

# Chapter 14

## Ageism in Medication Use in Older Patients



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### 14.1 Introduction

Medications and doses are often similarly prescribed to older and younger adult patients (Somers 2016). This is a problem that must be viewed as ageist, because pharmacological studies have shown for decades that many medications act differently in older and younger people due to the physiological and pathological changes that accompany ageing. Many medications have different efficacy and safety profiles in younger and older age groups (American Geriatrics Society (AGS) 2015; Fialová and Onder 2009; Pazan et al. 2016). For this reason, treating older adults the same as younger adults when prescribing medication, without respecting age-specific needs in terms of such issues as individual dose adjustments, geriatric drug forms, and geriatric medication management, can be seen as a form of ageism. Among older adults, the selection of medication, dosing schedules, and combined drug regimens, as well as appropriate follow-up and management of medication treatment, should always be *age-specific* and *highly individualized*. Unfortunately, this is not a common clinical practice (Fialová and Onder 2009; Petrovic et al. 2016).

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The [appendix](#) for a list of abbreviations used in this chapter is located at the end of the chapter.

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In 1969, Butler defined ageism as “systematic stereotyping and discrimination against older people because of their higher age” (Achenbaum 2014). Based strictly on this definition, non-discrimination of older adults in medication use could be understood as providing the same treatments to older adults as to younger adults. However, this “age-blind” approach has actually translated into some discriminatory practices towards older patients, including not prescribing safer and equally economically available drugs with lower therapeutic risks, not selecting geriatric low-dose drug regimens, prescribing medication with unknown efficacy in older patients with the potential to cause substantial harm, prescribing risky polypharmacy, and so on (Fialová et al. 2005; Fialová and Onder 2009; Petrovic et al. 2016).

This age-blind approach leads to a variety of direct and indirect forms of ageism (Coupland and Coupland 1993, 1998 Ouchida and Lachs 2015). Implicit ageist attitudes may be present as negative thoughts, feelings, and behaviours toward older people that may occur without conscious control and awareness. These can be reduced by self-assessment methods and training techniques aimed at overcoming implicit ageism (Adelman et al. 2000; Levy 2001). Explicit ageist attitudes may be exacerbated by persistent misconceptions that older patients are often demented, incontinent, depressed, and somehow “unsalvageable”. Higashi et al. (2012) described some of these ageist attitudes among young medical trainees. For example, one of the trainees said, “It’s always a bigger save when you help a 35-year-old woman with kids than it is to bring an altered 89-year-old woman with a urinary tract infection back to her semi-altered state” (Higashi et al. 2012). Direct ageism also occurs when it is considered normal and expected to have side effects from medications because “that’s just the way it is when people are old” and when healthcare professionals consider older patients to be just “poor old dears,” unable to look after themselves (Brossoie 2013). Becoming aware of these attitudes is one of the first steps in reducing ageism and is the responsibility of every healthcare professional caring for older persons (Brossoie 2013).

“Hidden” forms of ageism may also occur, for example, as a consequence of poorly coordinated, non-appropriately managed geriatric care (Ouchida and Lachs 2015). Moreover, fragmented healthcare systems limit healthcare communication, especially with older people, and reduce older patients’ access to adequate care (Adelman et al. 2000). For additional information on ageism in the healthcare system, see Wyman, Shiovitz-Ezra, and Bengel, 2018, Chap. 13 in this volume.

## 14.2 Aspects of Ageism and Inappropriate Medication Use in Older Patients

For many frequently prescribed medications (e.g., some cholinesterase inhibitors, antidepressants, and antivertiginous agents), clinical data from randomized controlled trials (RCTs) on standard dosing, clinically approved indications, and specific risks in geriatric patients are not available (Fialová and Onder 2009). This is

because, in the past, older patients were explicitly excluded from RCTs due to their higher age and higher probability of drug risks (Crome et al. 2011). During work on the new “Fit fOR the Aged” (FORTA) geriatric recommendations, Wehling and his team (Wehling 2016) reviewed the German Association of Scientific Medical Societies Guideline Register and found that only 2 out of 926 clinical guidelines explicitly addressed geriatric patients. One guideline dealt with nutrition in older patients and the other addressed the treatment of urinary incontinence. Information in other guidelines on specific aspects of drug therapy in older patients was short and vague, not addressing the complexity of clinical needs in older patients (Wehling 2016). However, the majority of current users of medication are geriatric patients. They are often prescribed multiple drug combinations despite a substantial gap in our knowledge about the efficacy and safety of multiple drug regimens in older adults. This gap is a direct product of ageist practices, which excluded older adults from clinical trials. These ethical problems also contribute to ageism in medication use.

Existing studies have described discrimination towards older patients in the provision of drug treatments. For example, sometimes treatable pathologies are dismissed because they are considered just common problems in old age. This phenomenon frequently leads to underdiagnosing and undertreating pain, depression, dementia, and other comorbidities in older adults (Cherubini et al. 2012). Other age-related drug provision problems include indication of a new drug or drugs for wrongly diagnosed drug-related problems (DRPs) and not reducing a dose or not withdrawing harmful medication (Kane et al. 2004; Routledge et al. 2004). Also, unnecessary overuse of some diagnostic tests and failure to provide appropriate geriatric care in poorly coordinated and fragmented healthcare systems are forms of ageism that can result in inadequate drug treatment for older adults (Fialová and Onder 2009; Qaseem et al. 2012).

In addition to an age-specific approach, highly individualized drug therapy is also necessary, particularly when treating older adults with complex conditions. Some older patients suffer from several disorders, disability, and are frail; they may use multiple medications (polypharmacy) and may be exposed to a variety of risk factors, such as memory problems, decreased ability to handle medication, and economic and social problems. Older patients should therefore be specifically protected from adverse drug outcomes by highly individualized medication treatment and highly individualized care that not only includes age-specific approaches, but also considers individual risk factors and individual goals of care (Fialová and Onder 2009; Petrovic et al. 2016). By not providing such highly individualized care, healthcare professionals and sometimes even healthcare managers promote ageist attitudes and approaches which compromise the health and wellbeing of older adults.

