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Optimizing Medication and Patient Health through Deprescribing Practices

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ABSTRACT

In this rapidly changing healthcare environment, optimizing medication regimens has become crucial for patient safety. This importance is emphasized by the increasing prevalence of polypharmacy - the use of multiple medications - which pose significant risk, especially in older adults, for adverse drug reactions, increased use of potentially inappropriate medications (PIMs), drug-drug interactions, and other factors that may threaten patient safety. In response to these challenges, deprescribing has gained prominence as an approach to enhance patient outcomes. More than simply stopping medications, deprescribing is a systematic process that aims to identify and discontinue specific drugs when their harm outweighs the benefit. This paper discusses the implications of polypharmacy, evaluates deprescribing tools and guidelines, assesses the barriers to implementing deprescribing practices, examines the roles of pharmacists, physicians and patients in deprescribing plans, and considers future trends and research directions to fill some of the gaps found within the actions of deprescribing. By providing this overview, this paper aims to start dialogue on how medication optimization can be used to improve patient health.

Keywords

Polypharmacy, Deprescribing, Medication optimization, Patient health, Optimizing medications, Medication management.

Introduction: What is Deprescribing?

In a time when medical technologies and pharmaceutical interventions are ever-expanding in the realm of healthcare, the optimization of medication regimens is critical for patient safety. In the pursuit of improved patient outcomes, the practice of deprescribing has become more prevalent, especially as a means to mitigate the negative effects of polypharmacy. Polypharmacy is usually defined as the "use of multiple medications, [and] is recognized as a risk factor for adverse drug reactions and healthcare utilization among older adults.

Polypharmacy is also associated with prescribing potentially inappropriate medications (PIMs), those in which the potential harms outweigh the benefits for most older adults" [1].

Deprescribing, moreover, is more than stopping a medication, but rather a process that systematically identifies and discontinues certain medications where the potential harms outweigh the benefits, in the context of the patient's health goals and preferences [2]. Deprescribing can come in many forms including discontinuing medications, reducing dosages, or changing medications to optimize a patient's medication regimen [2]. Taking that definition into consideration, the practice of deprescribing challenges the thought that taking more medications equates to improved health outcomes. As healthcare constantly changes, this paper will explore the challenges of polypharmacy, evaluate deprescribing practices and guidelines, discuss the roles of patients and healthcare workers in deprescribing actions, and consider future trends and research that should be conducted.

By looking at a broad overview of deprescribing as a practice, insights about its use, implementations, and effects may start dialogue on how medication optimization can be used to improve patient health.

Implications of Polypharmacy

Polypharmacy is the use of multiple medications at the same time by an individual. It becomes an issue when patients experience inappropriate polypharmacy [3], which is essentially when patients are on multiple medications when they are not necessary. Adults age 65 and older tend to be the victims of inappropriate polypharmacy more often [4], which can occur in patients for multiple reasons. For one, the patient may have several diseases (chronic conditions or health problems) at the same time (known as multimorbidity) that require many medications to be taken simultaneously [4]. From a study in the United States, conducted in 2013 on 31 million Medicare beneficiaries, "a total of 67% had multimorbidity, which increased with age, from 50% for persons under age 65 years to 62% for those aged 65-74 years and 81.5% for those aged ≥85 years" [5].

Another cause of polypharmacy can occur because of what is known as "prescribing cascades" [6] where medications are prescribed for a patient to treat side effects - otherwise known as adverse drug effects (ADE) - from another drug the patient is taking. An example given by Kalisch et al., is when a proton pump inhibitor is prescribed to a patient to reduce the ADEs associated with non-steroidal anti-inflammatory drugs (NSAIDs) [7]. Lastly, polypharmacy can be a result of having multiple prescribers that do not communicate with each other. As previously established, many older adults experience multimorbidity, which may mean that they have specialized physicians for each condition who will each prescribe the patient different medications. Taking so many medications, especially at the same time, can lead to safety concerns. The complexity of administering multiple drugs introduces potential challenges. For one, "managing multiple medications can be expensive, difficult to track, and hard to manage, especially for those who are homebound or who live in rural areas" [4]. Having so many medications to take and procedures to follow also causes concern for lack of adherence to their medication, meaning the patient may say they have taken the drug, but do not follow through [6]. The non-adherence could be a result of the overwhelming prescription list of drugs they have to take. The other cause for concern with polypharmacy is that "the use of many medications can increase the risk for adverse reactions (problems or side effects caused by a drug) and drug interactions (meaning two or more drugs don't work well together, causing unintended problems)" [4]. Not only can polypharmacy increase the risk of adverse reactions, but it may also reduce the effects of specific drugs, or increase certain side effects.

