE guidance</td>
</tr>
<tr>
<td>● Lack of expertise in guiding patients towards non-pharmacological alternatives</td>
</tr>
<tr>
<td>● Perverse incentives to prescribe e.g. QOF</td>
</tr>
<tr>
<td>● Patient’s belief in ‘a pill for all ills’</td>
</tr>
<tr>
<td>● Industry pressure and propaganda</td>
</tr>
<tr>
<td>● No stop or review dates</td>
</tr>
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<thead>
<tr>
<th>Supply</th>
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<tbody>
<tr>
<td>● Automated repeat prescriptions</td>
</tr>
<tr>
<td>● Hoarding and sharing</td>
</tr>
<tr>
<td>● Out of date medicines</td>
</tr>
<tr>
<td>● Perverse incentives for community pharmacists to deliver volume</td>
</tr>
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<table>
<thead>
<tr>
<th>Administration</th>
</tr>
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<tbody>
<tr>
<td>● Multiple contributors with limited understanding of medicines e.g. family, social care, care homes</td>
</tr>
<tr>
<td>● Assistive devices e.g. blister pack</td>
</tr>
<tr>
<td>● Lack of an honest conversation between patients and professionals around adherence</td>
</tr>
<tr>
<td>● Lack of practical skills administering medicines and understanding what patients actually do with medicines</td>
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<table>
<thead>
<tr>
<th>Stopping</th>
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</thead>
<tbody>
<tr>
<td>● Prescribers</td>
</tr>
<tr>
<td>○ Reluctance to stop drug prescribed by specialist</td>
</tr>
<tr>
<td>○ Reluctance to stop drug initially prescribed by practice colleague</td>
</tr>
<tr>
<td>○ Lack of evidence-based guidelines for deprescribing to defend practice</td>
</tr>
<tr>
<td>○ Emphasis of training is on starting not stopping medicines – independent prescribers are sold as ‘prescribers’, so feel the need to prescribe!</td>
</tr>
<tr>
<td>○ Underappreciation of the risks and harms of polypharmacy</td>
</tr>
<tr>
<td>○ Lack of time to have the discussions required</td>
</tr>
<tr>
<td>○ Lack of expertise</td>
</tr>
<tr>
<td>○ Lack of consideration of the relative merits of value based (what the patient wants) and evidence-based decision making</td>
</tr>
<tr>
<td>● Patients</td>
</tr>
<tr>
<td>○ Told to take drug by prescriber so either take it or don’t but don’t admit it</td>
</tr>
<tr>
<td>○ Underappreciation of the risks and harms of polypharmacy</td>
</tr>
<tr>
<td>○ Suspicion of ‘deprescribing’ as ‘saving money’ not improving health</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Monitoring / adjustment</th>
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<tbody>
<tr>
<td>● Lack of overall ownership of the whole prescription for a patient in a fragmented healthcare system</td>
</tr>
<tr>
<td>● Lack of empowerment of people in the pathway e.g.</td>
</tr>
<tr>
<td>● Doing monitoring (e.g. taking BP) without understanding why/how it will affect overall therapy for patient</td>
</tr>
<tr>
<td>● Task driven vs. patient driven</td>
</tr>
<tr>
<td>● Lack of consideration of medication adherence when adjusting therapy</td>
</tr>
<tr>
<td>● Outcome driven reactive monitoring – not patient centred</td>
</tr>
<tr>
<td>● Lack of awareness of treatment targets</td>
</tr>
<tr>
<td>● Lack of patient understanding and empowerment</td>
</tr>
<tr>
<td>● Gap between recommendations e.g. by non-prescribers such as pharmacists conducting medicines reviews and implementation e.g. by prescribers such as GPs</td>
</tr>
<tr>
<td>● GDPR restricting access to medical notes</td>
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</table>

**Table 1 Drivers to polypharmacy**
**Prevention and treatment of polypharmacy**

Tackling polypharmacy requires both medicines optimisation for patients already taking multiple medicines and measures to try to prevent patients from accumulating multiple prescriptions inappropriately in the future. Figure 3 attempts to start the conversation about what prevention and treatment might look like at different stages on a patient journey to polypharmacy and to suggest some measures that could be needed to address this.

