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Factors associated with antiretroviral treatment uptake and adherence: a review. Perspectives from Australia, Canada, and the United Kingdom

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ABSTRACT

International focus on reducing onward HIV transmission emphasizes the need for routine HIV testing and early uptake of antiretroviral treatment (ART). Strategic targets have been set for 2020 to achieve the goal of 90% of people infected with HIV diagnosed, 90% of identified cases on treatment, and 90% of persons on treatment virally suppressed (90–90–90). It is vital to understand the complexity of factors influencing a person's treatment decisions over time and the context which may enable better adherence. In this paper we present findings from the review of published and gray literature (2003–2013) on the documented factors associated with treatment initiation and adherence in the general adult population of Australia, Canada, and the UK. A framework developed by Begley, McLaws, Ross, and Gold [2008. Cognitive and behavioural correlates of non-adherence to HIV anti-retroviral therapy: Theoretical and practical insight for clinical psychology and health psychology. *Clinical Psychologist*, 12(1), 9–17] in Australia was adapted to summarize the findings. A systematic database search using keywords and a set of inclusion criteria yielded 17 studies (Australia = 6; Canada = 8; UK = 3). In addition 11 reports were included in the review. We found that a person's abilities and motivations (intrapersonal factors, reported in 7 studies) to start and continue ART are influenced by a host of interconnected factors spanning relationship (interpersonal, 3 studies) and broader structural (extrapersonal, 15 studies) factors that are situated within social determinants of health. People therefore evaluate various costs and benefits of starting and staying on treatment, in which biomedical concerns play an important yet often subsidiary role. In this review the economic barriers to care were found to be significant and under-reported, highlighting the persistent health inequities in terms of access to services. Our understanding of the context around people's use of ART remains poor. Qualitative social research within HIV-positive communities is urgently needed to capture people's lived experiences and may address some of this deficit in understanding.

ARTICLE HISTORY

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KEYWORDS

ART; review; factors;
Australia; Canada; UK

ABBREVIATIONS


ART: antiretroviral treatment;
the UK: United Kingdom; HIV:
human immunodeficiency
virus; AIDS: acquired
immunodeficiency syndrome;
PLHIV: people living with HIV;
the USA: United States of
America; IDU: injecting drug
user; PBS: Pharmaceutical
Benefits Scheme

Background

International focus on reducing onward HIV transmission emphasizes the need for routine HIV testing and early uptake of antiretroviral treatment (ART) (Flowers, Knussen, Li, & McDaid, 2013). Consequently, strategic targets have been set for 2020 to achieve 90% of infected people diagnosed, 90% of diagnosed people on treatment, and 90% of those on treatment virally suppressed (90–90–90) (UNAIDS, 2014), and research is underway to evaluate future universal testing and treatment (PopART trial) (Hayes, 2014). ART is now being promoted not only as a means of reducing the progression to AIDS and improving the health of people living with HIV (PLHIV) (Newman et al., 2007), but also as a public health measure to reduce transmission. In PLHIV non-adherence may be related to poor health

and well-being, emergence of drug-resistant HIV strains, treatment failure, faster progression to AIDS, and death (Begley et al., 2008; Sidat, Fairley, & Grierson, 2007). High treatment adherence confers significant public health benefits, including less transmission (treatment as prevention) and reduced economic costs (otherwise related to hospitalization) (Begley et al., 2008; Kall, Smith, & Delpech, 2012). Patients' perceptions of the health benefits of treatment, however, may not be aligned with clinical indicators (Grierson, Pitts, & Koelmeyer, 2013) and need to be balanced against a variety of psychosocial and structural considerations. In spite of ART's demonstrated benefits and considerable availability, a large group of PLHIV in high-income countries significantly delay treatment, or take "drug holidays", often not clinically monitored (Grierson, Misson, &