Polypharmacy causes a strain on not only the patient, but the healthcare system in trying to monitor and manage each patient. Addressing the implications of polypharmacy requires emphasizing medication reconciliation (possibly via deprescribing practices), patient education, and collaborative efforts among healthcare providers to minimize the potential risks while still improving patient's treatment regimens.

Who is Affected by Polypharmacy?

As previously discussed, high risk patient characteristics include those who experience "polypharmacy, multimorbidity, renal impairment, multiple prescribers, nonadherence to medication, limited life expectancy, older age, frailty and dementia" [8]. One key factor in the rise of polypharmacy is that the population is aging and with it, so is multimorbidity. For example according to Duncan et al., in the UK "the number of people aged ≥85 years is set to increase at the fastest rate, more than doubling to 3.6 million between 2014 and 2039" [9]. The rise in polypharmacy can also be seen in the fact that approximately 15% of the population are aged 65 and older, and yet they account for over one third of all prescription drugs [10].

Current Deprescribing Tools and Guidelines

In this section, a few of the current deprescribing guidelines will be reviewed (effectiveness, benefits, and challenges). The following guidelines are more so used as tools for identifying PIMs in older adults (65 and older) to initiate when deprescribing should take place.

The first tool is Beer's Criteria, which is used to help identify PIMs that older adults should avoid. It includes certain disease states, drugs that should be used with caution, drug-drug interactions, and dose adjustments, and a list of drugs with anticholinergic properties (which means it blocks the neurotransmitter acetylcholine) [11]. The Beer's Criteria was developed by the American Geriatrics Society (AGS) and is formatted with tables that have the specific drug category/name, recommendations, rationales, levels of evidence, and strength of each recommendation. The information is also "organized by organ system, therapeutic category, disease or syndrome" [12]. The Beer's Criteria is easy to use in clinical settings, and is also updated every three years. It also has an interdisciplinary expert panel that reviews the evidence before releasing updates [11]. However, it does have its disadvantages. Drugs that are not commonly prescribed are not included in Beer's Criteria. It also does not include patient-specific factors (e.g. height, weight, etc.). It is also not applicable to patients in palliative care, and does not list alternative therapies. For clinicians, the Beers Criteria should be thought of as a "warning light" that prompts a necessity for closer review and monitoring of the medication [13].

The "Screening Tool to Alert Doctors to Right Treatments / Screening Tool of Older Persons' Potentially Inappropriate Prescriptions" is also known as START/STOPP Criteria. Its main benefits are to identify PIMs in older adults (overprescribing), as well as identify potential prescribing omissions (under-prescribing) [14]. The criteria is arranged according to physiological systems and also includes additional considerations for drugs that increase fall risk and duplication of therapies [12]. The START/STOPP Criteria has an "international expert panel [that contributes] to the development with good inter-rater reliability". It also has an easy-to-use structure to help clinicians improve medication selection. This helps reduce patients' adverse drug events and polypharmacy. "In single-center trials, applying STOPP/START criteria improved medication appropriateness, reduced polypharmacy, reduced adverse drug reactions (ADRs), led to fewer falls, and lower medication costs" [15]. The disadvantage, however, is that it is