This chapter focusses on the association between ageism and three types of inappropriate medication use in older patients: inappropriate prescribing, polypharmacy and/or polyherbacy, and medication nonadherence. Definitions, risk factors, and negative outcomes of these three phenomena are comprehensively described (for an overview of negative outcomes see Table 14.1), as well as future possibilities for improvements.

**Table 14.1** Negative consequences of polypharmacy, suboptimal prescribing and medication nonadherence

PIM use
Increased use of healthcare resources
Higher occurrence of adverse drug events (ADEs) / adverse drug reactions (ADRs) / drug-interactions → lead to „prescribing cascades“, geriatric syndromes, medication nonadherence
Higher disability
Higher morbidity and mortality
Polypharmacy/Polyherbacy
Increased healthcare costs
Adverse drug events (ADE)/adverse drug reactions (ADR) → lead to „prescribing cascades“
Drug-interactions (drug-drug interactions; drug-disease interactions; drug-herbs/herbal supplements interactions, drug-lab tests interactions)
Medication nonadherence
Inappropriate drug use
Reduced functional capacity
Higher occurrence of geriatric syndromes, such as cognitive impairment, falls (orthostatic hypotension), urinary incontinence, malnutrition, psychiatric morbidity (e.g., deliria, depressions)
Nonadherence
More frequent physician office visits
Additional laboratory tests
Unnecessary additional treatments, polypharmacy
ADRs / ADEs, more frequent emergency department visits
Higher hospital or nursing home admissions

References: Abdulaheem (2013), Akazawa et al. (2010), ASA/ASCPF (2006), Gurwitz et al. (2003), Leendertse et al. (2011), Maher et al. (2014), Sabaté (2003), Scheen and Giet (2010), Spinewine et al. (2012), Strandberg (1984), and Vermiere et al. (2001)

## 14.3 Inappropriate Prescribing in Older Patients and Aspects of Ageism

### 14.3.1 Definitions and Epidemiology of Inappropriate Prescribing in Older Adults

Inappropriate prescribing in older patients is understood in many studies to be the prescribing of medication that is potentially inappropriate in older age. These so-called PIMs (potentially inappropriate medications) have been identified by a consensus of expert panels as medications that carry more risks than benefits for older adults. While safer alternatives exist in the pharmaceutical market, PIMs should not be prescribed to older patients because of their higher risks of drug-therapy problems. The best-known clinical criteria for describing these medications are the Beers Criteria (AGS 2015) and STOPP (Screening Tool of Older People's Prescriptions)/START (Screening Tool to Alert to Right Treatment) criteria (O'Mahony et al. 2015).

Unfortunately, previous studies have documented a high prevalence (14.6–44%) of PIMs being used in hospitalized older adults (Hajjar et al. 2005; Onder et al.

2003); 19.3% in older patients admitted to emergency department units (Chen et al. 2009); up to 48–59.2% in community-residing older patients (Baldoni et al. 2014); and 43% in older adults residing in nursing home facilities (measured as overall weighted point prevalence in a systematic review of studies) (Morin et al. 2016).

Prescription of PIMs, however, presents only one piece of suboptimal prescribing in older patients. Hanlon et al. (2001) define suboptimal prescribing in the geriatric population using the following three categories:

- Overprescribing or overuse of medicines: application of higher doses of medicine than is clinically necessary; excessive or inappropriate polypharmacy; long-term use of medication without proved efficacy; use of medication in vague indications
- Underprescribing or underuse of medicines: use of lower than optimal doses; not prescribing medications known to be effective and safe in geriatric patients
- Inappropriate prescribing: prescribing PIMs in geriatric patients; prescribing despite known drug-drug or drug-disease interactions

Inappropriate medication use is a general term describing a range of problems arising from the prescription, administration, and storing of medication, as well as problems with medication nonadherence (Griese and Leikola 2014). According to the Pharmaceutical Care Network of Europe (PCNE), all of these problems are classified as drug related problems (DRPs). A DRP is by definition “an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes” (Griese and Leikola 2014; Somers 2016) and can include adverse drug reactions (ADRs), drug-disease interactions, drug-drug interactions (DDI), drug therapy failures, inadequate dosing, drug use without indication, patient non-adherence, and many other DRPs.

### ***14.3.2 Risks Factors of Inappropriate Prescribing in Older Patients***

Inappropriate prescribing in older patients is usually the result of multiple risk factors, such as:

- Inadequacies in the provision of healthcare, such as ineffective care at the interface between hospital and primary care and inappropriate systems for repeated prescriptions;
- Lack of geriatric knowledge among prescribers or inadequate use of some therapeutics in relation to multimorbidity (e.g., some high-risk medications such as nonsteroidal anti-inflammatory drugs, anticoagulants, diuretics, psychotropics), and inadequate training in recognizing adverse drug interactions and reactions;
- Clinical guidelines aimed at managing single but not multiple conditions;
- Failure to recognize the need to stop inappropriate treatments;

- Psycho-social reasons on the side of prescriber, such as the desire to please patients, feeling pressured to prescribe medication, and balancing between prescribers' experiences and clinical evidence (Cullinan et al. 2014; Fialová and Onder 2009; Petrovic et al. 2016).

Older patients are often treated by several healthcare professionals, including different prescribing physicians, which may lead to duplicate prescribing and serious problems with inappropriate prescribing. There are also inconsistencies in updates on information about indications, duration of therapy, monitoring of adverse reactions and follow-up of safety and effectiveness of medications prescribed to older patients. Problems also arise from the lack of training in undertaking complex medication reviews among prescribers and the fact that prescribers often do not have time to undertake such reviews in routine clinical practice (Avery et al. 2012).

