Medication Literacy in Hospitalized Older Adults: Concept Development

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ABSTRACT

Background: Medication literacy encompasses the cognitive and social skills necessary for individuals to obtain, comprehend, communicate, calculate, and process medication-related information necessary to make informed decisions. Personal and contextual factors are widely recognized to influence the way that individuals acquire and maintain medication literacy skills. Despite a growing number of studies on medication literacy, current definitions remain general, lacking consideration for the specificities of older adults and hospitalization. **Objective:** The project was conducted to identify, compare, and summarize the attributes, antecedents, and consequences of medication literacy in hospitalized older adults and to propose a refined definition. **Methods:** A three-phase hybrid model of concept development was performed that included a literature review and focus groups with hospital nurses. In the final analytic phase, findings from the literature and focus groups were compared, and a refined definition of the concept was elaborated. **Key Results:** From the synthesis of 24 publications and the narrative data of 14 hospital nurses, 19 themes were described: 4 related to attributes, 8 to antecedents, and 7 to consequences. Medication literacy of hospitalized older adults has been further defined as the degree to which older adults and/or their natural caregivers can develop and maintain multidimensional skills, namely functional, interactive, and critical medication literacy skills. Adjustment of these skills is characterized by a dynamic and potentially complex process. In practice, optimal medication literacy might be achieved through control of and involvement in the medication regimen and the decisions related to it, and/or by using practical means to facilitate medication self-management (e.g., using lists, notes, reminders). **Conclusions:** The proposed refined definition might enhance professionals' common understanding of the concept and its application in practice, policy, and research. Managing a medication regimen is a complex activity that requires a high level of integration and coordination of cognitive and social skills. [*HLRP: Health Literacy Research and Practice.* **2022;6(2):e70–e83.**]

Plain Language Summary: Based on the literature on medication literacy and the experiences of nurses working in hospitals, this article defines medication literacy in hospitalized older adults. This definition will help professionals to better understand challenges related to medication literacy in older patients and to propose adequate support (i.e., provide education, simplify medication prescriptions, propose practical aids such as a pillbox).

People who take medications must deal with a group of medication-related information and instructions from numerous sources that vary in quality and reliability (Ng et al., 2017). Medication literacy encompasses the cognitive and social skills necessary for individuals to obtain, comprehend, communicate, calculate, and process medication-related information necessary to make informed decisions (King et al., 2011; Pouliot et al., 2018). Frequent synonyms include "pharmacotherapy literacy" (King et al., 2011; Krajnovic et al., 2019a; Krajnovic et al., 2019b; Pouliot & Vaillancourt, 2016; Pouliot et al., 2018; Ubavić et al., 2018), "pharmacy health literacy" (O'Neal et al., 2013; Pouliot & Vaillancourt, 2016; Pouliot et al., 2018) and "pharmaceutical literacy" (Krajnovic et al., 2019a; Vervloet et al., 2018). Derived from health literacy, medication literacy specifically targets medication-related skills: how to interpret medication dosing and measurements, how to read labels and understand instructions, and what actions to take in case of a missed dose or the occurrence of side effects (Sauceda et al., 2012; Yeh et al., 2017). With sufficient medication lit-

eracy skills, people can understand and follow through with medication information, which in turn may positively influence therapeutic adherence and prevent medication-related problems (Bailey et al., 2013; Chesser et al., 2016; Mira et al., 2015; Sauceda et al., 2012; Shrank et al., 2007).

Although medication literacy is considered a research priority in medication safety internationally (Sheikh et al., 2019), findings of recent systematic reviews on existing definitions of this concept and instruments used to measure it revealed inconsistencies across studies concerning the essential skills of medication literacy (i.e., attributes) (Gentizon et al., 2021; Pantuzza et al., 2020).

Despite a recent and important definition that adopted an international perspective (Pouliot et al., 2018), additional research is necessary to clarify the core characteristics of medication literacy and to propose a more operational definition. Moreover, the current definitions of medication literacy fail to consider the specificities of older adults and/or multimorbidity, as the co-occurrence of multiple chronic health conditions within one person (Gentizon et al., 2021; Koroukian et al., 2015; Pantuzza et al., 2020). Individual factors that potentially interfere with older adults' performance in using medication and that have been shown to be associated with worse medication management include poor vision and declining attention, working and prospective memory, and executive functions (Advinha et al., 2017; Elliott et al., 2015; Leat et al., 2016; Stilley et al., 2010). In addition, multimorbidity adds a layer of complexity to the capacity of patients to understand, manage, and monitor their health (Shippee et al., 2012).

Yet, these individual factors are not the only contributors to the acquisition and maintenance of sufficient medication literacy skills, as these skills are also influenced by the way that health care services are organized and delivered (King et al., 2011; Raynor, 2009). Periods of transition of care, namely, hospital admission and discharge are also points of considerable weakness regarding these skills. During the hospital stay, rather than being simplified, medication prescriptions are often made more complex; patients' orders are rewritten, new medicines are initiated, and medication handoffs remain incomplete (Nobili et al., 2011; Shelton et al., 2012; Verloo et al., 2017). After discharge, patients typically feel insufficiently informed about their medications (Elliott et al., 2015; Hain et al., 2012; Holland et al., 2011). It is therefore essential to move beyond an individual focus and recognize the importance of the health care context in the acquisition and maintenance of sufficient medication literacy skills (King et al., 2011; Raynor, 2009). Despite widespread recognition of the contextual factors that influence these skills (King et al., 2011; Raynor, 2008, 2009), a summary of the antecedents and potential consequences related to medication literacy remains to be undertaken.

Therefore, in this study, we aimed to identify, compare, and summarize the attributes, antecedents, and consequences of medication literacy in hospitalized older adults, as well as to propose a refined definition.

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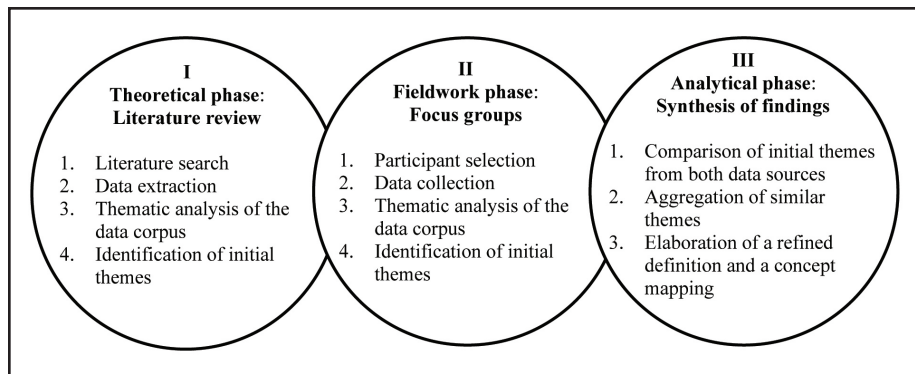
Figure 1. Illustration of the development method concept.