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Pitts, 2004). It is essential that we better understand the complexity of factors influencing people's ability to start and stay on treatment in high-income settings, including the short- and long-term health benefits, personal needs and lifestyle factors, access, and other structural issues. While reviews exist regarding barriers to treatment adherence among specific groups (MacDonell, Naar-King, Huszti, & Belzer, 2013; Wolfe, Carrieri, & Shepard, 2010; Wood, Kerr, Tyndall, & Montaner, 2008), or focusing on specific factors (Falagas, Zarkadoulia, Pliatsika, & Panos, 2008; Katz et al., 2013; Mills et al., 2006), and the context around treatment in the general population has been explored in the USA (Cavaleri et al., 2010; French, Tesoriero, & Agins, 2011; Kalichman & Grebler, 2010; Mary Cavaleri et al., 2011; McKay et al., 2011; Remien et al., 2003; Wolitski et al., 2009), not all findings may be applicable to Commonwealth countries. Consequently, the primary purpose of this study was to review the literature on factors associated with initiating and staying on treatment in the general adult population in Australia, Canada, and the UK using an established framework. The secondary aim was to investigate the opportunities for improving future treatment and care in similar contexts.

Methods

Search strategy and article selection

We conducted a search through peer-reviewed and grey literature (2003–2013) which informed two reviews: a review of barriers to HIV testing in Australia, Canada and the UK (Bolsewicz, Valley, Debattista, Whittaker, & Fitzgerald, 2014) and the review presented here. We drew from the medical, allied health, and social sciences online libraries as well as from unpublished reports, selected on recommendations from JD, their implication for the national and regional policies, and their currency. The three countries were selected because of a shared common history, language, and health systems. The search strategy and methods of data coding and synthesis were almost identical for both reviews (except different exclusion criteria) and previously described (Bolsewicz et al., 2014). In brief, search terms included a combination of words around factors influencing HIV treatment and care; we included primary studies and reviews published in English and articles were restricted to those that included the review search terms in the title, keywords, and abstracts (Figure 1). Studies from outside the three countries; those related specifically to biological and pharmacological aspects of treatment, and those focusing on specific populations (such as injecting drug users

(IDU), mothers, adolescents, prisoners, and sex workers) were excluded from this review.

Data coding and synthesis

In consultation with the research team, the lead author (KB) conceptualized the search strategy and study selection criteria, tables, and abstraction criteria. We used a categorization of barriers devised by Begley and colleagues (2008) who were the first to assess the association between self-efficacy beliefs, HIV illness factors, substance use, and ART non-adherence in Australia (Begley et al., 2008). In their study, barriers to ART were broadly categorized into *intrapersonal* (cognitive or psychological processes experienced by the individual, including person's attitudes, perception, and beliefs); *interpersonal* (relationship variables including relationship with health providers, community, and family; and social support); and *extrapersonal* (external variables including systemic, structural and demographic issues, experiences of illness, lifestyle, and treatment factors).

Results

Our search strategy resulted in 2730 publications, of which 123 were retrieved for full-text analysis and 17 of them (Australia = 6; Canada = 8; the UK = 3) were included in this review (Table 1S). Eleven reports were also included. Barriers to ART uptake or adherence were categorized as intrapersonal (reported in 7 studies), interpersonal (3), or extrapersonal (15).

The practices and policies around ART: Australia, Canada, and the UK

HIV epidemiological profiles and testing policies across Australia, Canada, and the UK have been previously described (Bolsewicz et al., 2014). In the last decade the uptake of ARTs among people diagnosed with HIV in these countries has increased, estimated in 2013 at 87% in Australia (Grierson et al., 2013), 66% in Canada (Public Health Agency of Canada, 2014), and 90% in the UK (Public Health England, 2014). These statistics do not reflect, however, geographic and social inequalities in access to ART and the fact that a large proportion of HIV-positive individuals remain undiagnosed and thus not on treatment (20–25% across the three countries) (Bolsewicz et al., 2014). While in the UK and Canada HIV-related services are provided free of charge and clients may choose their preferred clinic (Cook et al., 2009; Huntington, Chadborn, Rice, Brown, & Delpech, 2011; Tapp et al., 2011), in Australia the health system serving citizens and permanent residents provides free testing

A systematic review of published literature (2003-13) using Scopus, OVID-EMBASE, CSA/illumin, CINAHL, PROQuest, Web of Science, and Informit