The risk factors positively associated with prescribing medications that are potentially inappropriate for older adults (see Table 14.2) include the following: polypharmacy; psychotropic drug use; polymorbidity (mostly colinear with polypharmacy); specific health conditions, such as depression and psychoses; socio-demographic factors, such as low socioeconomic status, low income, low education level, illiteracy, and being single. Some risk factors relate to management and quality of healthcare, such as hospital stay of ten or more days; institutional care; longer stay in the nursing home; having more than one prescriber; and frequent physician visits (Baldoni et al. 2014; Chen et al. 2012; Fialová et al. 2005; Haasum et al. 2012; Lin et al. 2011; Niwata et al. 2006; Undela et al. 2014; Vieira de Lima et al. 2013; Zhan et al. 2001). Studies have found that older patients with psychiatric disorders had up to five times higher risk of being prescribed PIMs than other older patients (Vieira de Lima et al. 2013), and that a diagnosis of acute illness increased the risk of PIM prescribing more than eight times (Lin et al. 2011).

Many of the risk factors described above may indicate ageist attitudes and behaviour. When older patients frequently visit the physician's office, require acute care, or stay longer in nursing homes, they run a higher risk of being prescribed PIMs. More frequent use of PIMs has also been documented among older patients already at higher risk of adverse drug events (ADEs) for other reasons, such as in polymorbid older patients using polypharmacy and those using psychotropic drugs (Baldoni et al. 2014; Chen et al. 2012; Fialová et al. 2005; Haasum et al. 2012), even though drug risks should be rigorously reviewed in these groups of patients. Zhan et al. (2001) discussed, based on their findings, that visits at physicians' offices may frequently end with drug prescription in order to satisfy the patient. Some studies also showed that if older patients were more dependent on the prescriber (e.g., when they suffered from psychiatric illness, were in a poor economic situation, or did not have a partner) they were at significantly higher risk of inappropriate prescribing (Baldoni et al. 2014; Fialová et al. 2005; Qato and Trivedi 2013; Vieira de Lima et al. 2013). These examples suggest ageist behaviour, even though ageism has not yet been thoroughly studied in relation to prescribing practices.

PIMs include older medicines that have been available in the pharmaceutical market for decades. They can be cheaper than safer drug alternatives and are usually

**Table 14.2** Risk factors associated with use of potentially inappropriate medications (PIMs)

	Positively associated	Negatively associated
Demographic factors/ socio-economic factors	Age groups from 65 to 80/85 years (in the majority of studies) (*)female gender (in the majority of studies, usually collinear with having more health compliants and using polypharmacy) \$ (*)	Very old patients 85+ (in the majority of studies) \$
	Living alone/not having a partner (*)	Not visiting a physician (in some studies collinear with living along and not having a caregiver)
	Poor economic situation, low income (*)	
	Illiteracy (*)	
Disease- related factors	Psychiatric disorders (*)	Hypertension
	Rarely other disorders (e.g. neurological disorders, cardiac arrhythmias; congestive heart failure;et al.)	Cognitive impairment / severe cognitive impairment, mental illness
	Impaired physical functioning, disability (*)	
	Diagnosis of acute diseases (*)	
	Polymorbidity (*)	
Medication use and medication prescribing- related factors	Polypharmacy (5+/6+,9+/10+), number of drugs (*)	
	Psychotropic drug use (1 and more) (*)	
	Antianxiety drugs (1 and more) (*)	
	Higher medication costs (*)	
	More than 1 prescriber (*), prescribers' age >35 years	
	Frequent physician visits (*)	
Healthcare provision- related factors	Hospital admission (*)	
	Longer hospital or nursing home stay (*)	
	Living in a institution (*)	

References: Akazawa et al. (2010), Fialová et al. (2005), Chen et al. (2009), Chen et al. (2012), Lin et al. (2011), Niwata et al. (2006), Onder et al. (2003), Qato and Trivedi (2013), Undela et al. (2014), and Vieira de Lima et al. (2013)

Footnote: Many of above stated risk factors may be directly or indirectly linked to ageism (\*)

\$ – in some studies, positive association of PIM use with male gender and age group of patients 85+ have been also documented

available without co-payments. For this reason, PIMs are often more economically available to poor older adults than safer drug alternatives (Fialová et al. 2005). This form of ageism occurs at the drug regulatory level, when safer drug alternatives are less available to older patients with economic difficulties due, among other things, to higher co-payments.

### ***14.3.3 Negative Consequences of Inappropriate Prescribing in Older Patients***

As emphasized by many previous review studies, older patients suffer more often from drug-related problems and negative outcomes than younger adults (Beard 1992; Spinewine et al. 2012; for an overview of negative consequences see Table 14.1). At least 20–30% of patients in the 70–79 year old age group suffer from ADEs compared to 3–6% among the 20–29 year old age group (Beard 1992; Fialová and Onder 2009; Spinewine et al. 2012). ADRs among older patients in acute care setting range between 5.8% and 46.3% (Alhawassi et al. 2014), and for older people the risk of ADR-related hospitalization is 4 times higher than for younger adults (16.6% vs. 4.1%) (Beijer and de Blaey 2002). However, in older patients, up to 88% of the ADR-related hospital admissions may be preventable, while for younger adults it is only 24% (Beijer and de Blaey 2002). The extensive Hospital Admissions Related to Medication (HARM) study identified several risk factors for adverse drug outcomes due to inappropriate prescribing, namely: being 65 or older, poly-pharmacy (>5 chronic medications), nonadherence, decreased cognitive function, renal impairment, four or more co-morbidities, and living alone (Leendertse et al. 2008).

Inappropriate prescribing substantially contributes to higher morbidity and mortality among older adults and significantly raises overall medication costs (e.g., cost of more frequent ambulatory office visits, costs associated with drug-related health complications, and cost of drug-related admissions to acute hospitalization) (Bordet et al. 2001; Johnson and Bootman 1995; Leendertse et al. 2011). These costs are estimated to be 3–4 times higher than direct medication costs, and they substantially contribute to higher total expenditures for drug treatment in the healthcare system (Bordet et al. 2001; Johnson and Bootman 1995; Leendertse et al. 2011).