METHOD

Study Design

The design was a hybrid method of concept development that aims to dissect a concept into simpler elements (i.e., attributes, antecedents, consequences) to promote clarity and mutual understanding among health professionals and researchers (Schwartz-Barcott, 2000). In this method, findings from the literature and empirical data are combined to refine a definition of the concept of interest. As nurses' viewpoints and their understanding of the meaning of medication literacy have never been published, in this study, we aimed to perform a literature review and to conduct focus groups with hospital nurses. Three phases were undertaken as a recursive process: theoretical, fieldwork, and analytical (**Figure 1**).

Data Collection

The data collection phase corresponded to Points 1 and 2 of the theoretical and fieldwork phases, as described in **Figure 1**.

Theoretical Phase: Literature Review

The first part of this study was conducted as a literature review. A preliminary scoping search was conducted to explore the most applicable keywords. It appeared the literature specific to older adults and/or the context of hospitalization was limited to three publications (Miner et al., 2018; Zhong et al., 2019; Zhong et al., 2016). Thus, a comprehensive literature search focused on the adult population older than age 18 years, regardless of type of medication. No restriction was placed on the setting or on the year of publication. Inclusion criteria concerned any published manuscripts of primary research studies and theoretical reports written in English. All included publications had to provide a definition of medication literacy and/or valuable content about its internal structure

(i.e., attributes, antecedents, consequences). Therefore, we excluded conference abstracts and posters. In addition, publications exploring medication literacy in health care professionals were not considered for this study. An expert librarian was consulted for the search strategy, including the choice of key words and databases. The search was conducted in Embase, MEDLINE via Ovid, PubMed, CINAHL, PsycINFO via Ovid, Web of Science Core Collection, and Google Scholar with following key words: "literacy" or "illiteracy" in combination with "medication," "pharmacy," "pharmaceutical," "drug," "treatment," "medicine," "prescription," and "pharmacotherapy." The main investigator (J.G.) screened titles, abstracts, and full texts to select relevant literature by using Rayyan software (Ouzzani et al., 2016). The search was updated through March 23, 2020.

Fieldwork Phase: Focus Groups

Empirical data were collected to complete the literature and to expand the concept of medication literacy to the target population (i.e., older adults in the context of hospitalization). Focus group data collection method with nurses was chosen because it allows several professionals in permanent contact with older patients to discuss situations and concepts together. Therefore, three consecutive focus groups with nurses were held in 2018 in a university hospital and a regional hospital in French-speaking Switzerland. Hospital nurses involved in information and/or education of older patients for self-medication management were invited to participate. A purposeful sampling approach was used to select nurses with maximum variation in terms of experience, educational status, professional role, and field of practice. The moderator (J.G.) began each focus group by presenting a vignette that illustrated challenges in medication literacy faced by an older male patient admitted to hospital. An open-ended interview guide was then used, moving from broader questions to those that targeted medication literacy attributes, antecedents, and consequences. Data collection was conducted until no new substantive information was found. The dialogue in each focus group was recorded (±60 minutes) and transcribed verbatim. Prior to each focus group, information about the research and

TABLE 1

Predetermined Coding Frame Guiding the Organization of Raw Data From Publications and Focus Groups

Predetermined Code	Definition	Question to Guide the Coding	Example
Attributes	Essential elements of definition of the concept (Rodgers & Knafl, 2000) Those characteristics of a concept that appear repeatedly and are most frequently associated with the concept that allows the broadest insight into it (Walker & Avant, 2011)	What are the essential elements that define the concept of medication literacy? Which attributes appear more specific to older adults and the context of hospitalization? What dimensions are used to assess a person's medication literacy?	Necessary competencies to successfully manage medication (e.g., to know medication-related information, to find information, to understand instructions)
Antecedents	A situation preceding an instance of the concept; elements that must be in place prior to the occurrence of the concept (Walker & Avant, 2011) Antecedents are actions that are associated with the concept (Foley & Davis, 2017)	What must be present for medication literacy to be developed or maintained? Which antecedents appear more specific to older adults and the context of hospitalization? To what extent could some factors influence the development or maintenance of medication literacy skills?	Individual characteristics of the patient; health care provider's practice regarding medication self-management education
Consequences	A situation that follows an instance of the concept, the outcomes of the concept (Walker & Avant, 2011)	What could be the consequences of sufficient or insufficient medication literacy skills? Which consequences appear more specific to older adults and the context of hospitalization?	Medication use, clinical outcomes, health care service use

consent forms was given to participants. The nurses gave their oral consent prior to the recording of the focus groups.

Data Extraction and Analysis
Theoretical Phase: Literature Review

The use of qualitative research techniques to analyze literature has the potential to increase transparency and reduce bias (Whittemore & Knafl, 2005). Thus, the main investigator (J.G.) performed an in-depth examination of the full text of each publication. Words or phrases that represented antecedents, attributes, and consequences of

medication literacy were coded in accordance with a predetermined coding scheme (**Table 1**) (DeCuir-Gunby et al., 2011). The information was reported on a standardized form that included (1) study design or publication type, (2) concept and definition, (3) target or study population, (4) setting/context, (5) country, and (6) attributes, antecedents, and consequences. A second investigator (E.R.) independently coded 10% of the literature, and discrepancies were discussed to reach agreement. The data corpus was then subjected to thematic analysis (J.G.) followed by cross-checking by a second investigator (E.R.), and preliminary

themes were adjusted until agreement was reached (Braun & Clarke, 2006).

Fieldwork Phase: Focus Groups

From the semantic level, the main investigator (J.G.) coded the transcribed data in MAXQDA software in accordance with the predetermined coding scheme (**Table 1**). A second investigator (E.B.) independently coded 10% of transcripts from each focus group, and discrepancies were discussed until agreement was reached. The extracted verbatim transcripts related to attributes, antecedents, and consequences were subjected to thematic analysis by the main investigator (J.G.). The initial subthemes and themes were discussed and refined with a second investigator (E.B.) until consensus was achieved (Braun & Clarke, 2006).

Analytical Phase: Synthesis of the Findings

In the analytical phase, we compared the initial themes derived from the literature and from the focus groups (J.G., E.R., E.B.). Similar themes from both data sources were clustered into common themes and renamed to accurately reflect the data set as a whole. This article presents a synthesis of the findings; each theme is supported by a selection of relevant segments from the literature and verbatim transcripts from focus groups. In addition, we elaborated a refined definition of medication literacy in hospitalized older patients that was driven by the essential elements of the definition that we identified, namely its attributes.

The scientific rigor of this research was supported by the prolonged engagement of different investigators (J.G., E.R., E.B.) with the data corpus. To enhance the sense that we made of the statements and to favor credibility, we presented and discussed the findings with five nurse scientists who had expertise in hospital discharge preparation (Lincoln & Guba, 1986).

RESULTS
Theoretical Phase: Literature Review

Among the 388 publications identified after deduplication, 77 were selected for full-text screening. After we screened them for eligibility criteria, 24 publications were included in the final analysis (**Figure A**). Publication dates ranged from 2008 to 2020. Detailed characteristics of the included publications and the definitions found in each are reported in the supplementary material (**Table A**). The coding of words or phrases found in the publications accounted for 481 segments that were clustered into 15 preliminary themes.