Search terms included: ("HIV car*" OR "HIV counselling and test*" OR "HIV antibody" OR "HIV test*" OR "HIV treat*" OR "HIV screen*" OR "Human immunodeficiency virus") AND (factors OR barriers OR facilit* OR motivat* OR pathways OR "Reasons for test*") AND (UK OR "United Kingdom" OR Britain OR England OR Scotland OR Wales OR Ireland OR Australia OR Canada)

Included primary studies and reviews published in English; articles were restricted to those that included the review search terms in the title, keywords or abstract

Figure 1. Search strategy.

but requires a co-payment for ART. The financial barriers to care for PLHIV in Australia have been further exacerbated in recent years with the move away from providers billing Medicare directly for patients' health services (Allen, 2009). In the UK and Canada the majority of HIV-related clinical care is provided in public sexual health clinics (Bourne & Minichiello, 2009). In Australia, although care is available through public hospitals, sexual health centers, and specialist HIV clinics (Newman et al., 2012, 2013), most PLHIV access care is through a registered ART-prescribing general practitioner (Bourne & Minichiello, 2009; Grierson et al., 2013).

Barriers to treatment initiation and adherence

Barriers at the intrapersonal level

Low perception of the need for treatment (i.e., not experiencing HIV-related illness) was reported as a barrier to both starting and staying on treatment (Begley et al., 2008). Considering the lifelong strict regimen required for effective viral suppression, some PLHIV may delay the initiation of ART until they feel ready or capable to commit to the lifelong adherence (Alfonso, Bermbach, Geller, & Montaner, 2006; Begley et al., 2008; Grierson, Koelmeyer, & Pitts, 2011; Plitt et al., 2009). This includes a social and psychological readiness to commit to the behavior change required for effective adherence (Alfonso et al., 2006). Mental health issues (Alfonso et al., 2006; Evans et al., 2009; Plitt et al., 2009) and poor coping skills (Mill et al., 2008; Plitt et al., 2009; Prentice et al., 2011) have been reported as barriers to starting and continuing treatment. For instance Canadian Aboriginal youth have reported delaying initiating treatment (sometimes by a few years following diagnosis) because of fear and suicidal thoughts (Mill et al., 2008; Prentice et al., 2011). Having inadequate information about treatments and care also acts as a barrier to treatment initiation (Grierson et al.,

2013; Mill et al., 2008; Plitt et al., 2009). In a 2013 Australian national survey of PLHIV, almost 30% respondents reported that a lack of information regarding managing ART side effects and drug interactions made it difficult to make decisions about treatment (Grierson et al., 2013) (Table 1).

Taking medications may act as an unwanted reminder of one's condition and the internalized stigma associated with it, contributing to poorer adherence (Alfonso et al., 2006; Grierson et al., 2013; Mill et al., 2008; Sidat et al., 2007). Adherence to medication may also be fraught with social challenges related to unwanted disclosure (Alfonso et al., 2006; Grierson et al., 2013; Newman et al., 2007; Sidat et al., 2007) and this may contribute to missing doses of medication when traveling or entertaining (Sidat et al., 2007). Negative beliefs around the health benefits of biomedical treatments, seen as "polluting" the body, may also act as a barrier to starting and staying on treatment (Alfonso et al., 2006; Grierson et al., 2004, 2011). In an Australian study 52% of PLHIV who had ever taken drug holidays did so for lifestyle reasons, such as traveling and a desire to "clean out the system" (Grierson et al., 2004).

Barriers at the interpersonal level

Providers play an important role in the continuum of care for PLHIV in that they are seen as the main source of information about living with HIV and recommendations about treatment (Grierson et al., 2011, 2013). Patients may be more likely to start (Prentice et al., 2011), stop (Grierson et al., 2011, 2004, 2013; Prentice et al., 2011), and change treatment (Grierson et al., 2011) if recommended to do so by a health-care provider. Lack of a doctor's recommendation to initiate treatment at the time of HIV diagnosis has been associated with delays in accessing care (Plitt et al., 2009). The extent to which an individual will consider a provider's recommendations is mediated, however, by the person's

Table 1. Barriers to ART initiation and adherence.