not regularly updated. Similar to Beer's Criteria, it is also not applicable to those receiving palliative care. The lists are not all-inclusive. The Anticholinergic Risk/Burden Scale is used to identify the anticholinergic activity (e.g. high, medium, low, or none) of specific medications. "The use of drugs with high anticholinergic activity can increase the risk of adverse effects (especially cognitive impairment and increased risk of falls) in the elderly and can interact with other drugs reducing their effectiveness or increasing the risk of adverse effects" [12]. The Anticholinergic Risk/Burden Scale is a chart that calculates the total burden scale and notes the anticholinergic activity level as mentioned above. It is easy to calculate, helps clinicians improve medication selection and discontinue medications where possible or change to an alternative, which could reduce total anticholinergic burden for patients to reduce risk of falls. However, similar to the other two criterias, the chart is not all-inclusive and depending on the chart reviewed, each one may use a different ranking system. The use of the scale may be time-consuming or impractical depending on the setting.

The Medication Appropriateness Index helps to assess the appropriateness of a medication prescribed for older patients [16]. It uses a 10-question rating scale to determine this. It is easy to use, helps determine medication selection considering various factors, and is more useful in clinical settings. For example, the three questions related to indication, effectiveness, and duplication can be useful in detecting polypharmacy. However, it also has its disadvantages. For one, it does not consider all drug interactions (via those with allergy, alcohol, nicotine, or food). It also does not address medication adherence or adverse drug reactions [16]. And while it does only have 10 questions, it may take an extensive amount of time to complete the questionnaire for a patient's entire medication regimen. As technology increases in healthcare, and medical records are being digitized, "potential exists for electronic clinical decision support systems (CDSSs) to enhance deprescribing at the point of care" [17]. One example is MedStopper, which is a web-based system that helps identify the benefits and risks of specific medications and also provides recommendations on tapering medications and consequential symptoms [17]. Tapering doses over weeks to months is usually a safer route, as stopping medications abruptly may incur unintended symptoms and consequences [8]. Other CDSSs worth looking into include G-MEDSS, TaperMD, and MedSafer.

After identifying the occurrence of inappropriate polypharmacy, the practice of deprescribing can be approached using a stepwise framework as shown in Table 1. While there are many out there, the American Journal of Medicine published an article in which a 10-step conceptual framework for deprescribing was proposed. The framework began with the first step being ascertaining all current medications from the patient. The second step should then be determining if the patient is at high risk for experiencing ADEs. The third step is to estimate the life-expectancy for the patients that were found to be high-risk in step two. The fourth step is to talk with the patient to define their health care goals in the context of the life expectancy that was calculated in step three. Step five is to confirm current indications for any ongoing treatments. Building off the last step, step six determines the time until there is benefit from any disease-modifying medications. Afterwards, for step seven, the magnitude of benefits versus harm for each medication should be estimated. Steps eight and nine should be a review of the use of different drugs and then to identify those that can be discontinued. The last step is then to implement a drug minimization plan and monitor the utility and patient adherence [18]. This should ideally be done by one clinician so that information is not spread out between different healthcare providers, but rather in one centralized place where a patient's prescription and medical history can be holistically reviewed.

While the ten-step framework provides more in-depth insight into the deprescription process, there are four essential principles for medication optimization. According to Duncan et al., a patient's healthcare team should aim to understand the patient's experiences, have a clear evidence-based reasoning for choosing specific medications, ensure that the use of medications (especially multiple) are as safe as possible, and lastly, to make optimization of medication apart of routine practice [9].

The practicality of deprescribing should also be addressed. Some strategies offered by Steinman & Reeve, include setting aside separate visits to focus of medication review, using advice from other healthcare professionals (e.g. pharmacists, nurses, etc.) as well as a patient's physician, and lastly to use patient educational materials (PEMs) whenever possible [8], so that patients are aware and understand what is changing in the medication regimen. Patient education will be discussed in further depth later in the paper, but it should be noted that this is an important part of the process. Changing a patient's regimen and ensuring adherence requires that they completely understand what they are taking or stopping, why, and how it can affect them. When deprescribing specific medications, clinicians should thoroughly research specifics. Certain medications have different resources available for reference. Some of these medications include "benzodiazepines, proton pump inhibitors, antipsychotics, glucose-lowering medications, cholinesterase inhibitors and memantine, antidepressants, and antihypertensive medications" [8].