Fieldwork Phase: Focus Groups

Fourteen nurses, with a median professional experience of 15 years (minimum-maximum = 3-14), from two hospitals in French-speaking Switzerland participated in the study. The individual characteristics of the participants were collected at the beginning of each focus group (**Table 2**). Coding of the transcribed data led to 490 verbatim extracts, which were clustered into 19 preliminary themes.

Analytical Phase: Attributes, Antecedents, and Consequences Across Both Data Sources

The comparison of preliminary themes, respectively, 15 from the literature and 19 from the focus groups, converged toward 15 similar themes while four additional themes only emerged from the analysis of focus groups (i.e., two attributes, two consequences). Therefore, a synthesis of the findings integrated 19 themes, 4 related to attributes, 8 to antecedents, and 7 to consequences (**Table 3**). The results are displayed in the form of concept mapping (**Figure 2**).

Attributes

One common theme was predominant across both data corpora: the presence of functional, interactive, and critical medication literacy skills, as derived from Nutbeam's dimensions of health literacy (2000). Functional medication literacy skills encompass the skills to prepare, self-administer, and monitor the effects of medication, and having a grasp on medication names is an important indicator of these skills, as reflected by hospital nurses: "the name of the medicines … very often they don't know the name, they only know the box, the color, the color of the pill" (Focus Group [FG] 1, university hospital [UH]). In the literature, functional skills rely on the ability not only to know medication information (Zhong et al., 2016), but also to comprehend what was read or said about a medication (i.e., instructions) (Sauceda et al., 2012; Vervloet et al., 2018) and to remember it (Shi et al., 2019; Zhong et al., 2016), to calculate the correct dose and dosing intervals (Pouliot et al., 2018; Sauceda et al., 2012; Yeh et al., 2017), to follow through on medication instructions (Sauceda et al., 2012), and to observe adverse reactions (Shi et al., 2019). Interactive medication literacy skills refer to the ability of a patient to actively interact with health care providers, which includes asking for information when questions arise or expressing concerns (Pouliot et al., 2018; Vervloet et al., 2018; Yeh et al., 2017), discussing their health condition (Raynor, 2009), and engaging in shared decisions (Vervloet et al., 2018). During hospitalization, "some people are interested, asking what we are preparing as a treatment, what is it for, if it is new, why it is being introduced" (FG1, UH). Critical

TABLE 2

Characteristics of Focus Group Participants (*N* = 14)

Characteristic	*n* (%)
Number of participants	
FG1	5 (35.7)
FG2	5 (35.7)
FG3	4 (28.6)
Setting	
UH	10 (71)
RH	4 (29)
Female	13 (93)
Male	1 (7)
Educational status	
Bachelor or equivalent degree	7 (50
Master's degree	7 (50)
Professional role	
Clinical nurse specialists	11 (79)
Front-line nurses	3 (21)
Field of practice	
Internal medicine (including intermediate care unit)	6 (43)
Surgery (i.e., septic, traumatology, plastic)	4 (29)
Gerontology (including rehabilitation)	2 (14)
Neurology	1 (7)
Palliative care	1 (7)

Note. FG = focus group; UH = university hospital; RH = regional hospital.

TABLE 3

Synthesis of Findings From the Literature and the Focus Groups

Attributes
  1. Presence of functional, interactive, and critical medication literacy skills
  2. Constellation of medication information presented to patients
  3. Medication literacy skills in informal caregivers[a]
  4. Manifestation of control, involvement, and use of practical means[a]
Antecedents
  1. Capacities and resources declining with aging
  2. Life story and background
  3. Health and illness trajectory
  4. Knowledge base acquired through formal education, occupation, and experiences
  5. Medication prescription complexity
  6. Adequacy of medication prescription
  7. Constraints and opportunities related to hospitalization
  8. Competencies and practices of healthcare providers
Consequences
  1. Medication use and safety
  2. Achievement of health outcomes
  3. Empowerment and self-determination in decisions concerning health and medicines
  4. Effects on interpersonal relationships with healthcare providers and the process of care
  5. Effects on interpersonal relationships with informal caregivers[a]
  6. Health care service use
  7. Home maintenance[a]

[a]These themes emerged only in the focus groups, not in the literature.

medication literacy skills apply to analyzing information and using it to exert greater control and to solve problems. This continuous actualization of knowledge is an important step: "If you're a little up-to-date on things, you get critical, too" (FG1, UH). Patients with critical skills are able to seek additional information (Shreffler-Grant et al., 2013; Ubavić et al., 2018) from reputable sources (Shreffler-Grant et al., 2013), to critically evaluate its quality (Zhang et al., 2021), to handle contradictory information (Vervloet et al., 2018), and to analyze whether it is applicable to one's own situation (Vervloet et al., 2018). Consequently, people can make informed medication and health decisions (Shi et al., 2019; Shreffler-Grant et al., 2013), such as selecting appropriate products when choosing over-the-counter medication (O'Neal et al., 2013) and taking appropriate actions when a problem arises (e.g., in case of a missed dose) (Pouliot et al., 2018; Ubavić et al., 2018).

The development of medication literacy skills is challenged by a constellation of medication information presented to patients, notably basic information (e.g., medication names, active ingredients, expiration date, storage, and disposal directions) (Raynor, 2009; Sauceda et al., 2012; Ubavić et al., 2018; Yeh et al., 2017), treatment indications and goals (Vervloet et al., 2018), administration instructions (i.e., frequency, duration, method of administration, monitoring directions) (Sauceda et al., 2012; Yeh et al., 2017), and precautions (i.e., contraindications, potential side effects, interactions) (King et al., 2011). In addition, hospital nurses expect patients "to link the medication to the symptoms" (FG2, UH). Medication information concerns prescribed (Zhong et al., 2019) and nonprescribed medication (Sayekti et al., 2018; Zhang et al., 2021), such as over-the-counter (Sayekti et al., 2018; Zhang et al., 2021) and complementary medicine (Shreffler-Grant et al., 2013) used by patients in various galenic forms, and it includes measuring devices (e.g., syringe, cup, measuring spoon) (King et al., 2011; Sauceda et al., 2012; Stilley et al., 2014; Ubavić et al., 2018). Specific to medication information is the presence of num-
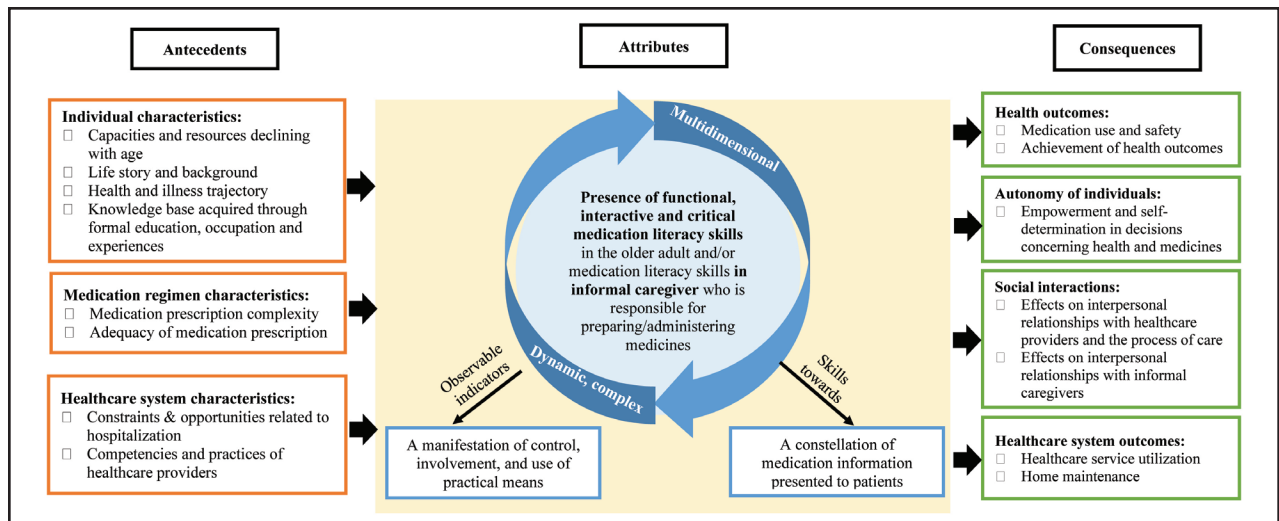
Figure 2. Concept mapping of medication literacy in older patients in the context of hospitalization from the literature and focus groups. Note. Attributes are the defining characteristics of medication literacy in hospitalized older adults. Antecedents precede the instance of medication literacy or are associated with it. Consequences are the outcomes of sufficient or insufficient medication literacy skills.