### ***14.3.4 Strategies to Reduce Inappropriate Prescribing in Older Patients and Aspects of Ageism***

Several studies have reviewed strategies for reducing inappropriate prescribing in older patients (e.g., Petrovic et al. 2016). Studies aimed at reducing inappropriate prescribing have used a variety of tools: decision-making support aids for prescribers; computer alerts for prescribing errors; medication reviews; training and learning methods; patient reminder systems; and novel methods of service provision (Duerden et al. 2013). In the United Kingdom, the PINCER trial was undertaken to evaluate whether a complex IT-based intervention was more effective than simple feedback in reducing medication error rates in general practices (GPs). At 6 months' follow-up, the GPs that received both computerized feedback and pharmacist



support had significantly fewer prescribing errors than the GPs that received computerized feedback alone (Avery et al. 2012). Studies have shown that effective interventions improving drug prescribing must combine several methods and that multidisciplinary cooperation and the provision of clinical medication reviews are crucial to successful intervention (Petrovic et al. 2016). One simple strategy would be also to avoid prescribing highly complex drug regimens (polypharmacy) and PIMs.

The number of drugs approved for clinical use has increased exponentially on the US and European pharmaceutical markets. As described in the publication of Bernhardt et al. (2017), global pharmaceutical consumption has increased four times since 1970, with estimations of 760 billion dollars spent annually in 2015 (Bernhardt et al. 2017). Pharmaceutical firms and regulatory agencies have been found to switch more medications to over-the-counter (OTC) status (Francis et al. 2005). Some PIMs for older patients are already available as OTC medications (Francis et al. 2005), such as contact laxatives, loperamide, proton-pump inhibitors, and nonsteroidal anti-inflammatory drugs for systemic use. Increasing the number of registered active substances, brand names, drug forms, and OTCs contributes to more frequent medication errors (e.g., transcription errors during the prescribing process; drug duplication; dispensing errors; and errors in the use of medicines by patients themselves). Controlling drug prescribing and drug use appropriateness has become more and more complicated.

Considering the vulnerability of older adults to ADEs as well as the increase in population ageing, the trends described above can be seen to reflect ageism at the level of regulatory institutions as well as in society in general. Significant discrepancies in providing standard healthcare to older adults already exist, and population ageing and the concomitant lack of adequate numbers of healthcare professionals raise worries that the prevalence of ageist attitudes and inappropriate prescribing in geriatric patients might increase in the future. Solutions to this problem can potentially begin at the regulatory level, by more strictly regulating the availability of risky medications to geriatric patients; by regulating drug advertisements and internet sales; and by stricter regulations on switching more risky medications to OTC status. In many European countries, there is still insufficient support of safer, more geriatric-oriented clinical practice, and insufficient support of clinical pharmacy, and clinical pharmacology services that create important feedback (Fialová et al. 2005; Fialová and Desplenter 2016; Spinewine et al. 2012). In some EU countries, such as the UK, the Netherlands, Belgium, and several other countries, patients already benefit from clinical pharmacy services that significantly help to improve appropriateness of drug prescribing and reduce overall healthcare costs and ADEs in older adults (Fialová and Desplenter 2016). More support of these positive feedback strategies could help to optimize medication treatment in vulnerable populations, including geriatric patients.

## **14.4 Polypharmacy and Polyherbacy in Older Patients and Aspects of Ageism**

### ***14.4.1 Definitions and Epidemiology of Polypharmacy and Polyherbacy***

The majority of older adults, approximately three quarters of geriatric patients (Anderson 2010), suffer from multiple chronic conditions and are consequently prescribed multiple medications (Lorgunpai et al. 2014). Polypharmacy describes an individual's use of multiple medications; however, a uniform definition for polypharmacy has not yet been set (Votova et al. 2013). "Polypharmacy" is usually defined as the concurrent use of five or more medications (Hoffmann et al. 2011), whereas "excessive polypharmacy" refers to the simultaneous use of more than ten prescribed medications (Jyrkkä et al. 2012). The term polyherbacy (Ness et al. 2003) is defined as the use of multiple natural health products, which include dietary supplements, vitamins, minerals, and herbals.

Today, polypharmacy and polyherbacy present important and growing public health problems, as their prevalence among older adults is high and rising and may significantly differ from country to country as well as regionally. In the United States, the concurrent use of five or more prescribed medications among older adults increased from 30.6% (2005–2006) to 35.8% (2010–2011) (Qato et al. 2016). Similar trends have been observed in Europe. In Sweden, the increase in excessive polypharmacy was 15.7% between 2005 and 2008 (Hovstadius et al. 2010). Observed use of dietary supplements in the United States increased from 51.8% (2005–2006) to 63.7% (201–2011) (Qato et al. 2016).

### ***14.4.2 Risk Factors of Polypharmacy and Polyherbacy in Older Patients***

The risk factors of polypharmacy and polyherbacy can be classified into three groups: demographic risk factors; health status-related; and access to healthcare-related risk factors (see Table 14.3). Demographic characteristics of the older population cannot be influenced; however, interventions can be made to patients' habits and healthcare providers' practices to reduce the risk of polypharmacy.