<table>
<thead>
<tr>
<th>When</th>
<th>No regular medicines</th>
<th>1-4 regular medicines</th>
<th>5-10 regular medicines</th>
<th>&gt;10 regular medicines</th>
</tr>
</thead>
<tbody>
<tr>
<td>What</td>
<td>Primary prevention</td>
<td>Secondary prevention</td>
<td>Tertiary prevention</td>
<td>Treatment</td>
</tr>
<tr>
<td>Encourage alternatives to medicines, education, lifestyle, social support, counselling</td>
<td>Monitoring and review, Appropriate deprescribing</td>
<td>Structured medicines optimisation review</td>
<td>Multidisciplinary review, consider onward referral</td>
<td></td>
</tr>
<tr>
<td>How</td>
<td>Public health campaigns</td>
<td>Workforce campaign, Training in deprescribing as well as prescribing</td>
<td>Deprescribing guidance and support, Empower patients</td>
<td>Regional medicines specialist hubs embedded in and commissioned by STPs, Expertise in managing complex prescribing</td>
</tr>
</tbody>
</table>

*Figure 3 Prevention and treatment of polypharmacy. Courtesy of Prof E Baker [11]*

Given that the prevention and treatment of (inappropriate) polypharmacy is a whole workforce, and indeed public health, issue it is important to consider enablers for change across the medicines pathway.
| Empowerment of patients and the public | • Empowering patients to ask for medicines reviews, admit to non-adherence and ensure their values are heard, documented and reviewed  
• Public health campaign – balanced debate of the pros and cons of medicines and the hazards of polypharmacy |
|---------------------------------------|------------------------------------------------------------------------------------------------|
| Coordination of care                  | • Shared health records  
  o A clearly defined treatment record capturing all decisions around medicines including the actions and reasons – both current and lifetime  
• Profession-neutral activities and training to empower all professions to contribute to the optimal use of medicines for all patients |
| Workforce standards for the optimal use of medicines | • Standards for every interaction with the patient and their medicines to empower and support staff in the optimal use of medicines  
• Increasing skills and experience allows progression and encourages staff development and retention  
• Whole workforce supported by specialist hubs e.g. located in STPs that can advise on complex patients |
| Better guidance and resources         | • The ‘Medicines and Prescribing’ centre (the National Prescribing Centre as was) publishes the key therapeutic topic of multimorbidity and polypharmacy – which collects resources to support practice – increase national awareness and link with RMOC polypharmacy work ([https://www.nice.org.uk/about/nice-communities/medicines-and-prescribing](https://www.nice.org.uk/about/nice-communities/medicines-and-prescribing))  
• Specialist hubs could support the whole workforce through multidisciplinary meetings, training days and developing the evidence base |

*Figure 4 Enablers for the prevention and treatment of polypharmacy*
How could polypharmacy be addressed?

Medication Reviews

Definition
There have been a large number of controlled trials (both randomised and non-randomised) published in recent years, which attempt to assess the efficacy of conducting a medication review. These reviews are often specific to the setting in which they are conducted (e.g. community [12] [13] [14] [15], hospital inpatients [16], community pharmacy [17], nursing home [18]) and for the professional conducting the review (e.g. community pharmacist [17], hospital pharmacist [16], geriatrician). There is no single, official definition of what constitutes a medication review despite the widespread nature of the intervention. This lack of a single definition has resulted in significant heterogeneity between studies.

NICE guidance
NICE has recommended that a structured medication review is considered for patients taking multiple medicines. [19]

“A structured, critical examination of a person’s medicines with the objectives of reaching an agreement with the person about treatment, optimising the impact of medicines, minimising the number of medication-related problems and reducing waste.” [19]

Medication review, appropriately implemented, can be used as a method to minimise problematic polypharmacy, encourage appropriate prescribing and implement safe deprescribing. [19] The term “Medicines Optimisation Review” could also be used to define this.