bers (e.g., units, number of tablets, dosing intervals, dosing by weight (Sauceda et al., 2012; Yeh et al., 2017). All of this information is conveyed in a broad range of material and documents, such as prescription lists, educational materials, and leaflets (Sauceda et al., 2012; Zhang et al., 2021; Zheng et al., 2017); through different formats (e.g., oral; written; visual images, symbols, and pictograms (Pouliot et al., 2018; Zhong et al., 2016); and from multiple sources that may vary in quality and reliability (Ng et al., 2017; Ubavić et al., 2018).

More specific to older adults, hospital nurses emphasized the importance of considering informal caregivers, often a family member who provides care in the home environment usually without payment, to someone with whom they have a personal relationship (i.e., aging parent, spouse, or unrelated person) (National Research Council, 2010). The hospital nurses recognized the importance of medication literacy skills in the informal caregivers who are responsible for the preparation of medicine and/or its administration to their relative: "Often the wife is found to follow the treatment better; even without [patient's] cognitive problems, the wife will manage everything and knows" (FG3, regional hospital [RH]). When providing information and counselling, hospital nurses acknowledge the importance of their involvement: "If the wife is in charge, then we discuss it together; we inform them of the changes, with the patient as well" (FG2, UH).

In practice, hospital nurses relied on observable and subjective indicators of medication literacy such as the manifestation of control and involvement and the use of practical means to facilitate medication self-management. The greater the degree of control and involvement of older patients in the medication management process during hospitalization, the more nurses perceive a high level of medication literacy. "The one that shows hyper-control [high level of control]: 'I don't take generics because it works less well. It is my medication, take my box, it is my brand and not Torasis [brand-name medication] instead of Torasemide [generic medication]" (FG1, UH). In contrast, lower medication literacy may manifest as passiveness: "We try to explain the changes in the treatment plan; they say: 'you're the one who knows'" (FG1, UH). In addition, the practical means (i.e., using lists, notes, reminders) that are developed by patients to facilitate their medication self-management routine are regarded by nurses as indicators of their level of medication literacy and autonomy: If "they arrive at the hospital with their [own] medication, if they have a routine … how they bring them (medicines), if it is in a pillbox, who is preparing it. I would worry about that"; "they have their list [of medicines]; "they write down on their [medication] boxes (FG2, UH).

Antecedents

Analysis of the literature and of the focus groups converged toward the same emerging antecedents, which were classified as characteristics of individuals, of the medication regimen, and of the health care system (**Figure 2**).

At the individual characteristics level, the knowledge base acquired through formal education, occupation, and experiences, such as familiarity with medical issues (Miner et al., 2018) and background health knowledge (Sayekti et al., 2018; Shi et al., 2019), influence the way that people engage

in updating their medication literacy skills: "My mother is a medical doctor, she is engaged because she trusts her knowledge and wants to take charge of her medication" (FG2, UH). Notably, confidence in reading, writing, and speaking (i.e., literacy) (King et al., 2011; Raynor, 2009; Shi et al., 2019; Yeh et al., 2017), the time an individual requires to learn (Miner et al., 2018), and his/her memory abilities (Zhong et al., 2019) pave the way for the cognitive efforts that a patient must demonstrate to acquire sufficient medication literacy skills (King et al., 2011). Focus groups revealed that illiteracy is still observed in practice "[the wife said]: You know my husband, he can't read" (FG1, UH). Other personal factors (e.g., age, gender, location of residence, socioeconomic status) were commonly found in studies to describe patients' profiles associated with medication literacy (Ma et al., 2020; Miner et al., 2018; Niehaus, 2014; Raynor, 2009; Sayekti et al., 2018; Shi et al., 2019; Shreffler-Grant et al., 2013; Yeh et al., 2017; Zheng et al., 2017; Zhong et al., 2019; Zhong et al., 2016). These factors were grouped together under life story and background to underscore existing interindividual differences in adjusting medication literacy skills: "We don't all have the same baggage" (FG3, RH); "there's the person's [life] story too, who he is. Basically, as a farmer [in reference to the vignette presented], maybe he wasn't used to asking anyone more questions than that" (FG1, UH); "the future generation will be much more invested, involved in their health" (FG3, RH). Hospital nurses underlined that social background, and the demographic, economic and cultural factors may interfere with older adults' attitudes towards medication, and their confidence to interact with healthcare providers.

Although some previous antecedents remain more stable over the life course, others may fluctuate by means of advances and setbacks, particularly in older adults. As people age, they change in a myriad of ways, both biological and psychological. The decline in capacities and resources with aging explains how changes in cognition (e.g., speed of information processing, attention, memory) (Stilley et al., 2014; Zheng et al., 2017; Zhong et al., 2016), a decline in sensory and perceptual abilities (Sayekti et al., 2018), and fatigue prevent older individuals from enhancing their medication literacy skills: "We are talking about the elderly who may have cognitive problems that set in, with memory problems, forgetting to take medication or taking twice the medication" (FG3, RH). Moreover, the health and illness trajectory describes how the presence of comorbidities, side effects of medication, and deterioration in clinical condition alter cognitive, physical, emotional, and social functioning (Niehaus, 2014; Pouliot & Vaillancourt, 2016; Shi et al., 2019; Shreffler-Grant et al., 2013), more often found during hospitalization: "He's got

heart failure, there's chronic fatigue that followed that, and the Metoprolol that slows [you] down and makes you tired" (FG2, UH). Thus, hospitalization hinders patients' capacity to acquire new medication information "because you're distressed by the hospitalization; on top of that you're also a little bit cognitively impaired, so you have to restart all this" (FG1, UH).