### ***14.4.3 Negative Consequences of Polypharmacy and Polyherbacy in Older Adults***

Like inappropriate prescribing and medication nonadherence, polypharmacy and polyherbacy in older patients have numerous negative consequences on both the patient and the healthcare system (see Table 14.1). They are associated with greater

**Table 14.3** Risk factors associated with polypharmacy

Demographic factors	Increased age (*)
	White race
	Education
	Female gender
Health factors	Poorer health (*)
	Comorbidities (cardiovascular disease, hypertension, asthma, diabetes mellitus)
	Use of >9 medications (*)
Access to healthcare	Number of healthcare visits (*)
	Supplemental insurance (?*)
	Multiple providers (*)
Due to healthcare providers (*)	Presuming that patient expects prescription medication
	Prescribing drugs without sufficient investigating of clinical situation
	Providing unclear, complex or incomplete instructions how to take medicines
	Not simplifying medication regimens, when it is possible
	Not conducting patient's medication review regularly
	Ordering automatic refills without adequate follow-up
	Lack of knowledge of geriatric clinical pharmacology
	Stacking and insisting on using drugs that are no longer necessary
Due to patients	Inaccurate report to physicians of all medicines that patients are using simultaneously
	Not reporting symptoms patients are experiencing (these can be also drug-induced)
	Having duplicate prescriptions
	Using additional drugs to treat symptoms, disorders (also OTC drugs) or also drug-related symptoms
	Using medications for a very long period, without appropriate follow-up
	Influence of patients' daily manners on the action of medications (i.e. smoking, changes in activity level, food and fluid intake)

References: Abdulraheem (2013), Hajjar et al. (2007), and Hovstadius et al. (2010)

Footnote: Many of above stated risk factors may be directly or indirectly linked to ageism (\*)

healthcare costs and an increased risk of ADRs and other complications, such as drug-interactions, medication nonadherence, reduced functional capacity, and multiple geriatric syndromes (Maher et al. 2014).

Polypharmacy has been found to be associated with a higher risk of outpatient visits, hospitalizations, taking PIMs, and with an approximate 30% increase in medical costs (Akazawa et al. 2010). The risk of ADRs and other ADEs may be substantially increased by a higher number of prescribed drugs and OTC medication. Polypharmacy and polyherbacy sometimes lead to so-called prescribing cascades that begin when an ADR is misdiagnosed as a new medical condition and, consequently, a new medicine is prescribed. The patient is then exposed to a risk of developing additional adverse effects (Rochon and Gurwitz 1997). The potential for drug interactions increases exponentially with the number of applied medicines. Doan

et al. (2013) found that a patient taking 5–9 medications had a 50% probability of a drug-drug interaction (DDI), and a patient taking 20 or more medications had a 100% probability of developing DDIs.

Studies that analysed the correlation between polypharmacy and underprescribing have had conflicting results. Some researches consider the number of medications to be a risk factor for underuse of highly effective drug treatment strategies (Kuijpers et al. 2008), whereas others did not find an association (Gallagher et al. 2011; Ryan et al. 2009; Ryan et al. 2013; Wright et al. 2009). It is important to identify which pharmacological groups and risk factors are linked with polypharmacy and underprescribing, and to examine this possible relationship (Blanco-Reina et al. 2015) with an aim to achieve improvements in pharmacotherapy (Franchi et al. 2013). As confirmed by previous studies, the main determinants of underprescribing in older patients are comorbidity, polypharmacy, ageism, lack of or scanty evidence concerning the efficacy and safety of drugs in older patients, fear of ADRs, and economic constraints (Cherubini et al. 2012).

Polypharmacy and polyherbacy are also associated with medication nonadherence. One of the most important negative consequences of polypharmacy/polyherbacy is the higher risk of occurrence of geriatric syndromes. This includes increased risk of cognitive impairment, falls, urinary incontinence, and reduced functional capacity (Maher et al. 2014). Also, a patient's nutritional status can be affected by polypharmacy. Jyrkkä et al. (2011) found that 50% of patients taking ten or more medications were malnourished or at risk of malnourishment, mostly because of frequent indigestion and other gastrointestinal problems caused also by the mixture of chemical substances interacting in the gastrointestinal tract and consequently decreased food intake.

#### ***14.4.4 Strategies to Reduce Inappropriate Polypharmacy and Polyherbacy in Older Patients***

We argue that the issue of the increasing prevalence of polypharmacy in older patients (and consequently increasing problems of side effects, geriatric syndromes, malnutrition, hospitalizations, higher healthcare costs, and other negative consequences) is strongly linked to ageism. In the current world of “consumer” healthcare, the consumption of medications and the phenomenon of polypharmacy both increase (Bernhardt et al. 2017; Hovstadius et al. 2010). Older patients and their informal caregivers generally cannot judge whether multiple drug prescription is appropriate or not and they are fully dependent in this respect on the decisions, skills, and attitudes of healthcare providers. Because of strong pressure on drug market sales, patients and healthcare providers are (intentionally or unintentionally) pressured to prescribe and consume more medicines, having less time to thoroughly consider their long-term benefits and risks (Bernhardt et al. 2017; Petrovic et al. 2016). Polypharmacy becomes a common practice, particularly in older patients

with complex disorders (Petrovic et al. 2016). Patients, carers, patient organizations, healthcare providers, and regulatory institutions should jointly support strategies against ageist medication-related practices which may increase in the future because of increased consumption of medicinal products.

When treating patients with complex medical issues and high-risk patient groups, such as older adults, it is particularly important to obtain a balance between different therapeutic goals and the expected efficacy and possible risks of medications for the ageing organism, and to practise more frequent reviews of medication and overall health status than in younger patients (Steinman and Hanlon 2010). The prescribing physician or consulting clinical pharmacist should evaluate the use of appropriate medication; minimize doses of medication without affecting treatment efficacy; readjust inappropriate doses of drugs, such as doses beyond the drug safety margin; and rectify any incorrect or inappropriate use of medication by older patients (Simonson and Feinberg 2005; Steinman and Hanlon 2010). Medication regimens of older patients should be evaluated at least twice a year, ideally monthly, to reduce the incidence and adverse effects of polypharmacy (Rochon 2016). Even for older patients who have been using the same drug regimen for a long time, medication reviews are necessary, because physiological changes associated with ageing can alter drug pharmacokinetics and increase the risk of ADRs (Corsonello et al. 2010; Routledge et al. 2004; Sokol et al. 2007). Treatments should be designed to prioritize improvements in health, functional status, and quality of life (Blanco-Reina et al. 2015). Some studies have found that physicians already consider medication guidelines to be too rigid, resulting in individuals with multiple disorders receiving an increasing number of different drugs (Hovstadius et al. 2010; Moen et al. 2010). Clinical care is structured and organized mainly to treat a single health problem at a time or to treat the various illnesses a single patient has as if they were independent of each other and isolated from the individual who suffers from them (Starfield 2006). Unfortunately, physicians often add medications without being aware of potential interactions with other medications and/or diseases (Blanco-Reina et al. 2015). If different specialists are involved in the care of the same patient, a risk of fragmented care occurs, due to frequent failures of communication among healthcare professionals (Green et al. 2007; Hajjar et al. 2007). Poor communication can result in conflicting or poorly coordinated treatment goals, inadequate monitoring of the patient's therapeutic regimen, and inappropriate expectations and definitions of success, which may contribute to patients' overall negative outcomes and negative perceptions of the healthcare system (Makris et al. 2015).