In assessment of the clinical and cost-effectiveness of medication reviews, NICE critiqued available trial evidence and considered the discussion of the guideline development group.

Clinical effectiveness
There is low-quality evidence that medication review has been beneficial at improving a number of surrogate outcomes such as blood pressure control, cholesterol control, INR control, asthma severity and HbA1c. [19] Moderate quality evidence is available to demonstrated reduction in night-time wakening from asthma, need for asthma reliever use, number of falls in elderly patients and a number of pain scores. [19] Medication reviews have had beneficial impact on reducing inappropriate medication use. [19] There is equivocal evidence about whether medication reviews improve adherence, with two low-quality studies showing improvement, and three moderate-quality RCTs showing no difference. [19]

It is important to note that NICE was aware when it made its recommendations that medication review has not yet demonstrated efficacy at avoiding hospitalisations or mortality. The improvement in terms of surrogate markers is likely a function of the relatively direct relationship between the intervention and the outcome. The desire to use mortality as the primary outcome in medication review trials has been challenged; mortality and hospitalisations are subject to many confounding
factors, which would necessitate either a very large treatment effect or a large population for an adequately powered trial of medication review. [20] Resultantly, trials of medication review rarely use mortality as a primary efficacy outcome, and therefore we are unable to determine whether medication review can avoid death.

A research group from Belgium has proposed an international core set of outcomes to be used in trials of medication review. Their proposal was based on a systematic review of the literature to identify all of the different types of outcome used to date in trials (327 distinct outcomes identified across 47 published studies) [20], followed by a three-round Delphi survey to seek patient and professional consensus on what was considered most important. Seven outcomes that were identified as priorities for use in trials of medication review were: drug-related hospital admissions; drug overuse; drug underuse; potentially inappropriate medications; clinically significant drug-drug interactions; health-related quality of life; pain relief. [21]

**Cost-effectiveness**

When assessing the cost-effectiveness of medication review compared to usual care, NICE concluded that medication review was unlikely to be cost-effective, with an Incremental Cost Effectiveness Ratio (ICER) > £50,000 / Quality Adjusted Life Year (QALY). They drew this conclusion from review of 2 studies with partially applicable evidence and minor limitations. [19]

The HOMER study research group investigated the effectiveness of two pharmacist home-visits following discharge from an emergency hospital admission, for patients aged over eighty years who were taking two or more medicines. This study found this model of medication review led to an increased number of hospital readmissions (RR=1.3, 95% CI 1.07 to 1.58, p=0.009), and there was no difference in EQ-5D between intervention and control arms. [22] As there is a cost associated with the pharmacist intervention, the medication review in this model will not have been cost-effective. Perraudin et al (2016) conducted a systematic review of economic evaluations looking at a range of professional pharmaceutical services implemented across Europe. As part of their analysis, they cited the HOMER study as evidence that medication review is not cost-effective, but also cited a Spanish study which found medication review was 100% likely to be cost-effective at a willingness-to-pay threshold of EUR30,000/QALY. [23]

Other studies (with potentially serious limitations) considered by NICE provide more conflicting evidence on the matter of cost-effectiveness. The guideline development group were of the opinion that the studies were compromised in their ability to demonstrate true cost-effectiveness due to their short time horizons (6 months) and methodology that wouldn’t necessarily be repeated in practice (community pharmacists delivering intervention in patients’ own homes); focusing the intervention towards specific groups (see below) could improve its cost-effectiveness. There was no cost-effectiveness evidence for medication review conducted by primary-care pharmacists or other health care professionals. [19]

A review of two 2 randomised controlled trials (RCTs) and 6 observational studies from different countries showed that a pharmacist-led medication review for patients in care homes results in a mean reduction in spend on medication. Although full details of how the included studies were identified are not provided by the authors, all but one (conducted in Singapore) of the eight studies
showed that pharmacist-led medication review would reduce spend on medicines; there were three studies (two RCTs) included from the UK. [24]