Barriers to Deprescribing

Though use of deprescribing techniques are helpful in reducing polypharmacy, they are not routinely used in practice. Part of their effectiveness can be shown by a "2016 Cochrane review [that] showed that inpatient medication reviews led by physicians, pharmacists, and other health care professionals resulted in a 27% reduction in emergency department visits, follow-up ranging from 30 days to 1 year" [19]. Though it has shown to be helpful, multiple studies conclude that there are at least four prominent barriers to deprescribing in a primary care setting. The first barrier was culture barriers. The study found that there was "a trend toward the prescribing of medication for asymptomatic patients to prevent future morbidity and mortality, and a continuation of unnecessary preventive medicine in older patients [because] there was a lack of financial incentives for primary healthcare practitioners to address polypharmacy" [20].

Framework Step	Operational Strategies	Caveats
1. Ascertain all drugs.	Ask patients to disclose all medications they are taking; apply the "brown paper bag" method of ascertainment; seek collateral information on adherence, side effects, out-of-pocket expenses, and administration burden from family, caregivers and prescribing primary care doctors.	Ensure patients understand that over-the-counter, herbal, and other nonprescription complementary medicines are included.
2. Identify patients at high risk of or experiencing ADRs.	Identify all relevant risk factors. Apply risk prediction tools where appropriate.	Risk prediction rules vary in their predictive accuracy and applicability.
3. Estimate life expectancy.	Apply a validated survival prediction rule that best fits patient characteristics.	Estimates of life expectancy based on survival prediction rules are average or median survivals for whole populations and may not be accurate in individuals; actuarial life tables may be more accurate but may not be easily accessible and may still not be applicable to the individual patient.
4. Define care goals in reference to life expectancy, level of functional incapacity, quality of life, and patient/caregiver priorities.	Ascertain limitations of physical and social function and quality of life. Integrate life expectancy, functional limitations, and quality of life into an overall individual profile of need and prospects. Elicit patient and caregiver perceptions as to what constitute care priorities. On the basis of the needs and prospects profile and patient/caregiver priorities, define care goals as being directed primarily toward prolonging survival (survival prolongation), preventing major morbid events (event prevention), improving or maintaining functional capacity (capacity enhancement), or relieving symptoms (symptom relief).	Care goals may not be easily assigned if a profile of needs and prospects is complicated and likely to frequently change, or where there are unrealistic expectations on the part of patient or caregivers. They also may change over time, as patients transition in and out of disease states, and patients or caregivers alter their care priorities.
5. Define and confirm existent indications for ongoing treatment with reference to defined care goals.	Reconcile current medications with all listed diagnoses in identifying obvious mismatches. Verify diagnostic labels and ascertain current level of disease activity and response to specific therapies.	This step may prove time-consuming and impractical in gathering all the primary evidence to support or refute specific diagnoses. It also may entail challenging diagnostic labels applied by other specialists or on which patients and caregivers have become particularly fixated.
6. Determine time until benefit for preventive disease-specific medications.	Review all disease-specific medications aimed at event prevention and compare time to benefit with estimated life expectancy.	Accessing time to benefit data for every preventive medication in a time-efficient manner may not be feasible in busy clinical settings, and, when available, represent trial averages and may not be applicable to individuals.
7. Determine disease-specific benefit–harm thresholds that may support treatment discontinuation.	Estimate the disease-specific absolute risk of events based on patient characteristics (using validated risk prediction rules where appropriate). Estimate the potential treatment-specific reduction in absolute event risk.Estimate the treatment-specific absolute risk of harm. Determine the appropriate threshold for continuing or discontinuing treatment.	Accessing disease-specific risk prediction rules (or risk stratification data) and benefit–harm data for every preventive medication in a time-efficient manner may not be feasible in busy clinical settings and, when available, represent trial averages and may not be applicable to individuals.
8. Review the relative utility of individual drugs.	By using information derived from preceding steps where relevant, apply a utility grid to all current medications and classify them according to level of decreasing utility as follows: class A: very effective and minimal toxicity; class B: reasonably effective but some concerns about toxicity; class C: concerns about both effectiveness and toxicity; and class D: minimal effectiveness and considerable potential for toxicity in most circumstances.	Gathering all the data required and classifying medications according to drug utility may take more time than is available in busy clinical settings. The classification system also involves a degree of subjective judgment that may result in considerable variation in drug classification between clinicians.
9. Identify drugs that may be discontinued or have their dosing modified.	By using information derived from the preceding steps, especially step 8, identify drugs associated with a strong case for discontinuation or modification of dose. Where decisions to discontinue specific drugs are, or could be, highly sensitive to patient/caregiver preferences, elicit their opinions.	Patients, caregivers, and clinicians may experience difficulty in labeling nonspecific symptoms as drug side effects. Information on rarely encountered drug toxicity may be difficult to locate. Patients and caregivers may be unable to understand benefit–harm tradeoffs or have a fixation on continuing a particular drug despite low utility.
10. Implement and monitor revised therapeutic plan with ongoing reappraisal of drug utility and patient adherence.	Devise and implement a regimen of drug de-prescribing associated with close monitoring for disease or symptom recrudescence. Implement strategies to maximize patient adherence to clearly indicated drugs and observe for instances of persistent nonadherence that may call for drug discontinuation. Reappraise therapeutic plan in light of changed patient circumstances and care goals. Maintain oversight of therapeutic plan by a single nominated clinician.	Unacceptable demands may be placed on clinicians, especially clinical pharmacists, in making ongoing alterations to medication and monitoring for adverse effects of de-prescribing. Primary care clinicians may be reluctant to question the indications for, or discontinue, drugs prescribed by specialists. Strategies designed to maximize adherence with the chosen plan may entail additional time and resources that are not readily available in current practice settings.