<i>Intrapersonal</i> – cognitive or psychological processes experienced by the individual (Begley et al., 2008)	<i>Interpersonal</i> – relationship variables, such as lack of social support and relationship with health-care workers (Begley et al., 2008)	<i>Extrapersonal</i> – external variables that impact on the individual's ability to adhere (i.e., lifestyle factors, systems factors, demographics, and illness/symptoms) (Begley et al., 2008)
<p>Risk of <i>unwanted disclosure</i> and fear of related <i>discrimination</i> (Alfonso et al., 2006; Grierson et al., 2013; Newman et al., 2007; Sidat et al., 2007), in particular in rural small communities (Groft & Robinson Vollman, 2007). <i>Unwanted reminder of being positive</i> (Alfonso et al., 2006; Grierson et al., 2013; Mill et al., 2008; Sidat et al., 2007). <i>Perceived lack of/insignificance</i> of experienced HIV-related illness (Begley et al., 2008; Prentice et al., 2011).</p> <p><i>Low perceived readiness/self-efficacy</i> around ART adherence (Begley et al., 2008; Grierson et al., 2011; Plitt et al., 2009).</p> <p><i>Negative beliefs around the health benefits of the ART medications</i> (Alfonso et al., 2006; Grierson et al., 2011).</p> <p><i>Mental health problems</i>, negative mood, depression (Alfonso et al., 2006; Evans et al., 2009; Mill et al., 2008) and <i>poor coping skills</i> (Mill et al., 2008; Plitt et al., 2009; Prentice et al., 2011).</p> <p><i>Little knowledge about treatment and care</i> (Grierson et al., 2013; Mill et al., 2008; Plitt et al., 2009).</p>	<p><i>Patient care:</i></p> <ul style="list-style-type: none"> • <i>Lack of provider recommendation to start/to continue ART</i> (Grierson et al., 2011, 2004, 2013; Plitt et al., 2009; Prentice et al., 2011), may be due to provider's concern about the patient's ability to adhere and/or about lack of patient's readiness (Grierson et al., 2011) • <i>Patient's negative perceptions of provider's interpersonal skills, competency, and confidentiality (the last especially in small rural communities)</i> (Grierson et al., 2011; Groft & Robinson Vollman, 2007) and consideration of patient's needs and psychosocial costs of adherence (Alfonso et al., 2006; Grierson et al., 2004; Groft & Robinson Vollman, 2007). • Patient not being connected to services (Prentice et al., 2011) <p><i>Client's cultural attitudes and beliefs</i> may facilitate treatment uptake in some contexts and discourage it in others (Newman et al., 2007)</p> <p><i>Poor relationships with family/inadequate community and social support</i> (Alfonso et al., 2006; Grierson et al., 2013; Groft & Robinson Vollman, 2007; Plitt et al., 2009; Prentice et al., 2011)</p>	<p><i>Sociodemographic characteristics of the individual:</i> unemployed, younger than 45 years at the time of diagnosis (Plitt et al., 2009), living in non-metropolitan/rural area (Plitt et al., 2009), homeless (Milloy et al., 2012), Aboriginal ethnicity (youth in particular) (Mill et al., 2008; Plitt et al., 2009; Prentice et al., 2011), heterosexual and high-risk partners (McAllister et al., 2013; Plitt et al., 2009). While males tend to have lower adherence (Plitt et al., 2009), gender in this context is under-studied (Tapp et al., 2011).</p> <p><i>Care coordination:</i> Medication side effects and regimen factors: (Alfonso et al., 2006; Grierson et al., 2011, 2004, 2013; McAllister et al., 2013; Newman et al., 2007; Sidat et al., 2007). Comorbidities and drug interactions (Evans et al., 2009; Grierson et al., 2013; Groft & Robinson Vollman, 2007; McAllister et al., 2013).</p> <p><i>Lifestyle factors</i> including substance use or intravenous drug use (Begley et al., 2008; Grierson et al., 2011, 2004; Newman et al., 2007; Parashar et al., 2011; Plitt et al., 2009; Tapp et al., 2011).</p> <p><i>Barriers to accessibility of ARTs may be due to:</i></p> <ul style="list-style-type: none"> • Costs of ARTs resulting from lack of universal care (Grierson et al., 2011; McAllister et al., 2013) • High threshold for eligibility for ART subsidies, including immigrant status (Herrmann et al., 2012) • Unstable housing (Parashar et al., 2011; Prentice et al., 2011) • Distance traveled to health services (Cook et al., 2009; Grierson et al., 2013; Huntington et al., 2011) • Rural living and difficulties accessing comprehensive services (Groft & Robinson Vollman, 2007) • Poverty/economic hardship (Cook et al., 2009; Groft & Robinson Vollman, 2007; Huntington et al., 2011; McAllister et al., 2013; Newman et al., 2007)