**NICE Recommendations**

Following its systematic review of the literature and comprehensive discussion by the guideline development group, NICE concluded that a structured medication review should be considered for some groups of people where clear purpose for the review has been identified and should be prioritised for patients most likely to benefit. These groups include: people at high risk of medication-related problems (e.g. taking multiple medicines), people with special needs (e.g. care home residents, older people), and people with chronic/long-term conditions, particularly where there is an emerging or changing evidence base. [Recommendation 25]. [19]

**Implementation of medication reviews in practice**

It is clear that a “one size fits all” approach will not be suitable for either patients or clinical staff involved in dealing with polypharmacy. Just as different patients will have different requirements, different clinicians will be able to engage with different levels of patient complexity. This should be considered when planning for new services, or establishing expectations about what can be delivered. Effective medication review should incorporate optimal use of evidence, combined with patients’ values, preferences, attitudes and beliefs, using clinician judgement to agree a bespoke solution. [25] A synthesis of the evidence-base for the components to include in medication review is underway. [26] There is emerging evidence from a service evaluation that medicines optimisation review targeted at the right point in a patient’s journey (in this case immediate post-discharge from hospital) may have an impact on reducing rate of readmission to hospital (resultant cost avoidance for a Trust) and on length of any subsequent admission (saving for CCGs if >30 days post-discharge). [27] [28]

**Healthcare organisations and practitioners**

NICE requires that organisations should determine the most appropriate health care professional to conduct a medication review, taking into account their technical knowledge of managing medicines, knowledge of therapeutics, and communication skills [Recommendation 26]. [19] It is desirable that the person conducting the medication review has an official relationship with both the patient and, where applicable, the prescriber. Collaboration between pharmacist and GP, for example, has been highlighted as a contributing factor to support uptake of recommendations when medication review is conducted in home-dwelling patients. [29] Indeed, where clinicians have conducted medication reviews without linking in with the regular health care provider, there is evidence that no benefit is derived.

Different kinds of review will require different appointment lengths and will draw on different clinician skillsets. To take a person-centred approach, elucidating what is important to the patient will be an important first step to guide the appointment length. As available resources vary, professionals and patients will have differing amounts of time available, therefore effective prioritisation will be paramount.

A poly-de-prescribing (PDP) clinic conducted by a specialist in geriatric medicine compared outcomes for a cohort of patients elderly patients who were prescribed ≥ 6 medicines at baseline. Patients were retrospectively allocated to either PDP (n=122) or non-responder (NR, n=55) based on if they
had ≥ 3 medicines stopped following clinic attendance; this relied on the GP agreeing to the intervention. [30] One of the interesting findings from this study is that an average of 7 medicines were stopped per patient in the intervention group, with no significant impact on hospitalisation or mortality between the two groups (not powered outcomes).

In a report commissioned by the British Pharmacological Society, it has been estimated that for every £1 invested by the NHS in hiring professionals skilled in the safe and effective use of medicines, £6 could be saved. This is through intervening to reduce adverse drug events, reduce prescribing errors, promoting adherence and deprescribing inappropriate medicines. [31] The PwC report relates to Clinical Pharmacologists, but could equally apply to appropriately trained and experienced pharmacists.

Polypharmacy needs to be seen as a health-system wide issue, not one that is owned or led by a single clinical group. There are a range of professions from both health and social care who need to be engaged to have a significant impact on polypharmacy. It is incumbent on these professions to ensure that polypharmacy is recognised as an organisational and local health economy priority (e.g. through the Sustainability and Transformation Partnerships).