Chronic drug therapy in older patients should generally be started with the lowest possible dose, following the well-known geriatric phrase, "Start low, go slow," and both physicians and patients should be aware of the general rule that "Less is more" (Steinman and Hanlon 2010). At first, more physiological, nonpharmacological strategies should be promoted, if appropriate (e.g., physical exercise, sun exposure, nutritional interventions, and rehabilitation) (Abraha et al. 2015; Naci and Ioannidis 2013; Taylor et al. 2014). It is also important to regularly identify and eliminate unessential drugs and duplicate prescriptions for the same condition or disease (Dagli and Sharma 2014).

Many existing studies warn that polypharmacy in older patients is becoming more common and is strongly associated with higher mortality, faster functional decline, malnutrition, severe drug therapy problems, and often undertreatment of major disease conditions (Bourgeois et al. 2010; Jyrkkä et al. 2011; Kojima et al. 2012; Shah and Hajjar 2012). Ageism can be seen to be in effect in prescribing polypharmacy and in poor or no monitoring of drug efficacy and safety, and the patient's functional status and quality of life during treatment. A large number of older patients in a variety of care settings are currently prescribed multiple medications. Vulnerable older patients are among the biggest “consumers” of polypharmacy (Chau et al. 2016). As shown in the European project AdHOC (Aged in Home Care, 2001–2005), 22% of home care older clients used polypharmacy (9+ medications) in 8 European countries, however medication reviews provided on a regular basis at least every 6 months have been documented in only 11% of older patients in home care (Fialová et al. 2005).

It is essential to continuously create healthcare systems that optimize the use of medication and where older patients can obtain maximum benefits from their medication with the least harm (Duerden et al. 2013). The strategy of identifying and avoiding risky polypharmacy can lead to better outcomes in older patients and can help improve their quality of life (Dagli and Sharma 2014).

## 14.5 Medication Nonadherence in Older Patients and Aspects of Ageism

### 14.5.1 Definitions and Epidemiology of Medication Nonadherence

The scientific literature uses a variety of terms to describe medication-taking behaviours, including medication compliance, adherence, persistence, and concordance (American Society on Aging/American Society of Consultant Pharmacists Foundation (ASA/ASCPF) 2006; Chakrabarti 2014; Krueger et al. 2003; Sabaté 2003). *Adherence* is the most often used term, defined in the 2003 report of the World Health Organization (WHO) as “the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, etc. corresponds with agreed recommendations from a healthcare provider” (Sabaté 2003). The previously used term *compliance* has come into disfavour because of its connotation of patients passively following doctors' recommendations. Adherence, on the other hand, requires the patient's agreement with the physician's recommendations (Sabaté 2003). *Persistence* is defined as the ability of a person to continue in medication treatment for the intended course of therapy (whether for months, years, or for the rest of the patient's life). *Non-persistence* is when the patient does not fill his or her prescription or discontinues therapy too early (ASA/ASCPF 2006; Krueger et al. 2003). A newer term, *concordance*, takes into account agreement between the clinician and the patient on medication therapy as well as each other's views and

perspectives about medication-taking. It describes a broad process in which, after education and discussion with the patient, the physician should respect the patient's choice and views on the therapy, even if they are different or conflict with the clinician's views (Chakrabarti 2014). The evolution of the terms compliance, adherence, and concordance indicates a striving towards active patient involvement and a patient-centred approach in the medication treatment process (Chakrabarti 2014).

Medication nonadherence is the most frequently used term in the literature. Taken broadly, it includes different types of nonadherence, noncompliance, and nonpersistence, for example:

- Taking less or more of a medication/medications than prescribed, omitting a dose, taking a dose at the wrong time, taking a dose with prohibited foods, liquids, and other medication
- Improper administration of medication, including also improper use of administration devices, such as inhalers, injections, etc.
- Taking outdated medication or damaged medication, or storing medication improperly
- Taking a medication prescribed for someone else
- Prematurely discontinuing medication, failing to initially fill in a prescription or failing to refill a prescription as directed. (ASA/ASCPF 2006; Krueger et al. 2003)

Nonadherence to medication is a very frequent problem, particularly in community-dwelling older adults, where the prevalence of nonadherence has been reported to be between 43–100% (Vik et al. 2004).

### ***14.5.2 Negative Consequences of Medication Nonadherence in Older Patients***

There are various negative consequences of medication nonadherence: less than optimal management and control of the illness, medical and psychosocial complications of the disease, reduced patient quality of life, and increased use of medical resources, such as physician visits, laboratory tests, unnecessary additional treatments, emergency department visits, and hospital or nursing home admissions (see Table 14.1) (Col et al. 1990; Gurwitz et al. 2003; Scheen and Giet 2010; Strandberg 1984; Vermiere et al. 2001).

Problems with medication nonadherence have been documented as a contributing factor in more than 20% of preventable ADEs in older patients in ambulatory care settings (Gurwitz et al. 2003). Studies have also found that more than 10% of older adults' admissions to acute care may have been caused by nonadherence to medication regimens (Vermiere et al. 2001). Col et al. (1990) described in his study that one-third of older persons admitted to the hospital had a history of nonadherence, and Strandberg (1984) found that nearly one-fourth of admissions of older adults to nursing homes were due to their inability to self-administer medication.