At the level of the medication regimen characteristics, medication prescription complexity, characterized by the number of prescribed medications at discharge (Zhong et al., 2019), potentially taken several times a day and requiring multistep directions (Miner et al., 2018; Stilley et al., 2014; Vervloet et al., 2018; Zheng et al., 2019), was a notable antecedent that interfered with patient attempts to achieve appropriate their medication literacy skills. Particularly found during hospitalization, medication revisions lead to the introduction of new medicines and the suppression of existing medications, contributing to the complexity of the medication regimen: "That's another flag, it's the medication changes. . . .when you change a lot of things, they are lost" (FG1, UH). Moreover, the perceived adequacy of the medicine prescription, namely the importance of taking medicines in relation to one's own health situation and life goals, acts as a precondition for individuals to take steps to adjust their skills. Individuals are more likely to adopt new practices when they feel that this will also benefit them (O'Neal et al., 2013), if they perceive the necessity of the medication (Shi et al., 2019), and if it corresponds to their cultural and religious rationales (Miner et al., 2018; Niehaus, 2014). For older adults, their clinical situation is also an important feature in making sense of their medicine: "Calcium, is that really necessary? Does it make a difference at my age?" (FG2, UH); "the patient can say 'me with what I am experiencing [cancer], the prevention of osteoporosis I do not care, I do not want it [medication] at all'" (FG1, UH).

The health care system characteristics underline that medication literacy becomes relevant only if patients are presented with information that can be interpreted and understood. Promoting a better literacy for all (Raynor, 2009) relies on competencies and practices of health care providers in terms of training skills and experience to deal with different levels of medication literacy (Zhong et al., 2016), communication across a variety of challenging scenarios (O'Neal et al., 2013), and education of vulnerable patients (Miner et al., 2018). Good practices include literacy-sensitive techniques (e.g., Teach Back, AskMe3 program, plain language) (Pouliot & Vaillancourt, 2016), partnership and exchange (O'Neal et al., 2013; Raynor, 2008), easy-to-read-and-navigate written material (i.e., larger font size, shorter sentences written at the

fifth- to eight-grade levels) (Vervloet et al., 2018; Zheng et al., 2017), and individualized educational strategies (Miner et al., 2018; Vervloet et al., 2018): "That's what real therapeutic education is: you start from what the patient needs, how he sees his life, how he has built it, how it fits into his life" (FG1, UH). Beyond professional competencies, medication literacy is influenced by the way the healthcare system is organized and how health services accommodate individuals who are ill (Niehaus, 2014). Findings converged toward constraints and opportunities related to the hospitalization. During hospitalization, healthcare professionals engage with patients at multiple levels, in various ways, and at various times (Stilley et al., 2014). On the one hand, hospital routines, coordination, and discharge preparation are considerable points of weakness (i.e., information delivered at a highly stressful time; (Stilley et al., 2014): "We bring the medication in trays or small cups, it's nothing like what they do at home … the hospital is not a propitious climate for learning" (FG1, UH). On the other hand, hospitalization is an opportunity to identify individuals in need of additional support: "The hospital stay should also be a key, pivotal period to evaluate, monitor and assess the person's capacity. . .it's the key moment when the real analysis of the person, the context of life and resources can be made" (FG3, RH). For instance, medication review undertaken during hospitalization is an opportunity to ask questions, talk about problems, and support patients' best use of medicine (Raynor, 2008).

Consequences

With sufficient medication literacy skills, individuals are willing to revise their cognitive patterns and behaviors, successfully adapt themselves toward medication self-management, and achieve better health outcomes. In the case of discordance—insufficient medication literacy skills—negative consequences might emerge, affecting the individuals as well as the healthcare system outcomes. Findings from this study converged toward five common consequences, and our study with hospital nurses brought forward specific content for two others (**Figure 2**). Although most consequences might be applicable to the overall adult population concerned by medication utilization, hospital nurses emphasized that medication literacy skills in older adults may influence interpersonal relationships with informal caregivers and home maintenance.

Medication literacy is expected to act as a predictor of adequate medication use and safety, including using medicine regularly and correctly over the long term (Raynor, 2008; Zheng et al., 2019), preventing medication errors after discharge (i.e., overuse, misuse, underuse) (Zhong et al., 2016), nonadherence (Stilley et al., 2014; Zheng et al., 2019;

Zhong et al., 2019; Zhong et al., 2016), along with reducing adverse events "the elderly patient on Benzodiazepine with three glasses of wine a day … the adverse events you don't want to see, such as falls [fall-related hospital admissions]" (FG1, UH). Consequent to adequate medication literacy, achievement of health outcomes and of successful treatments (Raynor, 2008) is reached through effective control of symptoms and prevention of disease progression (Liang et al., 2018; Zheng et al., 2019). Thus, appropriate medication literacy maximizes "comfort [of older adults]" (FG1, UH) and the benefits patients derive from their medicines (Raynor, 2009).

In relation to individual autonomy, higher medication literacy promotes empowerment and self-determination in decisions concerning health and medicines (O'Neal et al., 2013; Raynor, 2009), operationalized through a wider variety of self-care option considerations (Shreffler-Grant et al., 2013) and endorsement of responsibility in medication self-management (Raynor, 2009). Optimal medication literacy reflects a process of growth, coping, and control and may prevent patients from being victims of swindles in unscrupulous sales practices (Shreffler-Grant et al., 2013). Notably, greater self-determination could mean "[patients] can decide to take, or not to take [medicine] and run the risk of not taking [it]" (FG1, UH).

High medication literacy in patients supports involvement in medication self-management and decisions, along with capabilities in seeking information from healthcare providers (i.e., less reticence in asking for assistance) (O'Neal et al., 2013; Pouliot & Vaillancourt, 2016). Consequences at a social interaction level were found, such as effects on interpersonal relationships with the health care providers and process of care. As patients communicate their preferences and provide prescribers with adequate feedback (e.g., signs and symptoms experienced), they facilitate the adaptation of the medication regimen: "They become real actors in their care and real partners" (FG1, UH). Advanced medication literacy may, however, challenge collaboration with healthcare professionals: "Patients who are self-determined in their choices. . .this could generate tension within the clinical team" (FG1, UH), possibly leading to conflicts, as "it makes patients more assertive … it's not sure that all the healthcare workers appreciate this" (FG1, UH). In addition, effects on interpersonal relationships with informal caregivers during the daily management of medicines may also occur. Hospital nurses described how this shared responsibility between the older adult and their informal caregiver may result in "issues of power" (FG1, UH) or conflicts: "Did you take your insulin? Did you see your blood sugar level? I'll do it later. No, you do it now!" (FG1, UH)

At a health care system level, suboptimal medication literacy influences health care service utilization, that is, medication-related hospital admissions, re-hospitalizations, and emergency visits (Vervloet et al., 2018; Yeh et al., 2017; Zheng et al., 2019; Zheng et al., 2017; Zhong et al., 2016). Hospital nurses mentioned "we often see the same people" (FG3, RH). In contrast, patients with adequate medication literacy receive the best from a health care system (Raynor, 2009) in terms of preventive service utilization (King et al., 2011) and timely, relevant visits to specialists and the emergency department. More specific to older individuals, home maintenance or "to be able to stay at home as independently as possible" (FG1, UH) was found to be a desirable objective.