perceptions of the provider's interpersonal skills, competency, and the extent of their patient-centered approach. In an Australian sample of PLHIV, a provider's interpersonal nature (described as being friendly, honest, non-judgmental, caring, having a sense of humor, and an ability to put patients at ease) was the highest valued characteristic (62% respondents) followed by the provider's competency, knowledge, and communication skills (32% respondents) (Grierson et al., 2011; Groft & Robinson Vollman, 2007). Patients may be less likely to start and/or continue treatment if they feel coerced (Groft & Robinson Vollman, 2007) or feel that the provider has a narrow medical focus (Alfonso et al., 2006; Grierson et al., 2004). The latter occurs when providers do not give enough consideration to the intrapersonal (Alfonso et al., 2006; Begley et al., 2008; Mill et al., 2008; Newman et al., 2007; Prentice et al., 2011; Sidat et al., 2007) or to the structural factors experienced by the patient (Alfonso et al., 2006;

Grierson et al., 2004, 2011) (Table 1). Meanwhile, for the individual, some of the anticipated psychosocial costs may be too high compared to the biomedical benefits of treatment (Alfonso et al., 2006). Interpersonal factors also encompass social relationships and social support, including the capacity to maintain a meaningful participation in the community and family (Newman et al., 2007). The link between inadequate social support and negative health outcomes, higher morbidity, and mortality has been well established in the general population (Berkman & Syme, 1979; Cornwell & Waite, 2009; Emler, 2006; Nicholson, 2012) and is arguably stronger for PLHIV (Alfonso et al., 2006; Edwards, 2006; Emler, 2006; Groft & Robinson Vollman, 2007; Heckman, Somlai, Kalichman, Franzoi, & Kelly, 1998; Plitt et al., 2009; Prentice et al., 2011). Conversely, PLHIV who feel socially supported are more likely to adhere to treatment (Atkins et al., 2010; Edwards, 2006).

Barriers at the extrapersonal level

While some extrapersonal barriers to ART adherence, such as medication side effects, care coordination, and access issues, may be addressed with appropriate strategies, other barriers (sociodemographic characteristics) cannot be modified. Many PLHIV live with a number of complex health conditions, which may or may not be related to their HIV status. Living with comorbidities poses an additional challenge to treatment adherence (Groft & Robinson Vollman, 2007) because of drug interactions and multidrug fatigue (Alfonso et al., 2006; Evans et al., 2009; Grierson et al., 2013; McAllister, Beardsworth, Lavie, MacRae, & Carr, 2013; Newman et al., 2007). In an Australian sample, difficulties remembering to take the drugs on time and managing the side effects of medication (21% each) were the most common barriers to adherence and the most common reason for stopping ART (Grierson et al., 2013). While the number and severity of comorbidities often lie beyond one's immediate control, the medication side effects, treatment regimen, and the coordination of care required to manage complex chronic conditions may be effectively addressed.

In an Australian study among individuals taking treatment breaks, lifestyle motivations, including recreational drug use, were as common as clinical ones (around 50%) (Grierson et al., 2004). Harm reduction approaches may help address regular substance use, including IDU, which are known barriers to treatment adherence (Begley et al., 2008; Newman et al., 2007; Tapp et al., 2011).