### 14.5.3 *Risk Factors of Medication Nonadherence and Aspects of Ageism*

Medication nonadherence is a multidimensional phenomenon which is determined by the interplay of different sets of risk factors, termed “dimensions” according to WHO (Sabaté 2003). These are namely:

- Socioeconomic risk factors
- Healthcare system and provider-related risk factors
- Condition-related risk factors
- Therapy-related risk factors, and
- Patient-related factors

Some of these risk factors may be directly or indirectly related to ageism (see Table 14.4); however, the relationship between medication nonadherence and ageist attitudes and behaviours has not been yet thoroughly studied.

The common belief that older persons are mostly nonadherent with medication can be seen as an ageist attitude. Published evidence confirms that all age groups are prone to nonadherence and that older persons are not an exception (Cooper et al. 2005; Culig et al. 2011; Topinková et al. 2012). Another common belief is that individuals are solely responsible for taking their medication appropriately, but this belief reflects a misunderstanding of the fact that a range of factors, including non-personal patient-related factors can strongly affect medication-taking behaviour (ASA/ASCPF 2006; Sabaté 2003). This misunderstanding may contribute to ageism when no help is provided to older patients with complex disease conditions that require compliance support, or to older adults who are cognitively impaired or otherwise have problems administering or taking drugs. Many older patients are prescribed several medications without any education on how to take and manage them appropriately. In one of the study of the European Commission project, Aged in Home Care (AdHOC) project (2001–2005), more than 2700 home care older patients were assessed in metropolitan areas of 8 EU countries. Of these older patients, 12.4% reported no help with medication compliance and managing their medications despite an objective need (Fialová et al. 2005).

When older people forget to take medication regularly (on time or in a prescribed dose) they are often viewed as senile, which is ageist attitude, whereas the same behaviour in a younger person is explained without these stereotypes. Culig et al. (2011) found in his study that the majority of subjects cited forgetfulness as the main reason for skipping drug dosing (60%), followed by not being at home (45.4%), and having run out of the drug (44.4%). However, with the simple help of pill boxes and adherence reminders, even forgetfulness is a modifiable risk factor of nonadherence that can be easily resolved (Culig et al. 2011). Not providing compliance support tools to geriatric patients should be viewed as a lack of age-specific care, and therefore as ageist behaviour.

Medication adherence depends on patients’ comprehension, their attitudes to disease and need to control the disease, reliance on their own capability to manage



**Table 14.4** Risk factors associated with medication nonadherence

<b>Patient- related factors</b>		
<i>Physical factors</i>	Visual impairment (*)	Patient sleepiness (e.g. drug-related sedation) contributing to inability to take medicine (*)
	Hearing impairment (*)	Decreased dexterity (*)
	Cognitive impairment (*)	Swallowing problems (*)
	Impaired mobility (*)	
<i>Psychological/ behavioral factors</i>	Medication knowledge (*), education (*)	Motivation (*)
	Health literacy (*)	Beliefs about medicines (*)
	Forgetfulness (*)	Attitudes to medication treatment (*)
	Decreased self-performance (*)	Social support (*)
	Alcohol and substance abuse (*)	
<i>Other factors</i>	Demographic factors: Age (*), gender, ethnicity, marital status	Patient-prescriber relationship(*)
	History of good adherence	Not at home
<b>Therapy-related factors</b>	Treatment complexity(*)	Route of administration (*)
	Duration of the treatment period (*)	Taste of the medication (*)
	Medication side effects or adverse drug reactions (*)	Requirements for drug storage
	Therapies that are inconvenient or interfere with a person's lifestyle (*)	Medications with a social stigma attached to its use (such as antidepressants, antipsychotics) (*)
	Lack of accessibility of medication(*)	Administration of a medication requiring the mastery of specific techniques (injections, inhalers) (*)
<b>Provider- and healthcare system-related factors</b>	Accessibility of healthcare provider (*)	Difficulty in getting prescriptions filled (*)
	Long waiting time or making appointments difficult (*)	Lacking continuity of provider care (*)
	Unhappy clinic visits(*)	Using restrictive formularies/ changing formularies (*)
	Physician's readiness to change compliance assessment method	High drug costs, high copayments (*)
<b>Condition/disease related factors</b>	Severity of the disease (?*)	Disease symptoms (*)
<b>Social and economic factors</b>	Cost and income (*)	Inability to take time off work (*)
	Poor social support (*)	Lack of health insurance coverage (*)
	Homelessness (*)	

References: Aggarwal and Mosca (2010), Crowley et al. (2013), Harris et al. (2011), and Munger et al. (2007)

Footnote: Many of above stated risk factors may be directly or indirectly linked to ageism (\*)

the use of medicines, their expectations concerning the drug therapy, and their behavior when the results of therapy are unsatisfactory (Casula et al. 2012). Patients' behaviour is a complex phenomenon significantly influenced by patients' home environments, the healthcare system, and healthcare professionals (ASA/ASCPF 2006). Table 14.4 shows there are many risk factors and groups of risk factors that contribute to lower adherence of patients to their medications. Some of these risk factors are related to ageism, for example, poorly coordinated care, inappropriate expectations of carers from the patient, inadequate education of older adults about medication because of physician's perceived lack of time, and so on (ASA/ASCPF 2006; Sabaté 2003; Scheen and Giet 2010).

#### ***14.5.4 Strategies to Reduce Medication Nonadherence in Older Patients***

For a number of chronic medical conditions, such as diabetes, hypertension, hypercholesterolemia, and congestive heart failure, higher rates of medication adherence have been found to be associated with lower rates of hospitalization. For example, for diabetes and hypercholesterolemia, better compliance to medication was associated with lower disease-related medical costs (Sokol et al. 2005).