Refined Definition

From the essential elements of the definition that we found (i.e., the attributes), we elaborated the following refined definition of medication literacy in hospitalized older patients.

Medication literacy in hospitalized older adults and/or their informal caregivers is the degree to which they can develop and maintain multidimensional skills that are functional, interactive, and critical. These skills are necessary to understand, prepare, and self-administer medication, as well as to monitor effects (functional dimension), actively interact with healthcare providers, express concerns, and take part in decisions (interactive dimension), critically analyze information (i.e., relevance, quality, contradictory information), use the information to exert greater control, and solve problems (critical dimension). In practice, optimal medication literacy might be observed by a manifestation of control and involvement in the medication regimen and the decisions related to it and/or the use of practical means to facilitate medication self-management (e.g., using lists, notes, reminders).

Adjustment of medication literacy skills appears to be embedded in a dynamic and potentially complex process, consisting of a continuous stream of interactions with health care providers and the health care system. The process is:

· Complex, because patients are presented with a constellation of medication-related infor-mation that is made available in various ways and at various times and that is variable in terms of quality and reliability, and this information changes along the continuum of care

· Dynamic, because patient engagement in achieving sufficient medication literacy skills is likely to change over time, becoming stronger or weaker, balancing the many changes in their own health status, personal resources, health requirements, and medication regimen complexity

DISCUSSION

The concept development described in this study reveals that medication literacy in hospitalized older adults is multidimensional and that adjustment of these skills is embedded in a dynamic and potentially complex process. Although the presence of different typologies of cognitive and social skills—functional, interactive, and critical medication literacy skills—is congruent with the findings of previous work (Emmerton et al., 2012; Pantuzza et al., 2020; Vervloet et al., 2018), in our study, we proposed a more detailed and inclusive understanding of medication literacy skills than has previously been presented in discussions on the topic. The range of skills related to medication literacy reported in the literature is extensive, but the exact nature of these skills is still debated (Gentizon et al., 2021; Pantuzza et al., 2020). However, this diversity of views can to a large extent be reduced through the adoption of the three main dimensions described herein: functional, interactive, and critical medication literacy.

Across publications, several core skills were widely admitted as being defining attributes of medication literacy (e.g., information accessing and understanding, calculation, decision making), but our proposed definition expanded the meaning to information remembering (i.e., memory), communicating, medication effect monitoring, and problem solving. Notably, our study did not reveal that older patients needed medication literacy skills that differed from those of other adult populations. Nevertheless, to date few studies have been conducted exclusively with older adults (Pantuzza et al., 2020). Thus, the medication literacy skills outlined in the current study should not be interpreted as a definitive list, but rather used to open avenues for further research that includes older individuals.

Congruent with the present study, subjective indicators of involvement and routines have been described as fundamental features in exerting agency and controlling for self-management of medication—developed either by patients or informal caregivers (Maidment et al., 2020). To promote a more systematic identification of individuals with lower skills, medication literacy could become a variable that is formally assessed by hospital practitioners, so that recommendations and plan of care can be adapted accordingly (i.e., educational strategies, medication prescription simplification, medication aids).

In the same perspective, this study recognized the importance of medication literacy skills in informal caregivers when they are responsible for preparing and/or administering medication to their older family member. Medication management was found to be the most common task re-

ported by informal caregivers (Reinhard et al., 2014), both in direct activities such as obtaining medications, preparing pillboxes, and assisting with medication administration and in more complex indirect activities that require cognitive effort (i.e., organizing and tracking medications, gathering information, and making treatment decisions (Look & Stone, 2018). Nevertheless, a recent systematic review underlines greater efforts are needed in strengthening involvement of informal caregivers in medication management at transitions of care, through designated family meetings, clinical bedside handovers, ward rounds, and admission and discharge consultations (Manias et al., 2019). Thus, the utilization of a standardized measurement instrument of medication literacy in informal caregivers—when they share medication management responsibility or became surrogate decision makers—could provide guidance to select the most appropriate initiatives for strengthening informal caregivers' knowledge, skills, and resources.

To ensure optimal transition to home and to reduce post-discharge medication-related adverse events, instruments that measure medication literacy in hospitalized older patients and/or their informal caregivers should allow early risk identification, that is, disruption in the imbalance between the individual capacity and the level of demands (i.e., tasks and responsibilities) (Maidment et al., 2020; Pleasant, 2014; Shippee et al., 2012). As medication-related demands change over time, along with individual resources and health and illness status, evaluation approach must regularly gather contextual information, namely perceived complexity of the medication prescription, needs and preferences. In future, longitudinal work may enhance insight into the temporal and evolving trajectory of medication literacy skills in older patients and/or their informal caregivers.

Another key contribution of this study is the clarification of antecedents and consequences related to medication literacy. Despite the widespread recognition of contextual factors that influence the acquisition and maintenance of medication literacy (King et al., 2011; Raynor, 2008, 2009), this work presents a more detailed and nuanced understanding of antecedents and consequences than has been provided in previous discussions. Concept mapping (**Figure 2**) outlines personal and contextual features that result in interindividual differences in achieving adequate medication literacy, which is congruent with theories in health literacy (Paasche-Orlow & Wolf, 2007; Sørensen et al., 2012; Squiers et al., 2012) and a substantial body of evidence in medication management in older adults (Maidment et al., 2020). Health literacy tends to decrease with advancing age and an insufficient level is more commonly noted in certain demographic groups (i.e., with

lower educational background, lower income, migrants). Low health literacy was found to be associated with many negative outcomes, such as greater emergency care use, increased rates of hospitalization, and a decreased ability to demonstrate appropriate self-administration of medication (e.g., medication misuse and errors) (Berkman et al., 2011; Sørensen et al., 2012; Zamora & Clingerman, 2011). Similar to health literacy rooted in the health promotion movement (Crondahl & Eklund Karlsson, 2016; Sørensen et al., 2012), medication literacy is probably critical to patient empowerment (Niehaus, 2014; O'Neal et al., 2013; Raynor, 2009). Higher medication literacy therefore aims to empower people as consumers and patients so that they can make better decisions about their health and improve their skills in managing themselves.

Our combined analysis of the literature and narrative data in relation to medication management in older adults corroborates how cognition, prior experience, personal background, and health priorities and goals are important individual features that condition the way that patients acquire new information (Maidment et al., 2020). Although practitioners have the opportunity to enhance appropriate decisions and actions in older adults, the perceived burden of medication regimen and complexity, along with disconnected care pathways within and across services (Maidment et al., 2020), remain significant barriers.