Note: From "Minimizing Inappropriate Medications in Older Populations: A 10-step Conceptual Framework" showing each framework step, its operational strategies, and caveats [18].

The second barrier the study identified was an organizational barrier. In residential care environments, there were staffing shortages, high turnover of staff, and lack of communication and information that hindered primary physicians from practicing deprescribing interventions for the older population [20]. Limited primary care time and a lack of alternatives for the patient also hindered the interventions [20]. The other sub-barrier here would be the lack of centralized information for each patient. As multiple prescribers were discussed earlier, it was seen that each prescriber has their own information about a specific condition for a patient, but may not be aware of what other providers are prescribing. In a study conducted in 2018 with 160 physicians, it was found that, "when medications were initially prescribed by another physician, 40% of physicians reported hesitance in deprescribing them" [21].

The third were interpersonal barriers. The problem that arose here was the lack of communication between different prescribers involved in a patient's care. "Some primary healthcare practitioners struggled to find the right 'language' to initiate deprescribing discussions with patients [and] uncertainties and a lack of knowledge, awareness, guidance, and tools and resources for deprescribing made it easier for the GP [general practitioner] to continue to prescribe and to maintain the 'status quo'" [20]. Those uncertainties also made pharmacists hesitant to make recommendations to physicians, and GPs were "reluctant to stop a medication started by another specialist in a different healthcare setting" [20]. In another study conducted by Palagyi et al., the authors stated, "participants described how residents often amassed large numbers of new medications during hospital admission, prescribed according to hospital protocol. Following discharge back to the LTCF [long-term care facilities], residents then failed to undergo timely review of these new medications by their GP. One of the pharmacists expressed their concern, saying: 'Often enough there's an intermediary system that plays a massive part in why they're on so much [medication]. It's a hospital… That's where the masses of medication get started and GPs, I feel, feel compelled to continue some of those medications'" [22].