It is important that medication review is not seen as a one-off intervention; a good review requires planning, execution, onward communication and follow-up, as shown in Figure 5 below. Two trials that limited patients to two health care professional visits failed to reduce hospitalisation through medication review; they may have had more success had there been a more person-centred approach to follow-up based on need. [22] [32]

![Figure 5 A patient centred approach to managing polypharmacy in practice](image-url)
Figure 6 Medicines Optimisation Review dependencies (finding from Working Group)
Training requirements
For medication review to be effective there must be appropriate recognition of the complexity of the task. A good medication review relies on the following professional attributes:

- Communication
- Prioritisation
- Clinical review skills
- Action planning
- Follow-up

Short, one-off training packages may not, on their own, be sufficient to support implementation of effective medication review. One criticism of the HOMER trial (which saw a 30% increase in hospitalisation following medication review) was that it only provided two days of training to pharmacists. [22] This may have been insufficient to adequately transmit the learning required to take on this complex intervention. Such an approach does not account for variation in clinician skill / experience, and is likely to have resulted in pharmacists who were either able to conduct an effective review before the intervention, or remained inadequately skilled throughout the intervention.

Training in use of data and metrics may be helpful when identifying patients at risk from inappropriate polypharmacy. South London HIN has developed a workshop to train staff to use ePACT2 and polypharmacy metrics, described below under “evaluation”. This was favourably received as it supported organisations to identify where prioritisation should be focussed. For example, organisations were able to identify patients that had “more than ten” or “more than twenty” medicines, to target a medication review. Approximately 8% of published studies use ten or more medicines to describe a state of more severe polypharmacy (hyperpolypharmacy, excessive polypharmacy and severe polypharmacy). [2]

Pharmacists already have access to a range of training packages that will support their ability to engage with patients and provide medication reviews. Examples of these packages provided by the CPPE include: Advanced Consultation Skills, Consulting with Older People, Introduction to Medication Review, Clinical Medication Review: a Person-Centred Approach, Polypharmacy. These training courses complement undergraduate and pre-registration pharmacist training, and any other foundation training a practitioner may undertake.

Specific considerations for deprescribing
Implementation of the findings of a medication review is likely to necessitate prescribing or deprescribing. Deprescribing requires the practitioner to be clinically competent to do so, in common with the requirement for prescribing. A medicines optimisation review conducted by someone other than a prescriber will require the additional step of communicating with the prescriber. As the NHS in England has GPs embedded at the centre of routine prescribing for patients, this should not pose a difficult challenge. GP engagement with the review process is important as in one study, lack of agreement by the GP to implement a change was the most common reason for changes not occurring (responsible in 87% of cases where a recommended change to medication was not implemented). [30] Where onward referral to a prescriber for action
is required, the process must identify how communication will happen and how GP buy-in will be sought.

Considering further the complexity of the deprescribing process, training needs to form an integral part of clinician support, as a shift in skills and mind-set are required if the issues of polypharmacy is to be addressed. Deprescribing has been defined as “the complex process required for the safe and effective cessation of inappropriate medication”. [3] In recognition of the challenge of satisfactorily implementing this intervention, an English “deprescribing network” has recently been established to support sharing of good practice. This is modelled on the success of the Canadian Deprescribing Network (CaDeN), established to bring together interested stakeholders (clinicians, patient advocates, health care leaders and academics) to promote deprescribing of medicines that may be causing harm or otherwise no longer of benefit. [34] Examples of the output produced by CaDeN include evidence-based clinical guidelines on deprescribing (PPIs, antihyperglycaemics, antipsychotics), patient decision aids to support deprescribing, and information pamphlets.

In recognition of the complexity of deprescribing, any attempts to stop prescriptions should be made by clinicians with appropriate competency. This includes having undertaken a robust foundation-level training that equips them with appropriate knowledge of medicines and their effects on people. [35] A structured approach to post-registration training may help prescribers meet this challenge; this recognises that prescribing is a complex skill that can develop with advancing experience of practice, could be explored. A proposed structure of training is presented in Table 2 below; this could be used to develop a competency framework to provide assurance about deprescribing practices. In this model, which describes medical and prescriber post-qualification development, prescribers should become independent in deprescribing at level 2.