STRENGTHS AND LIMITATIONS

To the best of our knowledge, this is the first study to combine analysis of the literature with narrative data from hospital nurses. As a general observation, the findings highlighted a different and complementary contribution from both data sources, and many themes of the literature review coincided with the descriptions by the interviewed nurses, indicating the probable validity of the concept in other locations. Nevertheless, to date few studies have been conducted exclusively with older adults and/or the context of hospitalization. Consequently, we acknowledge a challenge to differentiate between medication literacy antecedents, attributes, and consequences in the whole population concerned by medication utilization and the specificities of medication literacy of hospitalized older adults. Thus, antecedents, attributes, and consequences outlined in the current study should not be interpreted as definitive, but rather guide further research. The concept mapping presented in this study, provide a preliminary conceptual framework for medication literacy, which may guide future research and the formulation of research hypotheses. The magnitude and direction of potential relationships remain to be empirically validated, and further in-

vestigation is needed to establish how different factors, such as coping strategies, self-efficacy, motivation, and relationship continuity with professionals influence the acquisition and maintenance of medication literacy skills. As the studies in this field increase, it is likely future studies will allow to conduct a realist evaluation (Pawson et al., 2005) focusing on medication literacy in older adults, articulating assumptions regarding linkages between structures, processes, and outcomes. Moreover, the fieldwork phase was confined to health care professionals; the inclusion of older adults and their informal caregivers is an avenue of pursuit in the development of the concept.

CONCLUSION

Managing a medication regimen is a complex self-care activity that requires a high level of integration and coordination between cognitive and social skills. The present study provides an operational definition of medication literacy in hospitalized older adults and/or their informal caregivers, as they may become surrogate decision makers.

Health care professionals need to be aware, however, that beyond individual patient characteristics, the medication regimen and the way that health care services are organized and delivered have a potential relationship with medication literacy. This possibility underlines the collaborative efforts that are required at every level: motivation and involvement from patients and their informal caregivers to develop and update their medication literacy skills, engagement of health care professionals to take responsibility in balancing patient capacities and demands, and the political will and drive from hospital settings to support "better medication literacy for all."

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Figure A

Flow Diagram of the Publication Selection Process

Identification

Records identified through
database searching
(*n* = 465)

Records after duplicates removed
(*n* = 388)

Screening

Records screened
(*n* = 388)

Records excluded
(*n* = 311)

Eligibility

Full-text manuscripts
assessed for eligibility
(*n* = 77)

Full-text articles excluded, with
reasons (*n* = 53)

- 3 duplicates
- 9 wrong topic (i.e., health literacy)
- 2 foreign language
- 4 wrong population (i.e.,
  adolescents, healthcare
  professionals)
- 35 providing insufficient
  information

Included

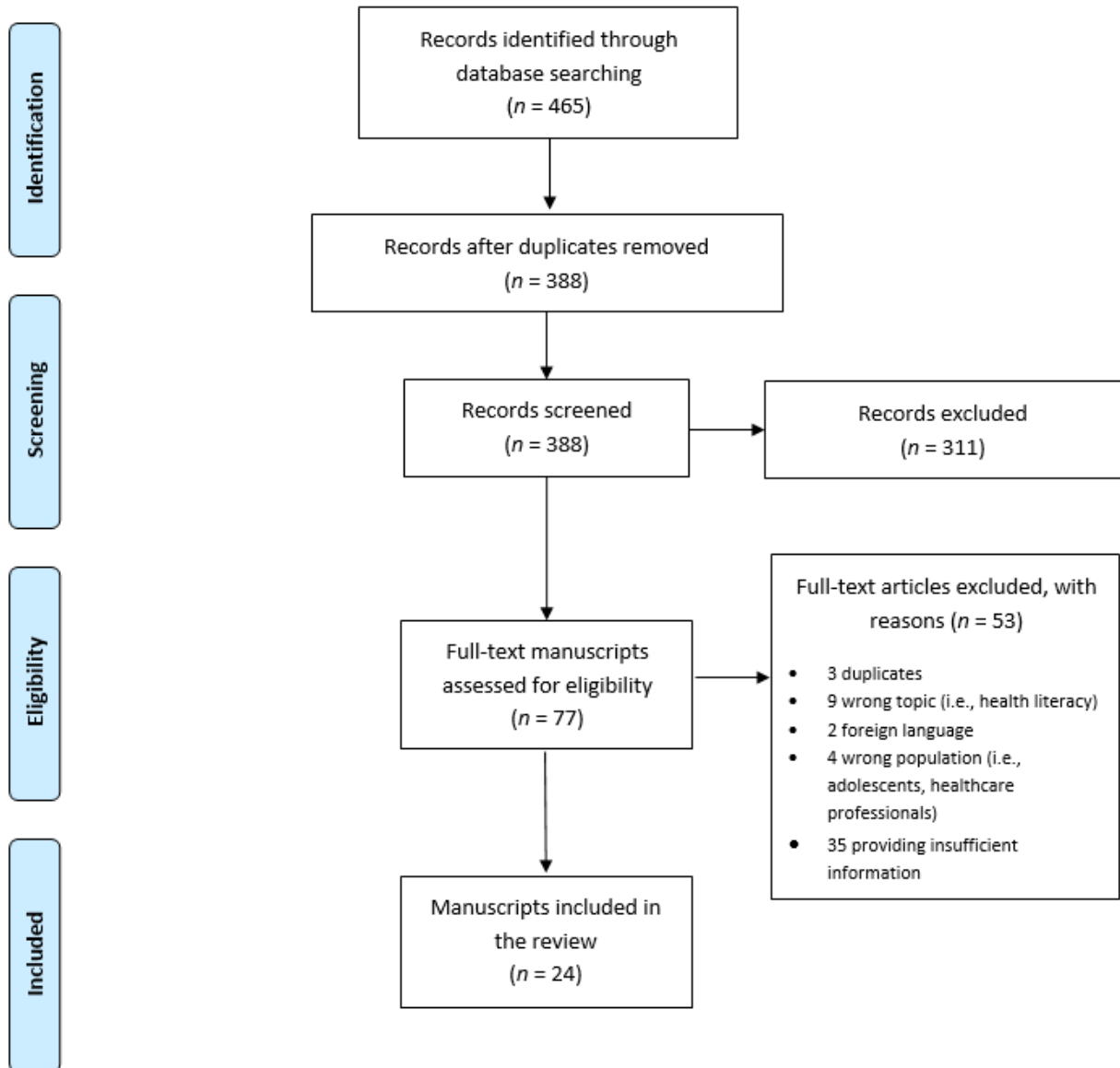Manuscripts included in
the review
(*n* = 24)

Table A

Characteristics of the Included Publications

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
Prospective cohort study (Zhong et al., 2016)	Medication literacy	The ability of the individual to obtain, appropriately interpret, and adequately handle the basic medication information, and make the right decisions accordingly	Patients (≤85 y) with acute coronary syndrome	After hospital discharge	China
Cross-sectional study (Zhong et al., 2019)	Medication literacy	The ability of individuals to obtain, correctly understand, and use medication information in order to take the medication safely and appropriately	Patients (≤85 y) with essential hypertension	After hospital discharge	China
Cross-sectional study (Zheng et al., 2017)	Medication literacy	The ability of individuals to access, appropriately understand, and adequately act on basic medication information, and to make the right decisions accordingly	Outpatients (≥18 y), any disease	Ambulatory care of a tertiary hospital	China
Cross-sectional survey (Zheng et al., 2019)	Medication literacy	The degree to which individuals can obtain, comprehend, communicate, calculate, and process patient-specific information about their medication and health decisions in order to safely and effectively use their medications,	Patients (≥18 y) with coronary heart disease	Hospital setting	China