The fourth, and one of the most important barriers, were individual barriers. In the same study, it was found that some patients were not able to state the reasons they were taking any particular medications and/or they were not aware or did not care about the side effects [20]. The lack of patient education and understanding was a huge barrier in starting any sort of deprescribing. Especially with people of older age, combined with low levels of education and/or impaired cognitive functions can be an important barrier to safe deprescribing practices. An example is when a physician was concerned about a patient taking diclofenac the physician quoted, "he [the patient] just doesn't want [to discontinue the drug] and says, 'you can't take that away from me. [I am] free of pain for the first time in 7 years. I need that." [20], this is why it is also important to assess the patient's healthcare goals and ensure they are in complete understanding of what they are taking and how it affects them. Individuals within the study also spoke of the burden of having too many medications in that it caused them discomfort and also financial stress. However, they remained passive toward any kind of medication reduction. The study stated that "willingness to initiate and accept medication change was dependent on the GP, who emerged as a central trusted figure" [22]. Especially with the older generation that mainly grew up with never having to question their physicians, patients might be hesitant to confront their doctors about questions regarding their medications. The study also stated that "GPs preferred 'the path of least resistance', signaling systems barriers (poor uniformity of LTCF medical records, limited trained LTCF personnel); time constraints (resident consultations, follow-up with specialists and family); and the organization of care (collaborating with LTCF staff, pharmacists and prescribing specialists) as obstacles to deprescribing" [22].

While there are numerous barriers to deprescribing, the process should start with a review of medications and patient education and understanding. There should be communication between the patient's care team. Understandably, without definitive evidence and information, physicians are hesitant to stop a patient's medication, which is why more research on deprescribing certain medications should be conducted.

Pharmacist's Role in Deprescribing

In deprescribing practices, pharmacists play a vital role as a member of the patient's healthcare team. Pharmacists bring their expertise in medication therapy management to collaborate with other healthcare providers and patients in the safe and effective optimization and/or reduction of medications. Pharmacists also contribute by conducting thorough medication reviews, identifying PIMs, and assessing the overall appropriateness of the patient's drug therapy. They also play a crucial role in educating patients about their medications and the importance of deprescribing - potential risks and benefits, and expected outcomes. Ideally, they work closely with healthcare providers to develop specific plans that consider the patient's individual health status, preferences, and goals. One way they do this is by using Medication Therapy Management (MTM) or Comprehensive Medication Management (CMM), which will be briefly discussed later in the paper. Pharmacists can also help with addressing medication-related concerns and with factors such as monitoring withdrawal effects. Through their specialized knowledge, pharmacists contribute significantly to promoting patient safety and optimizing medication regimens in the pursuit of improved health outcomes.

A systematic review assessing interventions led by community pharmacists was published by the British Pharmacological Society. The review stated that "the pharmacist's role as patient educator is known to improve health outcomes and increase patient satisfaction. Deprescribing can be added as a positive outcome of educational interventions. One of the key steps for successful deprescribing is patient education regarding the necessity and benefits of potential medication cessation. Accessibility of both patient education materials and community-based pharmacists can empower patients to engage in conversations about deprescribing with their healthcare providers" [23]. The same study discussed deprescribing through medication review, consultation, and therapy management

interventions. However, these interventions showed mixed results. "It can successfully reduce both the number of medications and side effects, as well as prevent a decrease in self-rated health. However, [in this study] it has no effect on patients' quality of life, rate of falls, hospitalization, or mortality" [23].