<table>
<thead>
<tr>
<th>What</th>
<th>When (post qualification)</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1: Basic</td>
<td>Year 1</td>
<td>Foundation practitioners (doctors and independent prescribers)</td>
</tr>
<tr>
<td>Level 2: Intermediate</td>
<td>Year 2 to 5</td>
<td>Doctors and independent prescribers expanding their practice</td>
</tr>
<tr>
<td>Level 3: Advanced</td>
<td>Year 5 to 9</td>
<td>Specialist practitioners e.g. SpR, senior pharmacist IPs</td>
</tr>
<tr>
<td>Level 4: Very advanced</td>
<td>Years 10 onwards</td>
<td>Consultant pharmacists, consultant clinical pharmacologists, Care of the Elderly consultants, advanced clinical pharmacists, some GPs, General Medicine consultants</td>
</tr>
</tbody>
</table>

Table 2 Post-qualification prescriber training. Courtesy of Prof Emma Baker. [36] This model suggests a ‘profession-neutral’ framework that could be used to support (and assess) the development of prescribing competence after qualification

**Engagement with public and patients**

Engaging patients and the public about medicines optimisation is critical if we want to achieve change in behaviours. Public engagement could help develop the messages that are essential to present reviewing polypharmacy as an important health care intervention as opposed to a cost-saving exercise. It is important that patients are involved in the co-design of future pieces of work.
Identifying patients for medication review

Tools to identify problematic polypharmacy

NICE Key Therapeutic Topic on Multimorbidity and Polypharmacy highlights the importance of a person-centred approach to care. It is incumbent on health care professionals to be aware of the guidelines available, and implement these whilst taking account of patient values, attitudes, beliefs and preferences. [19] Patient decision aids and other tools are available to support this process. However, these cannot substitute for clinician expertise, familiarity with the risks and benefits of each medicine to the individual patient they are treating, and effective communication skills.

There are a wide range of tools available to support medication review. This includes tools to support identification of problematic medicines and combinations. A repository of tools to support clinicians involved in medication review may help, however, it is outside the scope of this report to critique these tools.

Organisations may choose to use the Electronic Frailty Index [37], which can be automatically run using primary care patient records to calculate a level of frailty that correlates with a person’s one-year hazard ratio for mortality and hospitalisation. Alternatively, the PEONY tool can be used to predict the likelihood that a person will have an emergency admission over the next year. [38]

The PINCER tool is able to audit GP practice systems to identify patients who are on medicines that commonly lead to medication errors. This system has demonstrated effectiveness in a pragmatic, cluster randomised trial at reducing the likelihood of a patient being exposed to a medication error. Cost effectiveness of the PINCER tool is thought likely if there is a willingness to pay of £75 per error avoided. [39] PINCER is being rolled out at a national level, therefore does not require any specific input from local RMOCs.

NHS Business Services Authority (NHS BSA) ePACT2 Polypharmacy Indicators

NHS BSA has recently launched a suite of prescribing indicators that allows GP practices and Clinical Commissioning Groups (CCGs) to compare themselves to one another in terms of specific polypharmacy domains. [40] The indicators measure the following:

- Average number of unique medicines per patients
- % patients prescribed 8 / 10 / 15 / 20 or more unique medicines
- % patients with an anticholinergic burden score of 6 / 9 / 12 or greater
- Multiple prescribing of anticoagulant and antiplatelet medicines
- % patients prescribed ≥ 2 unique medicines likely to cause kidney injury (DAMN medicines)
- % patients prescribed ≥ 2 unique medicines likely to cause kidney injury (DAMN medicines), one of which is an NSAID

Polypharmacy metric datasets are useful at a health system level (e.g. for CCGs to include in annual reports on prescribing) and at a GP practice level (e.g. to identify which patients to prioritise for medication review). [41] Organisations should be conscious that there is a lot of interest in measurement of the appropriateness of polypharmacy; additional indicator sets are in development.
**Cohorts with potential for problematic polypharmacy**