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
		regardless of the mode by which the content is delivered (written, oral and visual)			
Cross-sectional survey (Zhang et al., 2019)	Medication information literacy	The combination of medication literacy and information literacy (…) and refers to medication-related information behavior, including needs, seeking and use of information related to the medication (…); it involves the ability to read and understand medication instructions	Pregnant women	Obstetric clinics of tertiary hospitals	China
Psychometric study (Yeh et al., 2017)	Medication literacy	The ability to read, understand, and process medication-related information	General population ≥20 y, regardless of the health condition	Community (nonclinical setting)	Taiwan
Psychometric study (Vervloet et al., 2018)	Pharmaceutical literacy	To understand and apply the instructions on how to use the medication, understand what the medication is for, and what its adverse effects can be	Pharmacy consumers (≥18 y), regardless of the health condition	Pharmacy setting	Netherlands

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
Cross-sectional study (Ubavić et al., 2018)	Pharmacotherapy literacy	An individual's capacity to obtain, evaluate, calculate, and comprehend basic information about pharmacotherapy and pharmacy-related services necessary to make appropriate medication-related decisions, regardless of the mode of content delivery (e.g., written, oral, visual images, and symbols)	Parents of preschool children (1–7 years of age) responsible for preparing and/or administering prescribed over-the-counter pediatric medication	Kindergarten (nonclinical setting)	Serbia
Psychometric study (Stilley et al., 2014)	Medication health literacy	A definition of health literacy was used: the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions	Liver transplant recipients and diabetic patients (any age)	Ambulatory care and transplant institute	USA
Literature review and expert opinion (conceptual model development)	Complementary and alternative medicine (CAM) health literacy	The information needed about CAM to make informed self-management decisions regarding health	Individuals using CAM (herbal products), regardless of the health condition	Community (nonclinical setting)	USA

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
(Shreffler-Grant et al., 2013)					
Cross-sectional survey (Shi et al., 2019)	Medication literacy	The ability of an individual to self-medicate in a safe and appropriate way on the basis of obtaining, comprehending, and communicating the information about the medications and correctly evaluating it, regardless of the manner in which the content is provided (e.g., written, verbal, and visual)	Patients (≥18 y) with essential hypertension	Hospital settings and community healthcare services	China
Cross-sectional survey (Sayekti et al., 2018)	Literacy of medication labeling	The degree to which individuals can obtain, comprehend, communicate, calculate, and process patient-specific information about their medication to make informed medication and health-related decisions in order to safely and effectively use their medications, regardless of the mode by which the content is delivered (e.g., written, oral, visual)	Patients (≥18 y) with essential hypertension	Primary healthcare centers	Indonesia

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
Psychometric study (Sauceda et al., 2012)	Medication literacy	The ability of individuals to safely and appropriately access, understand, and act on basic medication information	Patients and general population (≥18 y), regardless of the health condition	Community health centers, pharmacy setting, and nonclinical settings	USA
Editorial, expert opinion (Raynor, 2008)	Medication literacy	A definition of health literacy was used: the capacity of the recipient of information in terms of ability to understand health information and make appropriate decisions about health	Not specified	At the time of hospital discharge	UK
Editorial, expert opinion (Raynor, 2009)	Medication literacy	A person's ability to make decisions about medicines that are right for them, allowing the safe and effective use of medicine	Not specified	Pharmacy setting	UK

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
Editorial, expert opinion (Pouliot & Vaillancourt, 2016)	Medication literacy, pharmacy health literacy, pharmacotherapy literacy	An individual's capacity to obtain, evaluate, calculate, and comprehend basic information about pharmacotherapy and pharmacy-related services necessary to make appropriate medication-related decisions, regardless of the mode of content of delivery (written, oral, visual images and symbols)	Not specified	Pharmacy setting	Canada
Cross-sectional survey (Pouliot et al., 2018)	Medication literacy, pharmacy health literacy, pharmacotherapy literacy	The degree to which individuals can obtain, comprehend, communicate, calculate, and process patient-specific information about their medication and health decisions in order to safely and effectively use their medications, regardless of the mode by which the content is delivered (written, oral and visual)	Not specified	Not specified	Not applicable
Post-test-only control group design (O'Neal et al., 2013)	Pharmacy health literacy	A definition of health literacy was used: the degree to which individuals have the capacity to obtain, process, and	Pharmacy consumers (≥18 y), regardless of the health condition	Community pharmacies	USA

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
		understand basic health information and services needed to make appropriate health decisions			
Ethnographic and biographic study (Niehaus, 2014)	Therapeutic literacy, treatment literacy	The product of the information, motivation, and skills operating at the level of the individual and frequently deploying the concept of "treatment literacy" to explain them	A man living with AIDS	Community (nonclinical setting)	South Africa
Qualitative study (Miner et al., 2018)	Medication literacy	The ability of individuals to access and understand medication information and then use that information to act and take their medication in a safe and appropriate way	Older adults (≥50 y) receiving home healthcare regardless of the health condition, and their families	Home healthcare	Somalia
Cross-sectional survey (Krajnovic et al., 2019a)	Pharmaceutical literacy skills, parental	Pharmacotherapy literacy skills that include numeracy, literacy, and knowledge are crucial for appropriate and safe medication	Parents (≥18 y) of preschool children (1–7 years of age) responsible for preparing and/or	Kindergartens (nonclinical setting)	Serbia

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
	pharmacotherapy literacy		administering prescribed over-the-counter pediatric medication		
Cross-sectional study (Krajnovic et al., 2019b)	Pharmacotherapy literacy	An individual's capacity to obtain, evaluate, calculate, and comprehend basic information about pharmacotherapy and pharmacy-related services necessary to make appropriate medication-related decisions, regardless of the mode of content delivery (e.g., written, oral, visual images and symbols)	Parents (≥18 y) of preschool children (1–7 y of age), responsible for preparing and/or administering prescribed over-the-counter pediatric medication	Kindergartens (nonclinical setting)	Serbia
Cross-sectional survey (King et al., 2011)	Pharmacotherapy literacy	An individual's ability to obtain, evaluate, calculate, comprehend, and properly act upon patient-specific information concerning pharmacotherapy and pharmaceutical services necessary to make appropriate medication-related decisions, regardless of the mode of content of delivery (written, oral, visual, images)	Not specified	Pharmacy setting	USA

Study design/publication type and reference	Concept(s) as found in the publication	Definition (paraphrase)	Target population/study population[a]	Setting/context[b]	Country
Cross-sectional study (Ma et al., 2020)	Medication literacy	The ability of an individual to self-medicate in a safe and appropriate way on the basis of obtaining, comprehending, and communicating the information about the medications and correctly evaluating it, regardless of the manner in which the content is provided (e.g., written, verbal, and visual)	Patients (≥18 y) with essential hypertension	Hospital settings and community health service institutions	China

Note. [a] The target population for which the definition of medication literacy was proposed and/or a measurement instrument conceptualized, or the population being studied.

[b] The clinical or nonclinical setting where participants of studies were recruited or the context for which the definition of medication literacy was proposed.