While education and medication review interventions have shown to have success in optimizing patients' medication regimens, figuring out a way to integrate these interventions into the workplace and into the role of pharmacist may prove difficult as it will take extra effort in communication with all aspects of the patient's healthcare team. That being said, community pharmacists also hold a unique position in that they are better positioned to see all the medications a patient takes and therefore have an advantage in being able to perform routine prescription monitoring. However, there are two barriers to this. For one, being a community pharmacist "is an unfavorable position in comparison to a pharmacist working in inpatient facilities, as communication and collaboration with other healthcare providers is often complicated due to logistics-related obstacles" [23] such as location and ease of communication. Added on, a significant barrier is the way in which pharmacists are paid "pharmacists are the only licensed healthcare provider in the United States whose community and long-term practices are supported almost entirely by the sale of as many medications as possible… Medicare and most other payers do not pay them for providing clinical services such as prescription checkups" [24]. Lastly, there is a gap when it comes to deprescribing tools and pharmacists' knowledge. In a study conducted by Springer et al., they found that student pharmacists felt they had very limited knowledge on deprescribing and that it was not as prevalent in pharmacy school curriculum as other topics [25]. While it may be briefly talked about when discussing Geriatrics, there does not seem to be consistent teachings that align with teaching about deprescribing practices.

Physician's Role in Deprescribing

As primary decision-makers in a healthcare team, physicians play a key role in deprescribing practices. The process of deprescribing would require the physician to take account of the patient's complete medication regimen, medical history, and health goals to reduce medication that is unnecessary or harmful. Similar to pharmacists, physicians should speak with patients and engage in shared decision-making [8]. Physicians should make medication reviews a part of a routine with the patient where they also provide patient education of each medication. One barrier discussed earlier was that some physicians did not know how to start the conversation with their patients. One example would be to first introduce choice by saying something like "You are on a number of medications now. I would like to regularly review these to make sure each of them is still benefiting you, as well as check for side effects. What do you think?" [26]. Then the physician should ensure the patient is aware of the potential risks and benefits to make sure they align with the patient's healthcare goals, and then help them to explore their options and make a shared-decision [26]. Also, as previously mentioned when discussing barriers, oftentimes-older patients will wait for the physician to initiate the conversation of a medication review. Therefore, another role of the physician should be to make medication reviews a part of a routine basis that allows for patient education and for the patient to ask any questions they might have about their medications [27]. A study conducted in 2009, showed that "most physicians do not come close to conducting all elements of a medication review. Comprehensive evaluation of chronic medications was rare in the visits studied" [27]. Moreover, physicians should have ongoing collaboration with all other aspects of a patient's healthcare team. Physicians are responsible for making changes to medication regimens, so their collaboration with other healthcare workers can ensure that a revised medication list for the patient continues to meet all of their needs. A lack of time efficiency was one of the barriers that physicians had [9], and if that is the case, better communication with a patient's other healthcare professionals can help delegate and relieve some of the more time consuming work that comes with reviewing a long list of medication reviews. For example, a shift from MTM to CMM has been becoming consistent since 2018. The difference between MTM and CMM is that CMM is a "well-defined process of care" and can be used for all patients, including those at high-risk [28]. CMM practices can usually be carried out by a pharmacist, but physicians should ideally see their patients every six months after their initial visit, and after every visit, should be referred to the pharmacist for medication optimization. "A growing body of real-world studies now highlights the value of CMM in achieving all 4 components of the quadruple aim of healthcare" [28]. Lastly, physicians also contribute to the development and use of specific guidelines and the best practices related to deprescribing, to build a culture of evidence-based medicine.

Patient's Role in Deprescribing

As already stated, the patient is one of the most important stakeholders when it comes to using deprescribing practices effectively. The physician can make suggestions and recommendations but if the patient does not understand or feel comfortable with the decision made, the deprescribing framework falls apart. In a study conducted by Lukacena et al., "most of [their] participants mentioned having conversations with primary care clinicians and pharmacists and said they would be willing to stop medication if their clinician said it was possible. Older participants, those with more years of education, those who thought their medications might lead to side effects, and those who communicated with their clinician or pharmacists were more willing to have one of their medicines stopped" [29]. In the context of deprescribing practices, patients play a pivotal role in the collaborative decision-making process aimed at safely reducing or discontinuing unnecessary medications. Patients are encouraged to actively engage with healthcare professionals in open and transparent communication about their medications, including any concerns or side effects they may be experiencing. It involves a shared decision-making approach where patients contribute their perspectives, preferences, and goals for their healthcare. Patients are instrumental in providing valuable insights into their overall well-being, allowing healthcare providers to tailor deprescribing strategies that align with individual health priorities. Moreover, patient education is crucial in empowering individuals to understand the potential

risks and benefits associated with deprescribing, fostering a sense of ownership and cooperation in optimizing their medication regimen. This active involvement ensures that deprescribing decisions are patient-centered, promoting both the safety and efficacy of healthcare interventions.