Lack of universal access to ART and related costs of treatment, unstable housing, and distance and cost of traveling to health services are among the modifiable extrapersonal barriers to treatment initiation and adherence (Table 1). Stress associated with unstable housing may exacerbate health issues and interfere with disease management and self-care (Parashar et al., 2011). The underlying inequalities driven by social determinants of health exacerbate the lived experiences of extrapersonal barriers to ART for certain PLHIV groups. Ethnicity has long been documented as a social determinant of health. In the USA (country not included in this review) the African-American population carry a disproportionate burden of HIV infections (Wong et al., 2013) and barriers to care (Golub, Gamarel, Rendina, Surace, & Lelutiu-Weinberger, 2013). While in Australia the rates of HIV infections among the Indigenous (4.4/100,000) and non-Indigenous groups (5.0/100,000) are comparable (The Kirby Institute, 2012, 2013), the Aboriginal population in Canada is almost four times more likely to be infected with HIV as compared to others

(Public Health Agency of Canada, 2012a, 2012b). In both countries (Mill et al., 2008; Newman et al., 2007; Orchard et al., 2010; Parashar et al., 2011; Plitt et al., 2009; Prentice et al., 2011), people from Indigenous populations access HIV medication less than non-Indigenous populations and subsequently suffer higher HIV morbidity and mortality (Mill et al., 2008; Newman et al., 2007; Prentice et al., 2011). Also, people's preferences as to where to access HIV care or collect their medication encompass considerations about privacy, convenience, and the cost. While for the sake of privacy (particularly in smaller, rural communities) PLHIV may prefer accessing non-local HIV health services, and individuals living with complex comorbidities may need to travel further to access specialist care (Huntington et al., 2011), financial constraints will prevent some from accessing care (Cook et al., 2009; Grierson et al., 2011, 2013; Huntington et al., 2011; McAllister et al., 2013). In Australia 20% of the surveyed positive men from Sydney found it difficult to afford medication and 14% admitted delaying purchase due to the cost (further 9% ceased treatment because of the cost) (McAllister et al., 2013). Financial stress associated with HIV care has been an under-reported phenomenon in high-income countries (McAllister et al., 2013) and most pronounced for females (Carman, Grierson, Pitts, Hurley, & Power, 2010; McAllister et al., 2013); individuals with low income and no health card (Cook et al., 2009; Huntington et al., 2011; Newman et al., 2007), those who are ineligible for subsidies (Grierson et al., 2011), pensioners (Grierson et al., 2011), and those living in rural and remote areas (Carman et al., 2010; Grierson et al., 2011; Groft & Robinson Vollman, 2007; McAllister et al., 2013).

Enabling factors for increased ART uptake and adherence

While a systematic discussion about interventions addressing barriers to HIV treatment and care was beyond the scope of this paper given that effective interventions will be context specific and assessed locally (Begley et al., 2008), studies featured in this paper described a number of strategies to improve ART uptake and adherence. These have been grouped into two broad themes based on the types of barriers to ART they sought to address, including policies addressing accessibility of ART (Cook et al., 2009; Herrmann et al., 2012; Melbourne Declaration, 2012; Milloy et al., 2012; Parashar et al., 2011) and strategies to improve the quality of medical care received, including patient care (Alfonso et al., 2006; Groft & Robinson Vollman, 2007; Sidat et al., 2007) and care coordination (Evans et al., 2009)

(Table 2). The individual-level coping mechanisms and cognitive approaches for optimal ART adherence, and the broad-based, holistic models of care used in Aboriginal health have been described in greater detail elsewhere (Begley et al., 2008; Newman et al., 2007; Prentice et al., 2011; Sidat et al., 2007).

Discussion

The primary objective of the review was to summarize the recent evidence on the factors associated with ART initiation and adherence from Australia, Canada, and the UK, using an established framework (Begley et al., 2008). While the social, cultural, and structural context around starting and staying on treatment is increasingly recognized (Alfonso et al., 2006; Grierson et al., 2004; Newman et al., 2007; Sidat et al., 2007), most of the material meeting our inclusion criteria came from Australia and there is much more that needs to be understood in order to translate these findings into more effective responses (Alfonso et al., 2006; Barber, Hellard, Jenkinson, Spelman, & Stooove, 2011; Bolsewicz et al., 2014; Grierson et al., 2004; Kaai, Bullock, Burchell, & Major, 2012; Newman et al., 2007).