We have already discussed the cohorts of patients that NICE advocates prioritising for medication review (see page 16). There is a range of additional literature that looks at this issue. A recent observational study identified that patients who have recently been discharged from hospital are at increased risk of experiencing medication-related, which leads to substantial use of healthcare resources. This cohort of patients could reasonably be prioritised for a review to optimise medicines after discharge in order to reduce the financial burden from medication related harm. [9] The new Community Pharmacy Contractual Framework (published after this report was submitted to the London RMOC) includes a provision for delivery of medicines reconciliation in community pharmacy for patients who have been discharged from hospital. [42]

Part of appropriate recruitment of patients to medication review will involve providing them with sufficient information to get the most out of their medication review. This will involve agreeing what to expect from a review and encouraging preparation (e.g. to think about how they really take their medicines, adverse events they experience, etc). Tools available to support this include the Choosing Wisely UK campaign [43], and leaflets produced by NHS bodies (e.g. NHS Highlands [44]) and the Royal Pharmaceutical Society. [45]

Lower educational attainment has been associated with an increased risk of polypharmacy. [46] As a result, professionals must be able to adapt their style and message based on the baseline knowledge and understanding of the person having their medicines reviewed. Engagement with patients whilst services are being designed may help identify early in the process any specific considerations.

**Environment**

Evidence has shown that medication reviews are conducted in a variety of settings, which will have impact on accessibility of patient records and specialist reference sources. Inadequate access to medical records was a feature of the HOMER trial, in which medication review led to an increased number of hospitalisations. [22]

The location of the review may also influence how it is perceived by the patient. For example, a medication review conducted in a GP practice may be perceived to be more closely aligned to their regular care than one provided in another health centre. Conversely, a review conducted in a hospital may emphasise medication review as an important specialist clinical service.

A basic review of medicines already occurs as part of medicines reconciliation at admission to hospital and when writing a discharge summary. However, this is unlikely to be the most appropriate opportunity to conduct a thorough explanation of medicines as urgent clinical needs should be prioritised. Additionally, discussing their medicines may not be a priority for patients about to go home. Nonetheless, discharge from hospital has recently been identified as a period during which a high proportion of patients experience medicines-related harm, and conducting a medication review could help avoid this harm. [9]
There is evidence from the north of England that referring patients for a post-discharge review of medication can reduce rate of readmission and reduce the length of any subsequent admission. Patients who did not receive a post-discharge medication review were three times as likely to be admitted to hospital (OR 3.1; 95% CI 2.1 to 4.7; readmission 0 to 30 days post discharge) compared to those who received a medication review. A similar pattern was seen for odds of hospital readmission at 31-60 days and at 61-90 days. The absolute rate of readmission dropped from 16% to 5.8% at 0-30 days if a medication review was received. This was based on a service that identified patients whom it was thought were likely to benefit from a review of medicines (including patients on four or more medicines), which was delivered on a voluntary basis by community pharmacies. Additionally, patients had autonomy over whether they attended their medication review and could be “rejected” from the service by the community pharmacist for various reasons (e.g. if the patient did not respond to contact attempts), with 54.7% of referrals accepted and a total of 30.5% completed. [27] Financial modelling on behalf of one specific CCG has estimated that, by introducing a service to refer patients for a post-discharge review of medicines could save the local health economy over £1.3 million if 2,600 patients are referred into the service annually. This estimate relies on referral into a service already funded by NHS England (costs not included in the estimate). [28]

**What recommendations can the RMOC make to support NHS organisations in addressing problematic polypharmacy?**

As demonstrated by a survey of the approaches employed by London Trusts and CCGs to tackle polypharmacy (report available here), there are already various services established, highlighting the heterogeneous nature of what is required. These include commissioning medication review of high risk or frail patients, GP prescribing incentive schemes, community pharmacy referral schemes and integrated medicines optimisation services. These services have arisen from different local needs and drivers. Notably, most of the services identified in this survey were delivered by pharmacists, though some used multidisciplinary teams (MDTs), consultants and other allied health professionals.