Future Trends

Deprescribing and medication optimization is gaining significance as a vital aspect of patient care. Future trends may include greater utilization of technology, centralization of information, interdisciplinary collaboration between healthcare professionals, patient education, healthcare schooling, and more disease-specific guidelines. As technology becomes more integrated into healthcare, it can be utilized to help with the centralization of patient information, as well as, helping healthcare professionals make informed decisions about deprescribing and factors like drug interactions. Technology can be used to collect and analyze patient data, medication histories, chronic diseases, and other factors which can then be used for drug utilization and optimization reviews to improve overall patient health. This personalized approach is likely to enhance the effectiveness of deprescribing strategies, minimizing the risk of adverse effects and improving patient outcomes. Another significant trend is the emphasis on interdisciplinary collaboration among healthcare professionals. Deprescribing is a complex process that requires input from physicians, pharmacists, nurses, and other healthcare providers. To be effective and focus on patient-based care, communication between a patient's healthcare team will be crucial for the identification of unnecessary medications, patient education, and more streamlined deprescribing plans.

Patient education also plays a pivotal role in the future of deprescribing. Shared decision-making is important when making health-related decisions, which is why it is important for patients to understand the importance and effects of their medications. This way they can also join in the conversation about their own medication regimens. This education can be in the form of PEMs but also communication tools like healthcare portals and telehealth may streamline the communication between a patient and their health care team. It was stated earlier, that oftentimes a review of medications will not be conducted unless a physician brings it up first. Increased patient education on how many different medications should warrant a conversation with their doctor. Increased patient education should help patients feel more comfortable approaching their physicians with questions so that they can make better-informed decisions about deprescribing based on individual preferences and goals. While patients should feel more confident about understanding their medications, so should their healthcare professionals. As mentioned earlier, pharmacists felt that there was a gap in their schooling that did not prepare them for the incorporation of deprescribing into regular routines. Teaching deprescribing practices, plans, and guidelines will not only help pharmacists and other healthcare professionals identify examples of PIMs and other ways to optimize patient health, but also make them more confident in their ability to deprescribe, as that was seen as a major barrier. Lastly, further research into creating more disease-specific guidelines would help increase the confidence of physicians to deprescribe medications. Further research into complementary therapies and lifestyle changes that do not solely rely on pharmacological interventions may also help ease transition for both patients and healthcare professionals.

Conclusion

Deprescribing interventions can be used to solve the increasing prevalence of inappropriate polypharmacy, which affects the older population (ages 65 and older). This paper reviewed guidelines and tools used to initiate medication reviews and identify PIMs. Though some lack specifics, they can be helpful as a starting point of which to base a conversation with the patient and their healthcare team. This paper also reviewed a ten-step framework on how to start the process of describing, and emphasized that a shared decision-making and communicative approach would be most beneficial. The paper also discussed the main barriers to deprescribing including cultural, organizational, interpersonal, and individual. The roles of different healthcare professionals, as well as patients, were also talked about in the context of the roles they play in the medication optimization process. Lastly, it talked about the future trends and gaps that future research can help fill to ensure optimized patient health.

In conclusion, the future of deprescribing holds numerous possibilities as healthcare continues to evolve. By integrating advanced technologies, fostering interdisciplinary collaboration, educating patients, and conducting more research for more drug specific guidelines, deprescribing is positioned to become an integral component of patient-centered, personalized healthcare. These trends signal a shift towards a more holistic and individualized approach to medication management, ultimately enhancing the quality of care and improving patient outcomes.

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