A person's abilities and motivations (intrapersonal factors) around ART are influenced by a host of interconnected factors spanning relationship (interpersonal) and broader socioeconomic, political, and cultural (extrapersonal) factors that are situated within social determinants of health. These complex interactions change over time and therefore need to be periodically reassessed (Sidat et al., 2007). As a result, while a range of individual-level strategies has been observed in patients with total adherence (Sidat et al., 2007), many PLHIV are not able or willing to engage in these. People engage in complex evaluations of the costs and benefits of starting and staying on treatment, in which biomedical concerns play an important yet often subsidiary role (Alfonso et al., 2006; Grierson et al., 2004; Newman et al., 2007). Our review confirms findings from studies in the USA which demonstrated the importance of social barriers in this context (Cavaleri et al., 2010; Edwards, 2006; Kalichman & Grebler, 2010) and highlights the need to understand the mechanisms through which social support is associated with treatment decisions (Alfonso et al., 2006; Edwards, 2006; Groft & Robinson Vollman, 2007; Plitt et al., 2009; Prentice et al., 2011).

The secondary objective of our study was to describe the conditions proposed in the reviewed literature as facilitating ART uptake and adherence. We noted two main groups of enabling strategies: first, policies to address accessibility barriers and second, strategies to improve the quality of medical care received. Within

the first group, universal access to ARTs (universal care) remains the foundation which should be considered as a priority to allow for structural barriers to treatment to be addressed more effectively (i.e., provision of free and low-barrier housing and transport to services) (Cook et al., 2009; McAllister et al., 2013; Milloy et al., 2012). Within the second group, while recognizing the important role health providers play in patient decisions around treatments (Grierson et al., 2011, 2013; Groft & Robinson Vollman, 2007; Plitt et al., 2009; Prentice et al., 2011), providers need to continue to include patients in decision-making and carefully negotiate treatment options that are best for the patients (Alfonso et al., 2006; Grierson et al., 2004; Newman et al., 2007). Also within the second group, it has been argued that in order to more effectively manage the complex health needs of the PLHIV (i.e., so that services they receive are less fragmented and there is less risk for multidrug interaction), the primary and secondary care they receive must be better integrated (Evans et al., 2009).

We noted several common themes in the documented barriers and the proposed enabling strategies from the first (Bolsewicz et al., 2014) and the subsequent review, and believe that highlighting these may help inform policies and tailor services to improve HIV prevention and care. At the intrapersonal level, fear related to diagnosis and unwanted disclosure and lack of information were reported as barriers to testing and treatment uptake. At the interpersonal level, reluctance by providers to initiate conversations around HIV testing/treatment, inadequate patient care, inadequate connection with the community and services, and patients' cultural attitudes and beliefs have all been reported as barriers to testing and treatment adherence. Finally, at the extrapersonal level, difficulties accessing services due to a combination of geographical, social, and economic factors were reported as barriers along the HIV continuum of care.

Generalization of our findings is limited to contexts similar to Australia, Canada, and the UK. Some relevant studies may have been omitted as a result of the exclusion criteria and search terms used (i.e., specific terms may be used to describe a minority population; adolescents may be representative of young adults; studies excluded from this review focusing on special populations such as prisoners and IDU may have provided information that is relevant to the general population) and our selected search terms may have failed to capture groups of interest (i.e., hard-to-reach populations). No formal method was employed to evaluate the strength of the evidence of the studies included in the review, other than summarizing their limitations. Future reviews should use a more systematic way to rate the strength of evidence of the included studies, taking into

Table 2. Literature-derived strategies to address barriers to ART initiation and adherence.*Policies to address accessibility barriers:*

- Provide ARTs free of charge or improve financial assistance to those with greatest needs. Cost of ARTs is the main barrier to treatment adherence in settings where ARTs is not provided free of charge (McAllister et al., 2013), and the poor/homeless people are six times more likely to interrupt treatment as opposed to those who can afford (Milloy et al., 2012).