Organisations need to be clear about their individual needs in relation to medication review. Using an agreed framework, Medicines Optimisation leaders in an organisation should be able to identify what to deliver to address the problem locally.

This RMOC Working Group can learn from trials of medication review that have failed to demonstrate a benefit to patients, or have shown harm from medication review, by ensuring interventions do not repeat the methodological mistakes of these trials.

The RMOCs should work with appropriate commissioners to prioritise medicines optimisation review to reduce inappropriate polypharmacy and to encourage safe prescribing. The following should be ambitions for the NHS:

- Organisations to engage with the national roll-out of the PINCER tool to help identify patients at high risk of harm related to medication
- Organisations to implement a process for identifying patients at high risk of medication harm
• All patients receiving ten or more medicines, and all people receiving a high risk medicine, will receive a medicines optimisation review before discharge from hospital
• All patients registered with a GP will have a medicines optimisation review annually using a validated tool
• A minimum skill set will be identified for clinicians conducting medicine reviews

Individuals conducting medication review
In line with NICE, individual organisations will need to decide which health care professionals are most appropriate to conduct medication reviews. This decision should be based on an individual’s knowledge and skills, including “technical knowledge of processes for managing medicine, therapeutic knowledge on medicines use, effective communication skills”. This may be a pharmacist or another appropriate health professional working as part of a multidisciplinary team. [19]

Evaluation
Organisations should be judicious in what outcomes from medicines optimisation reviews are evaluated. It has already been demonstrated through meta-analyses that hospitalisations and mortality are unlikely to change following medicines optimisation. In clinical trials, this may have been because of the heterogeneity of participants, types of review and professionals involved in individual studies. However, benefits of medication reviews have been seen in terms of impact on glycosylated haemoglobin, blood pressure and cholesterol [19]; as these are very disease-specific surrogate outcomes, they are unlikely to be suitable for any intervention commissioned for a wider population.

The benefit of medication review is likely to lie in improving outcomes such as drug knowledge and drug adherence. [1] [47] Although these two latter outcomes are also surrogates, they represent something that is meaningful to both patients and clinicians. Adherence is likely to be easier to evaluate than is the change in knowledge of a patient.

Health-related quality of life (HRQoL) is recognised as a comprehensive, patient-centred outcome that could be used in evaluations of medicines optimisation reviews. Extreme caution should be used if a measure of HRQoL (e.g. SF-36, EQ-5D) is chosen to evaluate interventions, because these are likely to be insensitive to the small changes seen from a optimising a medicine. Evidence is available demonstrating that some medication reviews do not improve HRQoL compared to standard practice. [12]

When new services are being established, consideration should be given to evaluating services based on the outcome set proposed by Beuscart et al (drug-related hospital admissions; drug overuse; drug underuse; potentially inappropriate medications; clinically significant drug-drug interactions; health-related quality of life; pain relief) as it is hoped that future research into medication review will be based around these outcomes. [20] [21]

The NHS BSA Polypharmacy metrics were in part developed to allow CCGs to demonstrate the impact of initiatives to address polypharmacy. [40] Therefore, these should form the basis of any system-wide measurement.
Organisations should record the number of medicines optimisation reviews conducted by them. This should include details of the type of resource used (e.g. clinical pharmacist, consultant pharmacist, clinical pharmacologist, geriatrician) and the outcomes (e.g. medicines stopped, started, changed).
Next steps that were suggested to RMOC (London) in July 2018

The London RMOC Polypharmacy Subgroup should use this summary and additional evidence they are aware of to achieve the following actions requested by the London RMOC:

- Identify how medication reviews to address polypharmacy could be delivered
- Suggest a delivery model and identify barriers / enablers to achieve this

This will be achieved at the meeting through discussing the following:

1. Role of different professions in medicines optimisation review
2. What medicines optimisation review looks like in primary care
3. What medicines optimisation review looks like in secondary care
4. How a programme will be evaluated and measured
References