Several publications and website sources have summarized the prerequisites for good adherence to medication regimens that require that a person will

- Show interest in his or her health and understand the diagnosis and potential impact of the diagnosis
- Believe that the prescribed treatment will help
- Know exactly how to take the medication and know the duration of therapy (it is possible to assess the patient's understanding of the disease and the treatment regimen and provide information where knowledge gaps exist)
- Find ways to fit the medication regimen into his or her daily routine, use adherence aids, such as medication organizers and charts
- Value the outcome of treatment more than the cost of treatment
- Believe that he or she can carry out the treatment plan and is actively involved in the treatment process.
- Get support from the healthcare team, both professional support (e.g., by simplifying medication regimens) and human support (e.g., by recognizing any difficulties in coping with or recognizing other socio-behavioural issues that may affect the person's ability to follow the treatment regimen)
- Believe that the healthcare practitioners truly care about him/her as a person rather than as a disease to be treated. (ASA/ASCPF 2006; Krueger et al. 2003)

Studies have shown that single interventions are not usually adequate to improve adherence (Hughes 2004) and almost all effective interventions for improving patient adherence long-term have been complex (including a combination of different intervention strategies, such as patient counselling, patient self-monitoring, medication use reminders, telephone follow-up, psychological therapy, crisis intervention, supportive care, and so on) (Haynes et al. 2008). In clinical practice, many interventions focus on providing only one strategy (if any): for example, education to increase knowledge; simplifying the medication regimen (e.g., prescribing fixed-dose combination pills and slow-release drug forms for once-daily dosing) (Schroeder et al. 2004), using adherence aids, or using refill reminders. However, simplifying a dosage regimen alone cannot positively influence adherence if a person does not believe that drug treatment will be effective. It has been demonstrated that comprehension of drug therapy alone is insufficient for keeping good medication adherence (ASA/ASCPF 2006; Haynes et al. 2008; Hughes 2004).

Some disease-specific health education programmes (e.g. for diabetes and hypertension) were found to be effective in improving patients' adherence (Balamuguran et al. 2006), but in the absence of such formal programmes, physicians can use other educational resources (e.g., pharmacists' counselling, interactive web-based materials, etc.). The more empowered older patients feel, the more likely they are to be motivated to manage their health and adhere to their medications. Ageist practices contributing to medication nonadherence can be reduced by physicians, carers, and patients being motivated to be actively involved in drug treatments. A comprehensive approach requires team-based care that includes non-physician staff (such as nurses and pharmacists) to perform assessment and management of medication adherence. It might require some of the duties traditionally performed by physicians to be transferred to non-physician staff. This strategy allows physicians more time for diagnostic procedures and interpretation. Recently, motivational interviewing—a counseling technique originally developed to help treat addiction (designed to help patients identify and overcome reasons they may be reluctant to change their behaviour)—is also recommended (Miller 2010).

Healthcare providers can significantly influence patients' healthy behaviour. Atreja et al. (2005) reviewed interventions that helped to improve patients' adherence to medications and summarized them into several simply remembered recommendations under the acronym "SIMPLE":

1. Simplifying regimen characteristics;
2. Imparting knowledge;
3. Modifying patient beliefs;
4. Patient communication;
5. Leaving the bias; and
6. Evaluating adherence.

In conclusion, the most important measures for improving medication adherence in older patients are: (a) increase training and education of healthcare providers and patients in adherence support, team-based approach, active patient involvement, motivation to use appropriate treatment, and continuous research in specific aspects of aging; (b) empower and educate older patients; and (c) utilize appropriate screening and treatment methods for improving adherence among older patients.

Medication adherence is an important contributor to improved patient health. In order to reduce ageist behaviours stemming from ageist attitudes, healthcare systems must ensure that sufficient time in daily clinical practice is allocated to the appropriate management of adherence in older patients (Abbo et al. 2008).

## 14.6 Conclusions

It is important to take an active, more realistic role in confronting and preparing healthcare systems for the ageing of the population. Selection of age-specific approaches (e.g., the right geriatric drug, dosing schedule, drug combination, and appropriate geriatric recommendations during the drug treatment process) are crucial first steps in the area of appropriate medication use in older patients. Prescribers currently tend to follow mostly nongeriatric recommendations, which are not relevant to potentially frail, polymorbid, and highly complex older adults (Steinmann and Hanlon 2010; Wehling 2016). Part of the problem is due to missing evidence from randomized controlled trials on effective and safe medication and dosing for geriatric patients. Novel evidence from specifically geriatric studies is necessary, ideally for specific groups of geriatric patients. Individualization of drug regimens and adherence support under close clinical surveillance must be also used to improve appropriate medication use in older patients. Further training of physicians, nurses, and pharmacists in these techniques, in patient active involvement, and in team-based care is needed.

Today's healthcare provision and drug use in the geriatric population is clearly not meeting the specific needs of older patients. Older adults are often either untreated in situations where treatment is relevant and necessary, or they suffer inappropriately from adverse drug reactions or unnecessary and aggressive treatments. These extremes represent a significant shortage in the appropriate managing of healthcare needs for older patients in the area of medication use and must be addressed by more individualized, age-specific, integrated care.

## Appendix: List of Abbreviations

ADE(s)	Adverse Drug Event(s)
AdHOC	Aged in HOME Care project
ADR(s)	Adverse Drug Reaction(s)
AGS	American Geriatric Society
ASA/ASCPF	American Society on Aging/American Society of Consultant Pharmacists Foundation
DDI(s)	Drug-Drug Interaction(s)
DRP(s)	Drug- Related Problem(s)
FORTA List (of medications)	Fit fOR the AgeD List (of medications)
GP(s)	General Practice(s)
HARM study	Hospital Admissions Related to Medications study
OTC	Over-the-Counter (Over-the Counter Medications)
PCNE	Pharmaceutical Care Network of Europe
PIM(s)	Potentially Inappropriate Medication(s)
PINCER trial	A Pharmacist-led information technology intervention for medication errors' trial (called PINCER trial)
RCTs	Randomised Controlled Trials
STOPP/START criteria	Screening Tool of Older Person's Prescriptions/Screening Tool to Alert Doctors to Right Treatment Criteria

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