In Australia, where ART is not universal, the Melbourne Declaration (2012) set out strategies to increase the access to and uptake of ART:

- Enhance the scope for people with HIV and their doctors to initiate ART, including the removal of the Pharmaceutical Benefits Scheme (PBS) indication limiting antiretroviral drug prescribing above CD4 counts of 500.
- Remove financial barriers to treatment uptake arising from patient dispensing fees for HIV antiretroviral medications in all jurisdictions and broaden HIV dispensing arrangements beyond hospital-based pharmacies.
- Establish programs to provide ART to people with HIV not eligible for Medicare cover.

Where ARTs are universal and free of charge, that is, Canada and the UK:

- improve accessibility to low-barrier housing to the homeless (no stringent requirements for eligibility) and expand adherence support programs (i.e., to better reach prison inmates) (Milloy et al., 2012; Parashar et al., 2011).
- provide services locally (Huntington et al., 2011), place the region's largest source of excellent/specialist care close to some of the most deprived areas, or reimburse for costs of travel (Cook et al., 2009).
- in some populations (i.e., Aboriginal populations), HIV care needs to be a "one stop shop" model of care, providing "under one roof" addiction treatment, housing assistance, and food security (broad-based, holistic model of care) (Newman et al., 2007; Prentice et al., 2011). Stable housing and support from family and friends – essential to the HIV care-seeking process in Aboriginal youth (Prentice et al., 2011)

Strategies to improve the quality of medical care received:

Provide high-quality patient care: A good relationship with a trusted doctor was at the heart of successful adherence among individuals with total adherence to treatment (Sidat et al., 2007). Doctors are regarded as the main source of support and information regarding individual's health and medication issues. However, the regimen cannot be perceived as "forced" (Alfonso et al., 2006; Groft & Robinson Vollman, 2007) which may be achieved through providers allowing patients to voice their concerns and addressing them (Alfonso et al., 2006), treating patient as a whole person with complex psychosocial needs (instead of narrow focus) (Alfonso et al., 2006; Grierson et al., 2004) taking into account patient's lifestyle and preferences (Grierson et al., 2004) and developing ART routine/reminder systems together with the patient to fit into the patient's daily routine (Sidat et al., 2007).

Improve care coordination: Provide more integrated care (primary and secondary care) to manage total health needs of PLHIV, such as multi-morbidity and medication interactions (Evans et al., 2009)

consideration different indicators for different study designs (Grade Working Group, 2004; West et al., 2002). Despite these limitations, our data synthesis (2003–2013) is a valuable contribution to the literature on the topic in high-income countries and, to our knowledge, we are the first to build upon Begley et al.'s (2008) framework (Begley et al., 2008) in this way.

Conclusions

Given the advancements in ART available in high-income countries, care and well-being of people living long term with HIV are becoming an increasingly salient area of research. A person's ability and willingness to initiate and to adhere to treatment are vital parts of that discourse. The review substantially contributes to the field by summarizing the recent evidence across three high-income Commonwealth countries using an established framework. Factors associated with adherence were found to be complex and tightly interwoven. Broader socioeconomic, political, and cultural contexts influence interpersonal and intrapersonal factors. In addition, despite HIV care being provided free of charge in Canada and the UK and heavily subsidized in Australia, deep inequities exist in terms of access to services and health outcomes. We propose that the most effective strategies to address barriers to ART initiation and adherence (with a potential of addressing barriers to

HIV testing) will be systemic. These include continued efforts to reduce HIV stigma at a population level, removal of structural and social barriers to care, and a meaningful participation by affected communities; and a health workforce skilled in initiating discussions around HIV testing and treatment while maintaining a patient-centered approach. This study revealed that the understanding of the broad context around ART adherence remains limited. Qualitative social research within HIV-positive communities is urgently needed to capture people's lived experiences and may address some of this deficit in understanding.

Disclosure statement

No potential conflict of interest was reported by the authors.

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